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## APPENDICES

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<td>PLANT AND TREE LISTS</td>
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APPENDIX A

STORM WATER LID

DETERMINATION WORKSHEET
PURPOSE: Use this form to determine whether or not this project will need to incorporate permanent Storm Water Best Management Practices (BMP's) and submit a Standard Urban Storm Water Mitigation Plan (SUSMP).

APPLICABILITY: Required with all entitlement application packages, improvement plans and building permit applications. Information presented on this worksheet must reflect the final development condition.

**Part 1: Information**

<table>
<thead>
<tr>
<th>Project Name</th>
<th>*Applicant Name</th>
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**Type of Application/Project:**

- [ ] Subdivision
- [ ] Grading Permit
- [ ] Building Permit
- [ ] Design Review
- [ ] Use Permit
- [ ] Other

*Applicant is the owner or developer.*
Part 2: Other Regulatory Determinations

CALGREEN:

1. Does this Project require a non-residential building permit for a newly constructed building without sleeping accommodations? 

   YES: This project may need to implement permanent Storm Water BMP's and be designed in accordance with the Storm Water Low Impact Development (LID) Technical Design Manual due to CALGreen requirements. Complete the remainder of this worksheet.

   NO: Complete the reminder of this worksheet.

Section 401:

2. Does this Project require a section 401 permit? 

   YES: Complete the remainder of this worksheet.

   NO: This Project does not need to incorporate permanent Storm Water BMPs. Please go to page 6 and complete the exemption signature section.

   2A. if YES, are any of the following a component of this project? (Check all that apply)

   - Disturbance of 1 acre or more of soil
   - New Outfall
   - Any new impervious surface

   If you checked any of the boxes in section 2A, please be advised that this Project will require North Coast Regional Water Quality Control Board review and permanent Storm Water BMP's designed in accordance with the Low Impact Development (LID) Technical Design Manual. Skip to page six and sign the "acknowledgement signature section."

Initial Determination:

3. Does this Project create or replace 10,000 sq ft or more of impervious surface?

   YES: Complete the remainder of this worksheet.

   NO: This Project does not need to incorporate permanent Storm Water BMPs. Please go to page 6 and complete the exemption signature section.

---

1. Additions, alterations, repairs and existing structures are not subject to the requirements of CALGreen. For further information on determining building permit requirements, contact the governing agency's building department.

2. A 401 permit is required from the North Coast Regional Water Quality Control Board (NCRWQCB) if any part of this project is located within or adjacent to “waters of the State” which can be a creek, drainage ditch, wetland or any seasonal waterway. For further information on determining 401 Permit requirements, contact the North Coast Regional Water Quality Control Board.
PART 3: Exemptions

1. Is this a routine maintenance activity\(^3\) that is being conducted to maintain original line and grade, hydraulic capacity, and original purpose of facility such as resurfacing existing roads and parking lots?
   Yes [ ]  No [ ]

2. Is this an emergency redevelopment activity\(^4\) required to protect public health and safety?
   Yes [ ]  No [ ]

3. Is this a project undertaken solely to install or reinstall public utilities (such as sewer or water lines) that does not include any additional street or road development or development activities?
   Yes [ ]  No [ ]

4. Is this a reconstruction project\(^5\), undertaken by a public agency, of street or roads remaining within the original footprint and less than 48 feet wide?
   Yes [ ]  No [ ]

5. Is this a stand alone pedestrian pathway, trail or off street bike lane?
   Yes [ ]  No [ ]

Did you answer "YES" to any of the above questions in Part 3?

☐  YES: Stop. This project is exempt and will not need to incorporate permanent storm water Best Management Practices. Please go to Page 6 and complete the exemption signature section.

☐  NO: Proceed to Part 4 below to see if this project will need to incorporate permanent Storm Water BMP's.

Part 4: Project Triggers

Projects that Trigger Requirements:
Please answer the following questions to determine whether this project requires permanent Storm Water BMP's and the submittal of a SUSMP.

1. Does this development or redevelopment project create or replace a combined total of 1.0 acres or more of impervious surface\(^6\)?
   Yes [ ]  No [ ]

---

\(^3\)“Routine Maintenance Activity” - This exemption includes activities such as overlays and/or resurfacing of existing roads or parking lots as well as trenching and patching activities and reroofing activities.

\(^4\)“Emergency Redevelopment” - The Regional Water Quality Control Board must agree that the activities are needed to protect public health and safety to qualify for this exemption.

\(^5\)“Reconstruction” is defined as work that replaces surfaces down to subgrade. Street width is measured from face-of-curb to face-of-curb. Overlays, resurfacing, trenching, and patching are considered maintenance activities and are exempt.

\(^6\)“Impervious Surface” is defined as an area that has been modified to reduce storm water runoff capture and percolation into underlying soils. Such surfaces include rooftops, walkways, and parking areas. Permeable pavement shall be considered impervious for this section if they have subdrains to preclude infiltration into underlying soils.
2. Does this project create or replace a combined total or 10,000 ft² or more of impervious street, roads, highways, or freeway construction or reconstruction?  Yes  ❑ No  ❑

3. Does this project include four or more new homes?  Yes  ❑ No  ❑

4. Is this project an industrial park creating or replacing a combined total of 10,000 ft² or more of impervious surface?  Yes  ❑ No  ❑

5. Is this project a Commercial strip mall creating or replacing a combined total of 10,000 ft² or more of impervious surface?  Yes  ❑ No  ❑

6. Is this project a retail gasoline outlet creating or replacing a combined total of 10,000 ft² or more of impervious surface?  Yes  ❑ No  ❑

7. Is this project a restaurant creating or replacing a combined total of 10,000 ft² or more of impervious surface?  Yes  ❑ No  ❑

8. Is this project a parking lot (not included as part of a project type listed above) creating or replacing a combined total of 10,000 ft² or more of impervious surface or with 25 or more parking spaces?  Yes  ❑ No  ❑

9. Is this project an automotive service facility creating or replacing a combined total of 10,000 ft² or more of impervious surface?  Yes  ❑ No  ❑

Did you answer "YES" to any of the above questions in Part 4?

❑ YES: The project must implement permanent Storm Water BMP's and be designed in accordance with the Storm Water LID Technical Design Manual. Please complete the remainder of this worksheet. Sign under the "Acknowledgment Section" on page 6.

❑ NO: Stop. The project will not need to incorporate permanent Storm Water BMP's. Please continue to Page 6 and complete the exemption signature section.

7 "Industrial Park" is defined as industrial facility or building and associated impervious surface on a site zoned or planned to allow industrial or commercial development (planning for mixed-use residential, industrial or commercial development and redevelopment is included).

8 "Commercial Strip Mall" is defined as commercial facility or impervious surface on a site zoned or planned to allow commercial or industrial use (planning for mixed-use residential, industrial or commercial development and redevelopment is included) with street access and onsite parking.
Part 5: Project Description

1. Total Project area: ________ Square feet or ________ acres.

2. Existing land use(s): (check all that apply)
   - Commercial
   - Industrial
   - Residential
   - Public
   - Other

   Description of buildings, significant site features, etc.:

3. Existing impervious surface area: ________ square feet or ________ acres.

4. Proposed Land Use(s): (check all that apply)
   - Commercial
   - Industrial
   - Residential
   - Public
   - Other

   Description of buildings, significant site features, etc.:
Implementation Requirements: All calculations shall be completed using the "Storm Water Calculator" most updated version available at: www.srcity.org/stormwaterLID. The Storm Water Calculator and Determination Worksheet are provided in this manual for reference only.

Design Goal: Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR55 Manual. 100% volume capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 2 and 3 of this calculator do not need to be completed. This is a retention requirement.

Design Requirements: If the Design Goal of 100% volume capture is not achieved; then both Requirement 1-100% Treatment AND Requirement 2- Volume Capture must be achieved.

Requirement 1: Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a know intensity of 0.20 inches per hour.

Requirement 2: Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual. This is a retention requirement.

Acknowledgment Signature Section:

As the property owner or developer, I understand that this project is required to implement permanent Storm Water Best Management Practices and the submittal of a SUSMP. Any unknown responses must be resolved to determine if the project is subject to these requirements.

__________________________________  __________________________
Signature of Property Owner or Developer  Date

Exemption Signature Section:

As the property owner or developer, I understand that this project as currently designed does not require permanent Storm Water BMP’s nor the submittal of a SUSMP. I understand that redesign may require submittal of a new Determination Worksheet and may require permanent Storm Water BMP’s.

__________________________________  __________________________
Signature of Property Owner or Developer  Date
APPENDIX B

BMP SELECTION TABLE
<table>
<thead>
<tr>
<th>Best Management Practice (BMP)</th>
<th>Detail Sheet</th>
<th>Detail Title</th>
<th>Can be used with...</th>
<th>Explanation of selection</th>
<th>Other notes:</th>
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## BMP Selection Table

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<th>Detail Sheet</th>
<th>Detail Title</th>
<th>Can be used with...</th>
<th>Slope Constraints</th>
<th>Volume Capture</th>
<th>Pollution Prevention</th>
<th>BMP in this priority selected?</th>
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<th>No</th>
<th>Explanation of selection</th>
<th>Other notes:</th>
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<td>Vegetated Swale-with Bioretention</td>
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<td>Swale with Bioretention</td>
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</table>

**Priority 1 and 1A BMPs: to be installed with no underdrains or liners. Must drain all standing water within 72 hours.**

- Rain Garden
- Roadside Bioretention: P1-02
- Vegetated Swale-with Bioretention: P1-06
- Constructed Wetlands: N/A
- Infiltration Trench: P1-07

**Explanation of selection:**

- **Yes**: BMP selected
- **No**: BMP not selected
### BMP Selection Table

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<tr>
<th>Best Management Practice (BMP)</th>
<th>Detail Sheet</th>
<th>Detail Title</th>
<th>Can be used with:</th>
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</table>

Priority 2 BMPs: with subsurface drains installed above the capture volume.
## BMP Selection Table

| Priority 3 BMPs: Installed with subdrains and/or impermeable liner. Does not achieve volume capture and must be used as part of a treatment train. | Best Management Practice (BMP) | Detail Sheet | Detail Title | Can be used with... | High Ground Water Contamination Achieved? | Stage Constraints Achieved? | Treatment | Volume Capture | Pollution Prevention Credit | BMP in this priority selected? | Explanation of selection | Other notes: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rain Garden | P3-01 | Rain Garden | | | | | | | | | Yes | | |
| Bioretention | P3-02 | Roadside Bioretention - Flush Design Roadside | | | | | | | | | Yes | | |
| Bioretention | P3-03 | Roadside Bioretention - Contiguous SW | | | | | | | | | Yes | | |
| Bioretention | P3-04 | Roadside Bioretention - Curb Opening | | | | | | | | | Yes | | |
| Bioretention | P3-05 | Roadside Bioretention - No C & G | | | | | | | | | Yes | | |
| Flow Through Planters | | | | | | | | | | | | | |
| Pervious Pavement | P1-04 | Vegetated Buffer Strip | | | | | | | | | Yes | | |
| Vegetated Swale | P3-07 | Vegetated Swale | | | | | | | | | Yes | | |
## BMP Selection Table

<table>
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<tr>
<th>Best Management Practice (BMP)</th>
<th>Can be used with:</th>
<th>High Ground Water Contamination</th>
<th>Slope Constraints Achieves</th>
<th>Treatment</th>
<th>Volume Capture</th>
<th>Pollution Prevention</th>
<th>BMP in this priority selected?</th>
<th>Explanation of selection</th>
<th>Other notes:</th>
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<td><strong>Priority 4 BMPs</strong>&lt;br&gt;- does not achieve volume capture and must be used as part of a treatment train.</td>
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APPENDIX C

STORM WATER CALCULATOR
APPENDIX C
STORM WATER CALCULATOR

STORM WATER CALCULATOR*

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<td>Designer:</td>
<td>Design Engineer</td>
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<tr>
<td>Date:</td>
<td>Date</td>
</tr>
<tr>
<td>Inlet Number/Tributary Area/BMP:</td>
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*For example only, go to www.srcity.org/stormwaterlid for the latest version of the calculator

NOTE: In order for this calculator to function properly macros must be enabled.

Physical Tributary Area that drains to Inlet/BMP = 10,000 \( \text{ft}^2 \)

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains \[1\]

Input:
- Select disconnection condition:
  - Runoff is directed across landscape: Width of area: 5’ to 9’
  - Condition Factor = 0.25

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:
- Enter amount of rooftop area that drain to disconnected downspouts = 0 \( \text{ft}^2 \)
- Rooftop Area Factor = 0.00

Solution:
Area reduction = (Physical Tributary Area \times \text{Condition Factor} \times \text{Rooftop Area Factor})

\[
(10,000 \times 0.25 \times 0.00) = 0 \text{ ft}^2
\]

Rooftop Drainage Area Reduction

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:
- Enter percent of rooftop area to be disconnected from downspouts: 0
- Select Density: 3-4
- Density Reduction Factor = 0.2

Solution:
Area reduction = (Physical Tributary Area \times \text{Condition Factor} \times \text{Percent Disconnected} \times \text{Density Factor})

\[
(10,000 \times 0.25 \times 0.00 \times 0.19) = 0 \text{ ft}^2
\]

Density Reduction

NOTE:
- Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

1. See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.
2. See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.
3. See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.
4. Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.
7. From Sonoma County Water Agency Flood Control Design Criteria.
10. From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).
Paved Area Disconnection [1]

- Paved Area Type (select from drop down list): Not Directly-connected Paved Area
  - Multiplier = 1
- Enter area of alternatively designed paved area: 0 ft²
- Area Reduction = 0 ft²

Interceptor Trees [2]

- Number of new Evergreen Trees that qualify as interceptor trees= 0 New Evergreen Trees
- Area Reduction due to new Evergreen Trees= 0 ft² (200 ft²/tree)
- Number of new Deciduous Trees that qualify as interceptor trees= 0 New Deciduous Trees
- Area Reduction due to new Deciduous Trees= 0 ft² (100 ft²/tree)
- Enter square footage of qualifying existing tree canopy= 0 Existing Tree Canopy
- Allowed reduction credit for existing tree canopy= 0 ft² Allowed credit for existing tree canopy = 50 % of actual canopy square footage
- Area Reduction = 0 ft² = Sum of areas managed by evergreen + deciduous + existing canopy

Buffer Strips & Bovine Terraces [3]

- Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft²
- Buffer Factor = 0.7
- Solution:
  - Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =
  - Area Reduction = 0 ft²

INSTRUCTIONS:

- Paved Area Disconnection [1]: Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.
- Interceptor Trees [2]: Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.
- Buffer Strips & Bovine Terraces [3]: Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

NOTE:

Total Interceptor Area Reduction is limited to 50% of the physical tributary area.
Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area = 10,000 ft²

Tributary Area Reduction due to Pollution Prevention Measures = 0 ft²

Reduced Tributary Area to be used for Calculations = 10,000 ft²

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

**Design Goal: 100% Volume Capture**

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

**Formulas:**

\[ S = 1000 - 10 \]

\[ \text{Q} = \left( \frac{(P-K)-(0.2-S)}{P-K+(0.8-S)} \right) \times \frac{10}{12} \]

\[ V = \left( \frac{Q}{A_r} \right) \]

Where:

- \( S \) = Potential maximum retention after runoff (in)
- \( P \) = Precipitation (in)
- \( K \) = Seasonal Precipitation Factor
- \( V \) = Volume of Storm Water to be Retained (ft³)
- \( A_r \) = Reduced Tributary Area including credit for Pollution Prevention Measures (ft²)

\[ Q = 0.92 \text{ inches in the Santa Rosa area, based on local historical data.} \]

**Input:** (Pick data from drop down lists or enter calculated values)

<table>
<thead>
<tr>
<th>A_r</th>
<th>10,000 ft²</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Drop down Lists**

- Select post-development hydrologic soil type within tributary area
- Select post-development ground cover description

**Solution:**

Volume of storm water - Post Development

\[ S_{POST} = 1.11 \text{ in} \]

\[ Q_{POST} = 0 \text{ ft} \]

\[ V_{GOAL} = 225 \text{ ft}^3 \]

**Input:** (Pick data from drop down lists or enter calculated values)

| S_{POST} | 1000 - 10 |

\[ Q_{POST} = \left( \frac{(0.92 \times 1.00)-(0.2 \times 1.11)}{(0.92 \times 1.00)+(0.8 \times 1.11)} \right) \times \frac{11}{12} \text{ in} \]

\[ V_{GOAL} = \left( \frac{0.02246(10,000)}{225} \right) \]

\[ S_{POST} = \text{Post development potential maximum retention after runoff (in).} \]

\[ Q_{POST} = \text{Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.} \]

\[ V_{GOAL} = \text{Post Development Volume of Storm Water to be Retained (ft³).} \]

**NOTE:**

Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.
**Requirement 1: 100% Treatment**

Treatment of 100% of the flow generated by 85th percentile 24 hour mean annual rain event (0.2 in/hr).

**Formula:**

\[
Q_{\text{TREATMENT}} = (0.2 \text{ in/hr})(A)(C_{\text{POST}})(K) \text{ cfs}
\]

Where:

- \(Q_{\text{TREATMENT}}\): Design flow rate required to be treated (cfs)
- \(C_{\text{POST}}\): Rational method runoff coefficient for the developed condition\(^{[10]}\)
- \(A\): Reduced Tributary Area including credit for Pollution Prevention Measures (ft\(^2\))
- \(K\): Seasonal Precipitation Factor\(^{[7]}\)

**Input:**

- \(A\) = 10,000 ft\(^2\) = 0 Acres
- \(C_{\text{POST}}\) = 0.0
- \(K\) = 1.0

**Solution:**

\[
Q_{\text{TREATMENT}} = (0.2)(0.23)(0.00)(1.00) \text{ cfs}
\]

**INSTRUCTIONS:**

If the Design Goal of 100% Capture on page 3 of this calculator is not achieved; then Requirement 1-100% Treatment, this page of the calculator, AND Requirement 2-Volume Capture, page 5 of the calculator, must be achieved.
Requirement 2: Delta Volume Capture
No increase in volume of runoff leaving the site due to development for the 85th percentile 24 hour storm event.

Formulas:
\[ S = 1000 - 10 \text{ ft} \]  
\[ Q = \frac{\left(P \times K \times (0.2 - S)\right)}{\left(P+K \times (0.8 - S)\right)} \times \frac{\text{ft}}{12\text{ in}} \]
\[ V = \frac{Q}{A} \]

Where:
- \( S \): Potential maximum retention after runoff (in)
- \( CN \): Curve Number
- \( Q \): Runoff depth (ft)
- \( P \): Precipitation (in) = 0.92 inches in the Santa Rosa area, based on local historical data
- \( K \): Seasonal Precipitation Factor
- \( V \): Volume of Storm Water to be Retained (ft³)
- \( A \): Reduced Tributary Area including credit for Pollution Prevention Measures (ft²)

Input:
(Pick data from drop down lists or enter calculated values)

Solution:

Pre Development Storm Water Runoff Volume
\[ S_{\text{PRE}} = 3 \text{ in} \]
\[ Q_{\text{PRE}} = 0 \text{ ft} \]
\[ V_{\text{PRE}} = 41 \text{ ft}^3 \]

Where:
- \( S_{\text{PRE}} \): Pre development potential maximum retention after runoff (in).
- \( Q_{\text{PRE}} \): \( Q \) in feet of depth as defined by the “Urban Hydrology For Small Watersheds” TR-55 Manual.
- \( V_{\text{PRE}} \): Pre Development Volume of Storm Water Generated (ft³)

Post Development Storm Water Runoff Volume
\[ S_{\text{POST}} = 1 \text{ in} \]
\[ Q_{\text{POST}} = 0 \text{ ft} \]
\[ V_{\text{POST}} = 225 \text{ ft}^3 \]

Where:
- \( S_{\text{POST}} \): Post development potential maximum retention after runoff (in).
- \( Q_{\text{POST}} \): \( Q \) in feet of depth as defined by the “Urban Hydrology For Small Watersheds” TR-55 Manual.
- \( V_{\text{POST}} \): Post Development Volume of Storm Water Generated (ft³)

Solution: Volume Capture Requirement
Increase in volume of storm water that must be retained onsite (may be infiltrated or reused).
\[ \Delta V = V_{\text{POST}} - V_{\text{PRE}} \]

Where:
- \( \Delta V \): The increase in volume of storm water generated by the 85th percentile 24 hour storm event due to development that must be retained onsite (may be infiltrated or reused).

\[ \Delta V = (225.60) - (41.20) \]
\[ \Delta V = 184 \text{ ft}^3 \]
APPENDIX C
STORM WATER CALCULATOR

INSTRUCTIONS:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

LID BMP Sizing Tool: 100% Volume Capture Goal: \( V_{\text{GOAL}} \)

Formulas:

\[
V_{\text{GOAL}} = \left( \frac{V_{\text{GOAL}}}{P} \right) \times 864 \text{ ft}^3
\]

Where:

\( V_{\text{GOAL}} \) = Required volume of soil in LID BMP.
\( A_{\text{GOAL}} = \text{Footprint of LID BMP area for a given depth (below perforated pipe if present).} \)
\( P = \text{Porosity (enter as a decimal)} \)
\( D = \text{Depth below perforated pipe if present (in decimal feet)} \)
\( W = \text{Width (in decimal feet)} \)
\( L = \text{Length (in decimal feet)} \)

Input:

\( P = 0.3 \) as a decimal
\( D = 3.5 \) ft Below perforated pipe if present
\( W = 8.0 \) ft
\( L = 100.0 \) ft

Solution:

Percent of Goal Achieved = \( 324 \) %

\[
= \left( \frac{3.5 \times 800}{864} \right) \times 100
\]

LID BMP Sizing Tool Delta Volume Capture Requirement: \( V_{\text{DELTA}} \)

Formulas:

\[
V_{\text{DELTA}} = \left( \frac{V_{\text{DELTA}}}{P} \right) \times 705 \text{ ft}^3
\]

Where:

\( V_{\text{DELTA}} \) = Required volume of soil in LID BMP.
\( A_{\text{DELTA}} = \text{Footprint of LID BMP area for a given depth (below perforated pipe if present).} \)
\( P = \text{Porosity (enter as a decimal)} \)
\( D = \text{Depth below perforated pipe if present (in decimal feet)} \)
\( W = \text{Width (in decimal feet)} \)
\( L = \text{Length (in decimal feet)} \)

Input:

\( P = 0.3 \) as a decimal
\( D = 0.0 \) ft Below perforated pipe if present
\( W = 0.0 \) ft
\( L = 0.0 \) ft

Solution:

Percent of Requirement Achieved = \( 0 \) %

\[
= \left( \frac{0.0 \times 0}{705} \right) \times 100
\]

INSTRUCTIONS:
The Delta Volume Capture sizing tool helps the designer appropriately size a LID BMP to achieve the design requirement of the delta volume capture. Enter the percent of porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Requirement achieved" reaches 100%.

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.
APPENDIX D

LID SUBMITTAL COVERSHEET
Preliminary SUSMP Submittal Guide

Project Information:

<table>
<thead>
<tr>
<th>Applicant Name (owner or developer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
</tr>
<tr>
<td>City/State/Zip</td>
</tr>
<tr>
<td>Phone/Email/Fax</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Address</td>
</tr>
<tr>
<td>City/State/Zip</td>
</tr>
<tr>
<td>Permit # (s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engineer Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
</tr>
<tr>
<td>City/State/Zip</td>
</tr>
<tr>
<td>Phone/Email/Fax</td>
</tr>
</tbody>
</table>

Type of Application/Project:

- [ ] Subdivision
- [ ] Grading Permit
- [ ] Building Permit
- [ ] Design Review
- [ ] Use Permit
- [ ] Other __________

What your Preliminary Plan must include:

Narrative:

Project Description

- [ ] Description of proposed project type, location, and any specific uses or features.
- [ ] Description of any sensitive features (creeks, wetlands, trees, etc) and weather they are going to be preserved, removed or altered.
- [ ] Description of the existing site.
- [ ] Description of how this project triggers these requirements (impervious area, CALGreen, 401 Permit, etc).
Pollution Prevention and Credits

- Description of all proposed pollution prevention measures (street sweeping, covered trash enclosures, indoor uses, etc).
- Description of all credits utilized (Interceptor Trees, Impervious Area Disconnection, and/or Alternative Driveway Design).
- Summary of tributary area reduction due to credits.

Type of BMPs proposed

- Description of the types of BMPs selected including priority group that each is in.
- Description of level of treatment and volume capture achieved (if 100% Capture is achieved treatment is not required).

Maintenance

- Description of maintenance for each type of BMP.
- Description of funding mechanism.
- Designation of Responsible Party.

EXHIBITS AND ATTACHMENTS

Completed BMP Selection Table

- Completed BMP Selection Table for each tributary area including explanation for each Priority not used.

Proposed SUSMP Exhibit

- Exhibit should include: street names, property lines, storm drainage system, waterways, title block, scale, and north arrow.
- Tributary areas shown for all inlets (including offsite drainage areas).
- C value for each tributary area.
- Soil Type of existing site.
- New or replaced impervious area.
- All inlets shown (including identifier).
- All interceptor trees shown.
- All proposed BMPs shown.
Existing Condition Exhibit

- *Not necessary if no impervious area existed on the undeveloped site or if the Design Goal of 100% Volume Capture is achieved.*

- Exhibit should include: street names, property lines, proposed storm drainage system, waterways, title block, scale, and north arrow.
- Soil Type of existing site.
- Proposed tributary areas shown for all proposed inlets (including offsite drainage areas). Existing impervious areas.
- Existing impervious area.

BMP Details:

- Preliminary detail for each type of BMP selected- provide a preliminary 8.5”x11” detail for each BMP type or include on submitted drawings. These can be taken straight from the Fact Sheets if no significant changes are proposed.

ON PLANS

- Show all applicable elements of the selected BMPs on the appropriate sheets.

CALCULATIONS

- Preliminary calculations; both volume and treatment, using the “storm water calculator” for each inlet.
APPENDIX E

BMP FACT SHEETS, DETAILS AND INSPECTION CHECKLISTS
Living Roof
Also known as: Green Roof, Roof Garden, and Vegetated Roof

DESCRIPTION

Living roofs are roofs that are entirely or partially covered with vegetation and soils. Living roofs function as a soil and plant-based filtration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. Areas treated with a living roof are exempt from the Volume Capture requirement.

ADVANTAGES

- Living roofs are excluded from Volume Capture calculations.
- Provides water quality treatment.
- Used in urban areas where space is limited.
- Used on sloped sites.
- Provides habitat for birds and attracts pollinators like butterflies and bees.
- Reduces building heating and cooling costs.
- Provides noise reduction.
- Reduces heat island effect.
FACT SHEET- LIVING ROOF

LIMITATIONS

- Need to be integrated into the overall building and structural design.
- Overflow requirements need to be considered in design.
- Building orientation and shading needs to be considered in design.
- Plants must be selected for shallow soil layer and fast draining soils.
- Can only be installed on relatively flat roofs.

KEY DESIGN FEATURES

- All vegetated roofs are assembled in layers. The top layer includes the engineered soils and the plants. The soil is a lightweight mix that includes some organic material. Under the soil is a drainage layer that includes filter fabric to keep the soil in place and a core material that stores water and allows it to drain off the roof surface. Next is the root barrier, which prevents the roots from puncturing the waterproof membrane that lies below it, and finally there is the roof structure.
- Include plants suited to the unique shallow soil conditions and design to achieve ___% cover.
- Design for high flow as well as the water quality design storm.
- Underdrain or drainage system required.
- Designed to prevent standing water. All surface water must drain within 72 hours to prevent mosquito breeding.
- Select non-floatable surface mulching material to prevent clogging of downstream inlets.
- Building must be designed for the added weight of the living roof and all retained storm water.
- Seismic analysis may be necessary due to increased weight.
- Irrigation may be necessary for plant establishment and extended dry periods.

SIZING DESIGN- GOAL AND REQUIREMENTS

- Water Quality Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.20 inches per hour.
- Living roofs are excluded from Volume Capture calculations.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID
INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include; recommended maintenance practices, identify the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary, and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:

- Drainage features should be inspected and cleaned as necessary to remove any obstructions.
- Irrigation, if present, should be routinely inspected to ensure plant establishment and survival.
- Plants should be pruned, weeds pulled, and dead plants replaced as needed.
- Eroded areas should be repaired as needed
FACT SHEET- RAINWATER HARVESTING

RAINWATER HARVESTING
Also know as: Rain Barrel, Cistern, and Rainwater Collection

DESCRIPTION

Rainwater harvesting is the practice of collecting and using rainwater from impervious surfaces such as roofs and patios. Rain barrels, or cisterns, are containers or tanks, designed to capture rainwater runoff from roofs later used for irrigation. Rain barrels are inexpensive, easy to install and maintain, and well suited for small-scale residential sites. Cisterns are larger than rain barrels and can be installed above or below ground depending upon design requirements and site conditions.

ADVANTAGES

• Can provide volume capture.
• Can be used as part of a treatment train with other BMPs.
• Low maintenance requirements (for above ground installations).
• Good for sites where infiltration is limited.
• Provides another source for irrigation water.
• Prioritized as a “Universal LID feature.”

LIMITATIONS

• Limited storage capacity.
• Does not provide water quality treatment.
• May require infrastructure (pumps or valves) to use stored water.
• Inadequate maintenance can result in mosquito breeding and/or algae production.
• May require building permits. Contact the governing agency for requirements.
KEY DESIGN FEATURES

- Roof surfaces shall not include copper or materials treated with fungicides or herbicides.
- Gutters must be fully screened and installed at continuous grade.
- Storage containers, tank liners, and tank coatings must be listed as food grade, or be approved for potable water storage.
- Containers must be opaque, water tight, vented, completely covered and screened.
- Screen all openings.
- For above-ground systems, spigot and/or hose bib for drawing water must be at least 2 inches from the bottom and must be labeled “NONPOTABLE”.
- Overflow device must be equal in size to the total of all inlets and must lead to an approved discharge location with approved air gap.
- First flush diverter must be automatic self-draining with a clean out.
- Safety labels (non-potable, vector hazard, drowning hazard icons).
- Outdoor spigots must have an atmospheric vacuum breaker attached.
- Prior to installation, roofs must be cleaned, and downspouts disconnected from the storm drain system.
- All municipal water service lines to facilities with rainwater harvesting systems require the installation of an approved backflow prevention device. This condition may be met if the backflow prevention was installed as part of the fire sprinkler system.
- Not permitted within the front yard setback.
- Tanks up to 8 feet in height are permitted within the rear and side yard setbacks.
- Tanks in excess of 8 feet in height, shall be subject to the same setbacks as a detached residential accessory structure.
- Both rain barrels and above-ground cisterns must be sited in a stable, flat area. Rain barrels and cisterns may not block the path of travel for fire safety access.
- Overflow locations, which can include rain gardens, additional rain barrels or cisterns, or a discharge point to the storm drain system, must be designed to both direct outflow away from building foundations and prevent nuisance flows to adjacent properties.
- Overflow may not discharge water across a public right-of-way.
- Tanks should be placed in a cool or shaded area to avoid algal growth.
- Regular use of the water stored in systems between rain events is critical to ensure that storage is available for the next storm event.
FACT SHEET- RAINWATER HARVESTING

SIZING DESIGN GOALS AND REQUIREMENTS

- The **design goal** for rain water harvesting is to capture 100% of the runoff volume generated by the 85th percentile 24 hour storm event. 100% volume capture has been established as the ideal condition. If achieved, all requirements are satisfied and no additional treatment is required. This is a retention requirement.
- If the **design goal** is not achievable, then the rain water harvesting **sizing requirement** is:
- **Volume Capture** of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist. At a minimum maintenance shall include the following:

- Inspect twice annually to confirm that all the parts are operable and not leaking.
- Debris and clear all screens to prevent mosquitoes and other vectors from breeding.
- Clean tanks annually with a non-toxic cleaner, such as vinegar and dispose of wash water in a sink, bathtub or sewer cleanout.
- Test all backflow prevention assemblies annually by the system owner using an approved certified tester.
- Regular use of the water stored in systems between rain events is critical to ensure that storage is available for the next storm event.
- Clear roof gutter screens.
# Rainwater Harvesting - Inspection Checklist

**Rainwater Harvesting**  
Inspection and Maintenance Checklist  
(aka: Rain Barrel, Gistern, Rainwater Collection)

Date of Inspection: ____________________________  
Inspector(s): _________________________________  
BMP ID #: _________________________________  
Property Owner: _______________________________

Location Description: _______________________________

Type of Inspection:  
- Pre-rainy Season (PRS)  
- Rainy Season (RS)  
- After-rainy Season (ARS)

*This inspection and maintenance checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Drainage            | RS              | Is there standing or pooling of water after 3 days of dry weather around the storage tank(s) area? | • Regrade over flow drainage area.  
• Reposition splash block /dissipater.  
• Check for leaks from storage tank(s). | | |
|                     | RS              | Is there excessive splashing/spray from the overflow outlet? | • Reposition splash block or dissipater to reduce or eliminate splash/spray. | | |
|                     | RS              | Are the house/building gutters overflowing during a rain event? | • Check gutter down spout and gutter for obstructions.  
• Check storage tank(s) inlet screens for blockage.  
• Check storage tank(s) outlet(s) for blockage. | | |
<p>|                     | RS              | Are the storage tank(s) overflowing? | • Check storage tank(s) outlet(s) for blockage. | | |</p>
<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
</table>
| Erosion RS ARS      | Is there evidence of under cutting or washouts around storage tank(s)? | | | • Reposition splash block(s) or dissipater(s).  
• Fill in eroded areas and regrade.  
• Repair any leaks or overflows from storage tank(s). | |
| Erosion PRS RS ARS  | Is there accumulation of sediment, debris in the storage tank(s)? | | | • Remove sediment and check inlet and gutter screens.  
• Verify that the lid of the storage tank is secure. | |
| Erosion RS ARS      | Is there under cutting or washouts around the outlet splash block(s)? | | | • Reposition splash block(s) or dissipater(s).  
• Fill in eroded areas and regrade. | |
<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging the outlet areas?</td>
<td>Yes</td>
<td>Trim and/or remove the excess vegetation around the outlet flow areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch/gravel spread evenly throughout the storage tank(s) area?</td>
<td>Yes</td>
<td>Redistribute and add additional mulch/gravel if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds?</td>
<td>Yes</td>
<td>Remove dead and/or dry vegetation. Replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>Remove or trim any vegetation that is causing a trip or access hazard.</td>
<td></td>
</tr>
<tr>
<td>Inspection Category</td>
<td>When to Inspect</td>
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<td>------------------------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>BMP General</td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the area?</td>
<td></td>
<td>• Remove all trash/debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the surrounding area marked with Graffiti?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
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<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement.</td>
<td>• Placement should not disrupt flow characteristics/design.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the vector control/prevention devices in place and functional?</td>
<td></td>
<td>• Replace or repair all damage components.</td>
<td>• Contact vector control if problem persist.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the irrigation system functional?</td>
<td></td>
<td>• Repaired any broken components.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the Backflow operation/maintenance log current? (if installed)</td>
<td></td>
<td>• Test all backflow prevention assemblies annually by the system owner using an approved certified tester.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there algae or other growth in the storage containers?</td>
<td></td>
<td>• Clean tank(s) with non-toxic cleaner.</td>
<td></td>
</tr>
</tbody>
</table>
FACT SHEET- INTERCEPTOR TREES

INTERCEPTOR TREES
Also known as: Tree Credits

DESCRIPTION

Interceptor trees are new trees, or existing trees that are located within 25’ of impervious areas. Trees intercept rain water on their leaves and branches, allowing rain water to evaporate or run down the branches and trunk of the tree where it readily infiltrates into the soil. Tree roots also increase infiltration. Trees also provide shade over impervious surfaces which reduce peak flow in streams and provide shade which reduces the “heat island” effects of urban areas.

Interceptor tree credits are calculated into the site design by reducing the amount of tributary area that must be used to calculate treatment and volume capture. New deciduous trees provide a credit of 100 ft², new evergreen trees provide 200 ft², and existing trees provide one half of the existing canopy. Only tree that overhang impervious areas or are within 25’ of impervious areas can qualify as interceptor trees. The total area reduction credit due to the use of interceptor trees cannot exceed one half of the total physical tributary area. All interceptor tree credit calculations should be completed with the Credit Calculator in Appendix C.
FACT SHEET - INTERCEPTOR TREES

For example, if a project has 10,000 ft² of impervious area and plants 3 new deciduous interceptor trees and 2 evergreen interceptor trees, the area entered into the Storm Water Calculator to determine treatment and volume capture would be 10,000 ft² - (3*100 ft²) - (2*200 ft²) = 9,300 ft². If the project also kept an existing tree with a 100 ft² canopy, the tributary area could be reduced by an additional 50 ft².

ADVANTAGES

- Reduces the amount of pollutants entering the storm drain system.
- Can reduce size of downstream storm water quality treatment measure(s) by reducing the volume required to be treated.
- Provides shade to cool pavement and reduces surface runoff temperatures.
- Aids in removal of air pollutants and noise reduction.
- Trees required by the permitting agency may be counted as interceptor trees.
- Establishes habitat for birds and other pollinators like butterflies and bees.

KEY DESIGN FEATURES

- Appropriate new trees must be selected from the approved tree list. See Appendix G.
- Existing trees must be adequately protected during construction.
- Only tree that overhang impervious areas or are within 25’ of impervious areas can qualify as interceptor trees.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary, and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:

- Annual inspection prior to the rainy season.
- Annual proper watering and application of mulch.
- Routine pruning and weeding as needed.
- Replacement of trees as needed.
FACT SHEET- VEGETATED BUFFER STRIP

VEGETATED BUFFER STRIP
Also know as: Filter Strip, Grassed Filter

DESCRIPTION

Vegetated buffer strips are sloping planted areas designed to allow storm water to naturally infiltrate sheet flow from adjacent impervious surfaces. Buffer strips slope away from the impervious surface and are most often vegetated with low lying ground cover. Buffer strips function by slowing storm water runoff and allowing sediment and other pollutants to settle and infiltrate. Vegetated buffer strips are well-suited to addressing runoff from roads and highways, roof downspouts, and parking lots.

ADVANTAGES

- Provides a tributary area reduction. Calculations to be completed using the Pollution Prevention Credit Calculator in Appendix C.
- Enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- Can establish habitat for birds and other pollinators like butterflies and bees.
- Require minimal maintenance (typically erosion prevention, mowing, and/or pruning).
FACT SHEET- VEGETATED BUFFER STRIP

LIMITATIONS

- Requires sufficient area.
- Ultimate storm water collection needs to be considered in design.
- May not be appropriate for industrial sites or locations where chemical spills may occur.
- A thick vegetative cover is needed for these practices to function properly.
- Prohibited in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed location, the North Coast Regional Water Quality Control Board review and approval is required.
- Not appropriate for sites with a high risk of landslides or other geotechnical concerns. Slope stability shall be determined by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- Slopes should not exceed 15%.
- Slope shall be at least 2%.
- Minimum length (in direction of flow) shall be 15 feet.
- Strip shall be sized as long as the site will reasonably allow.
- Vegetation whose growing season corresponds to the wet season is preferred (see Appendix A for list of locally suitable plant species).
- Strip shall be free of gullies or rills.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include; recommended maintenance practices, parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary, and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:
- Mow as needed and irrigate during dry weather to the extent necessary to keep vegetation alive. Remove obstructions and trash from vegetated buffer strip.
- Pesticides and fertilizers shall not be used in the vegetated buffer strip.
- Where mowing is required, grass height shall be maintained between 3” and 6”.

Vegetated buffer strips shall be inspected and maintained twice a year to review:
- Condition of vegetation.
- Obstructions and trash.
- Ponded flow is drained within 72 hours after a rainfall event.
- If ponding is observed, grading will be required to restore positive drainage.
**VEGETATED BUFFER STRIP- CHECKLIST**

**Vegetated Buffer Strip**
Inspection and Maintenance Checklist
(aka: Filter Strip, Grassed Filter)

Location Description: ____________________________________________________________

Type of Inspection:  Pre-rainy Season (PRS)  Rainy Season (RS)  After-rainy Season (ARS)

*This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

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</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>RS</td>
<td>Is there standing or pooling of water after 3 days of dry weather?</td>
<td></td>
<td>• Remove any obstruction in the buffer strip and/or regrade to restore positive drainage. • Clean and/or remove any obstructions in and around the storm drain inlet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there poor drainage during a high intensity storm event?</td>
<td></td>
<td>• Clean and/or remove any obstructions in and around the storm drain inlet.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>Is the flow into the buffer strip even and uniform?</td>
<td></td>
<td>• Remove any obstruction preventing a uniform flow into the buffer strip.</td>
<td></td>
</tr>
</tbody>
</table>
### VEGETATED BUFFER STRIP- CHECKLIST

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<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there evidence of under cutting or washouts along the impervious surfaces of the buffer strip?</td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming along the length of the buffer strip area?</td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the buffer strip?</td>
<td>• Remove sediment and check the grading. Add replacement soil and or mulch.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch unevenly distributed in the buffer strip area?</td>
<td>• Redistribute and add additional mulch if needed.</td>
<td>• Regrade buffer strip area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there voids and/or holes around the storm drain inlet?</td>
<td>• Inspect the storm drain inlet for damage. Replace or repair as necessary.</td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td>• Repair and fill in damaged areas. • Rodent control activities must be in accordance with applicable laws and do not affect any protected species.</td>
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# VEGETATED BUFFER STRIP- CHECKLIST

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<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging or redirecting the inlet/outlet flow areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch distributed evenly throughout the buffer strip?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td>• Re grade buffer strip area.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds? Is the vegetation over grown?</td>
<td></td>
<td>• Remove dead and/or dry vegetation. Replace as needed.</td>
<td>• Remove or trim any vegetation that is causing a visual barrier, trip, and or obstruction hazards.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Mow grass as needed.</td>
<td></td>
</tr>
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# VEGETATED BUFFER STRIP- CHECKLIST

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<tr>
<td><strong>BMP General</strong></td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the buffer strip area?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is Graffiti present?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement.</td>
<td>Placement should not disrupt flow characteristics/design.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the vegetation irrigation functional?</td>
<td></td>
<td>• Repaired broken missing spray/drip emitters.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in place?</td>
<td></td>
<td>• Reposition and/or adjust to eliminate over spray and/or over watering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Check for damaged sidewalk, curb, gutter, and catch basin. This includes uplift and settling.</td>
<td></td>
<td>• Repair and/or replace loose or damaged features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>• Remove and replace damaged areas.</td>
<td></td>
</tr>
</tbody>
</table>
NOTES:
1. 15' MINIMUM WIDTH. 15% MAXIMUM SLOPE
FACT SHEET- BOVINE TERRACE

BOVINE TERRACE
Also know as: Terracing, Cow Terraces, and Infiltration Terraces.

DESCRIPTION
Bovine terraces are a low tech option for slowing runoff on slopes and maximizing infiltration potential. Cows (bovine) walk on contour when they graze on hillsides and create ruts, or terraces, where they walk. Intentionally replicating this natural occurrence slows runoff, increases infiltration and prevents erosion.

ADVANTAGES

- Provides a tributary area reduction. Calculations to be completed using the Storm Water Calculator in Appendix C.
- Can be used on sloped sites.
- Increases infiltration potential.
- Increases time of concentration.
- Decreases erosion.
- Enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- Can establish habitat for birds and other pollinators like butterflies and bees.
- Require minimal maintenance.

LIMITATIONS

- Requires sufficient area.
- Ultimate storm water collection needs to be considered in design.
FACT SHEET- BOVINE TERRACE

- Prohibited in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed location, the North Coast Regional Water Quality Control Board review and approval is required.
- Not appropriate for sites with a high risk of landslides or other geotechnical concerns. Slope stability shall be determined by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- Fill portion of terrace not to exceed 8” high.
- Vertical portion of cut not to exceed 2’ high.
- Horizontal portion of cut must be at least as wide as vertical portion of cut is high.
- For slopes between 4:1 and 2:1 spacing of terraces shall not exceed 15’.
- Not to be used on slopes exceeding 2:1.
- Terraces must be installed on contour.
- Termination of terraces needs to be designed to avoid concentrating flow at edges.
- Top portion of each terrace must be adequately constructed to prevent wash out.
- Vegetate sufficiently to support slope stability.
- Install overflow collection system to accept flow that exceeds design capacity of the terraces.
- Infiltration rate and flow rate must be considered in the design.
- Terraces must be designed to eliminate standing water within 72 hours to prevent mosquito breeding.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, designation of parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:
- Inspect prior to the start and end of the rainy season to repair washouts or remove excess sediment accumulation.
- Pesticides and fertilizers should be avoided in terraced areas.
BOVINE TERRACE- CHECKLIST

Bovine Terrace
Inspection and Maintenance Checklist
(aka: Terracing, Cow Terrance, Infiltration Terrace)

Date of Inspection: _______________________
Inspector(s): ___________________________
BMP ID #: _____________________________
Property Owner: ________________________

Location Description: ________________________________

Type of Inspection: Pre-rainy Season (PRS) Rainy Season (RS) After-rainy Season (ARS)

This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.

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<tr>
<td>Drainage</td>
<td>RS</td>
<td>Is there standing or pooling of water after 3 days of dry weather?</td>
<td></td>
<td>• Fill in and regrade terrace section.</td>
<td></td>
</tr>
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## BOVINE TERRACE- CHECKLIST

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<tr>
<td><strong>Erosion</strong></td>
<td>PRS, RS, ARS</td>
<td>Is there evidence of washouts and/or deep channeling along the terrace?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS, ARS</td>
<td>Is there channelization (gully) forming up/down slope of the terrace section?</td>
<td></td>
<td>• Fill in eroded areas, regrade, and replant slopes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS, ARS</td>
<td>Is there accumulation of excess sediment?</td>
<td></td>
<td>• Remove sediment and regrade section.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS, RS, ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td></td>
<td>• Repair and fill in damaged areas. Regrade if needed.</td>
<td>• Rodent/animal control activities must be in accordance with applicable laws and do not affect any protected species.</td>
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<tr>
<td>Vegetation</td>
<td>PRS, RS, ARS</td>
<td>Is the vegetation concentrating the flow to a portion of the terrace?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation to establish a uniform flow.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS, RS, ARS</td>
<td>Is there excess vegetation in the terrace area?</td>
<td></td>
<td>• Remove the excess vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ARS, PRS</td>
<td>Are there dead or dry plants/weeds?</td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier hazard.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove any nuance, dangerous plant species.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove, trim, mow all vegetation that may present an unusually high fire hazard.</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- PRS: Plan for Regeneration Strategy
- RS: Regeneration Strategy
- ARS: Advanced Regeneration Strategy

**City of Santa Rosa and County of Sonoma**
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<tr>
<td>BMP General</td>
<td>PRS, RS, ARS</td>
<td>Is trash/debris present?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS, RS, ARS</td>
<td>Is the surrounding area marked with graffiti?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
</tbody>
</table>
|                     | PRS, RS, ARS   | Are there missing or disturbed aesthetics features? |                      | • Replace and/or reposition aesthetics features to original placement.  
• Placement should not disrupt flow characteristics/design. |
|                     | PRS, RS, ARS   | Are mosquitoes present? |                      | • Contact vector control. |
|                     | PRS, RS, ARS   | Is the vegetation irrigation functional? |                      | • Repaired broken missing spray/drip emitters.  
• Reposition to eliminate over spray and/or over watering. |
|                     | PRS, RS, ARS   | Are the aesthetic features in good condition and firmly secured? |                      | • Repair and/or replace loose or damaged features. |
|                     | PRS, RS, ARS   | Are the signage, fencing in place and in good condition? |                      | • Replace/repair signage and fencing.  
• Add additional barriers signage to block access to hazardous areas. |
FACT SHEET- IMPERVIOUS AREA DISCONNECTION

IMPERVIOUS AREA DISCONNECTION
Including: splash blocks, rain chains, bubble up emitters, and pavement disconnection.

OVERVIEW

Impervious area disconnection allows storm water from impervious areas, such as rooftops and pavement, to be directed to pervious natural or landscaped areas and infiltrate into the soil. Impervious surfaces that drain directly to catch basins or storm drains are a directly connected impervious area. These areas prevent storm water infiltration into the soil or filtering through vegetation and soil. Impervious areas also increase the speed and amount of runoff from a site, which may contribute to peak flows and scour in downstream creeks and waterways. This BMP addresses these issues by disconnecting direct discharges by using: splash blocks, bubble-up emitter, and paved area disconnection.

SPLASH BLOCK DESCRIPTION

Splash blocks are a low tech option to hard piped downspout systems. Existing downspouts can be retrofitted using splash blocks.

ADVANTAGES

- Can be used as part of a treatment train with volume capture BMPs.
- Can reduce the size of downstream water quality treatment and volume capture BMPs by increasing the potential for infiltration.
FACT SHEET- IMPERVIOUS AREA DISCONNECTION

- Can be used as a retrofit BMP.
- Can be used to direct storm water to other BMPs

LIMITATIONS

- Adjacent buildings and overflow requirements need to be considered in design.
- May not be appropriate on all sites due to space constraints.

KEY DESIGN FEATURES

- Sites should be evaluated to ensure that splash blocks won’t have negative impacts.
- Rain water must be directed away from foundations and footings.
- Downspouts should not be directed to paved areas or across sidewalks.
- Landscaped areas receiving roof water should be adequately sized to prevent runoff or erosion.

BUBBLE-UP Emitter DESCRIPTION

Bubble-up emitters work very much like splash blocks, but allow for storm water to be released further from the building and even in landscape areas that are not directly adjacent to the building.

ADVANTAGES

- Can be used as part of a treatment train with volume capture BMPs.
- Can reduce the size of downstream water quality treatment and volume capture BMPs by increasing the potential for infiltration.
- Can be used as a retrofit BMP.
- Can be used to direct storm water to other BMPs

LIMITATIONS

- Adjacent buildings and overflow requirements need to be considered in design.
- May not be appropriate on all sites due to space constraints.

KEY DESIGN FEATURES

- Rain water must be directed away from foundations and footings.
- Downspouts should not be directed to paved areas or across sidewalks.
- 4” diameter SDR-35 pipe required as a minimum.
FACT SHEET- IMPERVIOUS AREA DISCONNECTION

- Distance and location of emitter relative to the building must be approved by a Licensed Geotechnical Engineer.
- Landscaped areas receiving roof water should be adequately sized to prevent runoff or erosion.
- Landscaped areas receiving roof water need to be designed to ensure proper drainage and to prevent ponding water.
- May be installed with a bottomless emitter to allow for infiltration. Bottom of emitter should be placed over drain rock to prevent sedimentation of pipe.
- Emitter should be equipped with “pop up” cover to prevent mosquito breeding.

PAVED AREA DISCONNECTION DESCRIPTION

Paved areas that can be graded so that they drain onto pervious area, such as landscape or natural area can increase the opportunity for infiltration and minimize the size of downstream treatment.

ADVANTAGES

- Can be used as part of a treatment train with other BMPs.
- Can reduce the size of downstream treatment and volume capture BMPs by increasing the potential for infiltration.

LIMITATIONS

- Areas receiving flow need to be adequately sized and stabilized.
- May be limited by site slopes.
- Overflow drainage must be provided.
- May not be appropriate on all sites.

KEY DESIGN FEATURES

- Rain water must be directed away from foundations and footings.
- Landscaped areas receiving storm water should be adequately sized to prevent runoff or erosion.
- Landscaped areas receiving roof water need to be designed to ensure proper drainage and to prevent ponding water.
# IMPERVIOUS AREA DISCONNECTION- CHECKLIST

**Impervious Area Disconnection**  
Inspection and Maintenance Checklist  
(aka: splash blocks, rain chains, bubble up emitters and pavement disconnection)

**Date of Inspection:** ____________________  
**Inspector(s):** ____________________  
**BMP ID #:** ____________________  
**Property Owner:** ____________________

**Location Description:** ____________________________________________

**Type of Inspection:**  
- Pre-rainy Season (PRS)  
- Rainy Season (RS)  
- After-rainy Season (ARS)

*This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

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<tr>
<th>Inspection Category</th>
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<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
</table>
| Drainage            | RS              | Is there standing or pooling of water after 3 days of dry weather? | | • Regrade drainage area.  
                     |                 |                   |                       | Reposition splash block.  
                     | RS              | Is there excessive splashing/spray? | | Clean inlets/outlets of obstructions.  
                     | RS              | Are the house/building gutters overflowing during a rain event? | | Reposition splash block or dissipater to reduce or eliminate splash/spray.  
                     |                 |                   |                       | Flush bubble up pipe to remove any obstructions.  
                     |                 |                   |                       | Check gutter down spout and gutter for obstructions. Clean if necessary.  

# IMPERVIOUS AREA DISCONNECTION- CHECKLIST

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</thead>
<tbody>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there evidence of under cutting or washouts around splash block/dissipater?</td>
<td></td>
<td>• Reposition the inlet splash block or dissipater.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming around the bubble ups?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the inlets/outlets areas?</td>
<td></td>
<td>• Remove sediment and check the grading.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Are there voids or holes along the path of the bubble up pipe or excess sediment in and around the bubble up outlet?</td>
<td></td>
<td>• Flush and inspect pipe for damage. • Replace damage pipe, fill in voids, and regrade.</td>
<td></td>
</tr>
</tbody>
</table>
# IMPERVIOUS AREA DISCONNECTION- CHECKLIST

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<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging the Inlet/outlet areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation around the inlet/outlet areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch spread evenly throughout the vegetation area?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds?</td>
<td></td>
<td>• Remove dead and/or dry vegetation. Replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier hazard.</td>
<td></td>
</tr>
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*Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)*
# IMPERVIOUS AREA DISCONNECTION - CHECKLIST

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<tr>
<td><strong>BMP General</strong></td>
<td>PRS, RS, ARS</td>
<td>Is there debris/trash in the area?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS, RS, ARS</td>
<td>Is the surrounding area marked with graffiti?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
</tbody>
</table>
|                     | PRS, RS, ARS    | Are there missing or disturbed aesthetics features? |                     | • Replace and/or reposition aesthetic features to original placement.  
• Placement should not disrupt flow characteristics/design. |                                                                                                                                 |
|                     | PRS, RS, ARS    | Check for broken or damage drain inlets/outlets, splash blocks, bubble ups, and grates. |                     | • Replace or repair all damaged features. |                                                                                                                                 |
|                     | PRS, RS, ARS    | Is the vegetation irrigation functional? |                     | • Repaired broken missing spray/drip emitters.  
• Reposition to eliminate over spray and/or over watering. |                                                                                                                                 |
|                     | PRS, RS, ARS    | Are the aesthetic features firmly secured in placed? |                     | • Repair and/or replace loose or damaged features. |                                                                                                                                 |
FACT SHEET- RAIN GARDEN

RAIN GARDEN
Also know as: Bioretention cell, infiltration planter

DESCRIPTION

Rain Gardens function as a soil and plant-based filtration and infiltration feature that remove pollutants through a variety of natural physical, biological, and chemical treatment processes. Rain gardens are usually installed in yards or common open areas to treat storm water from rooftops and parking lots.

ADVANTAGES

• Provides both water quality treatment and volume capture.
• Provides storm water treatment that enhances water quality of downstream water bodies through natural processes.
• Vegetation provides shade and wind breaks, absorbs noise, reduces heat island effects and adds to an area's landscape features.
• Establishes habitat for birds and attracts pollinators like butterflies and bees.

LIMITATIONS

• Most effective if installed flat to promote infiltration.
• Prohibited in areas of known soil and/or groundwater contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed location, the North Coast Regional Board review and approval is required.
FACT SHEET- RAIN GARDEN

- Should not be used in areas of high ground water. A minimum of 2’ of clearance needs to be provided between the bottom of the BMP and the seasonal high ground water level. If ground water is less than 2’ from the bottom, additional design elements may be necessary (impermeable liner, subdrains, etc).
- Do not use in areas of slope instability where infiltrated storm water may cause failure. Slope stability shall be determined by a licensed Geotechnical Engineer.
- Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- Native soil shall remain uncompacted to preserve infiltration capacity. Fence off during construction.
- Bottom of rain garden should be unlined to allow infiltration into native soil.
- If present, structural soil shall be installed as described in Reference Document E.
- For rain garden that adjoin pavement or utility trenches, moisture barrier shall be installed to protect road sub-base and any trenches.
- Use plants from the approved plant and tree list included in Appendix M.
- Devise vegetation that is both wet and dry tolerant is required.
- Design to achieve 51% cover.
- Install a designated high flow bypass inlet for storms larger than the design storm. See “Sizing Design” below.
- If required, perforated pipe shall be a minimum of SDR 35 plastic and installed in straight runs.
- Volume below the perforated pipe must be sufficient to hold and infiltrate the design volume.
- Surface ponding depth shall range between 6” and 12”.
- Must be designed to prevent extended standing water. All surface water must drain within 72 hours to prevent mosquito breeding.
- Select non-floatable surface mulching material to prevent clogging of downstream inlets.
- Direct downspouts into rain gardens and incorporate splash blocks and/or other dissipation methods to prevent erosion.

SIZING DESIGN- GOAL AND REQUIREMENTS

- The design goal for all rain gardens is to capture (infiltration and/or reuse) 100% of the volume of runoff generated by the 85th percentile 24 hour storm event. This is a retention requirement. If 100% volume capture is achieved than no additional treatment is required.
- If the design goal is not achievable, then the bioretention area sizing requirement is:
FACT SHEET- RAIN GARDEN

- **Water Quality Treatment** of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.92 inches per hour, and
- **Volume Capture** (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event. This is a retention requirement.
  - All calculations shall be completed using the “Storm Water Calculator” available at [www.srcity.org/stormwaterLID](http://www.srcity.org/stormwaterLID).

**Inspection and Maintenance Requirements**

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:
- Inspect twice annually and prior to rain events for blocked or clogged inlets, eroded areas, sedimentation and trash or debris accumulation.
- Obstructions and trash shall be removed and properly disposed of.
- Inspect twice during the rainy season for ponded water.
- If ponded water is observed, the first few inches of topsoil should be removed and replaced. If ponded water is still present, further grading and replacement may be necessary to prevent mosquito breeding.
- Pesticides and fertilizers shall not be used in the rain garden area. Non floatable mulch should be instead.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.
- Observe level and condition of mulch. Add to, re-grade or replace as needed (non-floatable mulch required).
- Confirm slash blocks, or other dissipation method, exist to direct downspouts into rain garden. Readjust location if needed. Replace if necessary.
# RAIN GARDEN - CHECKLIST

## Rain Garden

**Inspection and Maintenance Checklist**  
(aka: Bioretention Cell, Infiltration Planter)

---

**Date of Inspection:** ____________________  
**Inspector(s):** ____________________  
**BMP ID #:** ____________________  
**Property Owner:** ____________________

---

**Location Description:** ____________________

---

**Type of Inspection:**  
- Pre-rainy Season (PRS)  
- Rainy Season (RS)  
- After-rainy Season (ARS)

---

*This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

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</thead>
</table>
| **Drainage**        | RS              | Is there standing or pooling of water in the Rain Garden area after 3 days of dry weather? | Yes                   | • Check perforated pipe outlet for obstruction or damage. *  
• Flush perforated pipe to remove obstructions/sediment. *  
• Remove and replace the first few inches of topsoil.  
• Remove soil and inspect perforated pipe. Repair or replace perforated pipe, replace with new soil and regrade. |
|                     | RS              | Is there poor drainage during a high intensity storm event?                        | Yes                   | • Clean the high flow bypass inlet and pipe.                                   |
|                     | RS              | Is the flow into the Rain Garden even and uniform?                                | Yes                   | • Remove any obstruction preventing a uniform flow into the swale.  
• Regrade up slope if necessary.  
• Reposition splash block/dissipater. |

---

* If perforated pipe is present.
# RAIN GARDEN - CHECKLIST

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</tr>
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<tbody>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there under cutting or washouts around the splash blocks or dissipaters?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming along the length of the Rain Garden area?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the Rain Garden?</td>
<td></td>
<td>• Remove sediment and check the grading. Add replacement soil and/or mulch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch unevenly distributed in the Rain Garden area?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there voids or deep holes present? Is there sediment present in the catch basin and in the overflow pipe?</td>
<td></td>
<td>• Check perforated pipe outlet for damage. *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td></td>
<td>• Repair and fill in damage areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>• Rodent control activities must be in accordance with applicable laws and do not affect any protected species.</td>
<td></td>
</tr>
</tbody>
</table>

* If perforated pipe is present.
## RAIN GARDEN - CHECKLIST

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<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging or diverting the input flow areas?</td>
<td></td>
<td>• Trim and /or remove the excess vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch evenly distributed throughout the area?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds? Is the vegetation over grown?</td>
<td></td>
<td>• Remove dead and/or dry vegetation. Replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier, trip, and/or obstruction hazard.</td>
<td></td>
</tr>
</tbody>
</table>
# RAIN GARDEN - CHECKLIST

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<tbody>
<tr>
<td>BMP General</td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the Rain Garden area?</td>
<td></td>
<td></td>
<td>• Remove all trash and debris.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is Graffiti present?</td>
<td></td>
<td></td>
<td>• Remove all graffiti from the area.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetic features?</td>
<td></td>
<td></td>
<td>• Replace and/or reposition aesthetic features to original placement. • Placement should not disrupt flow characteristics/design.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the vegetation irrigation functional?</td>
<td></td>
<td></td>
<td>• Repaired broken missing spray/drip emitters. • Reposition and/or adjust to eliminate over spray and/or over watering.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in place?</td>
<td></td>
<td></td>
<td>• Repair and/or replace loose or damaged features.</td>
</tr>
</tbody>
</table>
NOTES:
1. DENSE, WET AND DRY-TOLERANT VEGETATION.
2. PONDING DEPTH 6" MAX.
3. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT MOSQUITO BREEDING.
4. MAXIMUM CONTRIBUTING AREA OF 1 ACRE.
5. BIORETENTION SOIL DEPTH 12" MIN. DEPTH TO BE CALCULATED.

TYPICAL SECTION

PLAN

NOTES:

SEE NOTES 1 & 2

DISTANCE TO BE DETERMINED BY LICENSED GEOTEchnICAL ENGINEER

BEGIN NATIVE SOIL

MULCH, 2"-3" DEPTH
UNDISTURBED NATIVE SOIL

BERM (MUST BE LOWER THAN UPHILL SIDE)

BIORETENTION SOIL, SEE NOTE 5.

HIGH FLOW BYPASS INLET

LENGTH TO BE CALCULATED

2' MIN. RAIN GARDEN

YARD

SEE NOTE 4

DOWNspout

SPASH BLOCK OR EQUIVALENT

PRIORITY 1
RAIN GARDEN
NOTES:
1. DENSE, WET AND DRY-TOLERANT VEGETATION.
2. PONDING DEPTH 6" MAX.
3. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT MOSQUITO BREEDING.
4. MAXIMUM CONTRIBUTING AREA OF 1 ACRE.
5. BIORETENTION SOIL DEPTH 12" MIN. DEPTH TO BE CALCULATED.

TYPICAL SECTION

PLAN

NOTES:

PRIORITY 2 RAIN GARDEN

SCALE: NONE DATE: 05/10/11

Not to Scale
NOTES:
1. DENSE, WET AND DRY-TOLERANT VEGETATION.
2. PONDING DEPTH 6" - 12"
3. PONDED WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT MOSQUITO BREEDING.
4. MAXIMUM CONTRIBUTING AREA OF 1 ACRE.
5. BIORETENTION SOIL DEPTH 12" MIN. DEPTH TO BE CALCULATED.

PRIORITY 3 RAIN GARDEN

SCALE: NONE DATE: 05/10/11
DWN. D/T CHK. HH SHEET 1 of 1 P3-01

Not to Scale
BIORETENTION
Also known as: Street rain garden, roadside bioretention, and bioretention cell

DESCRIPTION
The bioretention area best management practice (BMP) functions as a soil and plant-based filtration and infiltration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes.

ADVANTAGES
- Achieves both water quality and volume capture objectives.
- Bioretention areas provide storm water treatment that enhances the quality of downstream water bodies by using natural processes.
- The vegetation provides shade and wind breaks, absorbs noise, reduces heat island effects and improves an area’s landscape.
- Bioretention provides habitat for birds and attracts other pollinators like butterflies and bees.
- Does not interrupt utility installation.
- Does not interfere with tree planting.
FACT SHEET- BIORETENTION

LIMITATIONS

• Bioretention is not recommended for areas where street slopes exceed 10%.
• Should not be used in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed BMP location, the North Coast Regional Water Quality Control Board will need to be contacted and the site reviewed.
• Should not be used in areas of high groundwater. In general a minimum of 2’ of clearance should be provided between the bottom of the bioretention cell and seasonal high groundwater.
• Should not be used in areas of slope instability where infiltrated storm water may cause failure. Slope stability should be determined by a licensed geotechnical engineer.
• Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

ALL BIORETENTION

• Structural soil should be used within the bioretention area requiring load bearing capacity (adjacent to roadways and/or buildings.)
• Structural soil shall be installed as described in Reference Document E.
• Some BMPs may not require the use of structural soil and a more organic type planting soil and/or treatment media may be used in its place. It may be possible in some cases to use native soil or to amend the native soil so that it is suitable. Use of non-structural soil will depend on evaluation of the criteria in “Chapter 4-Site Assessment” as well as consideration of structural needs and may require evaluation by a licensed Geotechnical Engineer.
• Native soil should remain uncompacted to preserve infiltration capacity. Fence off the area during construction to protect it from compaction.
• Bottom of bioretention should be unlined to allow infiltration into native soil.
• Moisture barrier must be installed to protect road sub-base and any trenches adjacent to the bioretention area.
• If used, pervious concrete shall be designed and installed as described in Appendix G.
• If used, porous gutter must be protected during construction to prevent sediment loading.
• If the porous gutter design option is used additional trash and sediment capture BMPs may be required
• A curb opening type design may be used in place of a porous gutter if appropriate for the project.
• Bioretention areas shall be planted with plants from the approved plant and tree list included in Appendix F and shall be planted to achieve 51% cover.
FACT SHEET- BIORETENTION

- All bioretention areas shall be designed with a designated high flow bypass inlet for storms larger than the design storm.
- 6” perforated pipe to be installed at a depth of 6” below road structural section.
- Perforated pipe shall be installed in straight runs.
- The volume below the perforated pipe must be sufficient to hold and infiltrate the design volume.

SIZING DESIGN– GOAL AND REQUIREMENTS

- The design goal for all bioretention areas is to capture (infiltration and/or reuse) 100% of the volume of runoff generated by the 85th percentile 24 hour storm event. This is a retention requirement. If 100% volume capture is achieved than no additional treatment is required.
- If the design goal is not achievable, then the bioretention area sizing requirement is:
  - Water Quality Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.20 inches per hour, and
  - Volume Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event. This is a retention requirement.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum maintenance shall include the following:
- Dry street sweeping upon completion of construction
- Dry street sweeping annually, and
  - When water is observed flowing in the gutter during a low intensity storm.
  - Algae is observed in the gutter.
  - Sediment/debris covers 1/3 of the gutter width or more.
- Inspect twice annually for sedimentation and trash accumulation in the gutter. Obstructions and trash shall be removed and properly disposed of.
- Inspect twice during the rainy season for ponded water.
- Pesticides and fertilizers shall not be used in the bioretention area.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.
## PLANTER STRIP BIORETENTION- CHECKLIST

**Planter Strip Bioretention**  
Inspection and Maintenance Checklist  
(aka: Street Rain Garden, Roadside Bioretention, Bioretention Cell)

Location Description: ________________________________

**Type of Inspection:**  
- Pre-rainy Season (PRS)  
- Rainy Season (RS)  
- After-rainy Season (ARS)

*This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

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<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
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</table>
| Drainage            | RS              | Is there standing or pooling of water in the Bioretention area after 3 days of dry weather? |                       | • Check perforated pipe outlet for obstruction or damage. *  
|                     |                 |                    |                       | • Flush perforated pipe to remove obstructions/sediment. *  
|                     |                 |                    |                       | • Remove and replace the first few inches of topsoil.  
|                     |                 |                    |                       | • Remove soil and inspect perforated pipe. Repair or replace perforated pipe, replace with new soil and regrade.  
| PRS                 | Is there sediment visible in the gutter? |                       | • In dry weather, use a mechanical sweeper or a Vactor truck to clean gutter pan.  
| RS                  |                 |                    |                       |                                                                                                   
| ARS                 |                 |                    |                       |                                                                                                   
| RS                  | Is there water flowing in the pervious concrete gutter section during a low intensity storm? * |                       | • In wet weather, use a Vactor truck to clean gutter pan.                                         

* If perforated pipe is present.

Date of Inspection: ____________________________
Inspector(s): ________________________________
BMP ID #: ________________________________
Property Owner: ________________________________
# PLANTER STRIP BIORETENTION- CHECKLIST

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<th>Comments</th>
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<tbody>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there under cutting or washouts along the sidewalks and/or curbs abutting the planter strip?</td>
<td>No</td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming along the length of the planter area?</td>
<td>No</td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the planter?</td>
<td>No</td>
<td>• Remove sediment and check the grading. Add replacement soil and/or mulch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch unevenly distributed in the planter area?</td>
<td>No</td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there voids or deep holes present?</td>
<td>No</td>
<td>• Check the perforated pipe for damage.*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td>No</td>
<td>• Repair and fill in damage areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Rodent control activities must be in accordance with applicable laws and do not affect any protected species.</td>
<td></td>
</tr>
</tbody>
</table>

* If perforated pipe is present.
# PLANTER STRIP BIORETTENTION - CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging the inlet flow areas?</td>
<td>• Trim and/or remove the excess vegetation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                     | PRS RS ARS      | Is the mulch distributed evenly throughout the planter area? | • Redistribute and add additional mulch if needed.  
• Re-grade planter area. | | |
|                     | PRS RS ARS      | Are there dead or dry plants/weeds?  
Is the vegetation over grown? | • Remove dead and/or dry vegetation. Replace as needed.  
• Remove or trim any vegetation that is causing a visual barrier, trip, and or obstruction hazard. | |
## PLANTER STRIP BIORETENTION- CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the planter area?</td>
<td>• Remove all trash and debris.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is graffiti present?</td>
<td>• Remove all graffiti from the area.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td>• Replace and/or reposition aesthetics features to original placement. • Placement should not disrupt flow characteristics/design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the vegetation irrigation functional?</td>
<td>• Repaired broken missing spray/drip emitters. • Reposition and/or adjust to eliminate over spray and/or over watering.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in placed?</td>
<td>• Repair and/or replace loose or damage features.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Check for damage sidewalk, curb, gutter, and catch basin including uplift and settling.</td>
<td>• Remove and replace damaged areas.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. IF SWALE PROVIDES TREATMENT, LENGTH SHALL BE DESIGNED TO PROVIDE 12 MINUTES OF CONTACT TIME IF FLOW ENTERS UNIFORMMELY ALONG LENGTH. LENGTH SHALL PROVIDE 5 MINUTES OF CONTACT TIME IF 90% OR MORE OF THE FLOW ENTERS AT THE UPSTREAM END. IF SUBSURFACE BIORETENTION AREA PROVIDES 100% VOLUME CAPTURE - HIGH FLOW BYPASS INLET MUST BE 0.25' ABOVE SWALE FLOWLINE. ALL PONDED WATER MUST DRAIN WITHIN 72 HOURS.

2. SOIL TO BE SPECIFIED BY DESIGN ENGINEER TO PROVIDE VOLUME CAPTURE AND MEET GOVERNING AGENCY REQUIREMENTS. IF NON STRUCTURAL SOIL IS SELECTED A CUTOFF WALL IS REQUIRED IN PLACE OF A MOISTURE BARRIER.

3. BOTTOM OPEN TO ALLOW INFILTRATION INTO NATIVE SOIL.

4. SWALE MUST CONVEY HIGH FLOWS PER GOVERNING AGENCY DESIGN STANDARDS.
NOTES:
1. IF SWALE PROVIDES TREATMENT, LENGTH SHALL BE DESIGNED TO PROVIDE 12 MINUTES OF CONTACT TIME IF FLOW ENTERS UNIFORMLY ALONG LENGTH. LENGTH SHALL PROVIDE 5 MINUTES OF CONTACT TIME IF 90% OR MORE OF THE FLOW ENTERS AT THE UPSTREAM END. IF SUBSURFACE BIORETENTION AREA PROVIDES 100% VOLUME CAPTURE - HIGH FLOW BYPASS INLET MUST BE 0.25' ABOVE SWALE FLOWLINE. ALL PONDED WATER MUST DRAIN WITHIN 72 HOURS.
2. STRUCTURAL SOIL UNLESS OTHERWISE APPROVED BY GEOTECHNICAL ENGINEER AND ACCEPTED BY GOVERNING AGENCY.
3. SWALE MUST CONVEY DESIGN FLOWS PER GOVERNING AGENCY DESIGN STANDARDS.
4. PARKING ISLAND WIDTH PER APPLICABLE GOVERNING AGENCY STANDARDS.

PRIORITY 1
SWALE WITH BIORETENTION
NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).

PRIORITY 2
ROADSIDE BIORETENTION
- FLUSH DESIGN

SCALE: NONE
DATE: 05/10/11
DWN. D/T CHK. HH SHEET 1 of 2 P2-02

Not to Scale
SECTION A-A

10 MIL PLASTIC MOISTURE BARRIER
MIN (TYP)

OPTIONAL 12" PLANTING SOIL MIX

PERVIOUS CONCRETE GUTTER

BOTTOM OF ROAD STRUCTURAL SECTION

AC
AB2

NATIVE SOIL, TYP.

10 MIL PLASTIC MOISTURE BARRIER.

SECTION B-B

6" PERFORATED PIPE, SEE NOTE 2

TREATMENT AREA
STRUCTURAL SOIL (TYP)

CATCH BASIN, CURB AND GUTTER

OVERFLOW

TO STORM DRAIN SYSTEM

NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW BOTTOM OF ROAD STRUCTURAL SECTION.
3. BOTTOM OPEN TO ALLOW INфиLTRATION INTO NATIVE SOIL.

PRIORITY 2
ROADSIDE BIOTRETENTION
- FLUSH DESIGN

SCALE: NONE  DATE: 05/10/11
DWN. D/T CHK. HH  SHEET 2 of 2  P2-02
NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE MUNICIPAL STANDARDS (TYP).
2. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW ROAD STRUCTURAL SECTION.
3. TYPE A MINIMUM DIMENSIONS AND GRADES APPLY TO TYPE B.
4. BIORETENTION AREA PLANTS TO BE SELECTED FROM APPROVED PLANT LIST.
NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW BOTTOM OF ROAD STRUCTURAL SECTION.
3. BOTTOM OPEN TO ALLOW INFILTRATION INTO NATIVE SOIL.
NOTES:
1. SOIL TO BE SPECIFIED BY DESIGN ENGINEER TO PROVIDE VOLUME CAPTURE AND MEET GOVERNING AGENCY REQUIREMENTS. IF NON STRUCTURAL SOIL IS SELECTED A CUTOFF WALL IS REQUIRED IN PLACE OF A MOISTURE BARRIER.
2. BOTTOM OPEN TO ALLOW INFILTRATION INTO NATIVE SOIL.
3. SWALE MUST CONVEY DESIGN FLOWS PER GOVERNING AGENCY DESIGN STANDARDS.
4. TOP OF 6" PERFORATED PIPE TO BE SET 6" BELOW BOTTOM OF ROAD STRUCTURAL SECTION.

SECTION A-A

TREATMENT AREA
6" PERFORATED PIPE PER NOTE 4
VOLUME CAPTURE PER NOTE 1
NOTE 2
UNDISTURBED NATIVE SOIL

ROAD
1' MIN

10 MIL PLASTIC MOISTURE BARRIER AS REQUIRED

SIMILAR TO P1-02 WITH A PERFORATED DRAIN PIPE

PRIORITY 2
ROADSIDE BIORETENTION - NO CURB AND GUTTER

SCALE: NONE DATE: 05/10/11
DWN. D/T CHK. HH P2-05
PLAN

NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).

SIMILAR TO P2-02 WITH A MOISTURE BARRIER LINER, NO INFILTRATION.

PRIORITY 3
ROADSIDE BIORETENTION
- FLUSH DESIGN

SCALE: NONE
DATE: 05/10/11
DWN. D/T CHK. HH SHEET 1 of 2 P3-02

Not to Scale
NOTE:
1. SIDEWALK AND CURB AND GUTTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. 6" PERFORATED PIPE TO BE SET IN BOTTOM OF TREATMENT AREA TO ENSURE DRAINAGE.

SIMILAR TO P2-03 WITH A MOISTURE BARRIER LINER, NO INfiltrATION.
NOTE:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. 6" PERFORATED PIPE TO BE SET IN BOTTOM OF TREATMENT AREA TO ENSURE DRAINAGE.
3. TYPE A MINIMUM DIMENSIONS AND GRADES APPLY TO TYPE B.
4. BIORETENTION AREA PLANTS TO BE SELECTED FROM APPROVED PLANT LIST.

SIMILAR TO P2-04 WITH A MOISTURE BARRIER LINER, NO INFILTRATION.

PRIORITY 3
ROADSIDE BIORETENTION - CURB OPENING

SCALE: NONE
DATE: 05/10/11
DWN. D/T CHK. HH SHEET 1 of 2 P3-04
SECTION A-A

NOTES:
1. SIDEWALK AND PLANTER WIDTHS PER APPLICABLE GOVERNING AGENCY STANDARDS (TYP).
2. 6" PERFORATED PIPE TO BE SET IN BOTTOM OF TREATMENT AREA TO ENSURE DRAINAGE.

SIMILAR TO P2-04 WITH A MOISTURE BARRIER LINER, NO INFILTRATION.

SECTION B-B

10 MIL MOISTURE BARRIER

UNDISTURBED NATIVE SOIL

FIELD DRAIN HIGH FLOW BYPASS

STORM DRAIN PER PLAN

STRUCTURAL SOIL (TYP)

10 MIL MOISTURE BARRIER

UNDISTURBED NATIVE SOIL

5' OF 6" PERFORATED PIPE (TYP)
NOTES:

1. IF SWALE PROVIDES TREATMENT, LENGTH SHALL BE DESIGNED TO PROVIDE 12 MINUTES OF CONTACT TIME IF FLOW ENTERS UNIFORMLY ALONG LENGTH. LENGTH SHALL PROVIDE 5 MINUTES OF CONTACT TIME IF 90% OR MORE OF THE FLOW ENTERS AT THE UPSTREAM END. IF SUBSURFACE BIORETENTION AREA PROVIDES 100% VOLUME CAPTURE - HIGH FLOW BYPASS INLET MUST BE 0.25" ABOVE SWALE FLOWLINE. ALL PONDED WATER MUST DRAIN WITHIN 72 HOURS.

2. STRUCTURAL SOIL UNLESS OTHERWISE APPROVED BY GEOTECHNICAL ENGINEER AND ACCEPTED BY GOVERNING AGENCY.

3. SWALE MUST CONVEY DESIGN FLOWS PER GOVERNING AGENCY DESIGN STANDARDS.

4. PARKING ISLAND WIDTH PER APPLICABLE GOVERNING AGENCY STANDARDS.
FACT SHEET - CONSTRUCTED WETLANDS

CONSTRUCTED WETLAND
Also know as: Artificial Wetlands

DESCRIPTION

Constructed wetlands are designed to mimic natural wetlands with varied depth pools and wetland plants. Constructed wetlands remove pollutants through a variety of natural physical, biological, and chemical treatment processes. They retain storm water and allow it to infiltrate and evapotranspirate while allowing pollutants to settle out and provide habitat.

ADVANTAGES

- Provides both water quality treatment and volume capture.
- Provides storm water treatment that enhances water quality of downstream water bodies through natural processes.
- Aesthetically pleasing.
- Can provide recreation and educational information to the public.
- Vegetation provides shade and wind breaks, absorbs noise, reduces heat island effects and adds to an area’s landscape features.
- Establishes habitat for birds, amphibians, dragonflies, and pollinators like butterflies and bees.
FACT SHEET- CONSTRUCTED WETLANDS

LIMITATIONS

- Requires sufficient area.
- Prohibited in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed location, the Regional Board review and approval is required.
- Do not use in areas of slope instability where infiltrated storm water may cause failure. Slope stability shall be determined by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- Compartmentalization and variation in pool size and depth recommended.
- 20’ maximum distance across wetland if only accessible from all weather access road on one side.
- Perimeter all weather access road required if wetland is greater than 20’ wide. Roads should be located as close to the shoreline as possible.
- 40’ maximum distance across wetland.
- Design for water depth over 1’. Preferably 3’-4’ with plant free areas over 5’ in depth.
- 50% or less overall vegetative cover.
- 25% of vegetation should be maintained as isolated islands away from the ponds perimeter.
- Raised planting beds to limit and narrow vegetated zones.
- 1%-5% slope recommended along bottom of wetland for dewatering, maintenance, and mosquito control.
- 2.5:1 to 4:1 bank slope recommended to limit vegetation growth and ensure access.
- 4:1 max bank slope to allow access for mowing and sampling.
- Peripheral vegetation zones should be less than 3’ wide or minimum required for wildlife.
- Design to maximize spread and movement of water in wetland.
- Design to allow for complete dewatering of wetland for maintenance and mosquito control.
- Include an access ramp to basin floor for maintenance equipment.
- Concrete liners in shallow areas to discourage vegetation where not necessary.
- Design and necessary approvals to drain wetland completely when needed (Salinas – Outlet structure should be designed to drain the WQv (Water Quality Volume) within a minimum of 48 hours.)
FACT SHEET- CONSTRUCTED WETLANDS

SIZING DESIGN- GOAL AND REQUIREMENTS

• The design goal for all constructed wetlands is to capture (infiltration and/or reuse) 100% of the runoff volume generated by the 85th percentile 24 hour storm event. 100% volume capture has been established as the ideal condition. If achieved, all requirements are satisfied and no additional treatment is required. This is a retention requirement.

• If the design goal is not achievable, then the constructed wetland sizing requirement is:
  o Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.20 inches per hour, and
  o Volume Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event. This is a retention requirement.

• All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

• A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary, and provide site specific inspection checklist. Remember; designing for maintenance and to restrict emergent vegetation minimizes maintenance requirements.

At a minimum inspection and maintenance shall include the following:

• If vegetation removal is performed, biomass must be removed
• Ability to dewater sections or the entire wetland for mosquito control or maintenance. Valves, weirs, etc.
• Vegetation control – removal, thinning, or mowing
<table>
<thead>
<tr>
<th>Drainage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Inspection:</strong></td>
<td><strong>Maintenance Issue</strong></td>
</tr>
<tr>
<td>Pre-Rainy Season (PRS)</td>
<td>Requires Maintenance</td>
</tr>
<tr>
<td>Rainy Season (RS)</td>
<td>No Issue</td>
</tr>
<tr>
<td>After-Rainy Season (ARS)</td>
<td>No Issue</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Required Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damage to overflow channel for obstruction or check high flow bypass inlet pipe</td>
<td>• Check high flow bypass inlet pipe/ damage</td>
</tr>
<tr>
<td>Damage to check outlet area for obstruction or control values and height</td>
<td>• Check outlet area for obstruction or control values and height</td>
</tr>
</tbody>
</table>

After conducting, note when it will be done and notify if needed maintenance was not completed.

**Comments:**

**Inspection:**

These documents are designed to be used in conjunction with the corresponding LID Factsheet and Maintenance Plan. Please review and complete the Maintenance Checklist:

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP ID #:</td>
<td>BMP ID #:</td>
</tr>
<tr>
<td>Inspector(s):</td>
<td>Inspector(s):</td>
</tr>
<tr>
<td>Date of Inspection:</td>
<td>Date of Inspection:</td>
</tr>
</tbody>
</table>
## CONSTRUCTED WETLANDS- CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there evidence of under cutting or washouts around the inlet/outlet of the pond?</td>
<td></td>
<td>• Re-position the inlet splash rocks and/or dissipater(s).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming along the banks of the pond?</td>
<td></td>
<td>• Fill in eroded areas and re-grade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the pond?</td>
<td></td>
<td>• Fill in eroded areas, re-grade banks, and replant area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td></td>
<td>• Remove excess sediment from the pond.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>• Remove sediment from the pond and re-grade the pond’s bottom if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>• Repair and fill in damaged areas. Re-grade if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td></td>
<td></td>
<td>• Rodent/animal control activities must be in accordance with applicable laws and do not affect any protected species.</td>
<td></td>
</tr>
<tr>
<td>Inspection Category</td>
<td>When to Inspect</td>
<td>Maintenance Issue</td>
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<tr>
<td>---------------------</td>
<td>-----------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging the Inlet/outlet areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation around the inlet/outlet areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there excess vegetation in the pond?</td>
<td></td>
<td>• Remove the excess vegetation and biomass.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds on the banks of the pond?</td>
<td></td>
<td>• Remove dead and/or dry vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier hazard.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove any nuance, dangerous plant species.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove, trim, mow all vegetation that may present a fire hazard.</td>
<td></td>
</tr>
</tbody>
</table>
## CONSTRUCTED WETLANDS- CHECKLIST

<table>
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<tr>
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<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there trash/debris in and around the pond?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the surrounding area marked with graffiti?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there mosquitoes present?</td>
<td></td>
<td>• Contact vector control.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the vegetation irrigation functional?</td>
<td></td>
<td>• Repaired broken missing spray/drip emitters.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features in good condition and firmly secured?</td>
<td></td>
<td>• Reposition to eliminate over spray and/or over watering.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the signage, fencing in place and in good condition?</td>
<td></td>
<td>• Repair and/or replace loose or damage features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the vegetation irrigation functional?</td>
<td></td>
<td>• Replace/repair signage and fencing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features in good condition and firmly secured?</td>
<td></td>
<td>• Add additional barriers signage to block access to hazardous areas.</td>
<td></td>
</tr>
</tbody>
</table>

### BMP General
FACT SHEET- INFILTRATION TRENCH

INFILTRATION TRENCH
Also know as: Infiltration Gallery, Soakage Trench

DESCRIPTION

Infiltration Trenches are typically long narrow trenches that are filled with gravel that receive storm water and allow it to infiltrate into the soil. Infiltration trenches can be used to intercept storm water from landscape or open space before it crosses onto paved area or can be used as part of a treatment train with other BMP (such as Vegetated Buffer Strips or Vegetated Swales) to achieve the Volume Capture requirement.

ADVANTAGES

- Provides volume capture.
- Can be used as part of a treatment train with treatment BMPs.
- Can be used on sloped sites.
- Simple to install.

LIMITATIONS

- Does not achieve treatment.
FACT SHEET- INFILTRATION TRENCH

- Impacts to adjacent buildings and overflow requirements need to be considered in design.
- Requires adequate space.

KEY DESIGN FEATURES

- Install a designated high flow bypass inlet or route.
- Design to prevent standing water. All surface water must drain within 72 hours to prevent mosquito breeding.

SIZING DESIGN- GOAL AND REQUIREMENTS

- The design goal is to capture of 100% of the runoff volume generated by the 85th percentile 24 hour storm event. 100% volume capture has been established as the ideal condition. If achieved, all requirements are satisfied and no additional treatment is required. This is a retention requirement.
- If the design goal is not achievable, then the rain water harvesting sizing requirement is:
  - Volume Capture of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event, as calculated using the "Urban Hydrology for Small Watersheds" TR-55 Manual.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, identify the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:
- Inspect twice annually for ponded water. If ponded water is observed, the top layer of pea gravel will need to be replaced.
- If ponded water remains, further grading and replacement may be necessary to prevent mosquito breeding.
- The high flow inlet should be inspected and cleaned as necessary to remove any obstructions.
- Pesticides and fertilizers shall not be used in vegetated areas draining to the infiltration trench.
- Remove any accumulated sediment and/or trash.
NOTES:
1. DEPTH SHALL NOT EXCEED EITHER WIDTH OR LENGTH, WHICHEVER IS GREATER.
2. TO BE USED AS PART OF A TREATMENT TRAIN THAT PROVIDES TREATMENT.
3. ALL SURFACE WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT MOSQUITO BREEDING.
POROUS PAVEMENT
Also know as: Unit Pavers, Porous Concrete, and Pervious Pavement

DESCRIPTION
Porous Pavement is a system comprised of load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet. The surface can be porous such that water infiltrates across the entire surface of the material (e.g., crushed aggregate, porous concrete and porous asphalt), or it can be constructed of impermeable blocks separated by spaces and joints, through which the water can drain. This latter system is termed ‘permeable’ paving. Pervious paving is used for light vehicle loading in parking areas. For a surface to be considered porous it must allow water to infiltrate in to the soil below. Perforated pipe may be installed high in the section and the volume below the perforated pipe may be counted toward volume capture if no impermeable liner is installed. Sections with perforated pipe or liners at the bottom provide treatment only.

ADVANTAGES
- Significant flow attenuation and improvement in water quality.
- Can remove both the soluble and fine particulate pollutants.
- Roof runoff can be piped into the subsurface storage area directly, which would increase the level of flow attenuation.
- Within lined systems, there is the opportunity for stored runoff to be piped out for reuse.
- Pervious pavements have a high level of applicability because they are unobtrusive.
FACT SHEET- POROUS PAVEMENT

LIMITATIONS

- Can become clogged if improperly installed or maintained. However, this problem is minimized by the ease with which small areas of paving can be cleaned or replaced when blocked or damaged.
- Use should be limited to car parking areas and other lightly trafficked or nontrafficked areas. Pervious surfaces are currently not considered suitable for roadways within the public right-of-way.
- Prohibited in areas of known contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed location, the North Coast Regional Board review and approval is required.
- Do not use in areas of slope instability where infiltrated storm water may cause failure. Slope stability shall be determined by a licensed Geotechnical Engineer.
- Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- The subgrade should be able to sustain traffic loading without excessive deformation.
- The granular capping and sub-base layers should give sufficient load-bearing to provide an adequate construction platform and base for the overlying pavement layers.
- Prevent cracking or excessive rutting from the wear of traffic. The horizontal tensile stress at the base of these layers.
- Pervious pavements require a single size grading to create voids for infiltration. The choice of materials is therefore a compromise between stiffness, permeability and storage capacity.
- Because the sub-base and capping will be in contact with water for extended periods, the strength and durability of the aggregate particles when saturated and subjected to wetting and drying should be assessed.
- A uniformly graded single size material cannot be compacted and is liable to move when construction traffic passes over it. This effect can be reduced by the use of angular crushed rock material with a high surface friction.
- Pervious concrete shall be designed and installed as described in Appendix G.

SIZING DESIGN- GOAL AND REQUIREMENTS

- The design goal is to capture (infiltration and/or reuse) 100% of the volume of runoff generated by the 85th percentile 24 hour storm event. This is a retention requirement. If 100% volume capture is achieved than no additional treatment is required.
FACT SHEET- POROUS PAVEMENT

- If the design goal is not achievable, then the sizing requirement is:
  - Water Quality Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.92 inches per hour, and
  - Volume Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event. This is a retention requirement.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID.

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:

- Keep landscaped areas well maintained
- Prevent soil from washing onto pavement

Pervious Pavement shall be inspected and maintained 2-3 times per year:

a) Vacuum clean surface using commercial sweeping machines at the following times:
   - End of winter (April)
   - Mid-summer (July / August)
   - After autumn leaf-fall (November)
   - Inspect outlets annually

b) As needed maintenance:
   - If routine cleaning does not restore infiltration rates, then reconstruction of part of the pervious surface may be required.
   - The surface area affected by hydraulic failure should be lifted for inspection of the internal materials to identify the location and extent of the blockage.
   - Surface materials should be lifted and replaced after brush cleaning. Geotextiles may need complete replacement.
   - Sub-surface layers may need cleaning and replacing.
   - Due to the accumulation of pollutants, removed silts may need to be disposed of as controlled waste.
## POROUS PAVEMENT - CHECKLIST

### Porous Pavement
Inspection and Maintenance Checklist
(aka: Unit Pavers, Porous Concrete)

<table>
<thead>
<tr>
<th>Location Description:</th>
<th>Property Owner:</th>
</tr>
</thead>
</table>

**Type of Inspection:**  
Pre-rainy Season (PRS)  
Rainy Season (RS)  
After-rainy Season (ARS)

*This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.*

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Drainage            | RS              | Is there standing or pooling of water? |                       | • Check perforated pipe outlet for obstruction or damage.*  
|                     | RS              | Is there visible water flowing over the surface of the pervious concrete/pavers during a low intensity storm? | | • Flush perforated pipe to remove obstructions/sediment.*  
|                     | PRS             | Is there sediment visible on the surface of the pervious concrete/pavers? | | • Repair or replace perforated pipe, replace with new soil and regrade.  
|                     | RS/ARS          |                     | | • Subsurface layers may need cleaning and/or replacing.  
|                     |                 | Is there sediment visible on the surface of the pervious concrete/pavers? | | • In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area.  
|                     |                 |                     | | • In wet weather, use a vactor truck to vacuum clean surface area. |

* If perforated pipe is present.
# POROUS PAVEMENT- CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
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<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there under cutting or washouts along the sidewalks and/or curbs abutting a planter strip?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
</tbody>
</table>
|                     | PRS RS ARS     | Are there cracks, uplifts, slumps, missing pavers, and/or pot holes present? Is there sediment present in the catch basin and in the overflow pipe? |  | • Check perforated pipe outlet for damage. *
|                     |                |                   |                       | • Repair or replace perforated pipe, replace with new soil and regrade.* |
|                     |                |                   |                       | • Subsurface layers may need cleaning and/or replacing. |
|                     |                |                   |                       | • Replace or repair damaged areas. | |

* If perforated pipe is present.
<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>PRS</td>
<td>Is the vegetation clogging the inlet flow areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation.</td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS</td>
<td>Is there vegetation growing in the cracks, stress lines, and/or abutment areas?</td>
<td></td>
<td>• Remove vegetation.</td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td></td>
<td></td>
<td>• In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area.</td>
</tr>
<tr>
<td></td>
<td>PRS ARS</td>
<td>Is algae present?</td>
<td></td>
<td>• In wet weather, use a vactor truck to vacuum clean surface area.</td>
</tr>
</tbody>
</table>

**Comments** (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)

- In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area.
- In wet weather, use a vactor truck to vacuum clean surface area.
# POROUS PAVEMENT- CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMP General</strong></td>
<td>PRS RS ARS</td>
<td>Is there debris/trash area?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there gum or other material stuck to the pervious surface?</td>
<td></td>
<td>• In dry weather, use a mechanical sweeper or a vactor truck to vacuum clean surface area. • In wet weather, use a vactor truck to vacuum clean surface area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is graffiti present?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement. • Placement should not disrupt flow characteristics/design.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in placed?</td>
<td></td>
<td>• Repair and/or replace loose or damaged features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Check for damage sidewalk, curb, gutter, and catch basin including uplift and settling.</td>
<td></td>
<td>• Remove and replace damaged areas.</td>
<td></td>
</tr>
</tbody>
</table>

**Comments**: Describe maintenance completed and if needed maintenance was not conducted, note when it will be done.
1. Permeable pavement or surface per governing agency standards
2. Sand layer (fine sand)
3. Transition layer (coarse sand) as needed for conveyance and treatment
4. Structural soil or drain rock

UNDISTURBED NATIVE SOIL
FACT SHEET- VEGETATED SWALE

VEGETATED SWALE
Also know as: Bioretention Swale, Treatment Swale, and Grassy Swale

DESCRIPTION
The swale best management practice (BMP) functions as a soil and plant-based filtration and infiltration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of storm water runoff. Vegetated swales can serve as part of a storm water drainage system and can replace curbs, gutters and storm sewer systems.

ADVANTAGES

• Can achieve both water quality and volume capture objectives.
FACT SHEET- VEGETATED SWALE

- Vegetated swales provide storm water treatment that enhances the quality of downstream water bodies by using natural processes.
- The vegetation reduces heat island effects and improves an area's landscape.
- Vegetated swales can be designed to convey high flow as well as water quality flow.

LIMITATIONS

- Can be difficult to avoid channelization, which may cause erosion and limit infiltration potential.
- May not be appropriate for industrial sites or locations where spills may occur.
- Grassed swales cannot treat a very large drainage area. Large areas may be divided and treated using multiple swales.
- A thick vegetative cover is needed for these practices to function properly.
- Not effective and may even erode when flow velocities are high, if the grass cover is not properly maintained.
- Swales are more susceptible to failure if not properly maintained than other treatment BMPs.
- Should not be used in areas of know contamination. If soil and/or groundwater contamination is present on the site or within a 100’ radius of the proposed BMP location, the North Coast Regional Water Quality Control Board will need to be contacted and the site reviewed.
- Should not be used in areas of slope instability where infiltrated storm water may cause failure. Slope stability should be determined by a licensed geotechnical engineer.
- Do not use in locations that can negatively impact building foundation or footings. Location shall be approved by a licensed Geotechnical Engineer.

KEY DESIGN FEATURES

- The longest flow path for the swale shall have a minimum retention time of 12 minutes for conditions when the treatment flows enter the Vegetated Swale uniformly along the swale length. The longest flow path for the swale shall have a minimum retention time of 5 minutes if 90 percent or more of the treatment flow enters the swale at the upstream end.
- Swale should be designed so that the water level does not exceed 2/3rds the height of the grass or 4 inches, whichever is less, at the design treatment rate.
- Longitudinal slopes between 1% and 2.5% are recommended.
- Maximum allowable slope is 8% slope. In steep areas, check dams up to 24-inches high and at least 25 feet apart are allowed.
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.
- Swales constructed in cut are preferred, or in fill areas that are far enough from an adjacent slope to minimize the potential for gopher damage. Do not use side slopes constructed of fill, which are prone to structural damage by gophers and other burrowing animals.
FACT SHEET- VEGETATED SWALE

- A diverse selection of low growing, plants that thrive under the specific site, climatic, and watering conditions should be specified. Vegetation whose growing season corresponds to the wet season are preferred. Drought tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- Vegetated swales shall have a maximum treatment width of 10 feet. The vegetated swale bed shall be at least 2-feet wide and no more than 7-feet wide. Parallel swales may be used if calculations show greater width is needed.
- The bed of the swale flow area shall slope at about 2% from toe of side slope to center of swale. Side slopes shall be no greater than a 2 to 1 slope.
- If vegetation is not established by October 1st, a 1-year biodegradable loose weave geofabric shall be placed on swale surface. If vegetation is not established by October 15th of the year, sod shall be placed over loose soils.
- Vegetated swale shall be sized using the spreadsheet provided by the local agency.
- The swale shall convey the 10-year storm event with flows contained within the swale. Adjacent to streets, the 100-year storm event shall be conveyed with flows below the top of curb elevation. (Include flow in the gutter in the calculation.)
- If the 10 or 100-year storm event flow velocity is greater than 4 feet per second, a permanent geofabric liner shall be used that is rated for the calculated flow velocity.
- If used, the perforated pipe trench shall be backfilled with ¾” crushed rock with a 2-inch bed underneath and 6-inch cover.

SIZING DESIGN- GOAL AND REQUIREMENTS

- The design goal for vegetated swale is to capture (infiltration and/or reuse) 100% of the volume of runoff generated by the 85th percentile 24 hour storm event. This is a retention requirement. If 100% volume capture is achieved than no additional treatment is required.
- If the design goal is not achievable, then the vegetated swale sizing requirement is:
  - Water Quality Treatment of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.20 inches per hour, and
  - Volume Capture (infiltration and/or reuse) of the increase in volume of storm water due to development generated by the 85th percentile 24 hour storm event. This is a retention requirement.
- All calculations shall be completed using the “Storm Water Calculator” available at www.srcity.org/stormwaterLID
INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, state the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum maintenance shall include the following:

- Mow and irrigate during dry weather to the extent necessary to keep vegetation alive. Where 6-inch high grasses are used, the grass height shall be at least 3 inches after mowing. Where mowed grasses are shown, the grass height shall be mowed when the height exceeds 3 inches.
- Remove obstructions and trash from vegetated swale.
- Pesticides and fertilizers shall not be used in the swale.

Vegetated Swales shall be inspected and maintained monthly during the rainy season to review:

- Obstructions and trash.
- Ponded flow is drained within 72 hours after a rainfall event.
- Condition of grasses.
- If ponding is observed, grading will be required to restore positive drainage.
VEGETATED SWALE - CHECKLIST

Vegetated Swale
Inspection and Maintenance Checklist
(aka: Bioretention Swale, Treatment Swale, Grassy Swale)

Date of Inspection: __________________________
Inspector(s): ______________________________
BMP ID #: ______________________________
Property Owner: ____________________________

Location Description: __________________________________________

Type of Inspection:  Pre-rainy Season (PRS)  Rainy Season (RS)  After-rainy Season (ARS)

This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.

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<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>RS</td>
<td>Is there standing or pooling of water after 3 days of dry weather?</td>
<td></td>
<td>• Remove any obstruction in the swale and/or regrade to restore positive drainage.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>Is there poor drainage during a high intensity storm event?</td>
<td></td>
<td>• Clean the High Flow Bypass Inlet. • Check pipe for damage and/or blockage. Repair if required.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>Is the flow into the vegetative swale even and uniform?</td>
<td></td>
<td>• Remove any obstruction preventing a uniform flow into the swale.</td>
<td></td>
</tr>
<tr>
<td>Inspection Category</td>
<td>When to Inspect</td>
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<td>---------------------</td>
<td>----------------</td>
<td>-------------------</td>
<td>----------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Erosion</td>
<td>RS ARS</td>
<td>Is there under cutting or washouts along the impervious surfaces abutting the Vegetative Swale?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there channelization (gully) forming along the length of the swale area?</td>
<td></td>
<td>• Fill in eroded areas and regrade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS ARS</td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the swale?</td>
<td></td>
<td>• Remove sediment and check the grading. Add replacement soil and/or mulch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch unevenly distributed in the Vegetative Swale area?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there voids and/or holes around the High Flow Bypass Inlet?</td>
<td></td>
<td>• Repair and fill in damaged areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is there evidence of animal activity such as holes or dirt mounds from digging or borrowing?</td>
<td></td>
<td>• Rodent control activities must be in accordance with applicable laws and do not affect any protected species.</td>
<td></td>
</tr>
</tbody>
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# VEGETATED SWALE - CHECKLIST

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<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging or redirecting the inlet/outlet flow areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch distributed evenly throughout the swale area?</td>
<td></td>
<td>• Redistribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there dead or dry plants/weeds? Is the vegetation over grown?</td>
<td></td>
<td>• Remove dead and/or dry vegetation. Replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier, trip, and or obstruction hazards.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Mow grass as needed.</td>
<td></td>
</tr>
</tbody>
</table>
# VEGETATED SWALE - CHECKLIST

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</thead>
<tbody>
<tr>
<td><strong>BMP General</strong></td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the planter/swale area?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is Graffiti present?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement.</td>
<td>• Placement should not disrupt flow characteristics/design.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the vegetation irrigation functional?</td>
<td></td>
<td>• Repaired broken missing spray/drip emitters.</td>
<td>• Reposition and/or adjust to eliminate over spray and/or over watering.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in placed?</td>
<td></td>
<td>• Repair and/or replace loose or damaged features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Check for damaged sidewalk, curb, gutter, and catch basin. This includes uplift and settling.</td>
<td></td>
<td>• Remove and replace damaged areas.</td>
<td></td>
</tr>
</tbody>
</table>
NOTES
1. SWALE LENGTH TO BE DESIGNED TO PROVIDE 12 MINUTES OF CONTACT TIME WHEN FLOW ENTERS UNIFORMLY ALONG LENGTH. OR PROVIDE 5 MINUTES OF CONTACT TIME IF 90% OR MORE OF THE FLOW ENTERS AT THE UPSTREAM END.
2. SWALE MUST CONVEY DESIGN FLOWS PER MUNICIPAL DESIGN STANDARDS.
3. PARKING ISLAND WIDTH PER APPLICABLE MUNICIPAL STANDARDS.

N.T.S.

PRIORITY 3
VEGETATED SWALE

SCALE: NONE  DATE: 05/10/11
DWN. D/T  CHK. HH  SHEET 1 of 1  P3-07
FLOW THROUGH PLANTER
Also know as: Above Ground Bioretention, Filter Planter, and Water Quality Planter

DESCRIPTION
Flow Through Planters function as a soil and plant-based filtration feature that removes pollutants through a variety of natural physical, biological, and chemical treatment processes. Flow Through Planters are usually installed next to buildings or common open areas to treat storm water from rooftops.

ADVANTAGES
- Provides water quality treatment.
- Can be used as part of a treatment train with volume capture BMPs.
- Used in urban areas where space is limited.
- Used on sloped sites.
- Provides habitat for birds and attracts pollinators like butterflies and bees.
FACT SHEET - FLOW THROUGH PLANTER

LIMITATIONS

- Do not achieve volume capture/infiltration requirements.
- Impacts to adjacent buildings and overflow requirements need to be considered in design.
- Plant selection needs to consider effects of fast draining soils.

KEY DESIGN FEATURES

- Bottom shall be impervious to protect adjacent structures and slope stability, unless otherwise approved by a licensed Geotechnical Engineer. If designed to allow infiltration, the underlying soil will need to be tested to determine the infiltration rate and should not be compacted.
- Include plants suited to the unique conditions in the planter and design to achieve 51% cover.
- Install a designated high flow bypass inlet or route.
- Underdrain required.
- Designed to prevent standing water. All surface water must drain within 72 hours to prevent mosquito breeding.
- Select non-floatable surface mulching material to prevent clogging of downstream inlets.
- Downspouts to incorporate splash blocks and/or other dissipation methods to prevent erosion.

SIZING DESIGN- GOAL AND REQUIREMENTS
(Appplies to all tributary areas with impervious surfaces)

- **Water Quality Treatment** of 100% of the flow generated by the 85th percentile 24 hour storm event, as calculated using the Rational Method and a known intensity of 0.20 inches per hour.
- All calculations shall be completed using the “Storm Water Calculator” available at [www.srcity.org/stormwaterLID](http://www.srcity.org/stormwaterLID).

INSPECTION AND MAINTENANCE REQUIREMENTS

A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include recommended maintenance practices, identify the parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.

At a minimum inspection and maintenance shall include the following:
- Inspect twice annually for ponded water. If ponded water is observed, the perforated pipe shall be cleaned.
FACT SHEET- FLOW THROUGH PLANTER

- If ponded water remains, further grading and replacement may be necessary to prevent mosquito breeding.
- The high flow inlet should be inspected and cleaned as necessary to remove any obstructions.
- Pesticides and fertilizers shall not be used in the rain garden area.
- Plants should be pruned, weeds pulled and dead plants replaced as needed.
- Check downspout splash blocks for proper location and fill/regard any washouts.
- Evaluate mulching around plants. Add/replace as needed.
FLOW THROUGH PLANTER - CHECKLIST

Flow Through Planter
Inspection and Maintenance Checklist
(aka: Above Ground Bioretention, Filter Planter, Water Quality Planter)

Date of Inspection: ______________________
Inspector(s): ______________________
BMP ID #: ______________________
Property Owner: ______________________

Location Description: ______________________
Type of Inspection: Pre-rainy Season (PRS) Rainy Season (RS) After-rainy Season (ARS)

This Inspection and Maintenance Checklist is to be used in conjunction with its corresponding LID Factsheet and Maintenance Plan. Please review these documents before performing the field inspection.

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage</td>
<td>RS</td>
<td>Is there standing or pooling of water after 3 days of dry weather?</td>
<td>Yes</td>
<td>• Check perforated pipe outlet for obstruction or damage.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Flush perforated pipe to remove obstructions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove and replace the first few inches of topsoil.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove all the soil and inspect perforated pipe. Repair or replace perforated pipe, replace with new soil and re-grade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>Is there overflow due to excessive splashing/spray?</td>
<td>Yes</td>
<td>• Reposition splash block or dissipater to reduce or eliminate splash/spray overflow.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>Is water overflowing the sides of the planter unit during major storm events?</td>
<td>Yes</td>
<td>• Check outlet area for obstruction or damage.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Check High Flow Bypass inlet pipe for obstruction or damage.</td>
<td></td>
</tr>
</tbody>
</table>

A-115  City of Santa Rosa and County of Sonoma
<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion RS ARS</td>
<td></td>
<td>Is there under cutting or washouts around the inlet splash block(s)?</td>
<td></td>
<td>• Re-position the inlet splash block(s) or dissipater(s).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Fill in eroded areas and re-grade.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is there channelization (gully) forming along the length of the planter area?</td>
<td></td>
<td>• Re-position the inlet splash block or dissipater.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Re-grade planter area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is there accumulation of sediment (sand, dirt, mud) in the planter?</td>
<td></td>
<td>• Remove sediment and check the grading. Add replacement soil and or mulch.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is the mulch unevenly distributed in the planter area?</td>
<td></td>
<td>• Re-distribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Re-grade planter area.</td>
<td></td>
</tr>
</tbody>
</table>
## FLOW THROUGH PLANTER - CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation</td>
<td>PRS RS ARS</td>
<td>Is the vegetation clogging the Inlet/outlet areas?</td>
<td></td>
<td>• Trim and/or remove the excess vegetation around the inlet/outlet areas.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the mulch spread evenly throughout the planter area?</td>
<td></td>
<td>• Re-distribute and add additional mulch if needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS ARS</td>
<td>Are there dead or dry plants/weeds?</td>
<td></td>
<td>• Remove dead and/or dry vegetation. Replace as needed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Remove or trim any vegetation that is causing a visual barrier hazard.</td>
<td></td>
</tr>
</tbody>
</table>
# FLOW THROUGH PLANTER - CHECKLIST

<table>
<thead>
<tr>
<th>Inspection Category</th>
<th>When to Inspect</th>
<th>Maintenance Issue</th>
<th>Is the Issue Present?</th>
<th>Require Maintenance</th>
<th>Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP General</td>
<td>PRS RS ARS</td>
<td>Is there debris/trash in the planter area?</td>
<td></td>
<td>• Remove all trash and debris.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Is the planter and/or surrounding area marked with graffiti?</td>
<td></td>
<td>• Remove all graffiti from the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there missing or disturbed aesthetics features?</td>
<td></td>
<td>• Replace and/or reposition aesthetics features to original placement.</td>
<td>• Placement should not disrupt flow characteristics/design.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Check for broken or damaged drain inlets/outlets, splash blocks, and grates.</td>
<td></td>
<td>• Replace or repair all damage features.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS S</td>
<td>Is the vegetation irrigation functional?</td>
<td></td>
<td>• Repaired broken missing spray/drip emitters.</td>
<td>• Reposition to eliminate over spray and/or over watering.</td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are there cracks, holes, and/or damage sides, top of the planter unit?</td>
<td></td>
<td>• Repair or replace unit. Repairs must be watertight.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRS RS ARS</td>
<td>Are the aesthetic features firmly secured in placed?</td>
<td></td>
<td>• Repair and/or replace loose or damage features.</td>
<td></td>
</tr>
</tbody>
</table>
NOTE:
1. ALL SURFACE WATER MUST DRAIN WITHIN 72 HOURS TO PREVENT MOSQUITO BREEDING.
2. IRRIGATION MAY BE REQUIRED FOR PLANT ESTABLISHMENT AND IN DRY WEATHER.
FACT SHEET- PROPRIETARY UNITS

PROPRIETARY UNITS
Also known as: Structural Units, Physical Separators, Prefabricated Units, and Manufactured Units.

GENERAL DESCRIPTION
Proprietary units, or manufactured units, very in design and use to serve a wide variety of storm water quality needs. They are generally constructed offsite and are installed as a unit. Some are designed to target a particular pollutant, such as hydrocarbons, while others remove multiple pollutants. Proprietary units can be very useful when a particular pollutant needs to be removed as part of pretreatment or where space is limited as part of a treatment train. Proprietary typically provide treatment, but not volume capture.

CHAMBERED SEPARATOR UNITS

GENERAL INSPECTION AND MAINTENANCE REQUIREMENTS
A maintenance plan shall be provided with the Final SUSMP. The maintenance plan shall include the manufacturers recommended maintenance practices, designation of parties responsible for maintenance and upkeep, specify the funding source for ongoing maintenance with provisions for full replacement when necessary and provide site specific inspection checklist.
FACT SHEET- PROPRIETARY UNITS

CHAMBERED SEPARATOR UNITS

Use the properties of different pollutants to remove each in a separate chamber. As such, these units tend to be larger. They can either be inline with the storm drain system, or offline. An access point must be provided to each chamber for maintenance purposes. These units must be maintained with a vacuum truck.

TRASH EXCLUDERS

Use screens or other physical filtration to prevent trash from entering the storm drain system. The collected trash can either be stored in a portion of the inlet or in the curb. High flow bypass must be provided to prevent clogging and backup. These units must be maintained with a vacuum truck.

FILTER INSERTS

Use bags and/or fabric or other physical filtration to filter out trash, sediment, and/or hydrocarbons. Some filter inserts are designed to remove particular pollutants. High flow bypass must be provided to prevent backup.
CENTRIFUGAL SEPARATOR UNITS

Use curved baffles to direct storm water so that centrifugal force drops sediment and debris out and usually use screens to collect floatable material. These units can be either inline with the storm drain system or offline. These units must be maintained with a vacuum truck.

TREE FILTER UNITS

Are combination units that use both structural and biological elements to clean storm water. They generally consist of a concrete vault filled with a special soil mix that a tree or shrub is planted in. Storm water is directed into the unit, filtered through the soil, and collected in a perforated pipe and conveyed to the storm drain system. High flow bypass must be provided for high intensity rain events.
PLANT AND TREE LISTS
<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Grasses and Grass-like Plants</th>
<th>Other Notes</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrostis exarata</td>
<td>Spike bentgrass</td>
<td>X X Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alopecurus aequalis</td>
<td>shortawn foxtail</td>
<td>X X Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alopecurus sacculus</td>
<td>Pacific foxtail</td>
<td>X X Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromus carinatus</td>
<td>California brome</td>
<td>X X Yes Yes Yes Yes Yes NR L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex barbara variabilis</td>
<td>Santa Barbara sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td>Not for full sun</td>
<td></td>
</tr>
<tr>
<td>Carex brevicaulis</td>
<td>short stem sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td>Short turf-like growth habit</td>
<td></td>
</tr>
<tr>
<td>Carex demissa</td>
<td>dense sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex deweyanna</td>
<td>Dewey sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex divulsa</td>
<td>Berkeley sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td>Not a native. Mistakenly sold as the native C. tumulicola</td>
<td></td>
</tr>
<tr>
<td>Carex obtusa</td>
<td>slough sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex panicea</td>
<td>California meadow sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex rupestris</td>
<td>curly sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex stipata</td>
<td>sawbreak sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex sublusa</td>
<td>rusty sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex testacea</td>
<td>New Zealand orange sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex tumulicola</td>
<td>foothill sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex vesicaria</td>
<td>inflated sedge</td>
<td>X X Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dianthus californicus</td>
<td>California oatgrass</td>
<td>X X Yes Yes Yes Yes Yes NR L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deschampsia danthonoides</td>
<td>annual hairgrass</td>
<td>X X Yes Yes Yes Yes Yes Yes NR L</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Deschampsia cespitosa</td>
<td>tufted hairgrass</td>
<td>X X Yes Yes Yes Yes Yes Yes NR L</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Distichlis spicata</td>
<td>salt grass</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleocharis acicularis</td>
<td>needle spike rush</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleocharis macrostachya</td>
<td>creeping spike rush</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleocharis ovata</td>
<td>ovate spike rush</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eleocharis palustris</td>
<td>creeping spike rush</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ellusus glaucus</td>
<td>blue wild rye</td>
<td>X X Yes Yes Yes Yes Yes Yes NR M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Festuca californica</td>
<td>California fescue</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Festuca idahoensis</td>
<td>blue bunchedgrass</td>
<td>X Yes Yes Yes Yes Yes Yes Yes VL</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Festuca rubra</td>
<td>red fescue</td>
<td>X Yes Yes Yes Yes Yes Yes Yes L</td>
<td>Can be mowed as turf alternative. Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Glyceria rhombifolia</td>
<td>western managrass</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Hordeum brachyantherum</td>
<td>meadow barley</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes NR M</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Juncus balticus</td>
<td>Baltic rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncus bufonis</td>
<td>toad rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncus effusus</td>
<td>Pacific rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncus ensifolius</td>
<td>dagger leaf rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncus patens</td>
<td>blue rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td>L May not need summer irrigation after establishment</td>
<td></td>
</tr>
<tr>
<td>Juncus tenuis</td>
<td>slender rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juncus xiphoides</td>
<td>iris-leaved rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leymus triticeoides</td>
<td>creeping wild rye</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes VL</td>
<td>Can be mowed. Ideal plant for many uses.</td>
<td></td>
</tr>
<tr>
<td>Melica californica</td>
<td>California melic</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes VL</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Melica imperfecta</td>
<td>small flowered melic</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR L</td>
<td>Can tolerate saturation if top soil layer drains</td>
<td></td>
</tr>
<tr>
<td>Muhlenbergia rigens</td>
<td>deergrass</td>
<td>X Yes Yes Yes Yes Yes Yes Yes L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nassella lepidota</td>
<td>foothill needlegrass</td>
<td>X Yes Yes Yes Yes Yes Yes Yes VL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nassella pulchra</td>
<td>purple needlegrass</td>
<td>X Yes Yes Yes Yes Yes Yes Yes VL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phalaris californica</td>
<td>California canny grass</td>
<td>X X Yes Yes Yes Yes Yes Yes Yes M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleurozium virginicum</td>
<td>sapphire grass</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scirpus americanus</td>
<td>three square</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scirpus californicus</td>
<td>California bullrush</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typha angustifolia</td>
<td>narrowleaf cattail</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typha latifolia</td>
<td>cattail</td>
<td>X Yes Yes Yes Yes Yes Yes Yes NR H</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Herbaceous Plants

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Low Zone</th>
<th>Mid Zone</th>
<th>High Zone</th>
<th>Vegetated Buffer</th>
<th>Extended Detention Basin</th>
<th>Vegetated Wall</th>
<th>Tolerates Saturation</th>
<th>WUCOLS</th>
<th>Likely WUCOL</th>
<th>Other Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achillea millefolium</td>
<td>Common yarrow</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Aster sp.</td>
<td>aster</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Athyrium filix-femina</td>
<td>lady fern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blechnum spicant</td>
<td>deer fern</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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This species is adapted to low water conditions.

Similar to Russell hybrids.

Tolerates saturation in winter only.