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<th>Description</th>
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<tr>
<td>LID</td>
<td>Low Impact Development</td>
</tr>
<tr>
<td>MS4</td>
<td>Municipal Separate Storm Sewer System</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>DMA</td>
<td>Drainage Management Area</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>SC P</td>
<td>Stormwater Control Plan</td>
</tr>
<tr>
<td>APN</td>
<td>Assessor’s Parcel Number</td>
</tr>
<tr>
<td>PBS</td>
<td>Mendocino County Planning and Building Services</td>
</tr>
<tr>
<td>NCRWQCB</td>
<td>North Coast Regional Water Quality Control Board</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resource Control Board</td>
</tr>
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List of Terms

<table>
<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Treating Areas</td>
<td>Pervious areas that drain directly off-site or to the storm drain system</td>
</tr>
<tr>
<td>Self- Retaining Areas</td>
<td>Pervious areas that are graded to retain the first inch of rainfall, sized using the 2:1 ratio (impervious to pervious)</td>
</tr>
<tr>
<td>Source Controls</td>
<td>A structural device or a management practice used to prevent or reduce the release of pollutants to stormwater.</td>
</tr>
<tr>
<td>Site Design Measures</td>
<td>BMPs that are designed to reduce stormwater runoff from a project site</td>
</tr>
<tr>
<td>Small Project</td>
<td>Small projects are projects that create or replace between 2,500 SF and 5,000 SF of impervious surface or are single family homes* that create 2,500 SF or more of impervious surface (*the definition of single family home will be determined by PBS).</td>
</tr>
<tr>
<td>Regulated Project</td>
<td>Projects other than single-family homes that create or replace 5,000 SF or more of impervious surface</td>
</tr>
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PART A

Project Applicability
Map 1. Fort Bragg MS4 Area
Map 2. Ukiah MS4 Area
1.0 Applicability

The following table provides an overview of the various project types and required submittals for projects within the boundaries of the County of Mendocino’s MS4 permit area. MS4 General Permit Boundary Maps are attached and can also be obtained from the Planning and Building Services Department. The requirements for stormwater management are determined by the type and scale of the project.

### Table 1 - Applicable Post-Construction Standards Based on Project Type

<table>
<thead>
<tr>
<th>Type of Project</th>
<th>Required Submittals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exempt Projects</strong></td>
<td>• “MS4 Area – New and Post Construction Stormwater Runoff Control Checklist”</td>
</tr>
<tr>
<td>Exempt Projects include:</td>
<td>• Follow instructions in Part B Small Projects of this manual.</td>
</tr>
<tr>
<td>• Projects that create or replace less than (&lt;) 2,500 square feet (SF) of impervious surface;</td>
<td>• Site Design Measures, Appendix 1</td>
</tr>
<tr>
<td>• Interior remodels and routine maintenance or repair such as exterior wall surface replacement;</td>
<td>• Site Plan</td>
</tr>
<tr>
<td>• Renovating of an existing building;</td>
<td>• “MS4 Area – New and Post Construction Stormwater Runoff Control Checklist”</td>
</tr>
<tr>
<td>• Asphalt or paving overlays and resurfacing of existing surfaces. “Replacement, Development, or Redevelopment” is defined as work that replaces existing surfaces down to subgrade and are not exempt; and</td>
<td>• Follow instructions in Part B Small Projects of this manual.</td>
</tr>
<tr>
<td>• Linear Underground Projects (LUPs) unless the LUP has a discrete location that has greater than or equal to (≥) 5,000 SF of newly constructed impervious surface</td>
<td></td>
</tr>
<tr>
<td><strong>Small Projects</strong></td>
<td>• “MS4 Area – New and Post Construction Stormwater Runoff Control Checklist”</td>
</tr>
<tr>
<td>Small Projects include:</td>
<td>• Follow instructions in Part C of this manual.</td>
</tr>
<tr>
<td>• Single-family homes, not part of a larger plan of development, that create or replace greater than or equal to (≥) 2,500 SF of impervious surface; and</td>
<td>• Preliminary SCP (discretionary projects)</td>
</tr>
<tr>
<td>• Projects that create or replace greater than or equal to (≥) 2,500 SF and less than (&lt;) 5,000 SF of impervious surface</td>
<td>• Final SCP (all regulated projects)</td>
</tr>
<tr>
<td><strong>Regulated Projects</strong></td>
<td>• Requirements vary; contact County or City department within project jurisdiction</td>
</tr>
<tr>
<td>Regulated Projects include:</td>
<td></td>
</tr>
<tr>
<td>• Projects other than single-family homes that create or replace greater than or equal to (≥) 5,000 SF of impervious surface.</td>
<td></td>
</tr>
<tr>
<td><strong>Regulated Redevelopment, Roads, and Linear Underground Projects</strong></td>
<td></td>
</tr>
<tr>
<td>Regulated Redevelopment, Roads, and Linear Underground Projects include:</td>
<td></td>
</tr>
<tr>
<td>• See MS4 Permit, Section E.12.c (pg. 50) for additional description and details of applicable Redevelopment, Road, and Linear Underground project requirements.</td>
<td></td>
</tr>
<tr>
<td><strong>Hydromodification Projects</strong></td>
<td>• Requirement: post-project runoff shall not exceed estimated pre-project flow rate for the 2-year, 24-hour storm.</td>
</tr>
<tr>
<td>Hydromodification projects are:</td>
<td>• See requirements for Regulated Projects above</td>
</tr>
<tr>
<td>• Specific Regulated Projects are projects that create and/or replace greater than or equal to (≥) 1 acre of impervious surface.</td>
<td>• Follow instructions in Part C of this manual.</td>
</tr>
<tr>
<td>• A project that does not increase impervious surface area over the pre-project condition is not a hydromodification management project (MS4 permit Sec. E.12.f).</td>
<td></td>
</tr>
<tr>
<td>• Projects with greater than or equal to (≥) 1 acre of Land Surface Disturbance may be subject to the State Construction General Permit (CGP) Post-Construction Standards and shall comply with the Mendocino LID Stormwater Manual, Regulated Project Post-Construction Standards in lieu of CGP Post-Construction Standards, if project location falls within the MS4 General Permit area.</td>
<td></td>
</tr>
</tbody>
</table>

**Definition of Impervious Surface:** A surface covering or pavement of a developed parcel of land that prevents the land’s natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to: roof tops, walkways, patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold the specified volume of rainfall runoff, are not impervious surfaces.

**Definition of Land Surface Disturbing Activities:** Any construction or demolition activity, including, but not limited to: clearing of vegetation, grading, grubbing, and disturbance to the ground such as stripping of top soils, soil compaction, excavation, and stockpiling or any other activity that results in a land disturbance that changes the physical condition of land forms, soils, vegetation, and hydrology.
Figure 1. Project-type Determination
**Instructions**

*Mendocino County Ordinance No. 4313 STORM WATER RUNOFF POLLUTION PREVENTION PROCEDURE* (Mendocino County Code Chapter 16.30 et. seq.) requires any person performing construction and grading work anywhere in the County shall implement appropriate Best Management Practices (BMP) to prevent the discharge of construction waste, debris or contaminants from construction materials, tools and equipment from entering the storm drainage system (off-site). It also allows the County to adopt requirements identifying appropriate BMPs to control the volume, rate, and potential pollutant load of storm water runoff from new development and redevelopment projects as may be appropriate to minimize the generation, transport and discharge of pollutants and as required by the County's NPDES MS4 General Permit. The County may incorporate these requirements into land use entitlements and construction or building-related permits to be issued for new development or redevelopment.

The following checklist is to be completed by you (the applicant) to determine which plans and specifications for storm water runoff control are required as part of a Building Permit Application to the County of Mendocino Building Division of the Department of Planning and Building Services.

**I. Construction Project Information** *(Completed by Applicant)*

<table>
<thead>
<tr>
<th>Physical Address</th>
<th>Site Location</th>
<th>City</th>
<th>Assessor Parcel Number (APN)</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Anticipated Construction Start date: / / Site-work construction completion: / /

Circle and/or list all applicable permits directly associated with grading activity, not limited to the following:  
- State Construction General Permit- 
- State 401 Water Quality Certification,  
- U.S. Army Corps 404 permit,  
- California Fish and Wildlife 1600-

A.) Is the construction site part of a larger common plan of development or sale? YES NO UNKNOWN (circle one) B.) Name of larger common plan/project (if applicable):

**II. Checklist** *(Completed by Applicant)*

A.) Total area of soil disturbing activity (definition below) ___ sq. ft. If project disturbs 1 acre or more of soil then provide the State Construction General Permit Waste Discharge Identification Number: ____________

B.) Total area of new or replaced impervious surface ___ sq. ft. If project creates or replaces 2,500 sq. ft. or more of impervious surface, submit a Storm Water Control Plan or equivalent in compliance with the LID Manual.

**Definition of Impervious Surface** - A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/storm water. Impervious surfaces include, but are not limited to: roof tops, walkways, patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold the specified volume of rainfall runoff, are not impervious surfaces.

**Definition of Soil Disturbing Activities** - Any construction or demolition activity, including, but not limited to: clearing of vegetation, grading, grubbing, disturbance to the ground such as stripping of top soils, soil compaction, excavation, and stockpiling or any other activity that results in a land disturbance that changes the physical condition of land forms, soils, vegetation, and hydrology.

Does the stormwater runoff from the construction site discharge to (check all that apply):

- [ ] Remain on site/indirectly to  
- [ ] County Storm Drain System  
- [ ] Directly to waters of the U.S (e.g. river, lake, creek, stream, bay, ocean);  
- [ ] State 401 Water Quality Certification,  
- [ ] U.S. Army Corps 404 permit,  
- [ ] California Fish and Wildlife 1600-

Please indicate the distance from construction activity to nearest watercourse: _________ ft.

**III. Construction Site Storm Water Pollution Prevention Plan Submittal Requirement** *(Completed by Applicant)*

A. If your project is covered under the State Water Resources Control Board General Permit (CGP), attach a copy of the submitted Storm Water Pollution Prevention Plan (SWPPP) including the Notice of Intent (NOI) and WDID Number. Please note CGP projects within the MS4 areas are exempt from CGP post construction requirements provided a certification is submitted. See the State Water Board’s Stormwater Multi-Application, Reporting and Tracking System (SMARTS) to submit exemption certification information. *(https://smarts.waterboards.ca.gov)*

B. If a CGP is not required, your project shall submit, as part of your Building Permit Application, construction site BMPs plans and specifications prepared by a Qualified Storm Water Developer (QSD) OR applicant/owner/contractor prepared BMP plans and specifications referencing BMP information obtained from the County Department of Planning and Building Services and/or the California Storm Water Quality Association BMP Handbook. If an Encroachment permit is required from DOT, submission of the Water Pollution Control Plan from the encroachment permit may be used as a substitute provided it covers all proposed construction activities and locations.

**IV. Certification** *(Completed by Applicant)*

- Printed Name
- Signature

**V. For Official Use Only**

Submittal Date Received by Permit Number
PART B

Small Projects
2.0 SMALL PROJECTS (2,500-5,000 SQ.FT)

Projects that create or replace between 2,500 and 5,000 square feet of impervious surface or any size single-family home are considered small projects (size restrictions for single-family homes may be capped at a specific threshold – contact Mendocino County Planning and Building (PBS) staff if single-family home is greater than 5,000 square feet).

To comply with the MS4 regulations, small projects must include at least one stormwater runoff reduction measure (site design measure) in the project design. The site design measures available are found in Appendix 1. The site design sheets will be used as the Small Project Stormwater Control Plan. The following documents must be submitted with a Small Projects application to document compliance with the MS4 requirements:

- Site Design Measure Sheets of the measures used in the project (tables must be completed and signed)
- Site Plan showing the location of the labeled site design measures
- Completed “MS4 Area – New and Post Construction Stormwater Runoff Control Checklist”

The Site Plan may be a simple sketch or integrated into a plot plan or design drawings. An example of a Small Project Site Plan is found in Appendix 1 with the site design measures. Each site design sheet has a checklist of what should be included on the Site Plan.

The remaining sections of this manual go into specifics related to Regulated Projects. Although this detail may help in designing a small project, and all applicants are encouraged to read the entire manual, specific information for small projects is found on the individual site design measure sheets, Appendix 1, Site Design Measures.
PART C

Regulated Projects
3.0 INTRODUCTION

“Urban-related storm water has been identified as the source of impairment for tens of thousands of miles of rivers, streams, and coastal shorelines, as well as hundreds of thousands of acres of lakes, reservoirs and ponds in the United States. These impairments are largely due to the expansion of the built environment, which removes vegetation, alters the natural infiltration capability of the land, generates the discharge of pollutants, and leads to stream erosion.” (EPA 833-R14-003, pg. 1, 2014)

According to the State Water Resource Control Board (SWRCB), “Nonpoint source (NPS) pollution, also known as polluted runoff, is the leading cause of water quality impairments in California and in the nation.” (SWRCB, 2000)

In the U.S., approximately three-quarters (75%) of the population resides in urban areas. This is a dramatic shift from the early twentieth century when a majority of the population lived in rural settings. This shift has resulted in a significant increase in impervious or developed surfaces. “The creation of impervious surfaces that accompanies urbanization profoundly affects how water moves both above and below ground during and following storm events, the quality of that storm water, and the ultimate condition of nearby rivers, lakes, and estuaries.” (National Research Council, pg. 1, 2008)

Stormwater runoff that is not infiltrated directly into the soil and that lands on developed surfaces accumulates pollutants such as automotive fluids, cleaning solvents, toxic or hazardous chemicals, detergents, metals, bacteria, pesticides, oil and grease, food wastes, and other pollutants found on these surfaces. In urban environments, this polluted runoff eventually finds its way to surface water bodies, such as rivers, streams, lakes, bays, or the ocean. Polluted stormwater entering these waters is a significant concern to human health as well as a threat to plants and wildlife that inhabit these environments.

The National Pollutant Discharge Elimination System (NPDES) program under the Clean Water Act (CWA) is the main federal vehicle to regulate the quality of the nation’s waters. The County of Mendocino has prepared the Low Impact Development Standards Manual (LID Standards Manual) to comply with the requirements of the NPDES Municipal Separate Storm Sewer System (MS4) Permit (Order No. 2013-000). The LID Standards Manual provides guidance for the implementation of stormwater quality control measures in new development and redevelopment projects in unincorporated areas of the County with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges.

3.1 Background on Stormwater Regulations

Local stormwater regulations originate from federal regulations that began in 1987, when the Clean Water Act, originally passed in 1972, was amended by the Water Quality Act to formally include stormwater runoff. Congress subsequently authorized the National Pollution Discharge Elimination System (NPDES) program, authorizing the United States Environmental Protection Agency (EPA) to issue stormwater permits to municipalities regulating stormwater discharges. This authority was then delegated from the EPA to the California State and local Regional Water Quality Control Boards.

In 2003, the State Water Resources Control Board (SWRCB) established standards for local governing agencies to implement a number of programs to prevent pollution, improve and protect stormwater
quality, reduce stormwater runoff, and enhance the ecological function of local waterways in areas served by small Municipal Separate Storm Sewer Systems aka MS4s. The Phase II Small MS4 General Permit, specifically Section E.12, requires local governing agencies, such as the County of Mendocino, to regulate stormwater runoff from new developments or significant redevelopment projects in urban areas. In 2013, the SWRCB renewed the Phase II Small MS4 General Permit (SWRCB Water Quality Order No. 2013-0001-DWQ, General Permit No. CAS000004) and the North Coast Regional Water Quality Control Board (NCRWQCB) is responsible for enforcing Phase II Small MS4 General Permit in the urban areas of Mendocino County.

3.2 Purpose of this Manual

The purpose of this manual is to provide technical guidance for project applicants whose project requires conformance with Section E.12 of the Phase II Small MS4 General Permit. The target audience for this manual includes developers, designers, contractors, homeowners, and County staff engaged in plan-checking, permitting, and inspections related to land development activities. This manual contains the necessary forms and worksheets required to be completed by the developer for project approval and long-term maintenance.

This manual includes the following information:

- Basic information on the Phase II Small MS4 General Permit and its objectives
- Assistance with determining whether a project is subject to the Phase II Small MS4 General Permit regulations
- Simple ways to reduce the volume of stormwater runoff from a project site using Site Design Measures
- Methods to reduce stormwater contamination from operations on a project site using Source Control Measures
- An introduction to Low Impact Development (LID) and resources to assist with site design incorporating LID and creating a Stormwater Control Plan
- Explanation of a project applicant’s responsibility for the operations and maintenance of bioretention features – O&M

During the project planning process, read this manual to understand the principles and design procedures before beginning to design your project. Then, follow the steps on the appropriate worksheets to create a stormwater management plan for your project.

As this manual is a “living” document, updates may be made as local, regional, state, or federal policies or their applications change. Proposed revisions will be evaluated on a case by case basis and will require review and approval by the Planning and Building Department. Updates to this manual will be noted in the Acknowledgements Section of future versions.

3.3 Relationship of Manual to Local Stormwater Ordinance

This manual provides guidance and requirements for post-construction measures on projects within the Mendocino County MS4 area. Mendocino County Code, Chapter 16.30 states that the County shall adopt requirements identifying appropriate BMPs to control the volume, rate, and potential pollutant load of stormwater runoff from new development and redevelopment projects as may be appropriate to minimize
the generation, transport and discharge of pollutants and as required by the Phase II Small MS4 General Permit.

The requirements described herein apply to all new and redevelopment project applications (Building Permits, Coastal Development Permits, Use Permits, Variances, and Minor Subdivision Permits) that are submitted to the County of Mendocino Planning and Building Services after December 31, 2014.

3.4 Geographic Area

The requirements and standards described in this manual apply to those properties under the jurisdiction of the Phase II Small MS4 General Permit in Mendocino County, which encompasses the unincorporated areas of the County that have a high population (over 10,000 people) and high population density (at least 1,000 residents per square mile). The County of Mendocino’s small MS4 Permit applies to properties in the vicinity of the Cities of Ukiah and Fort Bragg, but not within the city limits of either. Maps 1 and 2 show properties that are subject to the Permit requirements (Part A). In the case that the MS4 Boundary intersects a parcel, only the part of the parcel within the MS4 permit boundary is subject to permit requirements. The County of Mendocino stormwater information website also contains a list of assessor’s parcel numbers subject to the MS4 permit regulations (https://www.mendocinocounty.org/government/planning-building-services/stormwater).

3.5 What is Low Impact Development (LID)?

Low impact development, or LID, is a stormwater management practice that aims to capture, treat, and infiltrate stormwater runoff in a way that mimics pre-project site hydrology. This is accomplished through the incorporation of small-scale landscape-based features throughout a project site. Small landscape features intercept stormwater runoff and meter its flow to reduce the detrimental effects of increased peak flows. LID captures runoff, promotes natural infiltration, and processes pollutants through natural biological activity in soil, rendering some pollutants less toxic.

Examples of LID include planting trees to intercept rainfall before it meets impervious surfaces; rain barrels at the end of roof gutters to catch water and store for irrigation or release into vegetated areas, vegetated buffer strips (self-retaining areas) to filter surface runoff before it meets surface waters (such as gutters or streams), and bioretention facilities to promote natural filtration of stormwater runoff through surface vegetation and soil infiltration. Specific LID features will be discussed in more detail in Sections 5, 6, and 7.

3.6 Project Scale

The requirements for stormwater management are determined by the type and scale of the project. The requirements and specifications for implementation of post-construction stormwater measures found in this section of the Mendocino County LID Manual are for Regulated Projects; Regulated Redevelopment, Roads, and Linear Underground Projects; and Regulated Projects with >1 acre of created or replaced impervious surface. Use the guidelines in Part A to ensure you have correctly determined the applicable project type and required submittals for your project. Consult the Planning and Building Department for assistance with determining project type.
4.0 STEPS TO COMPLIANCE

Depending on the type of project and the area of impervious surface being created or replaced, varying levels of regulation and design requirements will apply. Stormwater facilities should be integrated into the project design at the earliest stage of project development.

Compliance can be met through implementing a variety of LID strategies at your project site. For example, some strategies may include using Site Design Measures exclusively or a combination of site design measures and bioretention facilities. A clear indication of which LID strategies you are implementing will aid in the plan review process.

When utilizing bioretention facilities or equivalent in the design, consider, at the earliest stage, who will be responsible for operation and maintenance of the facility. In a residential subdivision, these considerations will help facilitate a design that meets compliance and that reduces costs associated with constraints that may occur after a subdivision has already been laid out. For example, operation and maintenance responsibilities may be included into the HOA’s Covenants Conditions and Restrictions (CC&Rs) or an assessment district could be formed to fund ongoing maintenance of LID/stormwater improvements within the subdivision. This would be similar to the permanent road division requirement for all new roads within a subdivision. There are many alternatives that can be used and should be discussed with permit approval staff.

This manual is a guide for compliance. Applicants may choose to use alternative methods to reach compliance. Alternative methods and formats will be accepted if they present all information requested by this manual, fulfill all requirements of the Post-Construction Requirements, Section E.12 of the MS4 General Permit, and fulfill the requirements of the County’s Planning and Building Department.

To aid in complying, these key steps should be taken:

1. Pre-application meeting with a Planning and Building Department staff member is recommended for regulated projects;
2. Follow this manual and use the worksheets to compile site information;
3. Draft a Preliminary Stormwater Control Plan (SCP) (discretionary projects only) using the template in this manual and submit to Planning and Building Department for review.
4. Draft a final SCP using the worksheets and template in this manual;
5. Draft a Stormwater Facilities Operation and Maintenance Plan (bioretention or equivalent facilities only, if required);
6. Provide detailed project designs;
7. Carry out construction;
8. Transfer maintenance responsibility upon transfer of site (bioretention facilities, if required); and
9. Submit annual Operation & Maintenance certification (if applicable)

4.1.1 Pre-Application Meeting

Although not required, a Pre-Application Meeting is recommended during the early planning stages of your project. This can be helpful in fully understanding the stormwater requirements and the necessary information needed for project submittal. Please make arrangements with a Planning and Building Services
Plan Checker to schedule a meeting time and date. Call (707) 234-6650 (Ukiah) or (707) 964-5379 (Fort Bragg) for more information.

4.1.2 Follow this Manual

Use this manual to understand the principles and the design procedures prior to planning your project. Use Section 5, Stormwater Control Plan to assist in design of your project.

4.1.3 Stormwater Control Plan

Preparation of the Stormwater Control Plan (SCP), which is submitted with your regulated application, will be used for the approval process. Be sure all appropriately sized bioretention facilities are explained in the SCP and are delineated on the site map, landscape design plans, and architectural designs.

4.1.4 Operation and Maintenance Plan (Regulated Projects Only)

During the planning phases, an Operation and Maintenance Plan should be drafted for the Stormwater Facilities within the project. The plan should include: a maintenance schedule, costs associated with maintenance, design life and replacement cost, recordkeeping of performed maintenance, and a legally binding agreement that identifies the responsible party for maintaining the Stormwater Facilities.

4.1.5 Detailed Project Design

Incorporate site design measures and treatment facilities into project construction documents. The site design and landscape design must show complete integration of bioretention facilities and other stormwater features into the overall design.

Some typical design elements include transitions and edges that allow runoff to flow from sidewalks and paved areas to self-retaining areas and bioretention facilities. The submitted construction documents (stamped plans) should include the Regulated Project SCP Checklist to assist the plan-checker with the review process (Appendix 3).

4.1.6 Construct the Project

Construction of bioretention facilities (if required) according to the guidelines in this manual should help avoid future problems. The following items need to be considered during the construction phase:

- Implement Construction BMPs (Mendocino County Code Sec. 16.30.070)
- Avoid soil compaction.
- Follow design elevations.
- Grade parking lots, driveways, and streets to promote evenly distributed sheet flow into bioretention facilities.
- Preserve native vegetation to aid in retention and filtration of stormwater.
- Set overflow inlets at the proper elevation so the surface of the bioretention facility floods as intended.
- Follow prescribed inspection schedule to identify and repair any malfunctioning or inadequately-designed facilities.

4.1.7 Transfer Maintenance Responsibility (Regulated Projects Only)

Transfer the responsibility to the owner or operator of the project who will maintain the project in perpetuity.
5.0 STORMWATER CONTROL PLAN

Stormwater infrastructure and design must be integrated into the planning, design, construction, and operation and maintenance of a project in its earliest stages. All regulated projects will be required to produce a Stormwater Control Plan (SCP). Some projects will be required to produce a preliminary SCP. The steps of the preliminary and final SCP include a site assessment, delineation of drainage management areas, and a calculation quantifying the reduction in stormwater runoff by using site design measures.

Projects may choose to utilize bioretention facilities or an equivalent LD treatment/baseline hydromodification feature to capture and treat excess runoff from the 85th-percentile, 24-hour storm event that is not retained or infiltrated by the site design measures.

Completing the SCP, using the provided template, includes providing the following details:

1. Project Information
2. Opportunities and Constraints
3. Conceptual Site Design
4. Calculations and Documentation
5. Source Controls
6. Maintenance

Appendix 2 contains the Preliminary SCP that should be used for certain discretionary projects, including subdivisions. Appendix 3 contains the SCP that should be used for all Regulated Projects, including discretionary projects.

5.1 Project Information

Enter the project information into the SCP worksheet. The required information consists of:

- Project name
- Contact information
- Project Type and Description
- Total existing project site impervious area (square feet)
- Total new or replaced impervious surface areas (square feet)
- Total post-project impervious surface area (square feet)

5.2 Opportunities and Constraints

Prepare a narrative within the SCP that describes opportunities and constraints. Opportunities include: low areas, oddly configured or unbuildable areas, setbacks, easements, or buffers (which may be used to accommodate bioretention facilities). Constraints include: soils with low permeability, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high intensity land use, heavy pedestrian or vehicle traffic, or safety concerns.
5.3 Conceptual Site Design

Optimizing the site layout can be achieved by applying the following design principles:

- Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed.
- Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.
- Limit overall impervious coverage of the site from paving and roofs. Design compact, taller structures, narrower and shorter streets and sidewalks, smaller parking lots, and indoor or underground parking (consult with Planning and Building Department staff for county requirements for these structures).
- Set back development from creek, wetlands, and riparian habitats, to maximize vegetative buffer widths and meet requirements set-forth by other Mendocino County Agencies (Environmental Health Land Development Requirements: Minimum Standards for On-site Sewage Systems).
- Preserve significant trees.
- Utilize and conform to site-specific topography when laying out a site design.
- Avoid excessive grading and disturbance of vegetation and soils.
- Replicate the site’s natural drainage patterns.
- Detain and retain runoff throughout the site and direct runoff to lawns or landscaping.
  - Limit the ratio of impervious to pervious area to 2:1 maximum;
  - Pervious areas must be relatively flat and the surface should be graded to a slightly concave surface to create a “self-retaining” area; and
  - Route runoff to a bioretention facility. The facility should have a surface area of at least 4% of the tributary impervious area.

5.3.1 Tips for Conceptual Drainage Design

- Use an underdrain in bioretention facilities (if required) when sited in clay soils. Bioretention facilities require about three to four feet of head from inlet to underdrain outlet.
- On flat sites, intersperse self-retaining areas with bioretention facilities (if required).
- On sloped sites, it may be advantageous to use traditional measures to pipe stormwater from impervious areas to bioretention facilities to prevent erosion of slopes.
- Use head from the downspouts by connecting leaders all the way to landscaping or bioretention facilities. Utilize drainage bubblers to disperse piped water to pervious and self-retaining areas.
- Use above-ground flow treatment LID features, such as a flow-through planter design, if site is located on an elevated plaza or if infiltration will contribute to a geotechnical hazard.
- Comply with all jurisdictional and State requirements for landscape watering when utilizing vegetation as a design component.

5.3.2 Alternative Methods to Compliance

There exist many avenues for compliance with the MS4 LID requirements. This manual is provided as a guide for achieving compliance. However, different techniques are permissible. For example, the use of a scientifically-validated hydrologic model/analysis to calculate the project run-off is acceptable. The
model/analysis must calculate pre- and post-development hydrology from each DMA. The designer must show, through calculations, that run-off will not be increased for each DMA for the design storm.

5.4 Siting Bioretention Facilities

Facilities should be easily accessible for inspection and maintenance. Inlet and outlet structures of the facilities should be placed in areas that permit easy access for inspections and maintenance. The shape of the facility is very flexible, which should make accessibility attainable.

In commercial, mixed-use, and multi-family developments, facilities can be located in parking medians, parking islands, street set-backs, side and rear set-backs, and other landscaped areas. In highly urbanized areas where pervious space is limited or non-existent, bioretention facilities may take the form of flow-through-planters. Additionally, tree-box-type biofilters and in-vault media filters may be approved (on a case-by-case basis) if they meet the alternatives criteria found below.

In residential subdivisions, a common technique used in placing bioretention facilities is to drain stormwater to the street and then from the street to a larger bioretention facility located on a common property that can double as a recreation area. The following Bioretention Alternatives Siting Guidelines flow chart (Figure 2) should act as a guide when choosing an alternative to the standard bioretention facility design.
Figure 2. Bioretention Alternatives
5.4.1 Alternatives to Bioretention Facilities

Bioretention facilities are ideal for stormwater control in Mendocino County. The specific design, which is described in this manual, is relatively easy to maintain, aesthetically pleasing, attenuates peak flow, and is effective at removing pollutants. However, if an alternative to the described bioretention facility is desired, the proposed facility must meet the following criteria, found in section E.12.e (ii)(g) of the MS4 General Permit:

- Equal or greater amount of runoff infiltrated or evapotranspiration;
- Equal or lower pollutant concentrations discharged from the proposed alternative;
- Equal or greater protection against shock loading and non-stormwater spills; and
- Equal or better accessibility for maintenance and inspection

Proposed alternative stormwater treatment and baseline hydromodification facilities will be reviewed on a case-by-case basis by the jurisdictional agency.

5.5 Calculations and Documentation

The SCP is the primary document that the Plan Checker will use to determine if you have met the necessary requirements for the MS4 General Permit. Small projects and regulated projects both require, as a component of the SCP, utilization of site design measures. Choosing the site design measures and quantifying the runoff reduction is a major step to compliance with the MS4 Phase II General Permit requirements. However, prior to selecting site design measures and quantifying the reduction, a site assessment which will identify Drainage Management Areas (DMAs) must be completed. DMAs are areas, both impervious and pervious, that divide a project site into small drainage units with each unit draining to a common point. Knowing the size of each DMA will allow for easy quantification of runoff reduction using the recommended site design measures and for sizing bioretention facilities.

A site map must be included with the SCP. This map should show the location and name of the bioretention facilities so that it can be easily cross-referenced in the SCP. In Section 6 Documenting Your Design, a detailed outline is presented to aid in the construction of your SCP.

5.6 Bioretention Design Criteria

The design standards for bioretention facilities are listed in Section 6. These standards will aid in project design and sizing of the facilities. The criteria that apply to your stormwater facility should be discussed in the SCP.

5.7 Source Controls (Regulated Projects Only)

Regulated Projects with pollutant-generating activities and sources are required to implement standard permanent and/or operation source control measures, as applicable, in addition to the basic requirements for a Regulated Project.
Measures to address potential pollutants shall be designed consistent with the recommendations from the California Stormwater Quality Association (CASQA) Stormwater BMP Handbook for New Development and Redevelopment, or equivalent manual. The applicable BMP fact sheets from the CASQA handbook are located in Appendix 4 and should accompany the SCP.

A Source Control Worksheet which is designed to assist project applicants in identifying which pollutant-generating activities and sources are part of their project and which offers guidance on BMP selection is found in Appendix 4. The applicable BMPs must be included in the final project design plans submitted to the County of Mendocino Planning and Building Services and must be included in the SCP worksheet with a brief narrative describing how they will be implemented. Also, include the CASQA BMP sheets for the Source Control BMPs that will be used within the project.

5.8 Treatment Facility Maintenance (Regulated Projects Only)

In your SCP, specify the means by which maintenance of your bioretention facilities will be financed and implemented in perpetuity. The Operation and Maintenance (O & M) Plan must accompany the SCP. The O & M Plan should include the following sections: BMP Maintenance Agreement, documentation of the responsible individual for the operation and maintenance, and a schedule for maintenance of the facility.

5.8.1 BMP Maintenance Agreement

BMPs installed on private lands shall be routinely inspected and maintained by the property owner as described in the Site Design Measure BMP Fact Sheets in Appendix 1. A formal, signed maintenance agreement shall be executed between the County of Mendocino and the property owner for bioretention facilities. The maintenance agreement will be recorded among the deed records at the County Recorder’s Office so that the agreement will be attached to the title of the land.

Upon conveyance of the deed during property transfer, the person acquiring the property must agree to maintain the private on-site bioretention facilities for the entire duration for which the property is owned. A copy of the BMP maintenance agreement shall be included in any sales and/or lease agreements involving the property.

5.8.2 On-Going BMP Operation and Maintenance

BMPs located on private property must be routinely inspected and maintained by the property owner in order to avoid operational issues with the BMPs. As the functionality of privately-owned BMPs has an effect on the functionality of other BMPs in the area, continual operation of all BMPs to the level at which they were designed is necessary (see Appendix 9 for O&M Plan template).

In the event that appropriate BMP maintenance is not carried out and operation of the BMPs is compromised, the property owner shall allow County staff or their designees the option to enter the property to inspect the affected BMPs and make suggestions on how to restore the BMPs into good working order. All expenditures associated with BMP restoration, in addition to any imposed fines or penalties, shall be the responsibility of the property owner, as described in the BMP Maintenance Agreement established between the County and the property owner.
5.8.3 **BMP Maintenance Record Keeping**

Inspection and maintenance records must be kept for those BMPs maintained by private property owners for a period of at least five years and shall be made available upon request by the County. These records shall include copies of completed inspection reports and maintenance checklists to document any inspection and maintenance activities that have been conducted within a five-year period. Any corrective actions, repairs, or replacements shall also be documented and kept with the BMP inspection and maintenance records for a minimum of five years.
6.0 DOCUMENTING YOUR DESIGN

The following procedures are to assist in designing and documenting the LID measures used on both a regulated project and a small project.

The procedures involve delineating Drainage Management Areas (DMAs), identifying DMA types and runoff factors, selecting the layout of bioretention facilities, and calculating the size of bioretention facilities.

6.1 Delineating DMAs

For the purposes of this manual and compliance with the MS4 Permit, a Drainage Management Area, or DMA, is the entire area that drains into a specific receiving area or accumulation point. To better understand and mitigate stormwater runoff patterns, the project site must be separated into one or more DMAs based on breaks in slope, other physical obstructions, or water flow conduits. Each DMA will then be addressed individually for designing BMPs or other LID features and meeting stormwater capture and treatment requirements.

6.1.1 Types of Drainage Management Areas

DMAs should be designated according to how they relate to the treatment of stormwater runoff. These designations include: Self-treating Areas, Self-retaining Areas, Impervious Areas draining to a Self-retaining Area, and Areas draining to a Bioretention Facility. The type of DMA will dictate how the runoff reduction calculation is made.

6.1.1.1 Self-treating Areas

Landscaped or turf areas that drain off-site or to the storm drain system and do not drain to bioretention facilities are self-treating areas. These areas do not generally contain, receive drainage from, or drain onto impervious areas. They are typically flat or have a very gentle slope that ensures absorption of stormwater by the vegetation and soil.

6.1.1.2 Self-retaining Areas

Areas that have topography such that stormwater is retained in a concave, basin-like depression (must capture and retain 1 inch of water) before overflowing and draining into a storm drain system. These areas have high infiltration rates which quickly dissipate the water and have vegetation that allows for efficient use of the water. These areas can be enhanced by replacing native soils with low infiltration ratings with amended soils that have high infiltration ratings.
6.1.1.3 Impervious Areas Draining to a Self-retaining Area

These areas are Self-retaining Areas except that they receive runoff from impervious areas. The self-retaining area size must adhere to a strict 2 parts impervious to 1 part pervious ratio or better (1:1,1:2,1:3 etc.). The entire area must be designed to retain the first 1 inch of stormwater (the 85th-percentile, 24-hour storm) from the impervious area and the self-retaining area itself without flowing off-site or into the storm drain system. Prolonged ponding is a potential problem at higher impervious to pervious ratios. It is important to ensure that soils can handle the additional run-on and are sufficiently well drained.

Adhering to the 2:1 ratio (impervious to pervious) and the 1-inch retention rule ensures compliance with the MS4 Permit. The Permit states that, “Permitees must implement Site Design Measures..., based on the objective of achieving infiltration, evapotranspiration and/or harvesting/reuse of the 85th percentile 24-hour storm runoff event.”

In Mendocino County the 85th percentile, 24-hour storm event is equivalent to approximately one inch. When using a 2:1 impervious to pervious ratio for the calculation of the self-retaining area, the area must be able to retain the first 2-inches of stormwater runoff from the impervious areas and the first inch that falls on the self-retaining area itself. This is why the self-retaining area should be depressed in order to achieve this 3-inch retention requirement.

6.1.1.4 Areas Draining to a Bioretention Facility

For each DMA, calculate the area, post-project surface type, the reduction in impervious area resulting from the use of trees and corresponding runoff factor, and the area after the runoff factor is applied. Use factors found on the Regulated Project SCP Worksheet found in Appendix 3. Utilizing self-treating areas, self-retaining areas, and trees as runoff reduction BMPs first will help in reducing the need for other site design measures and will reduce the size needed for a bioretention facility.

6.2 Site Design Measures through Bioretention

One of the first steps in developing a Regulated Project SCP is to delineate the DMAs by finding their area, grouping them according to type (self-treating, self-retaining, impervious draining to self-retaining, or impervious draining to bioretention), and tabulating the post-construction area by applying a runoff factor.
based on the surface type. The total tributary area to each bioretention facility will be calculated after the DMA area calculation has been completed. The DMA area tributary to the bioretention facility will then be multiplied by a sizing factor of 0.04; this is performed to calculate the minimum footprint of the bioretention facility.

Remember: The footprint of an impervious areas can be reduced with the use of site design measures (trees) prior to the final bioretention sizing calculation.

A sizing factor of 0.04 (facility can treat up to 25 times the size of the facility footprint) is used, in conjunction with the other specifications for a bioretention facility (soil/compost infiltration rate (5”/hour), reservoir depth, gravel layer depth, etc...), because these specifications meet the requirements in the MS4 Permit [E.12.e. ii (f)].

After computing the minimum bioretention facility size, review the Site Plan to determine if the reserved space for the facility is sufficient. If the area is not sufficient, revise the Site Plan accordingly.

6.2.1 Bioretention Facility Design

Bioretention facilities can be a variety of shapes. However, each of the layers within the facility must be designed and built flat and level. The following must have consistent elevations throughout:

- Bottom of excavation/ gravel layer (BGL)
- Top of gravel storage layer (TGL)
- Top of soil layer (TSL)
- Rim of facility reservoir

The surface reservoir should be level and circumscribed by a ridged boundary, such as a concrete curb, masonry, or landscape timbers.

6.2.1.1 Gravel Layer

The gravel layer must be a “Class II” open graded substrate; Caltrans specification 68-2.02F(3) is recommended. Drain rock or other granular material may be used. The depth of the gravel layer must be at least 12 inches. It must also be equivalent in area to the surface area of the bioretention facility (Appendix 5).

6.2.1.2 Planting Medium

A mixture of sand (60%-70%) and compost (30%-40%) should be used. The mixture must meet the following requirements:

- Have the ability to sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project;
- Sand mixture must meet the specifications of American Society for Testing and Materials (ASTM) C33; and
- Compost may be used.

The specific compost and sand combination, which meets the above requirements, is found in Appendix 5.
6.2.1.3 Underdrain

When using an underdrain, a 4-inch-diameter PVC pipe must be used, SDC 35 or equivalent. A perforated pipe, installed with perforations facing down, should be embedded into the Top of Gravel Layer (TGL). The connection with the storm drain must not be lower than the TGL. A threaded, capped cleanout connected by a sweep bend should be used. For a more detailed diagram of the requirements, see Appendix 5.

6.2.1.4 Plantings and Mulch

Select a plant palette for the bioretention facility from Appendix 6 or 7. Two plant palettes are listed: one for the inland MS4 area (Appendix 6) and one for the coastal MS4 area (Appendix 7).

Aged mulch should be used. Bark mulch has a tendency to float and may flow out of the facility during large events. Aged mulch or compost mulch reduces the chance of weed establishment, keeps soils moist, and replenishes nutrients.

Avoid the following:
- Overly dense plantings that prevent the flow of stormwater into the facility
- Plants with roots that inhibit percolation or block inflow
- Invasive weeds
- Plants that may require fertilizers or high water demands

6.2.1.5 Irrigation

Irrigation controls should be configured for the plant palette selected for the specific facility. Drip emitters are a preferred method for delivering water to the vegetation.

6.2.1.6 Tips for Good Design

Make sure all bioretention facilities are shown in all Site Plans, architectural drawings, and landscape designs. Be certain that these facilities will not interfere with other site design elements and that all elevations are shown and are consistent with the surrounding grading, drainage, and paving plans. Sharing a bioretention facility with a cable vault, phone vault, electrical box or other utility box should be avoided.

6.2.2 Pervious Pavements

Criteria for pervious pavements utilize standards which are derived from structural construction requirements. Areas that are highly erodible should not drain on to pervious pavement to prevent the pervious portion of the pavement from becoming clogged with sediment.

A reservoir base course of open-graded, crushed stone must be deep enough to retain rainfall (3" minimum) and support design loads (a greater depth may be required). The subgrade must be uniform and slopes must be gentle enough so that the subgrade is not prone to erosion. Subgrade compaction should be avoided. Sub drains are not recommended; however, if a sub drain is included, the outlet elevation must be 3" or more above the bottom of the base course.
A rigid edge is required if granular pavements and/or unit pavers are used. Solid pavers should be set in sand or gravel with a minimum 3/8-inch gap between pavers. Joints should be filled with an open-graded aggregate free of fines. Bedding sands shall conform to the grading requirements of ASTM C 33 (Interlocking Concrete Paving Institute).

Permeable concrete and porous asphalt should be installed by certified professionals and according to vendor recommendations. Other considerations when choosing pavements should be the site aesthetics, uses, and requirements (if applicable) of the Americans with Disabilities Act (ADA).

6.2.3 Exempt Projects over 5,000 SF

A number of project types are not required to meet quantified runoff standards for Regulated Projects despite creating or replacing over 5,000 square feet of impervious surfaces. However, they are still required to incorporate one or more site design measures (follow Small Project requirements – Section 2). These project types are as follows:

- Detached single family homes that create and/or replace 2,500 square feet or more and are not part of a larger plan of development
- Routine maintenance or repair, such as pavement resurfacing within an existing footprint
- Linear Underground/Overhead Projects (LUPs), unless the project has a discrete location that has 5,000 square feet or more of newly constructed contiguous impervious surface.
- Sidewalks built as part of new streets or roads and to direct stormwater runoff to adjacent vegetated areas
- Bicycle lanes that are built as part of new streets or roads that direct stormwater runoff to adjacent vegetated areas
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas or other non-erodible permeable areas
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces
- Trenching excavation, and resurfacing associated with LUPs
- Grinding and resurfacing of existing roadways and parking lots
- Construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways
- Routine replacement of damaged pavement such as pothole repair or replacement of short, non-contiguous sections of roadway

Please see Part A to assist with small project applicability determination. See Appendix 1, for a list of Site Design Measures; one or more of which need to be included in the project design for a small project.
7.0 HYDROMODIFICATION PROJECTS

Projects over 1-acre in size are required to implement hydromodification management in addition to water treatment measures (bioretention). In many cases, a self-retaining area or biotreatment facility will be sufficient for the hydromodification requirement.

The MS4 Permit hydromodification requirement is: post-project runoff shall not exceed the estimated pre-project flow rate for the 2-year, 24-hour storm event.

A project that does not increase impervious surface area over the pre-project condition is not a hydromodification management project (MS4 permit Sec. E.12.f). Projects over 1 acre may be subject to the State Construction General Permit (CGP) or may apply to the State for exemption from the CGP; however, post-construction requirements outlined under regulated projects in this manual will be required for projects within the MS4 boundary.

### Compliance with Hydromodification Requirements

Compliance with this standard can be met through the use of self-retaining areas (as referenced in Section 6.1.1.2 Types of Drainage Management Areas). However, soil infiltration rates on site must be taken into account, using ASTM D 422 standard test method for particle-size analysis of soils, when using self-retaining areas to meet the hydromodification design storm requirement.

Sites with infiltration rates less than (<) 1.0 inch per hour do not meet the hydromodification requirements using the self-retaining ratio method; alternatives to the self-retaining area will need to be discussed with the County’s Planning and Building Services Department staff.

Follow the chart below (Figure 3) to determine the steps necessary for using a self-retaining area to comply with the hydromodification design storm requirements.
Figure 3: Hydromodification Compliance Through Self-Retaining Area
8.0 NON-EXEMPT ROAD PROJECTS AND LINEAR UTILITY PROJECTS

Regulated Redevelopment Projects are any projects, private or public, that result in the creation, addition, or replacement of exterior impervious surface area (5,000 sq. ft. or greater) on a site on which some past development has occurred. The following is specific language from the MS4 Permit describing the requirements for the two different types of redevelopment projects:

Where a redevelopment project results in an increase of less than (<) 50 percent of the impervious surface of a previously existing development, only runoff from the new and/or replaced impervious surface, must be treated per the requirements for Regulated Projects.

Where a development project results in an increase equal to or greater than (>) 50 percent of the previously existing development, runoff from the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be treated per the requirements for Regulated Projects.

In both cases, the amount of impervious surface created, replaced, or added must be over 5,000 sq. ft. to qualify as a Regulated Redevelopment Project. Examples of common redevelopment projects are given below to aid in the understanding of these requirements.

**Example 1**
A project proposes adding 6,000 sq. ft. of impervious area to an existing developed lot. Currently, the lot has a structure and parking lot (total impervious area is 4,500 sq. ft.).

The additional impervious area triggers the Regulated Project requirements and the 50 percent requirement. Thus, the entire impervious area, existing and proposed, will be required to comply with the Regulated Project requirements.

**Example 2**
A project proposes adding a 2,000 sq. ft parking lot on an existing developed lot. Currently, the lot has a structure and small parking area (total impervious area of 8,000 sq. ft.).

The additional 2,000 sq. ft. does not trigger the Regulated Project (≥ 5,000 sq. ft.) or the Small Project requirements because the “new” development is not over 2,500 sq. ft.
8.1 Linear Underground/Overhead Projects (LUPs) and Road Projects

LUPS and Road Projects are exempt from LID requirements unless the LUP has a discrete location that has 5,000 sq. ft. or more of newly constructed contiguous impervious surface. There is not a trigger for LUPS to follow the Small Project requirements.

A non-exempt LUP or Road Project is required to follow the Regulated Project requirements for the specific discrete location that has an area greater than 5,000 sq. ft. of newly constructed contiguous impervious surface. These projects include:

- Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads
- Widening of existing streets or roads with additional traffic lanes
  - If more than 50 percent of the existing impervious surface is altered, then runoff from the entire project (old surface area and new surface area) must be included in the calculations
  - If less than 50 percent (but 5,000 sq. ft. or more) of the impervious surface is altered, only the runoff from the new and/or replaced surface must be included in the calculations

Certain LUPS and Road Projects with discreet locations greater than 5,000 sq. ft. will still be considered exempt despite the contiguous surface area >5,000 sq. ft. These projects include:

- Sidewalks and/or bicycle lanes built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces

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**Example 3**

A project proposes replacing an existing structure, with an impervious area of 3,500 sq. ft., with a building of the same size and amount of impervious area, 3,500 sq. ft.

The project does not meet the 5,000 sq. ft. threshold for Regulated Projects. It does, however, meet the Small Project threshold and should comply with the Small Project requirements.

**Example 4**

A project proposes an addition of 6,500 sq. ft. of impervious area to an existing building with an impervious area (including parking lot) of 14,000 sq. ft.

The project does not meet the 50 percent threshold but it is considered a Regulated Project because over 5,000 sq. ft. of impervious area is being added. Thus, the new impervious surface will be required to comply with the Regulated Project requirements. The existing impervious area will not need to be included in the calculations.
- Trenching, excavation, and resurfacing associated with LUPS; pavement grinding and resurfacing of existing roadways and parking lots; construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways; or routine replacement of damaged pavement such as pothole repair or replacement of short, non-contiguous sections of roadway.

Contact the Planning and Building Department staff to determine additional project requirements.
9.0 OPERATION AND MAINTENANCE PLAN

An Operation and Maintenance plan (O & M Plan) is required of all regulated projects by the State NPDES Phase II MS4 Permit. The primary component of an O & M Plan is the agreement to maintain the bioretention facility, which transfers from owner to owner (stays with the property) in perpetuity. A condition will be recorded with the Mendocino County Recorder’s office that indicates the presence of a bioretention facility. This recording will serve as a way for the County to remind the owner, on an annual basis, to complete a simple self-certification notice. This notice will serve as verification that the facility is operational and fully maintained according to the original approved specifications.

If, upon inspection of a facility by the County, a facility is found to be nonfunctioning, impaired, or removed, the County has the authority to request that the deficiencies be fixed and impose fines if function is not restored. The authority to impose fines is given to the County through Mendocino County Code, Chapter 16.30.

The O & M Plan must address each bioretention facility on site. This includes development of a maintenance schedule and the physical descriptions of each facility including location and construction specifications. The O & M Plan should be kept on site and updated when changes occur to the contact person/designated individual.

Five key components comprise the Operation and Maintenance Plan:
1. Designation of the Responsible Individual (RI)
2. Description of all bioretention facilities
3. Schedule of maintenance activities
4. Compilation of the Plan
5. Annual self-registration

9.1 Responsible Individual

The Responsible Individual (RI) is the person accepting all responsibility for the operation and maintenance of the bioretention facilities until the facilities are transferred to another entity. Contact information for the RI should be provided and updated upon transfer to another individual. A written condition will be recorded with the Assessor’s office. This will be used to track facilities as well as provide a way for the County to contact the RI on an annual basis for verification of the continued operation of the facility.

9.2 Description of all Bioretention Facilities

A description of all bioretention facilities should be included in the O & M Plan. The specific description must include: the location of a facility(s) (a map can be used), the dates that the facility(s) was installed, and as builds of each facility which will be used for recordation, tying each facility to the parcel.
9.3 Schedule Maintenance Activities

An annual maintenance schedule is needed to be in compliance with the MS4 Permit. However, some facilities will need more routine maintenance in the early stages after construction to ensure that the vegetation within the facility is healthy and that the facility is functioning properly. Annual maintenance should include:

- Cleaning debris (trash/refuse) out of the facility, which is especially important at the inlets.
- Pruning vegetation and replacing dead vegetation.
- Controlling invasive, non-native vegetation (weeds) without the use of synthetic herbicides.
- Adding mulch when needed to control weeds, replenish soil nutrients, and maintain adequate soil moisture.

9.4 Plan Compilation

A sample template can be found in Appendix 8. This template is only a sample. A plan that adequately addresses the key components but does not necessarily follow the template may be approved; however, it is recommended that the template be used.

9.5 Annual Self-Registration

A letter will be automatically generated on an annual basis by the Planning and Building Services Department to all RIs within the MS4 jurisdiction. This letter will be used by the RI to certify that all scheduled maintenance on the facility(s) has been completed for the year and that the operation of the facility has not been compromised. It will also be used by the RI to notify the County of any transfers of responsibilities (change in ownership) or other changes to RI contact information.
APPENDIX 1

Site Design Measures

Small Project SCP
TREE PLANTING AND PRESERVATION

DESCRIPTION

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. Trees also provide shade over impervious surfaces which reduces peak flow in streams and reduces the “heat island” effects of urban areas.

Technique

To use Tree Planting and Preservation as a Stormwater Runoff Reduction Measure, the following conditions must be met (Please check beside each requirement):

New Planting

☐ New plantings must have a trunk measuring at least 1-inch, 6 inches above the soil line

☐ New plantings must be at least **6 feet** tall for deciduous trees and **4 feet** tall for evergreen trees

☐ A minimum of **one** evergreen or **two** deciduous trees must be planted to use this credit

Tree Preservation

☐ Existing tree canopy must be equal to or greater than 300 sq. feet (collectively); existing tree preservation credit is 50% of canopy – the minimum credit is 150 square feet.

☐ Trees used as credit must be adequately protected during construction activity. See EC-2 in the Erosion and Sediment Control Handout, available on the Stormwater Website
Credit

New deciduous trees will provide a reduction credit of 100 square feet per tree, new evergreen trees provide a reduction credit of 200 square feet per tree. All existing trees provide a credit equivalent to half of the canopy area.

Please show on the site Map the location, with label, of each new or existing tree used as credit. Use the table below to calculate runoff reduction credit (One site map showing all site design measures is adequate. Please, do not include individual site plans for each site design measure used).

<table>
<thead>
<tr>
<th>Tree Label</th>
<th>New Trees (enter 100 for deciduous, 200 for evergreen) (Col. 2)</th>
<th>Existing Trees (enter 50% of canopy) (Col. 3)</th>
<th>Overall Total = (Col. 2 + Col. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Tree 1</td>
<td>(200)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example Tree 2</td>
<td>(200)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall Total = (400)

Square Foot Reduction Credit = (400 sq. ft.)

Volume Credit = Overall Total / (1.6 sq. ft./gallons) = (250 gallons)
Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services.

_____________________________  ______________________
Signature                          Date

_____________________________
Print Name

I am the:

☐ Property Owner  ☐ Applicant  ☐ Contractor
ROOFTOP AND IMPERVIOUS AREA DISCONNECTION
IMPERVIOUS TO SELF-RETAINING AREA

DESCRIPTION

Disconnection of rooftop and other impervious areas from the storm drain system helps reduce runoff and provide pollutant removal as the re-directed water travels over and through vegetation and soil instead of being directly piped and discharged into the storm drain. Roof runoff is directed to spread over a vegetated area (self-retaining area) or is directed into vegetated area that drains to the MS4 system (self-treating areas) or to bioretention facilities.

Technique

To use this site design measure, the ratio of impervious surface draining to the self-retaining area must be at least 2:1. The topography on-site or the method to move the stormwater from the impervious to self-retaining area must provide adequate head such that the water flows from the impervious area into the self-retaining area.

Examples of Implementation

Splash blocks reduce the velocity and impact of water exiting the roof downspout and direct water to a pervious area (self-retaining area).

Pop-up drainage emitters are useful in conveying stormwater from roof downspouts into vegetated areas. Roof runoff is piped then released through a capped device that opens with water pressure, allowing the stormwater to flow out of the emitter and into the vegetated area.

To use Rooftop and Impervious Area Disconnection Stormwater Runoff Reduction Measure the following conditions must be met (Please check beside each condition)

- Delineate the impervious area (roof, driveway, patio, etc.) and show, labeled, on site plan
Show how the stormwater will be directed to the self-retaining area (pop-up emitter, splash block, and vegetated filter strip, flexible downspout, etc.).

Self-retaining areas are basin-like depressions with at least 3 inches of depth and on slopes no greater than 25%.

Soils have infiltration rates greater than 1 inch per hour.

Self-retaining areas are vegetated or are designed such that soil erosion within the basin does not occur or is minimal.

Credit

Please show on the Site Plan the location, with label, of each impervious area and the corresponding self-retaining area (One site map showing all site design measures is adequate. Please, do not include individual site plans for each site design measure used). Use the table below to calculate runoff reduction credit.

<table>
<thead>
<tr>
<th>Area Label</th>
<th>Impervious Area (sq. ft.)</th>
<th>Self-retaining Area (sq. ft.)</th>
<th>(Col. 1/Col. 2) must be less than 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Example A”</td>
<td>(200)</td>
<td>(300)</td>
<td>(0.66)</td>
</tr>
</tbody>
</table>

Add Col. 1, total equals square foot reduction

Reduction Volume = (Col. 1) / 1.6 (sq. ft./gallon)

Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services.

_________________________  ________________________
Signature                  Date

_________________________
Print Name

I am the:

☐ Property Owner  ☐ Applicant  ☐ Contractor
SOIL QUALITY IMPROVEMENT

DESCRIPTION

In areas subject to grading/clearing not covered by impervious surface, create/amend pervious areas with a 12" layer of topsoil. Soil quality improvement options include the following:

Technique

To use Soil Quality Improvement as a Stormwater Runoff Reduction Measure the following conditions must be met (Please check beside each requirement):

Option 1 Leave native vegetation and soil undisturbed, and protect from compaction during construction

☐ Identify areas of the site that will not be stripped, logged, graded, or driven on, and fence off those areas to prevent impacts during construction.

Option 2 Amend existing site topsoil or subsoil

☐ Scarify or till subgrade to 8 inch depth (or to depth needed to achieve a total depth of 12 inches of un-compacted soil after calculated amount of amendment is added).

☐ Entire surface should be disturbed by scarification. Amend soil to meet desired organic content.

Option 3: Stockpile existing topsoil during grading. Replace it before planting

☐ Ensure that placed soil plus compost or other organic material will amount to at least 12 inches of depth.

☐ Stockpile and cover soil with weed barrier material that sheds moisture yet allows air transmission.
Replace stockpiled topsoil prior to planting. Amend soil to meet desired organic content.

**Option 4: Import topsoil mix of sufficient organic content and depth to meet desired organic content**

- Scarify or till subgrade in two directions to 6 inch depth. Entire surface should be disturbed by scarification.

- Compost/amendment shall be mature, stable, weed free, and produced by aerobic decomposition of organic matter

- Compost feedstock may include, but is not limited to: agricultural, food or industrial residuals; class A biosolids as defined in the EPA CFR Title 40, Part 503; yard trimmings, or source-separated municipal solid waste.

- The product must not contain any visible refuse or other physical contaminants, substances toxic to plants, or over 5% sand, silt, clay or rock material by dry weight.

- The product shall possess no objectionable odors. The product must meet all applicable USEPA CFR, Title 40, Part 503 Standards for Class A biosolids.

**Credit**

Numeric sizing criteria do not apply to this BMP, as this BMP does not directly reduce tributary area, provide volume-capture, or runoff treatment. Please utilize the SMARTS Post-Construction Calculator to quantify the runoff reduction credits associated with implementing this BMP. Include the filled out calculator with submission.


**Signature and Certification:**

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and is included in the final site plans submitted to Mendocino County Planning and Building Services.

_________________________________________  __________________________
Signature                                      Date

_________________________________________
Print Name

I am the:

☐ Property Owner  ☐ Applicant  ☐ Contractor
RAIN BARRELS AND CISTERNs

DESCRIPTION

Rain Barrels and Cisterns are a system that collects and stores stormwater runoff from a roof or other impervious surface. These typically have overflow mechanisms or plugs that drain to a vegetated area or to the storm drain system when the barrel is full.

Technique

To use this site design measure, the collection and storage devices must comply with local vector control requirements. Storage capacity of each device must be at least 55 gallons and sited on a level, stable service at or near the ground surface. To use the Rain Barrels and Cisterns Stormwater Runoff Reduction Measure, the following conditions must be met (Please check beside each condition):

□ Delineate the impervious area (roof, driveway, patio, etc.) draining to the rain barrel and show, labeled, on site plan

□ Show on the site plan the area that will receive overflow from the rain barrel or cistern

□ Gutters tributary to the Rain Barrels/Cistern are screened with a leaf guard or ¼-inch (minimum) to 1/2-inch (maximum) corrosion resistant metallic hardware fabric.

□ Water collected will be used for irrigation purposes only.

□ Openings are screened with a corrosion-resistant metallic fine mesh (1/16 inch or smaller) to prevent mosquito harborage.
☐ Large openings are secured to prevent entry by children.

☐ Rain Barrels and Cistern are cleaned annually.

**Credit**

Rain Barrels and Cisterns will provide a credit equal to the capacity of the container. Please show on the Site Plan the location, with label, of each impervious area and the corresponding Rain Barrel or Cistern Location (One site map showing all site design measures is adequate. Please, do not include individual site plans for each site design measure used). Use the table below to calculate runoff reduction credit.

<table>
<thead>
<tr>
<th>Impervious Area Label</th>
<th>Gallons of Storage (size of rain barrel/cistern)</th>
<th>Volume Credit</th>
<th>Square Foot Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Example A&quot;</td>
<td>(55)</td>
<td>(55 gallons)</td>
<td>1.6 square feet / gallon</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(88 sq. ft.)</td>
<td>x (Col. 2 total)</td>
</tr>
</tbody>
</table>

**Signature and Certification:**

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services.

__________________________________________________________  ________________
Signature                                                       Date

__________________________________________________________
Print Name

I am the:
☐ Property Owner   ☐ Applicant   ☐ Contractor
PERMEABLE PAVEMENT

DESCRIPTION

Permeable pavement allows stormwater to pass through and percolate into the underlying soil. This technology is comprised of a hard but permeable surface with underlying capacity to store water prior to infiltration. Excess water can be routed to a controlled drainage system. Examples include pervious concrete, porous asphalt, or interlocking concrete pavers separated by spaces and joints. Typical site locations include parking lots, plazas, walkways/sidewalks, and playgrounds.

Technique

Show on Your Site Plan:
- Location
- Extent
- Permeable pavement type

Confirm That the Following Specifications Have Been Met:
- No erodible areas drain on to permeable pavements
- Subgrade compaction is minimal
- Reservoir base course is of open-graded crushed stone
- Base depth is adequate to retain rainfall (3 inches) and support design loads (more depth may be required)
- No subdrain is included or, if a subdrain is included, outlet elevation is a minimum of 3 inches above the bottom of the base course
☐ Subgrade is uniform and slopes are not so steep that subgrade is prone to erosion

☐ Rigid edge is provided to retain granular pavements and unit pavers

☐ Solid unit pavers, if used, are set in sand or gravel with minimum 3/8 inch gaps between the pavers.

☐ Joints are filled with an open-graded aggregate free of fines

☐ Pervious concrete or porous asphalt, if used, are installed by industry-certified professionals according to the vendor’s recommendations.

☐ Selection and location of pavements incorporated Americans with Disabilities Act requirements (if applicable), site aesthetics, and uses.

**Credit**

Runoff reduction credits can be applied for area of installed porous pavement. A minimum area of 150 square feet of pervious pavement must be installed to use this credit.

<table>
<thead>
<tr>
<th>DMA Label</th>
<th>Area of Permeable Pavement (sq. ft.)</th>
<th>Runoff Reduction Factor</th>
<th>Runoff Reduction Credit (Col. 2 x Col. 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example pavement</td>
<td>(200)</td>
<td>0.9</td>
<td>180</td>
</tr>
</tbody>
</table>

| Total Area of Permeable Pavement (total of Col. 2) | Total Runoff Reduction Credit (sq. ft.) (total of Col. 4) | Total Volume Credit (Runoff reduction credit, above / (1.6 sq. ft./ gallon)) | 112.5 gal |

Table 2. Runoff Reduction Factors

<table>
<thead>
<tr>
<th>Type of Pavement</th>
<th>Runoff Reduction Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricks or solid pavers on sand</td>
<td>0.5</td>
</tr>
<tr>
<td>Bricks or solid paver, grouted</td>
<td>0.0</td>
</tr>
<tr>
<td>Pervious concrete/asphalt</td>
<td>0.9</td>
</tr>
<tr>
<td>Permeable pavement</td>
<td>0.9</td>
</tr>
<tr>
<td>Cobbles</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services.

Signature __________________________ Date ______________

Print Name ________________________________

I am the: ☐ Property Owner ☐ Applicant ☐ Contractor
An infiltration trench is typically a long, narrow (<25 ft.), rock-filled trench (depth between 3-8 ft.) that receives stormwater runoff and allows it to infiltrate. Infiltration trenches typically have no outlet. Before entering the trench, runoff should pass through stormwater pretreatment measures, such as vegetated filter strips, swales, or presettling basins, to remove coarse sediment that can clog the void spaces between the stones and render the trench ineffective. A level spreader may be used to spread concentrated flows. Pretreated runoff is stored in the void spaces and slowly infiltrates through the bottom of the trench into the soil matrix, thus contributing to groundwater recharge. Infiltration trenches should be designed to operate offline, such that only design flows are diverted to the trench and the remainder is bypassed.

**Technique**

To use this site design measure, the collection and storage devices must comply with local vector control requirements. Storage capacity of each device must be at least 55 gallons and sited on a level, stable surface at or near the ground surface. To use Infiltration Trenches and Basins the following conditions must be met (Please check beside each condition):

**On Site Plan Show:**

- □ Delineate the impervious area (roof, driveway, patio, etc…) draining to the site design measure and show, labeled, on site plan.
☐ Show how the runoff will be directed to the infiltration system
☐ Show on the site plan the area that will receive overflow from the trench or basin
☐ Show the percent and direction of land slope for the site

**Confirm that the Following Specifications will be met:**

☐ Infiltration device must be located at a minimum of 10 feet (down gradient) from building foundations
☐ Pretreatment system is used for systems that capture runoff from roads and parking areas
☐ No potential impact to groundwater (depth to seasonal high groundwater level is greater than 5 feet)
☐ No adverse impact to adjacent property
☐ Contaminated soils shall not be present on site
☐ Infiltration rates of the soils underlying the proposed infiltration device must meet the following specifications:

   Must not contain greater than 50% clay (zone 4) using ASTM D422 soil particle size analysis, or procedures detailed in the Mendocino County, "Soil Evaluation for On-site Sewage Disposal" https://www.co.mendocino.ca.us/hhsa/pdf/chs_eh_landUse_SoilEval.pdf

☐ An operation and maintenance plan must accompany permit submission (does not need to be recorded against the deed). Operation and Maintenance Plans that are specific to proprietary units and are produced by manufacturer are acceptable.

**Sizing and Materials**

☐ Depth of trench/basin is between 3 and 8 feet and no more than 25 feet wide
☐ Trench/basin shall have a flat surface and bottom to promote uniform infiltration across the trench.
☐ The top two inches should be a pea gravel filter layer with optional filter fabric below.
☐ Trench fill material should be double-washed, locally available rock with a diameter range of 1.5 to 2.5 inches and a porosity of about 35%
☐ Below the rock layer is a 6-inch deep sand filter layer. The sides of the trench can be lined with filter fabric to prevent adjacent soils from clogging the rock.
☐ An observation well located at the center of the trench is recommended to monitor water drainage from the system. The well can be a 4 to 6-inch diameter PVC pipe which is anchored vertically to a foot plate at the bottom of the trench.
Credit

Infiltration Trenches and Basins will provide a credit equal to the capacity of the pore space within the device. Please show on the site plan the location, with label, of each impervious area and the corresponding trench/basin location (One site plan showing all site design measures is adequate. Please, do not include individual site plans for each site design measure used). Use the table below to calculate runoff reduction credit.

<table>
<thead>
<tr>
<th>Impervious Area Label</th>
<th>Cubic Feet of Storage (Size of trench/basin)</th>
<th>Gallons of storage</th>
<th>Square Foot Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length x Width x Depth x 0.35</td>
<td>Col. 2</td>
<td>Col. 3</td>
</tr>
<tr>
<td>“Example A”</td>
<td>12' x 3' x 3' x .35 = (37.8 ft^3)</td>
<td>37.8 ft^3 x 7.48 gal/ft^3 = (283 gallons)</td>
<td>283 gal x 1.6 sq. ft./gal = (453 sq. ft.)</td>
</tr>
</tbody>
</table>

Square Foot Reduction (Col. 4) (453 sq. ft.)

Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures identified herein as being incorporated into my project have been designed in accordance with this approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services.

___________________________________________  __________________________
Signature                                                 Date

___________________________________________
Print Name

I am the:

☐ Property Owner  ☐ Applicant  ☐ Contractor
APPENDIX 2

Preliminary SCP

Discretionary Projects
Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

The flow chart outlines the basic process for discretionary project and subdivision approvals. This is only a guide; not all projects are identical.

The MS4 permit requires that the County enforce Low Impact Development (LID) regulations for development. The approval of a Final Map for a subdivision is considered development. The method the County employs to alert property owners/purchasers of conditions imposed by the LID regulation is to record a Notice on the title that will be recorded after the Final Map is approved. If a project requires a use permit, the LID requirements will be included in the Conditions of Approval in addition to recording a Notice on the title. If a project uses a Bio-retention Facility, the ongoing maintenance and reporting requirements will be recorded on the title. The notice on the title may be in the form of a “Notice of Development Plan”. In this case the title would reflect that a Development Plan is on file at the County Planning Department which would contain all applicable site specific LID requirements.
The following worksheet is used to demonstrate that for each and every lot, the intended use can be achieved with a design which disperses runoff from the roofs, driveways, sidewalks, streets and other impervious areas to self-retaining pervious areas. It is also used to demonstrate that drainage to treatment and/or flow control facilities is feasible and that the project is in overall compliance with the MS4 permit. Use this form to assist you in designing your project to comply with the design standards for Multi-Parcel Regulated projects. The completed, signed Preliminary SCP for Subdivision Projects, a site map, plus any additional applicable information, must be submitted with your application to the Planning Department.

A. Project Information

1a. Does Project create or replace 1-acre or more of impervious surface?
   - Yes (see question below)
   - No (skip question 1b.)

1b. If ‘Yes’ to the above question: Does project increase impervious surface from pre-project conditions?
   - Yes
   - No (regulated project requirements must be met)

Total pre-project Impervious Surface (sf):

Total new or replaced Impervious Surface Area (square feet)
   [Sum of impervious area that will be constructed as part of the project]
Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

B. Summary Table of Pervious to Impervious Surface

The following table will be used by staff to ensure that adequate measures have been utilized within the project design to capture, retain and/or infiltrate the design storm.

Each DMA shown in the table shall be designated with the same name on the site plan. All site design measures used to meet the runoff reduction goals and all treatment facilities utilized to capture remaining runoff volumes must be shown on the site plan at an appropriate scale. Please use the Flow Chart as a reference of the process.

1. Utilize Worksheet 1 to Summarize Impervious to Pervious Ratio for each DMA (Parcel) to determine if further runoff reduction is needed using site design measures and/or bioretention
2. Utilize Site Design Measures to effectively Reduce Pervious Area
3. Utilize Bioretention or equivalent if reduction cannot be achieved using Site Design Measures

Worksheet 1.

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>Does impervious to pervious ratio achieve 2:1 or better?</th>
<th>Can ratio be achieved using site design measures?</th>
<th>If “No” in column C: Bioretention facility is required for DMA (parcel). List name and the estimated size (sf) of the facility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>Utilize Table (2-7) found in the Regulated Projects SCP to aid in calculations</td>
</tr>
<tr>
<td>Example A</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Example B</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Example C</td>
<td>No</td>
<td>No</td>
<td>C = (1250 X .04) = 50 sf</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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</tbody>
</table>

C. Preliminary Site Plan Checklist - items that must be include on the site plan

- Topographic lines (2 ft. contours)
- On-site waterways/drainages, vegetation, and areas to be left undisturbed all shown with appropriate buffers
- DMAs clearly delineated and labeled with name and area (square feet)
Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

☐ Location of site design measures
☐ Location, size, and name of Bioretention/Treatment Facility
☐ Flow direction that clearly demonstrates the ability of self-retaining areas, infiltration site design measures, and treatment facilities to capture runoff from impervious surfaces
☐ Hydrologic soil class

D. Operation and Maintenance Plan Requirements

Each Bioretention facility or equivalent will be required to have an operation and maintenance plan attached to the final SCP and shall include all details found in Appendix 5, 6, 7, and 8 of the LID Manual.

E. Additional Requirements

A detailed final Stormwater Control Plan with narrative sections will need to be submitted prior to issuance of a grading/building permit (see Appendix 3). However, completing the Preliminary SCP enables a more efficient and timely review of the final SCP.

F. Signature and Certification

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures and stormwater flow treatment measures identified herein as being incorporated into my project have been designed in accordance with the approved BMP Fact Sheet or equivalent, and are included in the final site plans submitted to Mendocino County Planning and Building Services. I also hereby certify that my project meets the stormwater runoff reduction criteria identified in Worksheet 2, or as determined through other approved means.

________________________________________  ______________________________
Signature                                          Date

________________________________________
Print Name

I am the:
☐ Property Owner  ☐ Applicant  ☐ Contractor
Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

The following example illustrates the elements necessary for evaluating a project for compliance with the MS4 permit only. Additional requirements will most likely be needed for compliance with other regulations; please consult the full planning submission checklist to ensure all required elements are presented on the preliminary site plan.
APPENDIX 3

Final SCP

All Regulated Projects
Stormwater Control Plan for Regulated Projects

For Office Use Only
Application No._____________________
Received By: _______________________

Project Name:__________________________

Physical Site Address/APN:__________________________

Project Applicant:__________________________

Mailing Address:__________________________

Phone:__________________________

Consultant's Information

Name:__________________________

Firm:__________________________QSD certification #:__________________________

Address:__________________________

Email:__________________________

Phone:__________________________

Instructions

Based on the answers that you provided in the Construction and Post Construction Stormwater Runoff Control Checklist, you have determined that your project is classified as “regulated” for the purposes of the County of Mendocino MS4 Permit. Use this form to assist you in designing your project to comply with the County of Mendocino MS4 Permit design standards for regulated projects. The completed, signed SCP for Regulated Projects, plus any applicable, approved BMP Fact Sheets, must be submitted with your application to Mendocino County Planning and Building Services.

Type of Application/Project

What type of application is this checklist accompanying?

☐ Subdivision  ☐ Grading Permit

☐ Building Permit  ☐ Design Review

☐ Use Permit  ☐ Other (please specify)__________________________
A. Project Description

<table>
<thead>
<tr>
<th>Project Type and Description:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Pre-Project Impervious Surface Area (square feet)</td>
<td></td>
</tr>
<tr>
<td>Total New or Replaced Impervious Surface Area (square feet)</td>
<td>[Sum of impervious area that will be constructed as part of the project]</td>
</tr>
<tr>
<td>Total Post-Project Impervious Surface Area (square feet)</td>
<td></td>
</tr>
</tbody>
</table>

If your project includes more than 5,000 square feet in new or replaced impervious area, is your project one of the following project types?

- Detached single family homes that create and/or replace 2,500 square feet or more and are not part of a larger plan of development
- Interior remodels
- Routine maintenance or repair, such as exterior wall surface replacement or pavement resurfacing within an existing footprint
- Linear Underground/Overhead Projects (LUPs) without a discrete location that has 5,000 square feet or more of newly constructed contiguous impervious surface.
- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas
- Bicycle lanes that are built as part of new streets or roads that direct stormwater runoff to adjacent vegetated areas
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces
- Trenching excavation and resurfacing associated with LUPs
- Grinding and resurfacing of existing roadways and parking lots
- Construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways
- Routine replacement of damaged pavement such as pothole repair, or replacement of short, non-contiguous sections of roadway

☐ Yes       ☐ No

If you answered “Yes” above, your project is a non-regulated project under the definitions in the County of Mendocino MS4 Permit. Please use the Checklist for Non-Regulated Projects to assist you in your project design and application submittal.
B. Site Assessment (Opportunities and Constraints)

1. Soil Characteristics

   I. Soil characterization method______________________________

   II. Were infiltration rates assessed for the site?  
   □ Yes  □ No

   If Yes, please attach soil testing report

2. Depth to Groundwater

   I. What is the depth (below ground surface) to groundwater (in feet)? ______________

   II. How was this determined? ______________

3. Existing Vegetation and Natural Areas

   I. Are there any key natural vegetation areas, sensitive habitats, or mature trees on the site?  
   □ Yes  □ No

   If yes, please draw and label these features on the existing conditions site plan map and attach a description of them to this document.

4. Drainage and Hydrograph

   I. Are there any natural drainage features or modified natural drainage features on the site or directly adjacent to the site?  
   □ Yes  □ No

5. Potential Contamination

   I. Is the project site within or near a registered contaminated site, according to the State Water Resources Control Board Geotracker Website (http://geotracker.waterboards.ca.gov)?  
   □ Yes  □ No

   If yes, please attach the applicable contaminated site report from the Geotracker website and note the location of the contaminated site on the existing conditions site plan map. Please attach a description how this contamination will affect your project design.

C. Project Layout Optimization
Optimizing the site layout can be done through the following methods:

1. Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed.
2. Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.
3. Limit overall impervious coverage of the site from paving and roofs.
4. Set back development from creek, wetlands, and riparian habitats to maximize vegetative buffer widths.
5. Preserve significant trees.
6. Conform the site layout along natural landforms.
7. Avoid excessive grading and disturbance of vegetation and soils.
8. Replicate the site’s natural drainage patterns.
9. Detain and retain runoff throughout the site.

Based on the features included in the existing conditions site plan, please ensure your project site plan applies project layout optimization measures to the greatest extent practicable, while still meeting the objectives of your project.

Have you attached a short description of how site optimization techniques have been integrated into the project design?

☐ Yes  ☐ No

D. Source Controls

Does your project contain potential pollutant-generating activities or sources?

☐ Yes  ☐ No

If Yes, please complete the Source Control Worksheet, available at the County of Mendocino Stormwater website (https://www.mendocinocounty.org/government/planning-building-services/stormwater), and available as Appendix 4 of the County of Mendocino Low Impact Development Technical Design Manual; list and identify, using a simple table format, the source or treatment control measure and locations as an attachment to the SCP document.

E. Drainage Management Areas

On the project site plan, please delineate and label all drainage management areas (refer to Sec. 6 of the manual). Record the DMA names and Areas in the table below.

<table>
<thead>
<tr>
<th>DMA name</th>
<th>Area (square feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
F. Site Design Measures

Please identify the site design measures incorporated into the project design and attach the applicable, approved BMP Fact Sheet or equivalent to this checklist. These measures must be discussed in the SCP and shown on the site design map.

☐ Rooftop and Impervious Area Disconnection

☐ Tree Planting and Preservation

☐ Rain Barrels and Cisterns

☐ Porous Pavement

☐ Flow-Through Planter

☐ Bioretention
Stormwater Control Plan for Regulated Projects

### Table 2. Area Calculations of Self-retaining Areas Used to Treat Impervious Areas

<table>
<thead>
<tr>
<th>DMA Name</th>
<th>Area (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Runoff Factor (surface type)

<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Runoff Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs and Paving</td>
<td>1.0</td>
</tr>
<tr>
<td>Landscaped Area</td>
<td>0.1</td>
</tr>
<tr>
<td>Bricks or solid pavers-grouted</td>
<td>1.0</td>
</tr>
<tr>
<td>Bricks or solid pavers-on sand base</td>
<td>0.5</td>
</tr>
<tr>
<td>Pervious Concrete Asphalt</td>
<td>0.1</td>
</tr>
<tr>
<td>Turfblock or gravel</td>
<td>0.1</td>
</tr>
<tr>
<td>Open or Porous pavers</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Tables 4-6 below should be used to quantify the amount of runoff that is reduced by using site design measures. Using the tables in chronological order will calculate the minimum size for your bioretention facility in order to meet the MS4 permit requirements. Several iterations may be need to size facilities according to the site design.

### Table 4. Area draining to self-retaining areas

<table>
<thead>
<tr>
<th>DMA Name (must correspond to area on the site map and on Table 1)</th>
<th>DMA Area (sq. ft.) (Table 1)</th>
<th>Type of Surface (Runoff Factor Table 3)</th>
<th>Surface with Runoff Factor Column 2 X Column 3</th>
<th>Area of Self-retaining Area Receiving the Runoff (sq. ft.) (Table 2, Col. 2)</th>
<th>Ratio Col. 4 : Col. 5 Not to exceed 2:1 ratio (if number exceeds 2:1 use table 5 - 6 to reduce tributary area and recalculate or go directly to Table 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>700</td>
<td>Roof (1.0)</td>
<td>700</td>
<td>100</td>
<td>7:1 (must use site design measures, bioretention or both)</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
## Stormwater Control Plan for Regulated Projects

### Table 5. Tree Planting and Preservation (if not planting trees, go to Table 6)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DMA Name</strong> (must correspond to area on the site map)</td>
<td><strong>DMA sq. ft.</strong> (from Table 4, Col. 6)</td>
<td><strong>Deciduous</strong> (Input 100 for each deciduous tree)</td>
<td><strong>Evergreen</strong> (Input 200 for each evergreen tree)</td>
<td><strong>Total Tree Credit</strong> (Col. 3 + Col. 4) (DMA runoff reduction)</td>
<td><strong>New DMA Area</strong> Col. 2 – Col. 5 (for use in Table 6-8)</td>
</tr>
<tr>
<td>Example</td>
<td>700</td>
<td>------</td>
<td>200</td>
<td>200</td>
<td>500 (new DMA size that must be treated with methods below Table 6-7)</td>
</tr>
</tbody>
</table>

### Table 6. Rain Barrels and Cisterns (if not using site design measures, go to Table 8)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DMA Name</strong> (must correspond to area on the site map)</td>
<td><strong>New DMA sq. ft.</strong> (Table 5, Col. 7 or, if no trees used, value from Table 4, Col. 2)</td>
<td><strong>Number of Rain Barrels</strong></td>
<td><strong>Runoff Reduction from using a standard 55 gallon Rain Barrel = 88 sq. ft.</strong> Use the following if size is other than the standard (for every gallon of storage, approx. 1.6 sq. ft. of reduction is achieved)</td>
<td><strong>Col. 3 X Col. 4</strong> (DMA runoff reduction)</td>
<td><strong>New DMA Area</strong> Col. 2 - Col. 5</td>
</tr>
<tr>
<td>Example</td>
<td>500</td>
<td>1</td>
<td>88</td>
<td>88</td>
<td>412 (go to Table 7 to recalculate Ratio)</td>
</tr>
</tbody>
</table>
Table 6b. Infiltration Measures (Trenches and Dry Wells)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMA Name</td>
<td>New DMA sq. ft.</td>
<td>Runoff Reduction Volume using guidance on Infiltration Site Design Sheet</td>
<td>New DMA Area Col. 2 – Col. 3</td>
</tr>
<tr>
<td>(must correspond to area on the site map)</td>
<td>(Table 5, Col. 7 or, if no trees used, value from Table 4, Col. 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example</td>
<td>500</td>
<td>200</td>
<td>300</td>
</tr>
</tbody>
</table>

Table 7. New Tabulation of areas draining to self-retaining area after use of site design measures (must achieve a 2:1 ratio; if not achievable, use table 8 to calculate the size of bioretention required)

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMA Name</td>
<td>New Square footage of DMA</td>
<td>Area of Self-retaining Area Receiving the Runoff</td>
<td>Ratio</td>
</tr>
<tr>
<td>(must correspond to area on the site map)</td>
<td>(Col 6, Table 4,5,6)</td>
<td>(Table 2, Col. 2)</td>
<td>Column 2 : Column 3 Not to exceed 2:1</td>
</tr>
<tr>
<td>Example</td>
<td>412 (Table 6)</td>
<td>100</td>
<td>4.12:1 (still exceeds 2:1 go back, add more trees, rain barrels, or use bioretention – example uses bioretention, Table 8)</td>
</tr>
</tbody>
</table>
### Table 8. Tabulation of areas draining to Bioretention Facility

<table>
<thead>
<tr>
<th>DMA Name (must correspond to area on the site map)</th>
<th>DMA sq. ft.</th>
<th>Runoff Factor</th>
<th>DMA Area</th>
<th>Standard Sizing Factor</th>
<th>Minimum facility size</th>
<th>If site does not allow for the minimum size, recalculate DMA using additional Site Design Measures to further reduce the tributary size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>300</td>
<td><strong>1</strong> (already calculated in steps above, for this example)</td>
<td>300</td>
<td>0.04</td>
<td>12 sq. ft.</td>
<td>(proposed facility size on site plans)</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

### Table 9. Runoff Factors

<table>
<thead>
<tr>
<th>Material</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs and Paving</td>
<td>1.0</td>
</tr>
<tr>
<td>Landscaped Area</td>
<td>0.1</td>
</tr>
<tr>
<td>Bricks or solid pavers-grouted</td>
<td>1.0</td>
</tr>
<tr>
<td>Bricks or solid Pavers-on sand base</td>
<td>0.5</td>
</tr>
<tr>
<td>Pervious Concrete Asphalt</td>
<td>0.1</td>
</tr>
<tr>
<td>Turfblock or gravel</td>
<td>0.1</td>
</tr>
<tr>
<td>Open or Porous pavers</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Stormwater Control Plan for Regulated Projects

G. Operation and Maintenance in Perpetuity

Indicate whether an Operation and Maintenance Plan is accompanying this document (Appendix 9).

☐ Yes  ☐ No

H. Stormwater Control Plan

A Stormwater Control Plan is required for all Regulated Projects. This worksheet is designed to be the SCP if all requested descriptions and site plans have been attached. This document will be used by the plan checker to confirm that adequate stormwater control measures are being implemented on the project.

Indicate whether all supporting descriptions and worksheets are accompanying this document, Stormwater Control Plan

☐ Yes  ☐ No

I. Signature and Certification:

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for stormwater regulation. I hereby certify that the site design measures and stormwater flow treatment measures identified herein as being incorporated into my project have been designed in accordance with the approved BMP Fact Sheet or equivalent, which is attached to this checklist, and are included in the final site plans submitted to Mendocino County Planning and Building Services. I also hereby certify that my project meets the stormwater runoff reduction criteria identified in the County of Mendocino MS4 Post-Construction Stormwater Calculator, or as determined through other approved means.

________________________________________  __________________________
Signature                                           Date

________________________________________
Print Name

I am the:
☐ Property Owner   ☐ Contractor   ☐ Applicant
**Applicant Checklist for Regulated Projects; items that must be included in the Permit Packet**

### Items that must be on the Project Site Map

- Exiting natural hydrological features (depressions, watercourses, wetlands, riparian areas, undisturbed natural areas, significant natural resource areas)
- Existing and proposed site drainage network and connections to MS4 conveyances off-site
- Proposed design features and surface treatments used to minimize imperviousness and reduce runoff
- DMAs are delineated for the entire site and each is labeled with a unique identifier and is characterized as draining to self-retaining, self-treating, or draining to a bioretention facility
- Proposed locations and footprints of bioretention facilities
- Pollutant-generating source areas, including loading docks, food service areas, refuse areas, outdoor processes and storage, vehicle cleaning, repair or maintenance, fuel dispensing, equipment washing, etc. (Appendix 5)

### Contents of Stormwater Control Plan (SCP)

- Narrative or description of site features and conditions that constrain or provide opportunities for stormwater control
- Narrative of Site Design characteristics, building features, and pavement selections that reduce imperviousness of the site including the quantified runoff reduction.
- Completed tables showing square footage of proposed pervious and impervious areas, self-treating areas, self-retaining areas, and areas draining to bioretention facilities
- Preliminary designs, including calculations, for each bioretention facility. Elevations should show sufficient hydraulic head for each bioretention facility.
- General Maintenance requirements for bioretention facilities
- Statement accepting responsibility for interim operation and maintenance of facilities
- Stormwater Construction Checklist
- Certification by professional civil engineer, architect, landscape architect, or other approved professional
APPENDIX 4

Source Control Worksheet
APPENDIX 4

Source Control Worksheet and BMPs
# Storm Water Pollutant Sources/Source Controls Checklist

How to use this worksheet (also see instructions on Checklist for Regulated Projects):

1. Review Column 1 and identify which of these potential sources of storm water pollutants apply to your site. Check each box that applies.

2. Review Column 2 and incorporate all of the corresponding applicable Structural Source Control BMPs in your Storm water Control Plan drawings.

3. Review Columns 3 and 4 and incorporate all of the corresponding applicable Structural Source Control BMPs and Operational Source Control BMPs in a table in your Storm water Control Plan. Use this table and an accompanying narrative in the SCP, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs.

<table>
<thead>
<tr>
<th>IF THESE SOURCES WILL BE ON THE PROJECT SITE...</th>
<th>... THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Potential Sources of Runoff Pollutants</td>
<td>2 Structural Source Controls – Show on SCP Drawings</td>
</tr>
<tr>
<td>□ A. On-site storm drain inlets (unauthorized non-storm water discharges and accidental spills or leaks)</td>
<td>□ Location of inlets</td>
</tr>
<tr>
<td>□ Mark all inlets with the words “No Dumping! Flows to River/Ocean” or similar.</td>
<td>□ Maintain and periodically repaint or replace inlet markings.</td>
</tr>
<tr>
<td>□ Provide storm water pollution prevention information to new site owners, lessees, or operators.</td>
<td>□ Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”</td>
</tr>
</tbody>
</table>

See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Storm water Quality Handbooks at [www.casqa.org/resources/bmp-handbooks](http://www.casqa.org/resources/bmp-handbooks)
<table>
<thead>
<tr>
<th>Potential Sources of Runoff Pollutants</th>
<th>Structural Source Controls – Show on SCP Drawings</th>
<th>Structural Source Control – List in SCP Table and Narrative</th>
<th>Operational Source Control BMPs – Include in SCP Table and Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Interior floor drains and elevator shaft sump pumps</td>
<td>□ Show drain and pump locations</td>
<td>□ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer</td>
<td>□ Inspect and maintain drains to prevent blockages and overflow.</td>
</tr>
<tr>
<td>C. Interior parking garages</td>
<td>□ Show drain locations</td>
<td>□ State that parking garage floor drains will be plumbed to the sanitary sewer</td>
<td>□ Inspect and maintain drains to prevent blockages and overflow.</td>
</tr>
<tr>
<td>D1. Need for future indoor &amp; structural pest control</td>
<td>□ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.</td>
<td>□ Note building design features that discourage entry of pests</td>
<td>□ Provide Integrated Pest Management information to owners, lessees, and operators.</td>
</tr>
<tr>
<td>D2. Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance</td>
<td>□ Show self-retaining landscape areas, if any. □ Show bioretention facilities. (See instructions in Chapter 4.)</td>
<td>State that final landscape plans will accomplish all of the following. □ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. □ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. □ Where landscaped areas are used to retain or detain storm water, specify plants that are tolerant of saturated soil conditions. □ Consider using pest-resistant plants, especially adjacent to hardscape. □ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</td>
<td>□ Maintain landscaping using minimum or no pesticides. □ See applicable operational BMPs in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a> □ Provide IPM information to new owners, lessees and operators.</td>
</tr>
<tr>
<td>Potential Sources of Runoff Pollutants</td>
<td>Structural Source Controls – Show on SCP Drawings</td>
<td>Structural Source Control – List in SCP Table and Narrative</td>
<td>Operational Source Control BMPs – Include in SCP Table and Narrative</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>☐ E. Pools, spas, ponds, decorative fountains, and other water features</td>
<td>☐ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.</td>
<td>☐ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.</td>
<td>☐ See applicable operational BMPs in Fact Sheet SC-72, “Fountain and Pool Maintenance,” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
</tr>
<tr>
<td>☐ F. Food Service</td>
<td>☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer</td>
<td>☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.</td>
<td>☐ State maintenance schedule for grease interceptor</td>
</tr>
<tr>
<td>☐ G. Refuse areas</td>
<td>☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.</td>
<td>☐ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.</td>
<td>☐ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous materials” signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
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IF THESE SOURCES WILL BE ON THE PROJECT SITE...

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<th>... THEN YOUR STORM WATER CONTROL PLAN (SCP) SHOULD INCLUDE THESE SOURCE CONTROL BMPS</th>
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<tr>
<td>1</td>
<td>Potential Sources of Runoff Pollutants</td>
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<tr>
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<tr>
<td>4</td>
<td>Operational Source Control BMPS – Include in SCP Table and Narrative</td>
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[H. Industrial Process area]

- Show process area.
- If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”

[I. Outdoor storage of equipment or materials (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)]

- Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.
- Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.
- Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.
- Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.
- Where appropriate, reference documentation of compliance with the requirements of programs for:
  - Hazardous Waste Generation
  - Hazardous Materials Release Response and Inventory
  - California Accidental Release (CalARP)
  - Aboveground Storage Tank
  - Uniform Fire Code Article 80 Section 103(b) & (c) 1991
  - Underground Storage Tank

- See Fact Sheet SC-10, “Non-Storm water Discharges” in the CASQA Storm water Quality Handbooks at www.casqa.org/resources/bmp-handbooks
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<tr>
<td>☐ J. Vehicle and Equipment Cleaning</td>
<td>☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/ equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.</td>
<td>☐ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.</td>
<td>☐ Describe operational measures to implement the following (if applicable): Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Car dealerships and similar may rinse cars with water only. ☐ See Fact Sheet SC-21, “Vehicle and Equipment Cleaning,” in the CASQA Stormwater Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
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</table>
| □ K. Vehicle and Equipment Repair and Maintenance | □ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of storm water.  
□ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.  
□ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained. | □ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.  
□ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.  
□ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements. | In the Storm water Control Plan, note that all of the following restrictions apply to use the site:  
□ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.  
□ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.  
□ No person shall leave unattended parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. |
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<td>L. Fuel Dispensing Areas</td>
<td>☐ Fueling areas shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of storm water to the maximum extent practicable.</td>
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<td>☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover’s minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.</td>
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<td>☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.</td>
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<td>☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.</td>
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<td>☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency’s requirements.</td>
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<td>☐ The property owner shall dry sweep the fueling area routinely.</td>
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<td>☐ See the Business Guide Sheet, “Automotive Service—Service Stations” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
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<td>□ M. Loading Docks</td>
<td>□ Show the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct storm water away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. □ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. □ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.</td>
<td></td>
<td>□ Move loaded and unloaded items indoors as soon as possible. □ See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
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<td>□ N. Fire Sprinkler Test Water</td>
<td>□ Provide a means to drain fire sprinkler test water to the sanitary sewer</td>
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<td>□ See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Storm water Quality Handbooks at <a href="http://www.casqa.org/resources/bmp-handbooks">www.casqa.org/resources/bmp-handbooks</a></td>
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<td>O. Miscellaneous Drain or Wash Water or Other Sources</td>
<td>☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.</td>
<td>☐ If possible, purchase copper materials that have been pre-patinated at the factory.</td>
<td>If architectural copper is used, implement the following BMPs for management of rinse water during installation:</td>
<td></td>
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<tr>
<td>☐ Boiler drain lines</td>
<td>☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.</td>
<td>☐ If patination is done on-site, prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site.</td>
<td>☐ If possible, purchase copper materials that have been pre-patinated at the factory.</td>
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</tr>
<tr>
<td>☐ Condensate drain lines</td>
<td>☐ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.</td>
<td>☐ Consider coating the copper materials with an impervious coating that prevents further corrosion and runoff.</td>
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<tr>
<td>☐ Rooftop equipment</td>
<td>☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.</td>
<td>Implement the following BMPs during routine maintenance:</td>
<td></td>
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</tr>
<tr>
<td>☐ Drainage sumps</td>
<td>☐ Include controls for other sources as specified by local reviewer.</td>
<td>☐ Prevent rinse water from entering storm drains by discharging to landscaping or by collecting in a tank and hauling off-site.</td>
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<tr>
<td>☐ Roofing, gutters, and trim</td>
<td>☐ Other sources</td>
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<tr>
<td>☐ Other sources</td>
<td>☐ P. Plazas, sidewalks, and parking lots.</td>
<td>☐ Show extent of permeable paving materials</td>
<td>☐ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris.</td>
<td></td>
</tr>
<tr>
<td>☐ P. Plazas, sidewalks, and parking lots.</td>
<td>☐ Show extent of permeable paving materials</td>
<td>☐ Collect debris from pressure washing to prevent entry into the storm drain system.</td>
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</tr>
<tr>
<td>☐ P. Plazas, sidewalks, and parking lots.</td>
<td>☐ Show extent of permeable paving materials</td>
<td>☐ Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.</td>
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Non-Stormwater Discharges

Objectives
- Contain
- Educate
- Reduce/Minimize

Description
Non-stormwater discharges are those flows that do not consist entirely of stormwater. For municipalities non-stormwater discharges present themselves in two situations. One is from fixed facilities owned and/or operated by the municipality. The other situation is non-stormwater discharges that are discovered during the normal operation of a field program. Some non-stormwater discharges do not include pollutants and may be discharged to the storm drain. These include uncontaminated groundwater and natural springs. There are also some non-stormwater discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, and surface cleaning. However, there are certain non-stormwater discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges (which may include process waste waters, cooling waters, wash waters, and sanitary wastewater) can carry substances (such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants) into storm drains. The ultimate goal is to effectively eliminate non-stormwater discharges to the stormwater drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges.

Approach
The municipality must address non-stormwater discharges from its fixed facilities by assessing the types of non-stormwater discharges and implementing BMPs for the discharges determined to pose environmental concern. For field programs...
SC-10 Non-Stormwater Discharges

the field staff must be trained to now what to look for regarding non-stormwater discharges and the procedures to follow in investigating the detected discharges.

**Suggested Protocols**

**Fixed Facility**

**General**

- Post “No Dumping” signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.

- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as “Dump No Waste Drains to Stream” stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- Landscaping and beautification efforts of hot spots might also discourage future dumping, as well as provide open space and increase property values.

- Lighting or barriers may also be needed to discourage future dumping.

**Illicit Connections**

- Locate discharges from the fixed facility drainage system to the municipal storm drain system through review of “as-built” piping schematics.

- Use techniques such as smoke testing, dye testing and television camera inspection (as noted below) to verify physical connections.

- Isolate problem areas and plug illicit discharge points.

  **Visual Inspection and Inventory**

- Inventory and inspect each discharge point during dry weather.

- Keep in mind that drainage from a storm event can continue for several days following the end of a storm and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges are often intermittent and may require periodic inspections.

  **Review Infield Piping**

- Review the “as-built” piping schematic as a way to determine if there are any connections to the stormwater collection system.

- Inspect the path of floor drains in older buildings.

  **Smoke Testing**

- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems.
Non-Stormwater Discharges

- During dry weather the stormwater collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the stormwater system.

**Dye Testing**

- A dye test can be performed by simply releasing a dye into either your sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

**TV Inspection of Storm Sewer**

- TV Cameras can be employed to visually identify illicit connections to the fixed facility storm drain system.

**Illegal Dumping**

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

- Clean up spills on paved surfaces with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.

- Use absorbent materials on small spills rather than hosing down the spill. Remove the absorbent materials promptly and dispose of properly.

- For larger spills, a private spill cleanup company or Hazmat team may be necessary.


**Field Program**

**General**

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially ones that involve more than one jurisdiction and those that are not classified as hazardous, which are often not responded to as effectively as they need to be.

- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.

- See SC-74 Stormwater Drainage System Maintenance for additional information.
Non-Stormwater Discharges

Field Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.

- During routine field program maintenance field staff should look for evidence of illegal discharges or illicit connection:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.

- If trained, conduct field investigation of non-stormwater discharges to determine whether they pose a threat to water quality.

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers

- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms

- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms
Non-Stormwater Discharges

Educational materials

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during the course of normal daily activities so they can be investigated, contained and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated by recording tests performed, methods used, dates of testing, and any onsite drainage points observed.
- Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

Enforcement

- Educate the responsible party if identified on the impacts of their actions, explain the stormwater requirements, and provide information regarding Best Management Practices (BMP), as appropriate. Initiate follow-up and/or enforcement procedures.
- If an illegal discharge is traced to a commercial, residential or industrial source, conduct the following activities or coordinate the following activities with the appropriate agency:
  - Contact the responsible party to discuss methods of eliminating the non-stormwater discharge, including disposal options, recycling, and possible discharge to the sanitary sewer (if within POTW limits).
  - Provide information regarding BMPs to the responsible party, where appropriate.
  - Begin enforcement procedures, if appropriate.
  - Continue inspection and follow-up activities until the illicit discharge activity has ceased.
- If an illegal discharge is traced to a commercial or industrial activity, coordinate information on the discharge with the jurisdiction’s commercial and industrial facility inspection program.

Training

- Train technical staff to identify and document illegal dumping incidents.
- Well-trained employees can reduce human errors that lead to accidental releases or spills. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employees should be familiar with the Spill Prevention Control and Countermeasure Plan.
- Train employees to identify non-stormwater discharges and report them to the appropriate departments.
- Train staff who have the authority to conduct surveillance and inspections, and write citations for those caught illegally dumping.
SC-10  Non-Stormwater Discharges

- Train municipal staff responsible for surveillance and inspection in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).
  - Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

- Educate the identified responsible party on the impacts of his or her actions.

**Spill Response and Prevention**

- See SC-11 Spill Prevention Control and Clean Up

**Other Considerations**

- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.

- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

- Many facilities do not have accurate, up-to-date schematic drawings.

- Can be difficult to locate illicit connections especially if there is groundwater infiltration.

**Requirements**

**Costs**

- Eliminating illicit connections can be expensive especially if structural modifications are required such re-plumbing cross connections under an existing slab.

- Minor cost to train field crews regarding the identification of non-stormwater discharges. The primary cost is for a fully integrated program to identify and eliminate illicit connections and illegal dumping. However, by combining with other municipal programs (i.e. pretreatment program) cost may be lowered.

- Municipal cost for containment and disposal may be borne by the discharger.

**Maintenance**

Not applicable
Non-Stormwater Discharges

Supplemental Information
Further Detail of the BMP
What constitutes a “non-stormwater” discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:
  - Diverted stream flows;
  - Rising found waters;
  - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.
Non-Stormwater Discharges

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Illegal Dumping

- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties

Outreach

One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people on the street who are aware of the problem and who have the tools to at least identify the incident, if not correct it. There are a number of ways of accomplishing this:

- Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.

- Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).

- Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.

- Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).

- Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).

- Train volunteers to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.
Non-Stormwater Discharges

What constitutes a “non-stormwater” discharge?

- Non-stormwater discharges are discharges not made up entirely of stormwater and include water used directly in the manufacturing process (process wastewater), air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, landscape irrigation, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters.

Permit Requirements

- Current municipal NPDES permits require municipalities to effectively prohibit non-stormwater discharges unless authorized by a separate NPDES permit or allowed in accordance with the current NPDES permit conditions. Typically the current permits allow certain non-stormwater discharges in the storm drain system as long as the discharges are not significant sources of pollutants. In this context the following non-stormwater discharges are typically allowed:
  - Diverted stream flows;
  - Rising found waters;
  - Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20));
  - Uncontaminated pumped ground water;
  - Foundation drains;
  - Springs;
  - Water from crawl space pumps;
  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
  - Lawn watering.

Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence
of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

**Storm Drain Stenciling**

- Stencil storm drain inlets with a message to prohibit illegal dumpings, especially in areas with waste handling facilities.

- Encourage public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.

- See Supplemental Information section of this fact sheet for further detail on stenciling program approach.

**Oil Recycling**

- Contract collection and hauling of used oil to a private licensed used oil hauler/recycler.

- Comply with all applicable state and federal regulations regarding storage, handling, and transport of petroleum products.

- Create procedures for collection such as: collection locations and schedule, acceptable containers, and maximum amounts accepted.

- The California Integrated Waste Management Board has a Recycling Hotline, (800) 553-2962, that provides information and recycling locations for used oil.

**Household Hazardous Waste**

- Provide household hazardous waste (HHW) collection facilities. Several types of collection approaches are available including permanent, periodic, or mobile centers, curbside collection, or a combination of these systems.

**Training**

- Train municipal employees and contractors in proper and consistent methods for waste disposal.

- Train municipal employees to recognize and report illegal dumping.

- Train employees and subcontractors in proper hazardous waste management.

**Spill Response and Prevention**

- Refer to SC-11, Spill Prevention, Control & Cleanup

- Have spill cleanup materials readily available and in a known location.

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.
Non-Stormwater Discharges  SC-10

Other Considerations

- Federal Regulations (RCRA, SARA, CERCLA) and state regulations exist regarding the disposal of hazardous waste.

- Municipalities are required to have a used oil recycling element and a HHW element within their integrated waste management plan.

- Significant liability issues are involved with the collection, handling, and disposal of HHW.

Examples

The City of Palo Alto has developed a public participation program for reporting dumping violations. When a concerned citizen or public employee encounters evidence of illegal dumping, a door hanger (similar in format to hotel “Do Not Disturb” signs) is placed on the front doors in the neighborhood. The door hanger notes that a violation has occurred in the neighborhood, informs the reader why illegal dumping is a problem, and notes that illegal dumping carries a significant financial penalty. Information is also provided on what citizens can do as well as contact numbers for more information or to report a violation.

The Port of Long Beach has a state of the art database incorporating storm drain infrastructure, potential pollutant sources, facility management practices, and a pollutant tracking system.

The State Department of Fish and Game has a hotline for reporting violations called CalTIP (1-800-952-5400). The phone number may be used to report any violation of a Fish and Game code (illegal dumping, poaching, etc.).

The California Department of Toxic Substances Control’s Waste Alert Hotline, 1-800-69TOXIC, can be used to report hazardous waste violations.

References and Resources

http://www.stormwatercenter.net/

California’s Nonpoint Source Program Plan http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm


San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (http://www.projectcleanwater.org)

Vehicle and Equipment Cleaning

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description
Wash water from vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff. Use of the procedures outlined below can prevent or reduce the discharge of pollutants to stormwater during vehicle and equipment cleaning.

Approach
Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention
- If possible, use properly maintained off-site commercial washing and steam cleaning businesses whenever possible. These businesses are better equipped to handle and properly dispose of the wash waters.

- Good housekeeping practices can minimize the risk of contamination from wash water discharges.
SC-21  Vehicle and Equipment Cleaning

Suggested Protocols

General

- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.

- Mark the area clearly as a wash area.

- Post signs stating that only washing is allowed in wash area and that discharges to the storm drain are prohibited.

- Provide a trash container in wash area.

- Map on-site storm drain locations to avoid discharges to the storm drain system.

- Emphasize the connection between the storm drain system and runoff and help reinforce that car washing activities can have an affect on local water quality. This can be accomplished through storm drain stenciling programs.

Vehicle and Equipment Cleaning

- Design wash areas to properly collect and dispose of wash water when engine cleaning is conducted and when chemical additives, solvents, or degreasers are used. This may include installation of sumps or drain lines to collect wash water or construction of a berm around the designated area and grading of the area to collect wash water as well as prevent stormwater run-on.

- Consider washing vehicles and equipment inside the building if washing/cleaning must occur on-site. This will help to control the targeted constituents by directing them to the sanitary sewer.

- If washing must occur on-site and outdoor:
  - Use designated paved wash areas. Designated wash areas must be well marked with signs indicating where and how washing must be done. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
  - Oil changes and other engine maintenance cannot be conducted in the designated washing area. Perform these activities in a place designated for such activities.
  - Cover the wash area when not in use to prevent contact with rain water.

- Use hoses with nozzles that automatically turn off when left unattended.

- Perform pressure cleaning and steam cleaning off-site to avoid generating runoff with high pollutant concentrations. If done on-site, no pressure cleaning and steam cleaning should be done in areas designated as wellhead protection areas for public water supply.

Disposal

- Consider filtering and recycling wash water.
Vehicle and Equipment Cleaning

- Discharge equipment wash water to the sanitary sewer, a holding tank, or a process treatment system, regardless of the washing method used.
- Discharge vehicle wash water to (1) the sanitary sewer, a holding tank, or process treatment system or (2) an enclosed recycling system.
- Discharge wash water to sanitary sewer only after contacting the local sewer authority to find out if pretreatment is required.

Training
- Train employees on proper cleaning and wash water disposal procedures and conduct "refresher" courses on a regular basis.
- Train staff on proper maintenance measures for the wash area.
- Train employees and contractors on proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention
- Refer to SC-11, Spill Prevention, Control and Cleanup.
- Keep your Spill Prevention Control and Counter Measure (SPCC) Plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Clean up spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

Other Considerations (Limitations and Regulations)
- Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.
- Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to steam cleaning.
- Most car washing best management practices are inexpensive, and rely more on good housekeeping practices (where vehicles are washed, planning for the collection of wash water) than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive for municipal facilities. Also, for facilities that cannot recycle their wash water the cost of pre-treating wash water through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants can represent a cost limitation.

Requirements

Costs
- Capital costs vary depending on measures implemented
SC-21 Vehicle and Equipment Cleaning

- Low cost ($500-1,000) for berm construction,
- Medium cost ($5,000-20,000) for plumbing modifications (including re-routing discharge to sanitary sewer and installing simple sump).
- High cost ($30,000-150,000) for on-site treatment and recycling.

O&M costs increase with increasing capital investment.

Maintenance
- Berm repair and patching.
- Sweep washing areas frequently to remove solid debris.
- Inspect and maintain sumps, oil/water separators, and on-site treatment/recycling units.

Supplemental Information
Design Considerations
Designated Cleaning Areas
- Washing operations outside should be conducted in a designated wash area having the following characteristics:
  - Paved with Portland cement concrete,
  - Covered and bermed to prevent contact with stormwater and contain wash water,
  - Sloped for wash water collection,
  - Equipped with an oil/water separator, if necessary.

Examples

The City of Palo Alto has an effective program for commercial vehicle service facilities. Many of the program's elements, including specific BMP guidance and lists of equipment suppliers, are applicable to industrial vehicle service facilities.

The U.S. Postal Service in West Sacramento has a new vehicle wash system that collects, filters, and recycles the wash water.

References and Resources
http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wtr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
Outdoor Loading/Unloading

**Objectives**
- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

**Description**
The loading/unloading of materials usually takes place outside on docks or terminals; therefore, materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by stormwater runoff or when the area is cleaned. Additionally, rainfall may wash pollutants from machinery used to unload or move materials. Loading and unloading of material may include package products, barrels, and bulk products. Implementation of the following protocols will prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

**Approach**
**Pollution Prevention**
- Keep accurate maintenance logs to evaluate materials removed and improvements made.
- Park tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
- Limit exposure of materials with the potential to contaminate stormwater.
- Prevent stormwater runoff.
- Regularly check equipment for leaks.

**Targeted Constituents**
- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics
- Oxygen Demanding
SC-30  Outdoor Loading/Unloading

Suggested Protocols
Loading and Unloading – General Guidelines

- Develop an operations plan that describes procedures for loading and/or unloading.
- Do not conduct loading and unloading during wet weather, whenever possible.
- Cover designated loading/unloading areas to reduce exposure of materials to rain.
- A seal or door skirt between delivery vehicles and building can reduce or prevent exposure to rain.
- Design loading/unloading area to prevent stormwater runoff which would include grading or bermsing the area, and positioning roof downspouts so they direct stormwater away from the loading/unloading areas.
- If feasible, load and unload all materials and equipment in covered areas such as building overhangs at loading docks.
- Load/unload only at designated loading areas.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections. Several drip pans should be stored in a covered location near the liquid transfer area so that they are always available, yet protected from precipitation when not in use. Drip pans can be made specifically for railroad tracks. Drip pans must be cleaned periodically, and drip collected materials must be disposed of properly.
- Pave loading areas with concrete instead of asphalt.
- Avoid placing storm drains in the area.
- Grade and/or berm the loading/unloading area to a drain that is connected to a dead-end sump.

Inspection

- Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
- Look for dust or fumes during loading or unloading operations.

Training

- Train employees (e.g. fork lift operators) and contractors on proper spill containment and cleanup.
- Employees trained in spill containment and cleanup should be present during the loading/unloading.
- Train employees in proper handling techniques during liquid transfers to avoid spills.
Outdoor Loading/Unloading

- Make sure forklift operators are properly trained on loading and unloading procedures.

**Spill Response and Prevention**
- Refer to SC-11, Spill Prevention, Control & Cleanup
- Keep your spill prevention Control and countermeasure (SPCC) Plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

**Other Considerations**
- Space, material characteristics and/or time limitations may preclude all transfers from being performed indoors or under cover.

**Requirements**
**Costs**
- Should be low except when covering a large loading/unloading area.

**Maintenance**
- Conduct regular inspections and make repairs as necessary. The frequency of repairs will depend on the age of the facility.
- Check loading and unloading equipment regularly for leaks.
- Regularly broom dry-sweeping of area.
- Conduct major clean-out of loading and unloading area and sump prior to October 1 of each year.

**Supplemental Information**
**Further Detail of the BMP**
**Special Circumstances for Indoor Loading/Unloading of Materials**

As appropriate loading or unloading of liquids should occur indoors so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.

- For loading and unloading tank trucks to above and below ground storage tanks, the following procedures should be used:
  - The area where the transfer takes place should be paved. If the liquid is reactive with the asphalt, Portland cement should be used to pave the area.
  - Transfer area should be designed to prevent runon of stormwater from adjacent areas. Sloping the pad and using a curb, like a speed bump, around the uphill side of the transfer area should reduce run-on.
SC-30  Outdoor Loading/Unloading

- Transfer area should be designed to prevent runoff of spilled liquids from the area. Sloping the area to a drain should prevent runoff. The drain should be connected to a dead-end sump or to the sanitary sewer (if allowed). A positive control valve should be installed on the drain.

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:
  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles. Use drip pans when making and breaking connections.
  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources
http://www.stormwatercenter.net/

King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Orange County Stormwater Program

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
Outdoor Container Storage

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

Accidental releases of materials from above ground liquid storage tanks, drums, and dumpsters present the potential for contaminating stormwaters with many different pollutants. Tanks may store many potential stormwater runoff pollutants, such as gasoline, aviation gas, diesel fuel, ammonia, solvents, syrups, etc. Materials spilled, leaked, or lost from storage tanks may accumulate in soils or on other surfaces and be carried away by rainfall runoff. These source controls apply to containers located outside of a building used to temporarily store liquid materials and include installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

Approach

Pollution Prevention

- Educate employees about pollution prevention measures and goals

- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site. Re-evaluate inventory needs and consider purchasing alternative products. Properly dispose of outdated products.

- Try to keep chemicals in their original containers, and keep them well labeled.
SC-31 Outdoor Container Storage

Suggested Protocols

General

- Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading/Unloading for more detailed BMP information pertaining to loading and unloading of liquids.

- Protect materials from rainfall, runoff, runoff, and wind dispersal:
  - Cover the storage area with a roof.
  - Minimize stormwater runoff by enclosing the area or building a berm around it.
  - Use a “doghouse” structure for storage of liquid containers.
  - Use covered dumpsters for waste product containers.

- Employ safeguards against accidental releases:
  - Provide overflow protection devices to warn operator or automatic shut down transfer pumps.
  - Provide protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
  - Provide clear tagging or labeling, and restricting access to valves to reduce human error.

- Berm or surround tank or container with secondary containment system using dikes, liners, vaults, or double walled tanks.

- Contact the appropriate regulatory agency regarding environmental compliance for facilities with “spill ponds” designed to intercept, treat, and/or divert spills.

- Have registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.

Storage Areas

- Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.

- Provide barriers such as posts or guard rails, where tanks are exposed, to prevent collision damage with vehicles.

- Provide secure storage to prevent vandalism.

- Place tight-fitting lids on all containers.

- Enclose or cover the containers where they are stored.
Outdoor Container Storage

- Raise the containers off the ground by use of pallet or similar method, with provisions for spill control and secondary containment.

- Contain the material in such a manner that if the container leaks or spills, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters or groundwater.

- Place drip pans or absorbent materials beneath all mounted container taps, and at all potential drip and spill locations during filling and unloading of containers. Drip pans must be cleaned periodically, and all collected liquids and soiled absorbent materials must be reused/recycled or properly disposed.

- Ensure that any underground or aboveground storage tanks shall be designed and managed in accordance with applicable regulations, be identified as a potential pollution source, have secondary containment, such as a berm or dike with an impervious surface.

- Rainfall collected in secondary containment system must not contain pollutants for discharge to storm drain system.

Container Management

- Keep containers in good condition without corrosion or leaky seams.

- Place containers in a lean-to structure or otherwise covered to keep rainfall from reaching the drums.

- Replace containers if they are deteriorating to the point where leakage is occurring. Keep all containers undercover to prevent the entry of stormwater. Employees should be made aware of the importance of keeping the containers free from leaks.

- Keep waste container drums in an area such as a service bay. Drums stored outside must be stored in a lean-to type structure, shed or walk-in container.

Storage of Hazardous Materials

- Storage of reactive, ignitable, or flammable liquids must comply with the fire and hazardous waste codes.

- Place containers in a designated area that is paved, free of cracks and gaps, and impervious in order to contain leaks and spills. The area should also be covered.

- Surround stored hazardous materials and waste with a curb or dike to provide the volume to contain 10 percent of the volume of all of the containers or 110 percent of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain and a dead-end sump should be installed in the drain.

Inspection

- Provide regular inspections:
  - Inspect storage areas regularly for leaks or spills.
Outdoor Container Storage

- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.
- Label new or secondary containers with the product name and hazards.

Training

- Train employees (e.g. fork lift operators) and contractors in proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

- Train employees in proper storage measures.

- Use a training log or similar method to document training.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date, and implement accordingly.

- Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.

- Collect all spilled liquids and properly dispose of them.

- Employees trained in emergency spill cleanup procedures should be present when dangerous waste, liquid chemicals, or other wastes are delivered.

- Operator errors can be prevented by using engineering safe guards and thus reducing accidental releases of pollutant.

- Store and maintain appropriate spill cleanup materials in a location known to all near the tank storage area.

- See Aboveground Tank Leak and Spill Control section of the Spill Prevention, Control & Cleanup fact sheet (SC-11) for additional information.
Other Considerations

- Storage sheds often must meet building and fire code requirements.
- The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
- All specific standards set by federal and state laws concerning the storage of oil and hazardous materials must be met.
- Storage of reactive, ignitable, or flammable liquids should comply with the Uniform Fire Code and the National Electric Code.
- Storage of oil and hazardous materials must meet specific federal and state standards including:
  - Spill Prevention Control and Countermeasure Plan (SPCC) Plan
  - Secondary containment
  - Integrity and leak detection monitoring
  - Emergency preparedness plans

Requirements

Costs
- Will vary depending on the size of the facility and the necessary controls, such as berms or safeguards against accidental controls.

Maintenance
- Conduct weekly inspection.
- Sweep and clean the storage area regularly if it is paved, do not hose down the area to a storm drain.

Supplemental Information
- The most common causes of unintentional releases are:
  - Installation problems,
  - Failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves),
  - External corrosion and structural failure,
  - Spills and overfills due to operator error, and
  - Leaks during pumping of liquids or gases from truck or rail cars to a storage tank or vice versa.
Further Detail of the BMP

Dikes

One of the best protective measures against contamination of stormwater is diking. Containment dikes are berms or retaining walls that are designed to hold spills. Diking is an effective pollution prevention measure for above ground storage tanks and railcar or tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the stormwater side of the dike area. Diking can be used in any industrial or municipal facility, but it is most commonly used for controlling large spills or releases from liquid storage areas and liquid transfer areas.

- For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rain water.

- For trucks, diked areas should be capable of holding an amount equal to the volume of the tank truck compartment. Diked construction material should be strong enough to safely hold spilled materials.

- Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.

- Strong acids or bases may react with metal containers, concrete, and some plastics.

- Where strong acids or bases or stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.

- Dikes may also be designed with impermeable materials to increase containment capabilities.

- Dikes should be inspected during or after significant storms or spills to check for washouts or overflows.

- Regular checks of containment dikes to insure the dikes are capable of holding spills should be conducted.

- Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.

- Accumulated stormwater in the containment area should be analyzed for pollutants before it is released to surface waters. If pollutants are found or if stormwater quality is not determined, then methods other than discharging to surface waters should be employed (e.g., discharge to sanitary sewer if allowed).

- Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.
Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. The curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and transferring liquid materials occur. Curbing can redirect stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to another. Asphalt is a common material used for curbing; however, curbing materials include earth, concrete, synthetic materials, metal, or other impenetrable materials.

- Spilled materials should be removed immediately from curbed areas to allow space for future spills.
- Curbs should have manually-controlled pump systems rather than common drainage systems for collection of spilled materials.
- The curbed area should be inspected regularly to clear clogging debris.
- Maintenance should also be conducted frequently to prevent overflow of any spilled materials as curbed areas are designed only for smaller spills.
- Curbing has the following advantages:
  - Excellent runon control,
  - Inexpensive,
  - Ease of installment,
  - Provides option to recycle materials spilled in curb areas, and
  - Common industry practice.

Examples

The “doghouse” design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successfully at Lockheed Missile and Space Company in Sunnyvale.

References and Resources

http://www.nalms.org/bclss/storage.html

King County Stormwater Pollution Control Manual –
http://dnr.metrokc.gov/wlr/dss/spcm.htm
San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
Outdoor Storage of Raw Materials  SC-33

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize

Description
Raw materials, by-products, finished products, containers, and material storage areas exposed to rain and/or runoff can pollute stormwater. Stormwater can become contaminated when materials wash off or dissolve into water or are added to runoff by spills and leaks. Improper storage of these materials can result in accidental spills and the release of materials. To prevent or reduce the discharge of pollutants to stormwater from material delivery and storage, pollution prevention and source control measures, such as minimizing the storage of hazardous materials on-site, enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing stormwater runoff and runoff, and training employees and subcontractors must be implemented.

Approach
Pollution Prevention
- Employee education is paramount for successful BMP implementation,
- Minimize inventory of raw materials,
- Keep an accurate, up-to-date inventory of the materials delivered and stored on-site,
- Try to keep chemicals in their original containers, and keep them well labeled.

Targeted Constituents
- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics
- Oxygen Demanding
**Suggested Protocols**

**General**

- Store all materials inside. If this is not feasible, then all outside storage areas should be covered with a roof, and bermed, or enclosed to prevent stormwater contact. At the very minimum, a temporary waterproof covering made of polyethylene, polypropylene or hypalon should be used over all materials stored outside.

- Cover and contain the stockpiles of raw materials to prevent stormwater from running into the covered piles. The covers must be in place at all times when work with the stockpiles is not occurring. (applicable to small stockpiles only).

- If the stockpiles are so large that they cannot feasibly be covered and contained, implement erosion control practices at the perimeter of your site and at any catch basins to prevent erosion of the stockpiled material off site.

- Keep liquids in a designated area on a paved impervious surface within a secondary containment.

- Keep outdoor storage containers in good condition.

- Keep storage areas clean and dry.

- Design paved areas to be sloped in a manner that minimizes the pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

- Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.

- Cover wood products treated with chromated copper arsenate, ammonical copper zinc arsenate, creosote, or pentachlorophenol with tarps or store indoors.

**Raw Material Containment**

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers if applicable.

- Prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas, by placing a curb along the perimeter of the area. The area inside the curb should slope to a drain. Liquids should be drained to the sanitary sewer if allowed. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.

- Tanks should be bermed or surrounded by a secondary containment system.

- Release accumulated stormwater in petroleum storage areas prior to the next storm. At a minimum, water should pass through an oil/water separator and, if allowed, discharged to a sanitary sewer.
Outdoor Storage of Raw Materials  SC-33

**Inspection**
- Conduct regular inspections of storage areas so that leaks and spills are detected as soon as possible.
- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.

**Training**
- Employees should be well trained in proper material storage.
- Train employees and contractors in proper techniques for spill containment and cleanup.

**Spill Response and Prevention**
- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.
- Have employees trained in spill containment and cleanup present during loading/unloading of dangerous waste, liquid chemicals and other potentially hazardous materials.

**Other Considerations**
- Storage sheds often must meet building and fire code requirements. Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code and the National Electric Code.
- Space limitations may preclude storing some materials indoors.
- Some municipalities require that secondary containment areas (regardless of size) be connected to the sanitary sewer, prohibiting any hard connections to the storm drain. Storage sheds often must meet building and fire code requirements.
- The local fire district must be consulted for limitations on clearance of roof covers over containers used to store flammable materials.
SC-33  Outdoor Storage of Raw Materials

Requirements

Costs
- Costs will vary depending on the size of the facility and the necessary controls. They should be low except where large areas may have to be covered.

Maintenance
- Accurate and up-to-date inventories should be kept of all stored materials.
- Berms and curbs may require periodic repair and patching.
- Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage area.
- Sweep paved storage areas regularly for collection and disposal of loose solid materials, do not hose down the area to a storm drain or conveyance ditch.
- Keep outdoor storage areas in good condition (e.g. repair roofs, floors, etc. to limit releases to runoff).

Supplemental Information

Further Detail of the BMP
Raw Material Containment

Paved areas should be sloped in a manner that minimize the pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.

- Curbing should be placed along the perimeter of the area to prevent the runoff of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.
- The storm drainage system should be designed to minimize the use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.
- The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleys where material is not stockpiled.
- If the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC-31, Outdoor Container Storage.

Examples
The “doghouse” design has been used to store small liquid containers. The roof and flooring design prevent contact with direct rain or runoff. The doghouse has two solid structural walls and two canvas covered walls. The flooring is wire mesh about secondary containment. The unit has been used successively at Lockheed Missile and Space Company in Sunnyvale.

References and Resources
King County Stormwater Pollution Control Manual - http://dnr.metrokc.gov/wlr/dss/spcm.htm
Outdoor Storage of Raw Materials  SC-33


Orange County Stormwater Program

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
**Description**

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter stormwater runoff. The discharge of pollutants to stormwater from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal; reducing waste generation and disposal through source reduction, re-use, and recycling; and preventing runon and runoff.

**Approach**

**Pollution Prevention**

- Reduction in the amount of waste generated can be accomplished using the following source controls such as:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling

- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.

- Recycle materials whenever possible.
Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater runoff and runoff with a berm. The waste containers or piles must be covered except when in use.

- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.

- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.

- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.

- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.

- Transfer waste from damaged containers into safe containers.

- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post “No Littering” signs and enforce anti-litter laws.

- Provide a sufficient number of litter receptacles for the facility.

- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.

- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.

- Secure solid waste containers; containers must be closed tightly when not in use.

- Place waste containers under cover if possible.

- Do not fill waste containers with washout water or any other liquid.

- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be
disposed of in solid waste containers (see chemical/hazardous waste collection section below).

- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.

**Good Housekeeping**

- Use all of the product before disposing of the container.
- Keep the waste management area clean at all times by sweeping and cleaning up spills immediately.
- Use dry methods when possible (e.g. sweeping, use of absorbents) when cleaning around restaurant/food handling dumpster areas. If water must be used after sweeping/using absorbents, collect water and discharge through grease interceptor to the sewer.
- Stencil storm drains on the facility's property with prohibitive message regarding waste disposal.

**Chemical/Hazardous Wastes**

- Select designated hazardous waste collection areas on-site.
- Store hazardous materials and wastes in covered containers protected from vandalism, and in compliance with fire and hazardous waste codes.
- Place hazardous waste containers in secondary containment.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

**Runoff/Runoff Prevention**

- Prevent stormwater runoff from entering the waste management area by enclosing the area or building a berm around the area.
- Prevent the waste materials from directly contacting rain.
- Cover waste piles with temporary covering material such as reinforced tarpaulin, polyethylene, polyurethane, polypropylene or hypalon.
- Cover the area with a permanent roof if feasible.
- Cover dumpsters to prevent rain from washing waste out of holes or cracks in the bottom of the dumpster.
- Move the activity indoor after ensuring all safety concerns such as fire hazard and ventilation are addressed.

**Inspection**
Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.

Check waste management areas for leaking containers or spills.

Repair leaking equipment including valves, lines, seals, or pumps promptly.

**Training**
- Train staff pollution prevention measures and proper disposal methods.
- Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.
- Train employees and subcontractors in proper hazardous waste management.

**Spill Response and Prevention**
- Refer to SC-11, Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.
- Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:
  - Vehicles equipped with baffles for liquid waste
  - Trucks with sealed gates and spill guards for solid waste

**Other Considerations**
- Hazardous waste cannot be re-used or recycled; it must be disposed of by a licensed hazardous waste hauler.

**Requirements**

**Costs**
- Capital and operation and maintenance costs will vary substantially depending on the size of the facility and the types of waste handled. Costs should be low if there is an inventory program in place.

**Maintenance**
- None except for maintaining equipment for material tracking program.
Supplemental Information

Further Detail of the BMP

Land Treatment System

- Minimize the runoff of polluted stormwater from land application of municipal waste on-site by:
  - Choosing a site where slopes are under 6%, the soil is permeable, there is a low water table, it is located away from wetlands or marshes, there is a closed drainage system.
  - Avoiding application of waste to the site when it is raining or when the ground is saturated with water.
  - Growing vegetation on land disposal areas to stabilize soils and reduce the volume of surface water runoff from the site.
  - Maintaining adequate barriers between the land application site and the receiving waters. Planted strips are particularly good.
  - Using erosion control techniques such as mulching and matting, filter fences, straw bales, diversion terracing, and sediment basins.
  - Performing routine maintenance to ensure the erosion control and site stabilization measures are working.

References and Resources

King County Stormwater Pollution Control Manual - [http://dnr.metrokc.gov/wlr/dss/spcm.htm](http://dnr.metrokc.gov/wlr/dss/spcm.htm)

Orange County Stormwater Program

Description
Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, and abnormal pH. Utilizing the following protocols will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach
Pollution Prevention
- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Encourage proper lawn management and landscaping, including use of native vegetation.
- Encourage use of Integrated Pest Management techniques for pest control.
- Encourage proper onsite recycling of yard trimmings.
- Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents
- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics
- Oxygen Demanding
SC-41 Building & Grounds Maintenance

Suggested Protocols
Pressure Washing of Buildings, rooftops, and other large objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils.

- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.
Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. In which case you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

Store toxic material under cover with secondary containment during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

Use mulch or other erosion control measures when soils are exposed.

Place temporarily stockpiled material away from watercourses and drain inlets, and berms or cover stockpiles to prevent material releases to the storm drain system.

Consider an alternative approach when bailing out muddy water; do not put it in the storm drain, pour over landscaped areas.

Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

Follow manufacturers’ recommendations and label directions. Pesticides must never be applied if precipitation is occurring or predicted. Do not apply insecticides within 100 feet of surface waters such as lakes, ponds, wetlands, and streams.

Use less toxic pesticides that will do the job, whenever possible. Avoid use of copper-based pesticides if possible.

Do not use pesticides if rain is expected.

Do not mix or prepare pesticides for application near storm drains.

Use the minimum amount needed for the job.

Calibrate fertilizer distributors to avoid excessive application.

Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
Apply pesticides only when wind speeds are low.

Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.

Irrigate slowly to prevent runoff and then only as much as is needed.

Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Dispose of empty pesticide containers according to the instructions on the container label.

Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.

Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

**Inspection**

Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering, and repair leaks in the irrigation system as soon as they are observed.

**Training**

Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.

Train employees and contractors in proper techniques for spill containment and cleanup.

Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

**Spill Response and Prevention**

Refer to SC-11, Spill Prevention, Control & Cleanup

Keep your Spill Prevention Control and countermeasure (SPCC) plan up-to-date, and implement accordingly.

Have spill cleanup materials readily available and in a known location.

Cleanup spills immediately and use dry methods if possible.

Properly dispose of spill cleanup material.

**Other Considerations**

Alternative pest/weed controls may not be available, suitable, or effective in many cases.
Requirements

Costs
- Overall costs should be low in comparison to other BMPs.

Maintenance
- Sweep paved areas regularly to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

Building fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping but it is subject to rusting and results in lower quality water. Initially the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, polyphosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time, typically a year, between flushes and may accumulate iron, manganese, lead, copper, nickel and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

California’s Nonpoint Source Program Plan http://www.swrce.b.ca.gov/nps/index.html

King County - ftp://dnr.metrokc.gov/wlr/dss/spcw/Chapter%203.PDF

Orange County Stormwater Program


Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA) http://www.bassmaa.org/

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
**Fountain & Pool Maintenance**

**Description**
The primary pollutant of concern in municipal swimming pool water is chlorine or chloramine used as a disinfectant. This water, if discharged to the storm drain system, can be toxic to aquatic life. In lakes, lagoons, and fountains, the pollutants of concern are chemical algacides that are added to control algae mainly for aesthetic reasons (visual and odor). Following the procedures noted in this fact sheet will reduce the pollutants in this discharge.

**Approach**

**Pollution Prevention**
- Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems.
- Manage pH and water hardness to minimize corrosion of copper pipes.

**Suggested Protocols**

**Pools and Fountains**
- Do not use copper-based algacides. Control algae with chlorine or other alternatives, such as sodium bromide.
- Do not discharge water to a street or storm drain when draining pools or fountains; discharge to the sanitary sewer if permitted to do so. If water is dechlorinated with a neutralizing chemical or by allowing chlorine to dissipate for a few days (do not use the facility during this time), the water may be recycled/reused by draining it gradually onto a landscaped area. Water must be tested prior to discharge to ensure that chlorine is not present.
- Prevent backflow if draining a pool to the sanitary sewer by maintaining an “air gap” between the discharge line and the sewer line (do not seal the connection between the hose and sewer line). Be sure to call the local wastewater treatment plant for further guidance on flow rate restrictions, backflow prevention, and handling special cleaning waste (such as acid wash). Discharge flows should be kept to the low levels typically possible through a garden hose. Higher flow rates may be prohibited by local ordinance.
- Provide drip pans or buckets beneath drain pipe connections to catch leaks. This will be especially pertinent if pool or spa water that has not been dechlorinated is pumped through piping to a discharge location.

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**Objectives**
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

**Targeted Constituents**

- Sediment
- Nutrients
- Trash
- Metals
- Bacteria
- Oil and Grease
- Organics
- Oxygen Demanding

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CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Never clean a filter in the street or near a storm drain.

Rinse cartridge filters onto a dirt area, and spade filter residue into soil.

Backwash diatomaceous earth filters onto dirt. Dispose of spent diatomaceous earth in the garbage. Spent diatomaceous earth cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground.

If there is not a suitable dirt area discharge filter backwash or rinsewater to the sanitary sewer if permitted to do so by the local sewer agency.

Lakes and Lagoons

Reduce fertilizer use in areas around the water body. High nitrogen fertilizers can produce excess growth requiring more frequent mowing or trimming, and may contribute to excessive algae growth.

To control bacteria, discourage the public from feeding birds and fish (i.e. place signs that prohibit feeding of waterfowl).

Consider introducing fish species that consume algae. Contact the California Department of Fish and Game for more information on this issue.

Mechanically remove pond scum (blue-green algae) using a 60 micron net.

Educate the public on algae and that no controls are necessary for certain types of algae that are beneficial to the water body.

Control erosion by doing the following:

- Maintain vegetative cover on banks to prevent soil erosion. Apply mulch or leave clippings to serve as additional cover for soil stabilization and to reduce the velocity of stormwater runoff.

- Areas should be designed (sloped) to prevent runoff and erosion and to promote better irrigation practices.

- Provide energy dissipaters (e.g. riprap) along banks to minimize potential for erosion.

- Confine excavated materials to surfaces away from lakes. Material must be covered if rain is expected.

Conduct inspections to detect illegal dumping of clippings/cuttings in or near a lake. Materials found should be picked up and properly disposed of.

Avoid landscape wastes in and around lakes should be avoided by either using bagging equipment or by manually picking up the material. Collect trash and debris from within water bodies where feasible.

Provide and maintain trash receptacles near recreational water bodies to hold refuse generated by the public.
Fountain & Pool Maintenance

- Increase trash collection during peak visitation months (generally June, July and August).

**Training**
- Train maintenance personnel to test chlorine levels and to apply neutralizing chemicals.
- Train personnel regarding proper maintenance of pools, ponds and lakes.

**Spill Response and Prevention**
- Refer to SC-11, Spill Prevention, Control & Cleanup
- Have spill cleanup materials readily available and in a known location.
- Cleanup spills immediately and use dry methods if possible.
- Properly dispose of spill cleanup material.

**Other Considerations**
- Managers of pools located in sensitive areas or adjacent to shorelines should check with the appropriate authorities to determine if code requirements apply.
- Cleanup activities at lakes and lagoons may create a slight disturbance for local aquatic species. If the lake is recognized as a wetland, many activities, including maintenance, may be subject to regulation and permitting.

**Requirements**

**Costs**
- The maintenance of pools and lakes is already a consideration of most municipal public works departments. Therefore the cost associated with this BMP is minimal and only reflects an increase in employee training and public outreach.

**Maintenance**
- Not applicable

**Supplemental Information**

**Further Detail of the BMP**
When dredging is conducted, adhere to the following:
- Dredge with shovels when laying/maintaining pipes.
- To determine amount to dredge, determine rate of volume loss due to sediments.
- For large lakes, dredge every 10 years.
- When dredging small lakes, drain lake.
- When dredging large lakes, use vacuum equipment.
- After dredging test sediment piles for proper disposal. Dredged sediment can be used as fill, or may have to be land filled.
SC-72  Fountains & Pools Maintenance

References and Resources


Orange County Stormwater Program

APPENDIX 5

Bioretention Specifications and Checklist
Notes:

- No liner, no filter fabric, no landscape cloth.

- Maintain BGL, TGL, TSL throughout facility area at elevations to be specified in plan.

- Class 7 permeable layer may extend below and underneath drop inlet.

- Elevation or underdrain discharge is at top of gravel layer.

- See Chapter X for instructions on facility sizing and additional specifications.

Allowed variations for special site conditions:

- Facilities located within 10 feet of structures or other potential geotechnical hazards may incorporate an impervious cutoff wall.

- Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner between the native soil and the BGL and locate the underdrain discharge at the BGL (flow-through planter configuration).

- Facilities located in areas of high groundwater, highly infiltrative soils, or where connection of the underdrain to a surface drain or subsurface storm drain are infeasible may omit the underdrain.

Bioretention Facility

not to scale

**Overflow Structure**

Concrete drop inlet or manhole with frame, atrium or behive grate, ¼” openings

Min. 6’

3” max. mulch if specified by plans

Walls as needed to establish constant rim elevation around facility

to storm drain

Min. 18”

Min. 12”

Top of soil layer (TSL)

Top of gravel layer (TGL)

Bottom of gravel layer (BGL)

class 2 permeable material

4” min. diameter SDR 35 or equivalent perforations facing down

Schedule 80 (no perforations) seal penetration with grout

Bend or slope so discharge is at TGL elevation

Min. 18”

Min. 12”

Min. 6”

3” max. mulch if specified by plans

Native Soil

4” min. diameter SDR 35 or equivalent sweep bend and cleanout min. 2” above overflow level

Install all plantings to maintain TSL at or below specified elevation

cutoff wall if needed to protect structures or pavement

cobbles or splash block

adjacent pavement

curb cut or curb inlet if needed

4” min. diameter SDR 35 or equivalent sweep bend and cleanout min. 2” above overflow level

Install all plantings to maintain TSL at or below specified elevation
Bioretention Facility - Overview

not to scale

- 6" spacing of underdrain pipes is typically adequate.
- Curb inlets may be utilized if slope is greater than 2%.
- Multiple inlets are OK.
- Use cobble or splashblock to dissipate energy.
- Surface area of soil mix that will flood before facility overflows.
- Separate facility from adjacent landscaping with a wall or curb.
- It is OK to slope soil mix against curb to reduce drop-off and/or use plantings to discourage entry.
- 6" min. avg. depth.

Note:
Show all elevations of curb, pavement, inlet, top of soil layer (TSL), top of gravel layer (TGL), and bottom of gravel layer (BGL) at all inlets and outlets and at key points along edge of facility.
Compost shall be a well-decomposed, stable, weed-free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids, and shall meet the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

Compost Quality Analysis:

Before delivery of the soil, the supplier shall submit a copy of the lab analysis performed by a laboratory that is enrolled in the USCC’s Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Evaluation of Composting and Compost (TMECC). The lab report shall verify that the compost parameters are within the limits specified below.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Reported as (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organic Matter Content</strong></td>
<td>35-75 %</td>
<td>%, dry weight basis</td>
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<tr>
<td><strong>Carbon to Nitrogen Ratio</strong></td>
<td>15:1 to 25:1</td>
<td>ratio</td>
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<tr>
<td><strong>Maturity (Seed Emergence and Seedling Vigor)</strong></td>
<td>&gt;80</td>
<td>average % of control</td>
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<tr>
<td><strong>Stability (CO₂ Evolution Rate)</strong></td>
<td>&lt;8</td>
<td>mg CO₂-C/g unit OM/day</td>
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<tr>
<td><strong>Soluble Salts (Salinity)</strong></td>
<td>&lt;6.0</td>
<td>mmhos/cm</td>
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<tr>
<td><strong>pH</strong></td>
<td>6.5 - 8.0</td>
<td>May vary with plant species</td>
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<tr>
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<td></td>
</tr>
<tr>
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<td>PASS/FAIL: US EPA Class A standard, 40 CFR § 503.32(a) levels</td>
</tr>
<tr>
<td><strong>Salmonella</strong></td>
<td>PASS</td>
<td>PASS/FAIL: US EPA Class A standard, 40 CFR § 503.32(a) levels</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>Total Nitrogen (N)</strong></td>
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<tr>
<td><strong>Boron (Total B)</strong></td>
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<td>ppm</td>
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</tr>
<tr>
<td><strong>Magnesium (Mg)</strong></td>
<td>For information only</td>
<td>%</td>
</tr>
<tr>
<td><strong>Sulfur (S)</strong></td>
<td>For information only</td>
<td>%</td>
</tr>
</tbody>
</table>
Gravel Layer


The specific section, Subsurface Drains, Sec. 68, of the manual is used because it offers specific specifications for subsurface drains. In addition to the standardized permeable layer, a membrane layer of pea gravel or other intermediate-sized material is recommended at the top of the gravel layer to prevent fines from the soil/compost layer from moving downward into the gravel layer.

68-2.02F(1) General

Permeable material for use in backfilling trenches under, around, and over underdrains must consist of hard, durable, clean sand, gravel, or crushed stone and must be free from organic material, clay balls, or other deleterious substances.

Permeable material must have a durability index of not less than 40.

68-2.02F(3) Class 2 Permeable Material

The percentage composition by weight of Class 2 permeable material in place must comply with the grading requirements shown in the following table:

**Class 2 Permeable Material Grading Requirements**

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Percentage passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>90–100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>40–100</td>
</tr>
<tr>
<td>No. 4</td>
<td>25–40</td>
</tr>
<tr>
<td>No. 8</td>
<td>18–33</td>
</tr>
<tr>
<td>No. 30</td>
<td>5–15</td>
</tr>
<tr>
<td>No. 50</td>
<td>0–7</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–3</td>
</tr>
</tbody>
</table>

Class 2 permeable material must have a sand equivalent value of not less than 75.
### Bioretention Facility Construction Checklist

#### Layout (to be confirmed prior to beginning excavation permit approval stage)

| ☐ | Square footage of the facility meets or exceeds minimum shown in Stormwater Control Plan |
| ☐ | Site grading and grade breaks are consistent with the boundaries of the tributary Drainage Management Area(s) (DMAs) shown in the Stormwater Control Plan |
| ☐ | Inlet elevation of the facility is low enough to receive drainage from the entire tributary DMA |
| ☐ | Locations and elevations of overland flow or piping, including roof leaders, from impervious areas to the facility have been laid out and any conflicts resolved |
| ☐ | Rim elevation of the facility is laid out to be level all the way around, or elevations are consistent with a detailed cross-section showing location and height of interior dams |
| ☐ | Locations for vaults, utility boxes, and light standards have been identified so that they will not conflict with the facility |
| ☐ | Facility is protected as needed from construction-phase runoff and sediment |

#### Excavation (to be confirmed prior to backfilling or pipe installation)

| ☐ | Excavation conducted with materials and techniques to minimize compaction of soils within the facility area |
| ☐ | Excavation is to accurate area and depth |
| ☐ | Slopes or side walls protect from sloughing of native soils into the facility |
| ☐ | Moisture barrier, if specified, has been added to protect adjacent pavement or structures. |
| ☐ | Native soils at bottom of excavation are ripped or loosened to promote infiltration |

#### Overflow or Surface Connection to Storm Drainage (to be confirmed prior to backfilling with any materials)

| ☐ | Grating excludes mulch and litter (beehive or atrium-style grates recommended) |
| ☐ | Overflow is connected to storm drain via appropriately sized |
| ☐ | No knockouts or side inlets are in overflow riser |
| ☐ | Overflow is at specified elevation |
| ☐ | Overflow location selected to minimize surface flow velocity (near, but offset from, inlet recommended) |
| ☐ | Grating excludes mulch and litter (beehive or atrium-style grates recommended) |
| ☐ | Overflow is connected to storm drain via appropriately sized |
## Bioretention Facility Construction Checklist

### Underground connection to storm drain/outlet orifice

- Perforated pipe underdrain (PVC SDR 35 or approved equivalent) is installed with holes facing down
- Perforated pipe is connected to storm drain at specified elevation (typ. bottom of soil elevation)
- Cleanouts are in accessible locations and connected via sweep

### Drain Rock/Subdrain (to be confirmed prior to installation of soil mix)

- Rock is installed as specified, 12” min. depth. Class 2 permeable, Caltrans specification 68-2.02F(3) recommended
- Rock is smoothed to a consistent top elevation. Depth and top elevation are as shown in plans
- Slopes or side walls protect from sloughing of native soils into the facility
- No filter fabric is placed between the subdrain and soil mix layers

### Soil Mix

- Soil mix is as specified.
- Mix installed in lifts not exceeding 12”
- Mix is not compacted during installation but may be thoroughly wetted to encourage consolidation
- Mix is smoothed to a consistent top elevation. Depth of mix (18” min.) and top elevation are as shown in plans, accounting for depth of mulch to follow and required reservoir depth

### Irrigation

- Irrigation system is installed so it can be controlled separately from other landscaped areas
- Smart irrigation controllers and drip emitters are recommended and may be required by local code or ordinance.
- Spray heads, if any, are positioned to avoid direct spray into outlet structures
### Bioretention Facility Construction Checklist

#### Planting

<table>
<thead>
<tr>
<th></th>
<th>Plants are installed consistent with approved planting plan, consistent with site water allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Any trees and large shrubs are staked securely</td>
</tr>
<tr>
<td></td>
<td>No fertilizer is added; compost tea may be used</td>
</tr>
<tr>
<td></td>
<td>No native soil or clayey material are imported into the facility with plantings</td>
</tr>
<tr>
<td></td>
<td>1”-2” mulch may be applied following planting; mulch selected to avoid floating</td>
</tr>
<tr>
<td></td>
<td>Final elevation of soil mix maintained following planting</td>
</tr>
<tr>
<td></td>
<td>Curb openings are free of obstructions</td>
</tr>
</tbody>
</table>

#### Final Engineering Inspection

<table>
<thead>
<tr>
<th></th>
<th>Drainage Management Area(s) are free of construction sediment and landscaped areas are stabilized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inlets are installed to provide smooth entry of runoff from adjoining pavement, have sufficient reveal (drop from the adjoining pavement to the top of the mulch or soil mix, and are not blocked</td>
</tr>
<tr>
<td></td>
<td>Inflows from roof leaders and pipes are connected and operable</td>
</tr>
<tr>
<td></td>
<td>Temporary flow diversions are removed</td>
</tr>
<tr>
<td></td>
<td>Rock or other energy dissipation at piped or surface inlets is adequate</td>
</tr>
<tr>
<td></td>
<td>Overflow outlets are configured to allow the facility to flood and fill to near rim before overflow</td>
</tr>
<tr>
<td></td>
<td>Plantings are healthy and becoming established</td>
</tr>
<tr>
<td></td>
<td>Irrigation is operable</td>
</tr>
<tr>
<td></td>
<td>Facility drains rapidly; no surface ponding is evident</td>
</tr>
<tr>
<td></td>
<td>Any accumulated construction debris, trash, or sediment is removed from facility</td>
</tr>
<tr>
<td></td>
<td>Permanent signage is installed and is visible to site users and maintenance personnel</td>
</tr>
</tbody>
</table>
Bioretention Plant List – Inland and Coastal
Low

Species planted in this zone should have the following characteristics:
- Water tolerant;
- Dense root structure and vegetative cover to discourage erosion, slow runoff velocities, and provide maximum pollutant filtration.
- Native grasses and groundcovers are excellent choices for this zone.

Mid

Species planted in this zone should have the following characteristics:
- Tolerant of periodic inundation;
- Tolerant of periods without water;
- Dense root structure to provide erosion protection of side slopes.

High

Species planted in this zone should have the following characteristics:
- Deep roots to provide structural stability to the drainage feature;
- Tolerant of extended periods without water;
- Tolerant of occasional inundation.
### Plant List for Bioretention Facilities — Inland MS4 Area

<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Low</th>
<th>Mid</th>
<th>High</th>
<th>Low, Mid, and High refers to planting zones within the Bioretention Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grasses and Grass-like Plants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bromus carinatus</em></td>
<td>California brome</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Carex barbara</em></td>
<td>Santa Barbara sedge</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Not for full sun</td>
</tr>
<tr>
<td><em>Carex brevicaulis</em></td>
<td>short stem sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Short turf-like growth habit</td>
</tr>
<tr>
<td><em>Carex densa</em></td>
<td>dense sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex deweyanna</em></td>
<td>Dewey sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex.divulsa</em></td>
<td>Berkeley sedge</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Not a native. Mistakenly sold as the native C. tumulicola</td>
</tr>
<tr>
<td><em>Carex obnupta</em></td>
<td>slough sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex pansa</em></td>
<td>California meadow sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex rupestris</em></td>
<td>curly sedge</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex stipata</em></td>
<td>sawbeak sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex subfusca</em></td>
<td>rusty sedge</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex testacea</em></td>
<td>New Zealand orange sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex tumulicola</em></td>
<td>foothill sedge</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Carex vesicaria</em></td>
<td>inflated sedge</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Deschampsia danthonoides</em></td>
<td>annual hairgrass</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Deschampsia cespitosa</em></td>
<td>tufted hairgrass</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Eleocharis acicularis</em></td>
<td>needle spike rush</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Eleocharis macrostachya</em></td>
<td>creeping spike rush</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Eleocharis ovata</em></td>
<td>ovate spike rush</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Eleocharis palustris</em></td>
<td>creeping spike rush</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Elymus glaucus</em></td>
<td>blue wild rye</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Festuca californica</em></td>
<td>California fescue</td>
<td>X</td>
<td></td>
<td>X</td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Festuca idahoensis</em></td>
<td>blue bunchgrass</td>
<td></td>
<td>X</td>
<td>X</td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Festuca rubra</em></td>
<td>red fescue</td>
<td></td>
<td></td>
<td></td>
<td>Can be mowed as turf alternative. Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Glyceria occidentalis</em></td>
<td>western mannagrass</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Botanical Name</td>
<td>Common Name</td>
<td>Low</td>
<td>Mid</td>
<td>High</td>
<td>Low, Mid, and High refers to planting zones within the Bioretention Facility</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------</td>
<td>-----</td>
<td>-----</td>
<td>------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Grasses and Grass-like Plants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Hordeum brachyantherum</em></td>
<td>meadow barley</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Can tolerate saturation if top soil drains</td>
</tr>
<tr>
<td><em>Juncus balticus</em></td>
<td>Baltic rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Juncus bufonis</em></td>
<td>toad rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Juncus effusus</em></td>
<td>Pacific rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Juncus ensifolius</em></td>
<td>dagger leaf rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Juncus patens</em></td>
<td>blue rush</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>May not need summer irrigation after establishment</td>
</tr>
<tr>
<td><em>Juncus tenuis</em></td>
<td>slender rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Juncus xiphiodes</em></td>
<td>iris-leaved rush</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Leymus triticoides</em></td>
<td>creeping wild rye</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Can be mowed. Ideal plant for many uses.</td>
</tr>
<tr>
<td><em>Melica californica</em></td>
<td>California melic</td>
<td></td>
<td></td>
<td>X</td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Melica imperfecta</em></td>
<td>small flowered melic</td>
<td>X</td>
<td></td>
<td></td>
<td>Can tolerate saturation if top soil layer drains</td>
</tr>
<tr>
<td><em>Muhlenbergia rigens</em></td>
<td>deergrass</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Herbaceous Plants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Achillea millefolium</em></td>
<td>common yarrow</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Aster sp.</em></td>
<td>aster</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Athyrium filix-femina</em></td>
<td>lady fern</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Blechnum spicant</em></td>
<td>deer fern</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Camassia leichtlinii</em></td>
<td>camas lily</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Camassia quamash</em></td>
<td>common camas</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Epilobium canum</em></td>
<td>California fuschia</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Eriogonum fasciculatum</em></td>
<td>flattop buckwheat</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Eschscholzia californica</em></td>
<td>California poppy</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Botanical Name</td>
<td>Common Name</td>
<td>Low</td>
<td>Mid</td>
<td>High</td>
<td>Low, Mid, and High refers to planting zones within the Bioretention Facility</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-------------------</td>
<td>-----</td>
<td>-----</td>
<td>------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><em>Fragaria chiloensis</em></td>
<td>beach strawberry</td>
<td></td>
<td></td>
<td>X</td>
<td>This species is adapted to low water conditions</td>
</tr>
<tr>
<td><em>Iris douglasiana</em></td>
<td>Douglas iris</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Lupinus bicolor</em></td>
<td>miniature lupine</td>
<td></td>
<td></td>
<td>X</td>
<td>Tolerates saturation in winter only</td>
</tr>
<tr>
<td><em>Lupinus polyphyllus</em></td>
<td>large leaf lupine</td>
<td>X</td>
<td></td>
<td>X</td>
<td>similar to Russell hybrids</td>
</tr>
<tr>
<td><em>Mimulus guttatus</em></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Polypodium californicum</em></td>
<td>California polypody</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Polypodium glycyrrhiza</em></td>
<td>licorice fern</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Polystichum californicum</em></td>
<td>California sword fern</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Polystichum munitum</em></td>
<td>western sword fern</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Pteridium aquilinum</em></td>
<td>bracken fern</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Sisyrinchium bellum</em></td>
<td>blue-eyed grass</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Sisyrinchium californicum</em></td>
<td>yellow-eyed grass</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><em>Veronica liwanensis</em></td>
<td>speedwell</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Source: City of Santa Rosa, Storm Water Low Impact Development Technical Design Manual, August 2011
### Botanical Name | Common Name | Low | Mid | High | Low, Mid, and High refers to planting zones within the Bioretention Facility
--- | --- | --- | --- | --- | ---
**Grasses and Grass-like Plants**

*Carex ativulsa* | Berkeley Sedge, Grey Sedge | X | X | X | tolerates foot traffic, some drought and boggy soils

*Carex pansa* | California Meadow Sedge | X | X | X | good lawn substitute, tolerates wide range of growing conditions, seasonal inundation, drought, foot traffic and mowing

*Carex praegracilis* | Clustered Field Sedge | X | X |  | useful lawn substitute and bank stabilizer, good planted in masses, tolerates wide range of growing conditions, foot traffic and mowing, may look weedy when mixed with other plants

*Carex spissa* | San Diego Sedge | X |  |  | a large grass, tolerates alkaline soil, clay, serpentine, seasonal inundation, and deer

*Chondropetalum tectorum* | Small Cape Rush | X | X | X | A tough, attractive reed-like plant, tolerates boggy or clay soils and drought once established

*Festuca rubra* | Molate Red Fescue | X | X | X | a tufted, spreading bunchgrass, good lawn substitute, provides erosion control, tolerates wet conditions, but looks best with regular water, tolerates drought once established

*Juncus effusus* | Soft Rush | X |  |  | tolerates poor drainage, heavy soils, needs more supplemental water than *Juncus patens*

*Juncus patens* | Wire Grass, Blue Rush | X |  |  | strong performance in bioretention areas, tolerates poor drainage, seasonal inundation, drought, shade

*Leymus condensatus* | Canyon Prince Wild Rye |  | X |  | tolerates drought, wet, but not soggy soils, looks best with supplemental irrigation, spreads by rhizomes

*Muhlenbergia rigens* | Deer Grass |  | X |  | a large grass, tolerates sandy and clay soils, seasonal inundation, best when cut back annually to remove old thatch

**Perennials**

*Achillea millefolium* | Yarrow |  | X |  | tolerates alkaline soil, sand, clay, seasonal wet conditions, foot traffic and deer, will self sow

*Fragaria chiloensis* | Beach Strawberry |  | X |  | vigorous spreading groundcover, tolerates sand, clay, wet conditions, prefers good drainage

*Iris douglasiana* | Douglas Iris |  | X |  | tolerates sand, clay and serpentine soils, seasonal wet (but not soggy) soils and drought

*Salvia uliginosa* | Bog Sage |  | X |  | low growing perennial, tolerates clay, winter wet, summer drought, prefers light shade, provides nectar for birds and insects, does well under oaks

*Sisyrinchium bellum* | Blue-eyed Grass |  | X |  | a semi-evergreen perennial, tolerates sand, clay, seasonal wet soils and deer, dormant in summer, but can be delayed with supplemental irrigation

*Solidago californica* | California Goldenrod |  | X |  | tolerates poor soils, seasonal wet and drought, can spread aggressively if over irrigated
<table>
<thead>
<tr>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Low</th>
<th>Mid</th>
<th>High</th>
<th>Low, Mid, and High refers to planting zones within the Bioretention Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shrubs and Subshrubs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Baccharis pilularis</em></td>
<td>California Wild Rose</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>tolerates a wide variety of soils, seasonal flooding and some drought, spreads aggressively, avoid edges of walkways because of thorns</td>
</tr>
<tr>
<td><em>Coyote Brush</em></td>
<td>Coyote Brush</td>
<td>X</td>
<td>X</td>
<td></td>
<td>adaptable evergreen shrub, provides quick cover and bank stabilization, tolerant of coastal conditions, alkaline soil, sand, clay and seasonal wet</td>
</tr>
<tr>
<td><strong>Large Shrubs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Heteromeles arbutifolia</em></td>
<td>Toyon</td>
<td></td>
<td></td>
<td>X</td>
<td>tolerates sand, clay and serpentine soils, seasonal water with good drainage</td>
</tr>
<tr>
<td><em>Myrica californica</em></td>
<td>Pacific Wax Myrtle</td>
<td></td>
<td></td>
<td>X</td>
<td>large shrub or small tree, tolerates coastal conditions, sand, clay and seasonal inundation</td>
</tr>
<tr>
<td><em>Sambucus mexicana</em></td>
<td>Western Elderberry</td>
<td></td>
<td></td>
<td>X</td>
<td>large shrub to tree, tolerates clay, seasonal flooding and drought, good wildlife food source</td>
</tr>
<tr>
<td><strong>Trees</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Chilopsis linearis</em></td>
<td>Desert Willow</td>
<td></td>
<td></td>
<td>X</td>
<td>tolerates alkaline soil, sand, clay, seasonal flooding and drought, not coastal condition</td>
</tr>
<tr>
<td><em>Platanus racemosa</em></td>
<td>Western Sycamore</td>
<td></td>
<td></td>
<td>X</td>
<td>tolerates sand and clay soils, seasonal flooding, needs space to grow, avoid underground water/sewer pipes</td>
</tr>
<tr>
<td><em>Quercus agrifolia</em></td>
<td>Coast Live Oak</td>
<td></td>
<td></td>
<td>X</td>
<td>tolerates drought and winter wet conditions, mature trees produce significant litter limiting understory plantings, need space to grow</td>
</tr>
</tbody>
</table>

Source: Sunset Magazine
APPENDIX 7

Operation and Maintenance Template
A. Responsible Individual (RI).

The RI is the person that will have direct responsibility for the maintenance of stormwater controls, maintain self-inspection records, and sign any correspondence with the County of Mendocino.

Name of RI: ________________________________________________

Phone: _____________________________________________________

Project Name: ______________________________________________

Physical Site Address and/or APN: ________________________________

☐ Include from the Stormwater Control Plan Worksheet the Drainage Management Areas tabulations (tables #1-4)

☐ Include the site plan delineating the DMAs and the locations of the bioretention or equivalent facilities.

☐ Include the final construction drawings of the stormwater facilities:
  − Plans, elevations, and details of bioretention facilities.
  − Construction details and specifications, including: depths of sand and soil, compaction, pipe materials, and bedding.
  − Location and layouts of inflow piping and piping to off-site discharge
  − Native soils (lenses beneath the facilities)

B. Scheduled Maintenance Activities

The following activities will need to occur on an annual basis. Frequency may need to be adjusted depending on facility.

− **Refuse removal**: remove trash that collects near the inlets or that is trapped by vegetation. Clean out soil and debris blocking inlets or overflows.

− **Control weeds**: manual methods and soil amendments; non-natural (synthetic) pesticides should not be used.

− **Add mulch**: add mulch to maintain a mulch layer thickness of ~3 inches.

− **Pruning and replanting vegetation**: it may be necessary to replace or remove vegetation to ensure the proper functioning of the facility.

− **Check irrigation**: if irrigation exists, check to make sure the system is working as intended.

An annual self-certification letter will be mailed to the RI. This letter will serve as verification that all the stormwater facilities on the property are being maintained and remain operational. The letter should be signed and returned within 30 days.

C. Updates to the O & M Plan

Contact information for the Responsible Individual should be current. If the RI changes, the County of Mendocino’s Planning and Building Department should be notified with the appropriate revisions.

D. O & M plans for other Facility Types

If your project included a non-standard stormwater treatment facility that was approved by the Planning and Building Services Department, such as a tree-box type system, than the O & M should reflect the manufacturer’s recommended maintenance scheduling.
E. Signature and Certification:

“I, the RI/applicant accept responsibility for operation and maintenance of stormwater treatment and flow-control facilities until such time as this responsibility is transferred to a subsequent owner. Furthermore, a condition on the property deed will be recorded with the County Recorder’s office indicating that a stormwater facility is present on the property and that the maintenance responsibility will transfer with property ownership in perpetuity.”

_________________________________________  ________________________
Signature of the RI                      Date

_________________________________________
Print Name

I am the:

☐ Property Owner
☐ Applicant
☐ Contractor
APPENDIX 8

Definitions
Definitions

Certified Professional - a civil engineer licensed in California, certified professional in erosion and sediment control, state certified as a qualified SWPPP designer (QSD), or other professional, determined by the Planning and Building Services Director, or designee, competent to design a stormwater control plan.

Hydromodification - Changes in channel form associated with alterations in flow and sediment due to past or proposed future land-use alteration. Modification of hydrologic pathways (precipitation, surface runoff, infiltration, groundwater flow, return flow, surface-water storage, groundwater storage, evaporation, and transpiration).

Illicit Discharge - Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term illicit discharge includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under the Discharge Prohibitions section of this General Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4).

Impervious Surface - A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to; roof tops, walkways, patios, driveways, parking lots, storage areas, impervious concrete and asphalt, and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold the specified volume of rainfall runoff, are not impervious surfaces.

Linear Underground/Overhead Projects (LUPs) - Include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquefied, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities.

Low Impact Development – A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional stormwater management, which collects and conveys stormwater runoff through storm drains, pipes, or other conveyances to a centralized stormwater facility, Low Impact Development (LID) takes a different approach by using site design and stormwater management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall. LID has been a proven approach in other parts of the country and is seen in California as an alternative to conventional stormwater management.

Municipal Separate Storm Sewer System (MS4) - The regulatory definition of an MS4 (40 CFR 122.26(b)(8)) is “a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created to or pursuant to state law) including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved
management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

**National Pollutant Discharge Elimination System (NPDES)** - A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the Clean Water Act.

**New Development** - New Development means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision on an area that has not been previously developed.

**Pervious Pavement** - Pavement that stores and infiltrates rainfall at a rate that exceeds conventional pavement.

**Pollutant** - Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

**Receiving Water** – Surface water that receives regulated and unregulated discharges from activities on land

**Redevelopment** - Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. Redevelopment does not include trenching, excavation and resurfacing associated with LUPs; pavement grinding and resurfacing of existing roadways; construction of new sidewalks, pedestrian ramps, or bike lanes on existing roadways; or routine replacement of damaged pavement such as pothole repair or replacement of short, non-contiguous sections of roadway.

**Regulated Project** – Refers to projects subject to the new and redevelopment standards in Section E.12 of the MS4 permit; all projects that create and/or replace 5,000 sq. ft. or more of impervious surface.

**Single-family Home Project** - The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

**Source Control** - Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.

**Storm Drain System** - The basic infrastructure in a municipal separate storm sewer system that collects and conveys stormwater runoff to a treatment facility or receiving water body.

**Stormwater** – Stormwater is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground. As stormwater flows over the land or impervious
surfaces, it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the stormwater is discharged untreated.
APPENDIX 9

References


Humboldt County Department of Health and Human Services Division of Environmental Health. Wet Weather Testing of Soils. http://humboldtgov.org/685/Land-Use-Program


State Water Resources Control Board. State Water Resources Control Board Water Quality Order No. 2013-0001-DWQ National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000004 Waste Discharge requirements (WDRs) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) (General Permit)

StormTech: [www.stormtech.com](http://www.stormtech.com)
APPENDIX 10

Change Log
The following table summarizes changes in the Mendocino County Low-Impact Development Manual Version 2.1. These changes represent minor corrections to arithmetic and typographic errors in worksheets in the manual. When a correction has been made to the formula within or preceding a worksheet, the values in the worksheet have been updated accordingly and those updates have not been captured in this change log. The body of the document has not been modified.

<table>
<thead>
<tr>
<th>Page Number</th>
<th>Version 2.0</th>
<th>Version 2.1</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>Reduction Volume Equation = (Col. 1) x 1.6 (sq. ft./gallon)</td>
<td>Reduction Volume Equation = (Col. 1) / 1.6 (sq. ft./gallon)</td>
<td>Correction of arithmetic typo</td>
</tr>
<tr>
<td>51</td>
<td>Total Volume Credit (Runoff reduction credit, above / (1.6 sq./gallons))</td>
<td>Total Volume Credit (Runoff reduction credit, above / (1.6 sq. ft./gallon))</td>
<td>Correction of typo; revised to include correct unit measurement</td>
</tr>
<tr>
<td>51</td>
<td>Table 2. Runoff Reduction Factors</td>
<td>Table 2. Runoff Reduction Factors</td>
<td>Correction of arithmetic typo</td>
</tr>
<tr>
<td></td>
<td>Type of Pavement</td>
<td>Runoff Reduction Factor</td>
<td>Type of Pavement</td>
</tr>
<tr>
<td></td>
<td>Bricks or solid pavers on sand</td>
<td>0.5</td>
<td>Bricks or solid pavers on sand</td>
</tr>
<tr>
<td></td>
<td>Bricks or solid paver, grouted</td>
<td>1.0</td>
<td>Bricks or solid paver, grouted</td>
</tr>
<tr>
<td></td>
<td>Pervious concrete/asphalt</td>
<td>0.1</td>
<td>Pervious concrete/asphalt</td>
</tr>
<tr>
<td></td>
<td>Permeable pavement</td>
<td>0.1</td>
<td>Permeable pavement</td>
</tr>
<tr>
<td></td>
<td>Cobbles</td>
<td>0.1</td>
<td>Cobbles</td>
</tr>
</tbody>
</table>

1. Are there any natural drainage features or modified natural drainage features on the site or directly adjacent to the site?
   
   □ Yes     □ No

   If yes, your project falls under the County’s SUSMP requirements. Use the guidelines in the SUSMP for your project (directly adjacent is defined as, “within 100-feet of the top of bank”).

66

69

Runoff Reduction from using a standard 55 gallon Rain Barrel = 200 sq. ft.
   Use the following if size is other than the standard
   (for every gallon of storage, approx. 3.65 sq. ft. of reduction is achieved)

Runoff Reduction from using a standard 55 gallon Rain Barrel = 88 sq. ft.
   Use the following if size is other than the standard
   (for every gallon of storage, approx. 1.6 sq. ft. of reduction is achieved)

Correction of arithmetic typo indicating incorrect conversation ratio of rain barrel capacity to runoff square footage reduction

Removed relic referencing County SUSMP standards which no longer exist.