

ELK GROVE UNIFIED SCHOOL DISTRICT

POST-CONSTRUCTION STANDARDS MANUAL

Prepared for
Elk Grove Unified School District
9510 Elk Grove-Florin Road
Elk Grove, CA 95624



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(HEC Project 116-1)

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LIST OF ABBREVIATIONS AND GLOSSARY

ASTM	American Society of Testing and Materials
bioretention system	A surface and sub-service water filtration system. Although similar to sand filters, bioretention systems incorporate both plants and underlying filter soils for removal of contaminants. They are effective in removing sediments and attached pollutants, delaying runoff peaks by providing retention capacity and reducing runoff velocities.
BMP	Best Management Practice
C	Centigrade
CASQA 2003 New Development Manual	California Stormwater Quality Association. Stormwater Best Management Practice Handbook New Development and Redevelopment, January 2003
CASQA 2014 Industrial/Commercial Manual	California Stormwater Quality Association. Stormwater Best Management Practice Handbook Portal Industrial and Commercial, September 2014
CFR	Code of Federal Regulations
cfs	cubic feet per second
Construction General Permit	General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ (as amended by Order 2010-0014-DWQ) NPDES No. CAS000002, which was adopted by the SWRCB on July 1, 2010
County 2014 Design Manual	City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, Storm Water Quality Design Manual for the Sacramento Region, Final Draft May 2014
cu ft	cubic feet
District	Elk Grove Unified School District

DMA	Drainage Management Area. Individual discrete drainage area that is typically delineated by grade breaks and roof ridge lines.
DPR	California Department of Pesticide Regulation
EGUSD	Elk Grove Unified School District
enhanced infiltration devices	Includes gravel infiltration trenches, dry wells and similar facilities that are designed to increase onsite infiltration in accordance with geotechnical engineer recommendations.
evapotranspirate	The return of water to the atmosphere either through evaporation or by plants
excessive irrigation runoff	Irrigation runoff that leaves the intended use area is considered excessive if it is part of facility design, it is due to excessive application, it is due to intentional overflow or application, or if it is due to negligence.
ft	feet
gal	gallons
green infrastructure	Systems and practices that use or mimic natural processes to infiltrate, evapotranspire, or reuse stormwater or runoff on the site where it is generated
HEC	Herrera Engineering Consultants, Inc.
hydromodification	Modification of existing surface runoff, infiltration, groundwater flow, return flow, surface-water storage, groundwater storage, or evaporation and transpiration that results in positive or negative impacts to watershed health and functions.
impervious area disconnection	Impervious areas can be described as connected or disconnected. <ul style="list-style-type: none">• Connected areas drain directly into the storm drainage system via a hydraulic connection (e.g. parking lot runoff that drains into the street).• Disconnected areas first drain into a pervious surface that promotes infiltration (e.g. parking lot runoff draining into a vegetated swale).

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 portland cement concrete and asphalt, and any other continuous watertight pavement or covering.
incidental runoff	Incidental runoff is defined as unintended amounts (volume) of runoff, such as unintended, minimal over-spray from sprinklers that escapes the area of intended use. Water leaving an intended use area is not considered incidental if it is part of the facility design; if it is due to excessive application; if it is due to intentional overflow or application; or if it is due to negligence.
Integrated Pest Management (or IPM)	IPM is a pest management strategy that focuses on: <ul style="list-style-type: none">• Long-term prevention or suppression of pest problems through a combination of techniques such as, monitoring for pest presence and establishing treatment threshold levels and using non-chemical practices to make the habitat less conducive to pest development.• Improving sanitation, and using mechanical and physical controls.• Only using pesticides that pose the least possible hazard and are effective in a manner that minimizes risk to people, property, and the environment after careful monitoring indicates they are needed according to pre-established guidelines and treatment thresholds.
Large Projects	District projects that create and/or replace more than 5,000 square feet of impervious surfaces (including projects with no net increase in impervious footprint), excepting projects that have been specifically excluded as identified in subsections 2.2.1.1 and 2.2.1.3.
Low Impact Development (or LID)	A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, Low Impact Development (LID) takes a different approach by using site design and storm water 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.
mg/L	milligrams per liter (also known as parts per million)
min	Minute

municipal separate storm sewer system (or MS4)	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 storm water; (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.
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
pavement resurfacing	Resurfacing of pavement within an existing footprint, including pavement grinding and resurfacing of existing roadways and parking lots.
PE	Professional Engineer Registered in the State of California
RCD	California Department of Conservation Resource Conservation District
redevelopment	Any land-disturbing activity that results in creation, addition or replacement of exterior impervious surface area on a site on which some past development has occurred. Redevelopment includes remodel and modernization projects.
roads	Paved surface through District sites whose primary purpose is vehicular travel
RWQCB	California Regional Water Quality Control Board, Central Valley Region
sidewalks	Paved walkway through District sites whose primary purpose is pedestrian travel

Small MS4 Permit	General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004 (hereinafter Small MS4 Permit), which was adopted by the State Water Resources Control Board (SWRCB) on February 5, 2013
Small Projects	District projects that create and/or replace between 2,500 square feet and 5,000 square feet of impervious surfaces (including projects with no net increase in impervious footprint).
sq. ft	square feet
storm water treatment system	Any engineered system designed to remove pollutants from storm water runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
SWMP	Storm Water Management Plan
SWRCB	State Water Resources Control Board
storm water treatment systems and hydromodification controls	Controls installed to treat storm water runoff and/or prevent modification of existing surface runoff, infiltration, groundwater flow, return flow, surface-water storage, groundwater storage, or evaporation and transpiration.
trash and debris	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic and other natural and synthetic materials, thrown or deposited on the lands and waters of the state.
TRPA BMP Handbook	Tahoe Regional Planning Agency. <i>Best Management Practices Handbook, 2012.</i>
USDA NRCS	United States Department of Agriculture Natural Resources Conservation District
USEPA	United States Environmental Protection Agency

ug/L	micrograms per liter
WEF	Water Environment Federation
WDRs	Waste Discharge Requirements

EXECUTIVE SUMMARY

E.1 Introduction

Elk Grove Unified School District (District) is a permittee under the General Permit for Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004 (hereinafter Small MS4 Permit). The Small MS4 Permit requires that the District implement a post-construction storm water management program. Compliance is required by the California Water Code and the federal Clean Water Act. If the District fails to comply with the Small MS4 Permit requirements, it could be subject to enforcement actions (including monetary penalties) imposed by the California Regional Water Quality Control Board, Central Valley Region.

In order to implement the required post-construction storm water management program, the District has decided to prepare a Post Construction Standards Manual. The purpose of the Manual is to clearly present the post-construction requirements that apply to the District, the key factors that the District wants to be considered during design, and District preferences regarding design and operation of these facilities.

E.2 Post-Construction Storm Water Requirements

The purpose of the Post-Construction Storm Water Management requirements is to mitigate the storm water runoff impacts that could be caused by runoff from development and redevelopment (urban runoff). The Control Measure requirements that apply to the District are presented in Section 2.0 and are summarized below:

- For Small Projects (i.e. those that create or replace between 2,500 and 5,000 square feet of impervious surfaces), the project must include one or more Site Design Measures; and
- For Large Projects (i.e. those that create or replace more than 5,000 square feet of impervious surfaces), the project must incorporate Low Impact Development (LID) Standards that include not only Site Design Measures, but also Source Control Measures, and, in some cases, Storm Water Treatment and Baseline Hydromodification Measures.

E.3 Control Measures

The Control Measure requirements are described in greater detail below:

- Site Design Measures (Section 3.0). Eight potential measures are identified. These measures are primarily designed to reduce urban runoff volume. They include vegetated swales, tree planting and preservation, and impervious area disconnection;

- Source Control Measures - Permanent (Section 4.0) and Operational (Section 7.0). These measures are designed to reduce urban runoff pollution at its source. They consist of permanent control measures that are included in the facility design (e.g. covers over outdoor material storage areas) and operational control measures (e.g. containment of runoff that results from pressure washing of sidewalks);
- Numeric Sizing Criteria (Section 5.0). This criteria only applies to the sizing of Control Measures that receive runoff from Large Projects; and
- Storm Water Treatment and Baseline Hydromodification Measures (Section 6.0). These measures are designed to reduce urban runoff volume and the associated pollutants. They apply to any remaining Large Project runoff that is not addressed by a Site Design Measure. They include bioretention facilities (e.g. storm water planters) that are designed to infiltrate, evapotranspire and biotreat runoff.

E.4 Operation and Maintenance

The Small MS4 Permit also requires that the Control Measures installed by the District be properly operated and maintained for the life of the project. The operation and maintenance requirements for each of the Control Measures described above are presented in Section 8.0. Table 8.28 provides a list showing each of the existing storm water treatment systems currently being operated by the District.

E.5 Record Keeping

Section 9.0 addresses the records that the District must maintain to document compliance with the Post-Construction Storm Water Management requirements. The documentation includes:

- Design records that demonstrate that District projects either include the required Control Measures or meet the criteria for exemption from the post-construction standards requirements; and
- Inspection records that demonstrate that the District is implementing required operational source controls to prevent storm water pollution and is properly maintaining Site Design Measures (e.g. vegetated swales) and other storm water management systems (e.g. infiltration trenches and bioretention facilities).

1.0 INTRODUCTION

1.1 Background

The District is located in Sacramento County. Existing facilities include over 60 elementary, middle, high and alternative schools, and other support facilities, including Education Center, Purchasing/Warehouse/Distribution, Central Kitchen, Transportation and Maintenance & Operations.

The District has been designated by the California Regional Water Quality Control Board, Central Valley Region (RWQCB) as a Phase II Municipal Separate Storm Sewer System (MS4). As a result, the District is subject to the General Permit for Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004, which was adopted by the State Water Resources Control Board (SWRCB) on February 5, 2013.

The Small MS4 Permit requires that the District implement a Post-Construction Storm Water Management Program that is designed to mitigate potential storm water runoff impacts related to development and redevelopment. Those potential impacts include significant increases in:

- The runoff volume, velocity, peak flow rate, duration and connectivity with local creeks, which can result in stream channel erosion; and
- The pollutant load entering local waterways. Potential pollutants include sediments and other solids, nutrients, pathogens, oxygen-demanding substances, petroleum hydrocarbons, heavy metals, floatables, trash, and pesticides and herbicides.

For larger construction projects, the District currently implements the post-construction standards specified in the General Permit for Storm Water Discharges Associated with Construction Activities and Land Disturbance Order No. 2010-0014-DWQ NPDES No. CAS000002, which was adopted by the SWRCB on September 2, 2009 (hereinafter CGP). The Small MS4 Permit post-construction requirements supersede those specified in the CGP.

Compliance with the Small MS4 Permit post construction requirements is required by the California Water Code and the federal Clean Water Act. If the District fails to comply with the Small MS4 Permit requirements, it could be subject to enforcement actions by the RWQCB, including monetary penalties.

1.2 Current Storm Water Management Practices

Currently, the District implements the post-construction standards set forth in the Stormwater Quality Design Manual for the Sacramento and South Placer Regions dated May 2007 (2007 County Manual). The 2007 County Manual was recently updated in 2014 by issuance of a final draft of a revised manual (2014 County Manual). However:

- The District was not involved in the development of the 2007 or 2014 County Manuals;
- The County Manuals were written for implementation by private developers rather than the District; and
- The County Manuals were not written to address the post-construction requirements specified in the Small MS4 Permit.

Accordingly, the District has decided to prepare its own Post Construction Standards Manual. This Manual will address each of the post-construction measures specified in the Small MS4 Permit and is intended for implementation by the District employees, contractors and consultants.

1.3 Purpose

The purpose of this Manual is to clearly present:

- The Small MS4 Permit post-construction requirements that apply to:
 - ✓ The design of facilities that create or replace impervious surfaces;
 - ✓ Operations at those facilities after construction is complete (e.g. pressure washing, food service, pest control, etc.); and
 - ✓ Operation and maintenance (O&M) of storm water management systems, and the documentation of these activities.
- Key factors that the District wants to be considered when designing the post-construction measures, including key design criteria and considerations; and
- District preferences regarding the post-construction measures selected for installation at its facilities for purposes of reducing the runoff volume and removing pollutants.

The District Manual is not intended on being a comprehensive design manual. However, it includes references to other documents that provide design guidance for each type of storm water management measure.

1.4 References

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Roseville, County of Sacramento, and City of Sacramento, *Stormwater Quality Design Manual for the Sacramento and South Placer Regions*, May 2007.
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- State Water Resources Control Board, *General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ (as amended by Order 2010-0014-DWQ) NPDES No. CAS000002*, on July 1, 2010. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/construction.shtml
- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004*, adopted by February 5, 2013. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

2.0 PERMIT REQUIREMENTS

The Post-Construction requirements that apply to the District are specified in Section F.5.g. Post Construction Storm Water Management Program of the Small MS4 Permit. The project-specific requirements are dependent on the size of the impervious area that is created and/or replaced on a developed or undeveloped site (including projects with no net increase in impervious footprint). The requirements apply to new and redevelopment (e.g. remodel and modernization) projects.

- No requirements apply to projects that create or replace less than 2,500 square feet of impervious surfaces;
- Subsection 2.1 summarizes the requirements that apply to Small Projects that create or replace between 2,500 and 5,000 square feet of impervious surfaces; and
- Subsection 2.2 summarizes the requirements that apply to Large Projects that create or replace more than 5,000 square feet of impervious surfaces.

2.1 Small Projects

The District must include one or more of the following Site Design Measures to reduce site runoff from all District projects that create and/or replace between 2,500 square feet and 5,000 square feet of impervious surfaces (including projects with no net increase in impervious footprint):

- Stream Setbacks and Buffers;
- Vegetated Swales;
- Rooftop and Impervious Area Disconnection;
- Tree Planting and Preservation;
- Porous Pavement;
- Soil Quality Improvement and Maintenance;
- Rain Barrels and Cisterns; and/or
- Green Roofs.

Small Project Requirements	One or More Measure to Reduce Site Runoff
	No Sizing Criteria is Specified

No hydraulic sizing criteria is specified for the Small Project Site Design Measures. However, for reporting purposes, the District must use the SWRCB Post-Construction Calculator for Small Projects (or equivalent) to quantify the runoff reduction resulting from implementation of the Site Design Measures on Small Projects.

The Site Design Measures are described in greater detail and compared in Section 3.0.

2.2 Large Projects

The Low Impact Development (LID) Standards listed below apply to all Large Projects that create and/or replace 5,000 square feet or more of impervious surfaces (including projects with no net increase in impervious footprint), excepting projects that have been specifically excluded.

1. Source Control Measures – Permanent and Operational;
2. Numeric Sizing Criteria for Storm Water Retention and Treatment Facilities;
3. Site Design Measures; and
4. Storm Water Treatment and Baseline Hydromodification Management Measures.

Large Project Requirements	Source Control Measures
	Numeric Sizing Criteria
	Site Design Measures
	Stormwater Treatment/ Baseline Hydro-Modification Management

The excluded projects are identified in subsections 2.2.1.1 and 2.2.1.3.

The LID Standards must be implemented on projects that have received all required State of California project approvals after the Small MS4 Permit effective date (July 1, 2013).

2.2.1 Applicability

2.2.1.1 Affected Projects

- LID Standards:
 - ✓ Requirements for **Development and Redevelopment Projects** that create and/or replace 5,000 square feet or more of impervious surfaces are described in subsection 2.2.1.2; and
 - ✓ Requirements for **Road Projects** that create 5,000 square feet or more of newly constructed contiguous impervious surface and that are public road projects, and/or fall under the building and planning authority of the District are described in subsection 2.2.1.3.
- Specifically excluded are:
 - ✓ Interior remodels;
 - ✓ Routine maintenance or repair (such as exterior wall surface replacement and roof replacement); and

- ✓ Pavement resurfacing within an existing footprint, including pavement grinding and resurfacing of existing roadways.

2.2.1.2 Development and Redevelopment Projects

Development projects are new projects that occur on a new site.

Redevelopment projects are projects that occur on a site where some past development has occurred.

- If the impervious surfaces will increase by less than 50 percent, the LID measures must include runoff from only the new and/or replaced impervious surfaces.
- If the impervious surfaces will increase by 50 percent or more, the LID measures must include the runoff from all existing, new, and/or replaced impervious surfaces (if feasible).

2.2.1.3 Road Projects

Although the LID Standards apply to all road projects that create 5,000 square feet or more of newly constructed contiguous impervious surfaces, treatment of the runoff from the 85th percentile 24-hour storm runoff event that cannot be infiltrated on-site shall follow the US EPA guidance regarding green infrastructure to the extent feasible.

Affected projects include

- Construction of new streets or roads (including sidewalks and bicycle lanes built as part of the new streets and roads) which create 5,000 square feet or more of impervious surfaces.
- Widening of existing streets or roads with additional traffic lanes which create 5,000 square feet or more of impervious surfaces:
 - ✓ If the additional traffic lanes results in an alteration of less than 50% of the impervious surface of existing street or road, the treatment system design must only include the runoff from the new or replaced impervious surfaces.
 - ✓ If the addition of traffic lanes results in an alteration of 50% or more of the impervious surface of an existing street or road, the treatment system design must include the runoff from the entire project area consisting of all existing, new, and/or replaced impervious surfaces.

Specifically excluded are:

- Sidewalks built as part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas;
- Bicycle lanes are built as part of new streets or roads that direct storm water runoff to adjacent vegetated areas;

- Impervious trails built to direct storm water runoff to adjacent vegetated areas, or other non-a runnable permeable areas preferably away from creeks or towards the outboard side of levees; and
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.

2.2.2 Source Control Measures - Facilities and Maintenance Activities.

Projects with pollutant generating activities and sources must implement standard Permanent and/or Operational Source Control Measures. The measures shall be designed consistent with the recommendations from the California Stormwater Quality Association Stormwater BMP Handbook for New Development and Redevelopment or equivalent manual and include:

- Accidental spills or leaks;
- Interior floor drains (that are connected to the storm drainage system);
- Parking/storage area maintenance;
- Indoor structural pest control;
- Landscape/outdoor pesticide use;
- Pools, spas, ponds, decorative fountains, and other water features;
- Restaurants and other food service operations;
- Storage and handling of solid waste;
- Outdoor storage of equipment or materials;
- Vehicle and equipment cleaning;
- Vehicle and equipment repair and maintenance;
- Fuel dispensing areas;
- Loading docks;
- Fire sprinkler test water;
- Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources;
- Unauthorized non-storm water discharges; and
- Building and grounds maintenance.

Source Control Measures	To prevent pollution at its source
	Cover wide range of District facilities and activities that could result in storm water pollution.

Permanent Source Control Measures relate to the facility improvements and equipment that are described in Section 4.0. Operational Source Control Measures relate to the maintenance activities, procedures and training that are addressed in Section 7.0.

2.2.3 Numeric Sizing Criteria for Storm Water Retention and Treatment Systems.

All facilities designed to evapotranspire, infiltrate, harvest/use and/or biotreat storm water must meet at least one of the following Volumetric criteria and Flow-based criteria for hydraulic sizing:

- Volumetric Criteria. This criteria is typically applicable to systems that remove pollutants by detaining a volume of runoff for a period of time to allow settling and infiltration.
 - ✓ The maximized capture storm water volume for the tributary area on the basis of historical rainfall records (Design Storm Method); or
 - ✓ Volume of annual runoff required to achieve 80 % or more capture using local rainfall data (Percent Capture Method).
- Flow-based Criteria. This criteria is applicable to systems that remove pollutants from a flowing stream of water by filtration, infiltration and/or biological processes.
 - ✓ The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or
 - ✓ The flow of runoff produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records.

The Numeric Sizing Criteria are addressed in greater detail in Section 5.0.

2.2.4 Site Design Measures.

The project site should be divided into one or more discrete Drainage Management Areas (DMAs). The District shall use the following Site Design Measures to manage runoff from the impervious DMAs. The objective shall be to infiltrate, evapotranspire and/or harvest/reuse the runoff that would result from the 85th percentile rainfall event to the extent feasible. The selected Site Design Measures must be sized to meet the Numeric Sizing Criteria described in in Section 5.0.

- Stream Setbacks and Buffers;
- Soil Quality Improvement and Maintenance;
- Tree Planting and Preservation;
- Rooftop and Impervious Area Disconnection;
- Porous Pavement;
- Green Roofs;
- Vegetated Swales; and/or
- Rain Barrels and Cisterns.

Site Design Measures	Hydraulic Sizing Criteria Apply
- Large Projects	Minimize Treatment/ Hydromodification

The Site Design Measures are described in Section 3.0.

2.2.5 Storm Water Treatment and Baseline Hydromodification Management Measures.

After implementation of the Site Design Measures listed in subsection 2.2.4, any “remaining” runoff from impervious DMAs must be directed to one or more storm water treatment and baseline hydromodification) facilities that are:

- Designed to infiltrate, evapotranspire, and/or biotreat the runoff based on the Numeric Sizing Criteria for Storm Water Retention and Treatment described in in Section 5.0; and
- Are as effective as a bioretention facility.

The required control measures are described in greater detail in Section 6.0.

2.2.6 Alternative Post-Construction Storm Water Management Program

In lieu of the required measures, the District may propose alternative post-construction measures for multiple benefit projects. Multiple benefit projects are those that address not only water quality, but also any of the following: water supply, flood control, habitat enhancement, open space preservation, recreation and climate change.

The proposed multiple benefit project must be equally or more protective of water quality as the measures specified in the Small MS4 Permit. The alternative post-construction measures must also be approved by the RWQCB or the RWQCB Executive Officer.

2.2.7 O&M of Post-Construction Storm Water Management Measures.

For all projects that involve treatment systems and hydromodification controls, the District must:

- Assume responsibility for O&M of the systems and controls;
- Coordinate with the Sacramento-Yolo Mosquito and Vector Control District and provide annual notifications regarding treatment systems and hydromodification management controls installed; and
- Maintain a database or equivalent tabular format containing all projects that have installed treatment systems.

O&M of BMPs	All Projects with Treatment Systems and Hydro-modification Controls
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The O&M requirements are described in greater detail in Section 7.0 (Operational Source Control Measures) and Section 8.0 (O&M of Treatment Systems and Hydromodification Controls).

2.3 References

- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004* (section F.5.g.), adopted by February 5, 2013. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml
- State Water Resources Control Board, *Post-Construction Calculator for Small Projects*. Information available on-line at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

3.0 SITE DESIGN MEASURES

3.1 Introduction

As noted in Section 2.0, the Small MS4 Permit requires inclusion of Site Design Measures for both Small and Large Projects. The difference is as follows:

- Small Projects.
 - ✓ Only 1 Site Design Measure must be included in the project; and
 - ✓ There are no required design criteria.
- Large Projects.
 - ✓ All runoff from impervious DMAs must be addressed by the Site Design Measures described in this section or by the bioretention (or equivalent) facilities described in Section 6.0; and
 - ✓ The Numeric Sizing Criteria specified in Section 5.0 apply.

Each of the Site Design Measures results in slowing and treating the runoff through filtration, sedimentation, adsorption, and/or microbial degradation through vegetation and/or the subsoil matrix. They also result in reduced runoff volumes by infiltration and retention in the underlying soil.

3.2 Required Control Measures

The Site Design Measures are described in in the following subsections:

- 3.2.1 Stream Setbacks and Buffers;
- 3.2.2 Vegetated Swales;
- 3.2.3 Rooftop and Impervious Area Disconnection;
- 3.2.4 Tree Planting and Preservation;
- 3.2.5 Porous Pavement;
- 3.2.6 Soil Quality Improvement and Maintenance;
- 3.2.7 Rain Barrels and Cisterns; and
- 3.2.8 Green Roofs.

The descriptions in each subsection include advantages, limitations, siting criteria, design criteria, and references. The design criteria presented therein are based on information provided by the sources listed in each subsection and are not intended to be exhaustive or mandated.

The Site Design Measures can be used individually or in combination (e.g. vegetated swales with underlying compost amended soil) to meet the requirements for Small or Large Projects. The O&M requirements for each Site Design Measure are described in Section 7.0.

3.2.1 Stream Setbacks and Buffers

3.2.1.1 Description

This site design measure consists of using a gently sloped vegetated area (including trees, shrubs and other vegetation) that receives shallow sheet flow from adjacent surfaces. It functions by slowing runoff velocities and allowing particulate pollutants (sediment, trash and debris) to settle, and providing incidental infiltration into underlying soils. Originally, an agricultural treatment practice, it is now being used in urban areas.

- Stream setbacks (also referred to as riparian or forested buffers) are undisturbed areas immediately adjacent to the banks of a stream, river or lake where development is restricted or prohibited.
- Buffers (also referred to as filter strips, vegetated buffers, biostrips and grassed filters) are similar, but do not necessarily involve areas that are adjacent to watercourses. Buffers can be natural (existing) vegetation or man-made (e.g. planted) vegetation.



Figure 3.1 – Buffers
(Source: USDA NRCS)

3.2.1.2 Advantages

- Good at capturing litter and other floatables.
- Stream setbacks and natural buffers.
 - ✓ Can maximize natural water storage and infiltration; and
 - ✓ Can include setback areas or zones required by local, state and federal government agencies.
- Man-made buffers.
 - ✓ Best suited for treating runoff from roads, roof downspouts, small parking lots and other small pervious surfaces; and
 - ✓ If properly designed, vegetated and maintained, they can serve as aesthetically pleasing and relatively inexpensive measures that have significant storm water quality benefits.

3.2.1.3 Limitations

- All. Can become a nuisance due to mosquito breeding if standing water occurs and/or if adequate drainage slopes are not maintained.

- Stream setbacks. Only applicable at sites that are traversed by or adjacent to a stream or creek, lake or reservoir.
- Stream setbacks and natural buffers.
 - ✓ Project improvements must be designed so the improvements are located away from setback and that the natural vegetation is incorporated into the site design and drainage plan; and
 - ✓ Some maintenance is still required. The level of effort is essentially limited to removal of obstructions (e.g. accumulated trash, debris and sediment) and repair of erosion. See subsection 8.2.1 for greater detail.
- Man-made buffers.
 - ✓ Limited to treating runoff from drainage areas less than 5 acres.
 - ✓ Additional maintenance is required. In addition to the maintenance required for stream setbacks and natural buffers, the level of effort must include:
 - Irrigation, mowing, fertilization and revegetation as needed to sustain a thick vegetative cover; and
 - Weed and pest control while minimizing use of pesticides and herbicides.

See subsection 8.2.1 for greater detail. Initial level of maintenance effort may be greater until area has stabilized.

3.2.1.4 Siting Criteria

- Stream setbacks and natural buffers. The setback distance or zone is usually specified by a local, regional, state or federal government agency. The natural buffer area is defined by the site designer.
- Man-made buffers.
 - ✓ Site topography must have gentle slopes in the direction of flow;
 - ✓ Best in areas with dense vegetation; and
 - ✓ Effectiveness can be substantially reduced by large number of gophers.

3.2.1.5 Design Criteria/Guidance

- Stream setbacks and natural buffers. Use of setbacks and natural buffers requires actions during the planning, design and construction phases to preserve the area.
 - ✓ The contract documents must require that the contractor:
 - Install orange colored temporary mesh fencing along the setback or natural buffer prior to clearing and grubbing, and use appropriate fence posts and spacing to allow the fencing to be in an upright position; and
 - Maintain the fencing until all construction activity is complete and conduct periodic inspections to verify that the fencing remains upright and that the setback area is not disturbed.
 - ✓ The setback and natural buffer provisions in the contract documents must be enforced;
 - ✓ Setback boundaries should be well defined before, during and after construction; and
 - ✓ Provision should be made to assure runoff from smaller storm events passes through the buffer as sheet flow (rather than channel flow).
- Man-made buffers.
 - ✓ Must make provision (e.g. install level spreader such as gravel trench or embedded portland cement concrete curb) to evenly spread runoff as sheet flow across buffer (rather than allow it to form channels or gullies);
 - ✓ Effectiveness will be enhanced with permeable soils (Type A and B soils or compost amended Type C and D soils), dense grass cover and relatively long runoff contact times;
 - ✓ Most treatment occurs in the first 25 feet of sheet flow, longer lengths will provide somewhat greater levels of treatment and runoff reduction;
 - ✓ Requires low-growing dense vegetation. Irrigation system is generally required to maintain viability of vegetation during dry periods; and
 - ✓ If possible, divert storm runoff away from buffers while vegetation is being established.

3.2.1.6 Design Criteria/Guidance

Key design and sizing criteria are listed in **Table 3.1**.

Table 3.1 Stream Setback and Buffer Design and Sizing		
Parameter	Criteria	Comments
ALL PROJECTS		
Vegetation	Densely vegetated with grass or low growing drought tolerant vegetation.	To slow runoff velocities and allow sediment, trash and debris to settle, and provide incidental infiltration
Depth to groundwater, minimum	2 to 4 feet	To prevent contamination and ensure strip does not remain wet between storms
Linear application rate, maximum	0.005 cfs/ft of width	To maintain sheet flow across setback or buffer
Slope, maximum (in direction of flow)	1 to 4%	To prevent channelization. Terraces can be used where slopes are >4%
Slope, minimum (in direction of flow)	1%	To prevent ponding
Length, minimum (in direction of flow)	25 feet	To provide water quality treatment
Width of buffer or setback	Full width of area being drained	To assure treatment of all runoff
Velocity of flow across buffer or setback, maximum	1 foot/second	To prevent channelization and assure it remains sheet flow
Top of buffer strip	2 inches below upstream drainage area	To assure that vegetation and sediment accumulation does not prevent runoff from entering
LARGE PROJECTS		
Design storm flow	See Section 5.0 for Numeric Sizing Criteria	Small MS4 Permit requirement

Sources: County 2014 Design Manual and CASQA 2003 New Development Manual.

3.2.1.7 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheets SD-10 Site Design and Landscape Planning and TC-31 Vegetated Buffer Strip. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal: Construction*, July 2012. BMP Fact Sheet EC-2 Preservation of Existing Vegetation dated November 2009. Information available online at: <https://www.casqa.org/resources/bmp-handbooks>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-31 Vegetated Buffer Strip. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Department of Transportation. *Treatment BMP Technology Report (CTSWRT-09-239.06)*, April, 2010. Biofiltration BMP Fact Sheet. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>.
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Vegetated Filter Strip Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Filter Strip BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Protection of Natural Features, Riparian/Forested Buffer and Vegetated Filter Strip BMP Fact Sheets*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>

3.2.2 Vegetated Swales

3.2.2.1 Description

This site design measure (also referred to as bioswales, biofiltration swales and landscaped swales) consists of using a wide, shallow channel with dense vegetation covering the side slopes and bottom. It functions by controlling runoff velocities through the vegetation to provide sufficient contact time to allow for filtering and settling of the runoff and incidental infiltration into underlying soils.



3.2.2.2 Advantages

- Can serve as aesthetically pleasing and relatively inexpensive measure that has significant storm water quality benefits (runoff reduction and pollutant removal); and
- Can replace curbs and gutters as runoff conveyance systems;

Figure 3.2 – Vegetated Swale
(Source: California RCD)

3.2.2.3 Limitations

- Limited to treating the runoff from areas smaller than 10 acres;
 - Difficult to avoid channelization within the swale;
 - Can become a nuisance due to mosquito breeding if standing water occurs and/or if adequate drainage slopes are not maintained;
 - Maintenance is required. The level of effort must include:
 - ✓ Irrigation, mowing, fertilization and revegetation as needed to sustain a thick vegetative cover;
 - ✓ Removal of obstructions (e.g. accumulated trash, debris and sediment), and repair of erosion; and
 - ✓ Weed and pest control while minimizing use of pesticides.
- See subsection 8.2.2 for greater detail.
- More susceptible to failure if not properly maintained than other treatment BMPs.

3.2.2.4 Siting Criteria

- Sufficient land area must be available;
- Impractical in steep topography. If flow velocities are high, the swales are not effective;
- Best with slight slopes, permeable soils (Type A and B soils or compost amended Type C and D soils), dense grass cover and extended runoff contact times; and

3.2.2.5 Design and Sizing Criteria/Guidance

Key design and sizing criteria are listed in **Table 3.2**.

Table 3.2 Vegetated Swale Design and Sizing		
Parameter	Criteria	Comments
ALL PROJECTS		
Vegetation	Select fine, close growing water resistant grasses	To maximize water contact with vegetation and the soil surface.
Roughness coefficient (n), Manning's	0.020 to 0.025	Based on shallow flow through vegetation
Contact time, minimum	7 minutes	To provide sufficient length to yield minimum contact time
Bottom width, minimum	2 feet	To maximize water contact with vegetation and the soil surface.
Bottom width, maximum	10 feet	
Side slope, maximum	3:1 or flatter	Based on ease of mowing
Length	As required (typically 75 to 100 feet)	Actual length dependent on minimum contact time
Longitudinal slope	0.5 to 2.5%	To reduce velocity. Manage swales on steeper slopes with series of check dams
Check dams	As required	To maintain maximum longitudinal slope of 2.5%
Underdrains	As required	If longitudinal slope of < 1.0%
Depth of flow, maximum	3 to 5 inches and 1 inch below top of vegetation	To provide effective treatment
Velocity of flow, maximum	1 foot/second	Based on Manning's n of 0.20 to 0.25
Inlet curb cut width, minimum	≥ 12 inches	To prevent clogging at entrance to curb cut
Inlet curb cut outlet	2 inches above swale	To assure that vegetation and sediment accumulation does not prevent runoff from entering
	Install grouted cobbles	To minimize erosion in swale
LARGE PROJECTS		
Design storm flow	See Section 5.0 for Numeric Sizing Criteria	Small MS4 Permit requirement

If possible divert storm runoff away from the swale during vegetation establishment.

Sources: County 2014 Design Manual and CASQA 2003 New Development Manual.

3.2.2.6 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet TC-30 Vegetated Swale. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-30 Vegetated Swale. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Department of Transportation. *Treatment BMP Technology Report (CTSWRT-09-239.06)*, April, 2010. Biofiltration BMP Fact Sheet. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>.
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Vegetated Swale Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Sacramento State Office of Water Programs, *California Phase II Sizing Tool*, LID BMP Fact Sheet: Amended Swale. Information available at <http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Bioswale BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment*. Grassed Swale BMP Fact Sheet. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>
- United States Environmental Protection Agency, Storm Water Technology Fact Sheet Vegetated Swales, September 1999. Available online at: <http://water.epa.gov/scitech/wastetech/mtbfact.cfm>

3.2.3 Rooftop and Impervious Area Disconnection

3.2.3.1 Description

This site design measure consists of “breaking” direct connections between impervious areas and the storm drainage system. For example, this can occur by routing or re-routing rooftop or other impervious area drainage to pervious areas before the runoff enters the storm drainage system. Areas that can be disconnected include rooftops, parking lots, sidewalks, courtyards and roadways. Disconnection can be achieved using pipes, channels and/or by sloping surfaces toward:

- Natural or landscaped pervious areas where runoff can infiltrate incidentally;
- Areas that are designed for infiltration, including vegetated swales, buffer strips, compost amended soils, infiltration trenches, pervious pavement or bioretention facilities (e.g. rain gardens); and
- Containers used to capture and harvest runoff (e.g. rain barrels and cisterns).

3.2.3.2 Advantages

- Can reduce runoff volume and pollutant load; and
- Takes advantage of existing pervious areas or areas already planned to be landscaped.

3.2.3.3 Limitations

- Infiltration areas
 - ✓ Must be set back from the structures in accordance with geotechnical engineer recommendations; and
 - ✓ The minimum depth to groundwater below any infiltration structures shall be 10 feet;
- Potential for mosquitoes if there is standing water in area receiving runoff.
- Maintenance is required. The level of effort must include:
 - ✓ Removal of accumulated sediment and debris and clear obstructions;
 - ✓ Area receiving the runoff:
 - Irrigation, fertilization and revegetation as needed to sustain vegetation;
 - Repair of erosion; and
 - Weed and pest control while minimizing use of pesticides and herbicides.

See subsection 8.2.3 for greater detail.

3.2.3.4 Siting Criteria

- Area receiving runoff cannot have steep slopes; and
- Plant materials should be dense and able to be periodically inundated.

3.2.3.5 Design and Sizing Criteria/Guidance

- All projects:
 - ✓ Maximum slope in area receiving runoff should be less with 5% with turf and less than 2 % without turf;
 - ✓ Can direct downspouts to enhanced infiltration devices that are sized in accordance the combined amount of runoff received and soil percolation tests; and
 - ✓ Runoff should be spread out over the landscaped area as sheet flow to maximize contact with vegetation. Local area drains should be located so as to maximize travel distance of runoff through the landscaping.
- Large projects. See Section 5.0 for the Numeric Sizing Criteria that applies to the facility conveying the disconnected runoff to the pervious area.

Sources: County 2014 Design Manual.

3.2.3.6 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-11 Roof Runoff Controls. Information available online at:
<https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Disconnected Roof Drains and Disconnected Pavements Control Measures. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>
- District of Columbia, *Draft District of Columbia Stormwater Management Guidebook, Chapter 3.3 Impervious Surface Disconnection*. Information available online at:
http://green.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Ch3.3ImperviousDisconnection_0.pdf
- Virginia Department of Environmental Quality, *Draft VA DEQ Stormwater Design Specification No. 1, Rooftop (Impervious Surface) Disconnection*, March 1, 2011, Information available online at:
<http://www.vwrrc.vt.edu/swc/NonPBMPSpecsMarch11/VASWMBMPSpec1DISCONNECTION.html>
- North Carolina Department of Environment and Natural Resources, *Stormwater BMP Manual, 24. Disconnected Built-Upon Area*, Chapter Revised 4-1-14. Information available online at:
http://portal.ncdenr.org/web/lr/geodetic/boundary/maps?p_p_id=20&p_p_lifecycle=1&p_p_state=exclusive&p_p_mode=view&_20_struts_action=%2Fdocument_library%2FgetFile&_20_folderId=18167370&_20_name=DLFE-88064.pdf

- Philadelphia Water Department, *Stormwater Regulations Fact Sheet #4, Disconnecting Your Impervious Area*, April 2008. Information available online at:
http://www.pwdplanreview.org/WICLibrary/SWFS4_April2008.pdf
- Vermont Department of Environmental Conservation, Watershed Management Division, *Low Impact Development (LID) Fact Sheet, LID Principle #8 Stormwater Disconnection*. Information available online at:
http://www.watershedmanagement.vt.gov/stormwater/docs/sw_gi_1.8_stormwater_disconnection.pdf

3.2.4 Tree Planting and Preservation

This site design measure consists of planting new trees and carefully planned preservation of existing trees. Urban areas with higher numbers of tree exhibit hydrology that is more similar to natural conditions compared to urban areas without a tree canopy.

Tree leaves, branches and trunk surfaces absorb rainfall thus reducing runoff volume. The tree canopies reduce erosion by diminishing the volume and velocity of rainfall and shielding the soil surface. The tree roots and decomposition increase the soil absorption and infiltration capacity and rate; and hold soil in place, preventing erosion and drawing up nutrients and large quantities of water. Big trees with large dense canopies divert and absorb the most stormwater.

3.2.4.1 Advantages

- Trees reduce the volume of runoff leaving the site and pollutants entering the storm drain system; and
- Trees can be used to reduce the calculated volume of runoff requiring management using other BMPs. Runoff reductions can be demonstrated for:
 - ✓ Existing trees that have been specifically preserved as part of project construction; and/or
 - ✓ New trees that have been planted as part of project construction.

3.2.4.2 Limitations

- Existing Trees. New landscaping and improvements near existing trees must be carefully planned to avoid grade changes, soil compaction in the tree drip-line and excess moisture in the trunk area.
- New Trees. Do not place near structures that may be damaged by the growing root system.
- Maintenance is required. The level of effort must include:
 - ✓ Raking up leaves and debris and pruning for safety reasons;
 - ✓ Irrigation and fertilization as needed to sustain tree;
 - ✓ Protecting soil within drip line from compaction and erosion; and
 - ✓ Weed and pest control while minimizing use of pesticides and herbicides.See subsection 8.2.4 for greater detail.

3.2.4.3 Tree Preservation Guidance

- Identify trees that are to be preserved during project planning. Consider ways to minimize the number of existing trees that would have to be removed;

- Prepare contract documents that require contractor to:
 - ✓ Install orange-colored temporary mesh fencing around the tree drip lines prior to clearing and grubbing, and use appropriate fence posts and spacing to allow the fencing to be in an upright position;
 - ✓ Maintain the fencing until all construction activity is complete and conduct periodic inspections to verify that the fencing remains upright and is not disturbed;

3.2.4.4 Design and Sizing Criteria/Guidance

- All projects:
 - ✓ New trees.
 - Native species and those with a larger canopy are preferred
 - Space trees so that the crowns do not overlap at 15 years growth;
 - Set aside adequate un-compacted soil volume to accommodate tree growth through maturity; and
 - Install irrigation systems as needed maintain tree in perpetuity.
 - ✓ Existing trees. Grade changes greater than 6 inches in the root zone should be avoided.
- Large projects. See Section 5.0 for the Numeric Sizing Criteria that applies to the volume of runoff that will be infiltrated.

Sources: County 2014 Design Manual, CASQA 2003 New Development Manual, CASQA 2012 Construction Manual.

3.2.4.5 References

- Capiella, K., *Urban Watershed Forestry Manual Part 2: Conserving and Planting Trees*, prepared for USDA Northeastern Area State and Private Forestry, Center for Watershed Protection, Ellicott City, MD, 2005. Chapter 3 Design and Planting Guidelines for Storm Water Forestry Practices. Information available at: <http://www.cwp.org/online-watershed-library-owl>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-10 Site Design & Landscape Planning. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal: Construction*, July 2012. BMP Fact Sheet EC-2 Preservation of Existing Vegetation dated November 2009. Information available online at: <https://www.casqa.org/resources/bmp-handbooks>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm*

Water Quality Design Manual, Final Draft May 2014. Interceptor Trees Control Measure. Information available online at:

<http://www.beriverfriendly.net/Newdevelopment/>

- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Vegetation Protection BMP. Available online at:
<http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, Office of Wetlands Oceans and Watersheds Nonpoint Source Control Branch, Storm Water to Street Trees Engineering Urban Forests for Storm Water Management, September 2013, Information available online at: <http://water.epa.gov/polwaste/green/#multimedia>
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Protection of Natural Features and Urban Forestry BMP Fact Sheets*. Available online at:
<http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>

3.2.5 Porous Pavement

This site design measure (also referred to as pervious pavement, porous concrete and porous pavers) consists of installing a pavement surface that includes void spaces that allow runoff to pass through or around it into the base course (coarse aggregate) where it is treated and infiltrated or collected by underdrains. The entire pavement surface may be porous or the pavement may consist of impermeable blocks that are separated by spaces and joints.



Porous pavement types include the following:

- Pervious concrete (also referred to as porous concrete) consists of a specially formulated mixture of cement that does not contain fines (sand) and as a result has air voids of approximately 15 to 20 percent.
- Porous modular block pavement (also referred to as open-celled unit pavers and Grasscrete™) consists of concrete blocks with 20 percent or more open area which is filled with sand or sandy loam and turf. This type of pavement may not be acceptable to the local fire authority for fire access lanes.
- Reinforced grass pavement (also referred to as grid pavers, green parking and Grasspave™) consists of an irrigated surface that has been stabilized and the manufactured product over which soil and a seed mix has been spread. This pavement type is well-suited for low traffic areas such as overflow parking areas and maintenance roads.
- Cobblestone block pavement (also referred to as permeable interlocking concrete pavement) consists of concrete block units with at least an 8% percent void space where the corners meet. The units are installed on a gravel subgrade and the void space is filled with sand.

Figure 3.3 – Porous Pavement
(Source: Steve Herrera)

3.2.5.1 Advantages

- Is a filtration/infiltration system as well as a transportation surface;
- Can significantly reduce runoff volume and pollutant load;
- Can replace regular pavement (does not require additional land for the BMP); and
- Porous modular block and cobblestone block pavement can be removed and replaced to accommodate subsequent utility installations.

3.2.5.2 Limitations

- Not suitable for drainage areas with high likelihood of hazardous spills or runoff containing substantial oil and grease (e.g. loading areas, waste management areas, vehicle maintenance facilities, etc.);
- Some types of modular block pavement may not be acceptable to the local fire authority;

- Should not be used near potential pollutant hotspots where infiltration would not be acceptable (e.g. near fueling island); and
 - Maintenance is required. The level of effort must include:
 - ✓ Surface cleaning and periodic vacuuming is needed to maintain the infiltration capacity for pervious concrete, porous modular block, or cobblestone block; and
 - ✓ For reinforced grass pavement: irrigation, mowing, fertilization and, as needed, re-seeding, weed and pest control (while minimizing use of pesticides and herbicides).
- See subsection 8.2.5 for greater detail.

3.2.5.3 Siting Criteria

- Consult with geotechnical engineer to determine underlying soil permeability, required setbacks from building foundations, potential for seasonal shrink/swell and need for water barriers;
- Pervious concrete is best used for parking areas and low-use roadways. Porous modular block and cobblestone block pavement may be best used for sites where aesthetics are a priority;
- Requires permeable soils or other areas where runoff can infiltrate (including areas with compost amended soils and enhanced infiltration cells) or underdrains;
- The depth to groundwater should be a minimum of 10 feet below the aggregate base;
- The pavement material must be designed to accept the anticipated traffic load; and
- Consider opportunities for directing runoff from impervious areas across porous pavement.

3.2.5.4 Design and Sizing Criteria/Guidance

Key design and sizing criteria are listed in **Table 3.3**.

Table 3.3 Porous Pavement Design and Sizing	
Parameter	Criteria
ALL PROJECTS	
Depth to groundwater, minimum	10 feet below base course
Pervious Concrete	
Void space, minimum	15 %
Base course, minimum depths	With underdrain: 8” of coarse aggregate over 7” sand over 3” coarse aggregate. Without underdrain: 12” coarse aggregate
Liner	Geotextile filter cloth with 60 to 80 pores per inch between coarse aggregate and sand layers
Underdrain	Use enhanced infiltration device or perforated pipe embedded in coarse aggregate. Connect pipe to the storm drain system.
Modular block pavement	
Void space, minimum	20 %
Base course, minimum depth	8” of coarse aggregate
Liner	Same as were pervious concrete
Reinforced grass pavement	
Base course, minimum	12” of compacted sandy gravel mix
Table 3.3 Porous Pavement Design and Sizing (continued)	
Parameter	Criteria
ALL PROJECTS (cont.)	
Cobblestone block pavement	
Void space, minimum	8% of surface area as open annular spaces
Base course, minimum depths	7” of coarse aggregate over 7” of sand
Liner	Same as for pervious concrete
LARGE PROJECTS	
Design storm volume	See Section 5.0 for Numeric Sizing Criteria

Sources: County 2014 Design Manual and CASQA 2003 New Development Manual.

3.2.5.5 References

- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #4: Pervious Pavements. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-20 Pervious Pavements. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SD-20 Pervious Pavements. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- California Department of Transportation. *Treatment BMP Technology Report (CTSWRT-09-239.06)*, April, 2010. Porous Surface BMP Fact Sheets. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>.
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Porous Pavement Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Sacramento State Office of Water Programs, *California Phase II Sizing Tool*, LID BMP Fact Sheet: Porous Pavement. Information available at <http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Pervious Pavement BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Permeable Interlocking Concrete Pavement and Pervious Concrete Pavement BMP Fact Sheets*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>

3.2.6 Soil Quality Improvement and Maintenance

This site design measure consists of amending native soils with compost or other organic matter for purposes of improving the infiltration capacity and chemical characteristics.

3.2.6.1 Advantages

- The improved physical, biological and hydrological characteristics will make the soils more effective in improving storm water quality;
- Cost effective alternative to measures involving infiltration of runoff across existing soils;
- Particularly beneficial in areas with Type C and D soils;

3.2.6.2 Limitations

- May not be suitable for hillside areas with slopes greater than 25% or on slopes greater than 3:1, or
- Not suitable where groundwater table, hardpan or bedrock is less than 10 feet below the surface.
- Maintenance is required. The level of effort must include:
 - ✓ Mechanical aeration, deep tilling and use of additional amendments if runoff does not infiltrate. If not effective, remove and replace soil;
 - ✓ Trim vegetation and removed diseased vegetation, remove litter and debris; and
 - ✓ Weed and pest control while minimizing use of pesticides and herbicides.
- See subsection 8.2.6 for greater detail.

3.2.6.3 Siting Criteria

- Caution should be used in implementing compost amended soils in watersheds impaired for nutrients based on 303(d) list currently adopted by the RWQCB. The current list is the 2008 - 2010 303(d) List of Water Quality Limited Segments.

3.2.6.4 Design and Sizing Criteria/Guidance

- All projects:
 - ✓ Amended soil surface area should equal approximately 25% of the tributary impervious area;
 - ✓ Depth of amended soil is dependent on a number of factors including the design rainfall depth, area of amended soil, and imperviousness of tributary area; and
 - ✓ Amended bed should consist of 12% to 15% compost by volume.
- Large projects. See Section 5.0 for the Numeric Sizing Criteria that applies to the volume of runoff that will be infiltrated.

Sources: County 2014 Design Manual.

3.2.6.5 References

- California Regional Water Quality Control Board, Central Valley Region, current 303(d) list of impaired waters. Information available online at:
http://www.swrcb.ca.gov/centralvalley/water_issues/tmdl/impaired_waters_list/index.shtml#currentrpt
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Compost Amended Soil Control Measure. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>
- Low Impact Development Center, *Fairfax County – LID BMP Fact Sheet – Soil Amendments*, February 28, 2005. Information available online at:
http://www.lowimpactdevelopment.org/ffxcty/5-1_soilamendments_draft.pdf
- Sacramento State Office of Water Programs, *California Phase II Sizing Tool*, LID BMP Fact Sheet: Amended Strip. Information available at <http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx>

3.2.7 Rain Barrels and Cisterns

3.2.7.1 Description

This site design measure consists of capturing rooftop drainage in rain barrels or cisterns. Cisterns and rain barrels are above or below ground storage containers where rooftop runoff can be temporarily stored and released for subsequent use by irrigation or treatment and retention via infiltration. Rain barrels are typically 50 to 100 gallons. Cisterns are much larger, typically ranging up from 1,000 gallons.

3.2.7.2 Advantages

- Runoff stored in rain barrels and cisterns can be used for irrigation between storms; and
- Can irrigate already landscaped areas and areas with low permeability soils.

3.2.7.3 Limitations

- Above ground containers must be structurally engineered;
- The rain barrel and cisterns must be vector proof and child proof;
- If roofing materials include asphalt or wood shingles, the captured water should only be used to irrigate non-edible landscapes; and
- If harvesting runoff from a parking lot, there will be typically be greater levels of debris and pollutants.
- Maintenance is required. The level of effort must include:
 - ✓ Removal of sediment and debris from roof and in gutters system to prevent it from entering the rain barrels or cistern;
 - ✓ Repair of holes and/or damaged or missing mosquito preventative devices (screens); and
 - ✓ Removal of sediment and debris that accumulates in the rain barrels or cistern.See subsection 8.2.7 for greater detail.

3.2.7.4 Siting Criteria

- Locate cistern or rain barrel close to where it will be most useful.

3.2.7.5 Design and Sizing Criteria/Guidance

- All projects:
 - ✓ The number of barrels needed or the volume of the cistern needed is a function of the size of the rooftop area drained;
 - ✓ In Sacramento area, approximately 10 gallons of rainwater can be harvested each year per 1,000 square feet of roof;
 - ✓ Pre-manufactured rain barrels and cisterns come in a variety of sizes;

- ✓ Use screen to remove coarse material before storage. Use a fine screen (5 microns) to remove fines before irrigation;
- ✓ Eliminate access openings to the storm water storage device to the extent possible to control mosquitoes;
- ✓ Install
 - A cleanout to allow for diversion of the first-flush runoff before storage; and
 - A bypass/overflow system to accommodate runoff when the system is full;
 - A pumping system if needed to empty the container (e.g. storing runoff in below ground containers); and
 - Safety devices to prevent unauthorized access (e.g. child safety).
- Large projects. See Section 5.0 for the Numeric Sizing Criteria that applies to the volume of runoff that will be captured.

Sources: CASQA 2003 New Development Manual and TRPA BMP Handbook.

3.2.7.6 References

- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #5: Rainwater Harvesting. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-11 Roof Runoff Controls. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-12 Harvest and Reuse. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- Santa Clara Valley Urban Pollution Prevention Program, *Rain Barrel Fact Sheet*, August 23, 2012. Information available online at: http://www.scvurppp-w2k.com/pdfs/1213/BASMAA_Rain_Barrel_Fact_Sheet_082312_APPROVED_online_ver.pdf
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Rain Barrel and Cistern BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. On-Lot Treatment BMP Fact Sheet*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>

3.2.8 Green Roofs

This site design measure consists of installing a vegetative layer on a roof (or a rooftop garden) that filters, absorbs and retains the precipitation falling on the roof. In general, there are 2 types of green roofs:

- Extensive, which have shallow growth media and simple vegetation; and
- Intensive, which have deeper growth media and complex vegetation.

3.2.8.1 Advantages

- Requires no additional land;
- Decreases roof and runoff temperature;
- Provides insulation and lowers building cooling costs;
- Protects underlying roof material from climatic extremes, and ultraviolet light; and
- Can be an amenity accessible to students and staff, provide a green space for building occupants to enjoy (multistory buildings).

3.2.8.2 Limitations

- Proper design and management of drainage is essential. Inadequate drainage may result in more load than the roof can sustain, plant mortality and/or degeneration of the growth medium;
- Can provide habitat for unwanted wildlife; and
- Must choose plant type suitable for local climate and future irrigation.
- Maintenance is required. The level of effort must include:
 - ✓ Irrigation and replacement of dead vegetation as needed to sustain 90% vegetative cover;
 - ✓ Mow grasses (if applicable);
 - ✓ Removal of trash and debris and sediment); and
 - ✓ Weed and pest control while minimizing use of pesticides.

See subsection 8.2.8 for greater detail.

3.2.8.3 Siting Criteria

- No additional land area is needed; and
- Most appropriate for infill development and multistory buildings in dense urban areas, parking garages and warehouse roofs.

3.2.8.4 Design and Sizing Criteria/Guidance

Key design and sizing criteria are listed in **Table 3.4**.

Table 3.4 Green Roof Design and Sizing		
Parameter	Extensive Roof Criteria	Intensive Roof Criteria
ALL PROJECTS		
Design drawdown time, maximum	12 hours	12 hours
Growth media	Typical depth: < 6 inches	Typical depth: > 12 inches
Vegetation	Low growing, low-water-use vegetation such as Sedum, herbs, grasses and perennials	More complex low-water use species, but also incorporating trees and shrubs
Load	12 to 54 lbs./ft ² (average weight of saturated extensive roots is 17 lbs./ft ²), comparable to gravel ballast on some conventional roofs	> 72 lbs./ft ²
Roof slope, maximum	5:1	5:1 maximum
Access	Required for maintenance. Not generally design for public access	Required for maintenance. Public access often accommodated
Maintenance	Generally minimal once established	Significant maintenance required due to greater loading and complex plantings
Irrigation	Simple irrigation, only needed during plant establishment and dry season	Complex irrigation
Drainage	Simple drainage system	Complex a system
LARGE PROJECTS		
Design storm volume	See Section 5.0 for Numeric Sizing Criteria	Small MS4 Permit requirement

Sources: County 2014 Design Manual and USEPA Reducing Urban Heat Islands: Compendium of Strategies

3.2.8.5 References

- Bay Area Storm Water Management Agencies Association, Green Roof Minimum Specifications – MRP Provision C.3.c.iii.(4), 29 April 2011. Information available online at: http://www.scvurpppw2k.com/pdfs/1011/green_roofminimum_specifications_042911.pdf
- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #3: Green Roofs. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Green Roof Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- United States Environmental Protection Agency, Green Roofs website, Information available online at: <http://www.epa.gov/heatisland/mitigation/greenroofs.html>
- United States Environmental Protection Agency, Office of Atmospheric Programs, Reducing Urban Heat Islands: Compendium of Strategies (Draft report), Information available online at: <http://water.epa.gov/polwaste/green/#multimedia>
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Green Roofs BMP Fact Sheet*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/Green-Roofs.cfm>

3.3 Enhanced Infiltration Devices

Although not a required Site Design Measure, enhanced infiltration devices can be utilized in conjunction with the Site Design Measures to reduce the runoff volume and/or eliminate the need for an underdrain system. Enhanced infiltration devices include infiltration trenches (also known as percolation trenches).

Enhanced infiltration devices do not include Class V storm water drainage wells, which consist of bored, drilled, or driven shafts or dug holes that are deeper than their largest surface dimension and are designed to infiltrate storm water below the ground surface. The USEPA regulates Class V wells as injection wells pursuant to the Safe Drinking Water Act (in order to protect underground sources of drinking water). In California, owners of Class V wells must register ownership by filing Injection Well Registration forms with the USEPA Region 9.

3.3.1 Infiltration Trenches

3.3.1.1 Description

An infiltration trench is typically a long narrow rock or sand-filled trench that receives storm water runoff. Runoff is stored in the void space between the rocks and is infiltrated into the surrounding soil to recharge the local groundwater. Pretreatment measures (e.g. grass buffer strips, vegetated swales or sumps) are used to capture sediment before it enters the trench and prevent trench clogging.

3.3.1.2 Advantages

- Reduces or eliminates the volume of impervious area runoff leaving the site;
- Can be used to approximate pre-development hydrology; and
- Can be incorporated into site landscaping. Has little impact on site aesthetics.

3.3.1.3 Limitations

- Potential for groundwater contamination must be carefully considered. Not appropriate for sites where industrial activities occur (e.g. chemicals are stored or where spills can occur);
- Upstream drainage must be completely stabilized before infiltration trench is constructed to avoid clogging of trench with sediment;
- Pretreatment (e.g. using grass buffer strips, vegetated swales or sumps) is important to prevent trench clogging due to sediment and for drainage areas (e.g. parking lots) where there is a significant potential for runoff containing hydrocarbons, metals, or other pollutants; and

- Maintenance is required. The level of effort must include:
 - ✓ Erosion control in the tributary drainage area
 - ✓ Maintenance to sustain the effectiveness of the pretreatment device (grass filter strip or sump) in order to prevent trench clogging due to sediment and groundwater pollution (where there is a significant potential for runoff containing hydrocarbons, metals, or other pollutants such in parking lots). After trench becomes clogged, it is very difficult to restore function. Typically, the trench has to be rebuilt.
 - ✓ Removal of accumulated trash, debris and sediment
- See subsection 8.2.10 for greater detail.

3.3.1.4 Siting Criteria

- Consult with geotechnical engineer to verify that a permeable subsurface soil layer exists, and to determine required setbacks from building foundations; potential for seasonal shrink/swell, and need for water barriers;
- Not suitable for areas with low permeability underlying soils or high groundwater; and
- Not suitable in fill material or on steep slopes.

3.3.1.5 Design and Sizing Criteria/Guidance

Key design and sizing criteria are listed in **Table 3.5**.

Table 3.5 Infiltration Trench Design and Sizing		
Parameter	Criteria	Comments
ALL PROJECTS		
Tributary drainage area, maximum	5 acres (with low potential for erosion)	Typical maximum for any individual infiltration practice.
Depth to groundwater, minimum	10 feet from bottom of trench	To protect groundwater quality
Setbacks, minimum	100 feet from wells. Building setbacks per geotechnical engineer recommendation.	
Pretreatment	Grass buffer strip: minimum length 10 feet/maximum slope 4%	<ul style="list-style-type: none"> • If soil infiltration rate is greater than 2.0 inches/hour • To prevent sediment from clogging trench
Soil infiltration rate, minimum and maximum	0.5 to 2.0 inches per hour	To provide adequate treatment and prevent ponding over trench
Design volume	As required to meet infiltration requirements	
Maximum drawdown time	48 hours	
Maximum trench surcharge depth	10 feet above bottom of trench	
Trench media material	3.0 inch diameter	
Trench lining material (between rock and soil)	geotextile	To prevent surrounding soil from migrating into rock
Observation well size	4 to 6-inches in diameter extending to bottom of trench	To monitor subsurface conditions and verify that the trench is not clogging.
LARGE PROJECTS		
Design storm volume	See Section 5.0 for Numeric Sizing Criteria	Small MS4 Permit requirement

Sources: County 2014 Design Manual and CASQA 2003 New Development Manual.

3.3.1.6 References

- California Office of Environmental Health Hazard Assessment, *Dry Wells Uses, Regulations and Guidelines in California and Elsewhere*. Information available online at: <http://www.oehha.ca.gov/ecotox/drywells/pdf/DryWellFactsheet2013.pdf>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-10 Infiltration Trench. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-10 Infiltration Trench. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
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- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Infiltration Trench Control Measures. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Infiltration Trench and Subsurface Infiltration System BMPs. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Infiltration Trench BMP Fact Sheet*, last updated July 2014. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>
- United States Environmental Protection Agency, *Storm Water Technology Fact Sheet Infiltration Trench*, 1999. Available online at: <http://water.epa.gov/scitech/wastetech/mtbfact.cfm>

4.0 PERMANENT SOURCE CONTROL MEASURES

4.1 Introduction

The District is required to implement certain Permanent and/or Operational Source Control Measures (as applicable) for specific pollutant-generating activities and sources.

- Permanent Source Control Measures are described in this section. These measures are generally related to the design of new facilities (e.g. inclusion of secondary containment facilities); and
- Operational Source Control Measures are described in Section 7.0. These measures are generally related to operations and/or maintenance procedures, (e.g. spill prevention and response).

4.2 Permanent Source Control Measures

Each of the required Permanent Source Control Measures is listed in **Table 4.1** and is described in the noted subsection.

- The General Source Control Measures (e.g. the source control measures to prevent or respond to accidental spills and leaks, etc.) are presented in subsections 4.2.1 through 4.2.4) apply to all facilities; and
- The Facility-Specific Source Control Measures (e.g. the source control measures that apply to food service operations, etc.) are presented in subsections 4.2.5 through 4.2.13 and only apply to the specified type of facility.

Table 4.1 Permanent Source Control Measures	
Potential Pollutant-Generating Activity or Source	Subsection Number
<u>General</u>	
Accidental spills or leaks	4.2.1
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	4.2.2
Interior floor drains	4.2.3
Unauthorized non-storm water discharges	4.2.4

Table 4.1 Permanent Source Control Measures (continued)	
<u>Facility-Specific</u>	
Food service operations	4.2.5
Fuel dispensing areas	4.2.6
Loading docks	4.2.7
Outdoor storage of equipment or materials	4.2.8
Pools, ponds, decorative fountains, and other water features	4.2.9
Solid waste storage and handling	4.2.10
Vehicle and equipment cleaning	4.2.11
Vehicle and equipment repair and maintenance	4.2.12

Related Operational Source Control Measures (e.g. spill prevention training) are presented in Section 7.0.

4.2.1 Accidental Spills or Leaks

Accidental spills and leaks can contribute a number of pollutants to storm water runoff and result in non-storm water discharges. The potential pollutants of concern include hydrocarbons, coolant, solvents, paint and heavy metals.

4.2.1.1 Design Objective:

- Prevent or reduce discharges of pollutants into the storm drainage system caused by accidental spills and leaks.

4.2.1.2 Permanent Control Measures:

- Cover and/or enclose material storage and maintenance facilities. Direct roof runoff away from the facility. Prevent run-on from surrounding areas. Construct the facility on a base material (e.g. portland cement concrete) that is impervious to potential leaks and spills. This would include facilities where:
 - ✓ Materials are loaded, unloaded and/or stored; and/or
 - ✓ Vehicle or equipment maintenance occurs, including fueling.
- Liquid storage facilities:
 - ✓ Provide perimeter containment facilities (e.g. trench drains, containment curbs, etc.) that would contain spills and leaks that occur in areas where liquids are stored or maintenance occurs; and
 - ✓ Provide secondary containment facilities such as double-wall tanks, containment walls around single-wall tanks, or containment pallets or tubs, for smaller tanks, drums, or containers used to store petroleum products, chemicals, and other liquids. The secondary containment capacity should exceed the capacity of the largest container (plus have sufficient freeboard to allow for precipitation). If leakage into secondary containment cannot be easily observed, install a leak detection system (e.g. float switch) to show whether the primary storage container is leaking.
- Storm drainage inlets. Do not place storm water drainage inlets near outdoor material storage areas.

4.2.1.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SC-11 Spill Prevention, Control & Cleanup. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-11 Spill Prevention, Control and Cleanup. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Loading Areas, Outdoor Storage Areas and Outdoor Work Areas Source Control Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- State of California, *California Aboveground Petroleum Storage Act (APSA)*. Information available online at: <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=25001-26000&file=25270-25270.13>
- U.S. Environmental Protection Agency, *Oil Pollution Protection Rule Title 40*, Code of Federal Regulations, Part 112 (40 CFR Part 112). Information available online at: http://www.epa.gov/oem/docs/oil/cfr/0703_40cfr112.pdf

4.2.2 Drain or Wash Water from Boiler Drain Lines, Condensate Drain Lines, Rooftop Equipment, Drainage Sumps, and Other Sources

Discharges of drain or wash water from boiler or condensate drain lines, rooftop equipment, drainage sumps, and other sources can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. These cannot be discharged to the storm drain system. The potential pollutants of concern include chlorine, metals, organics and other chemicals that have been added to the equipment process water for maintenance purposes.

However, as noted in subsection 4.2.4, the Small MS4 Permit ‘authorizes’ the following types of non-storm water discharges provided they are not a significant source of pollutants:

1. Uncontaminated ground water infiltration (as defined at 40 CFR. §35.2005(20));
2. Uncontaminated pumped ground water;
3. Foundation drains;
4. Air conditioning condensation;
5. Water from crawl space pumps; and
6. Footing drains.

Design Objective:

- Prevent discharges of drain or wash water from boiler or condensate drain lines, rooftop equipment, drainage sumps, and other sources into the storm drainage system.

4.2.2.1 Permanent Control Measures:

- Construct the improvements needed (e.g. pipelines) to assure that existing drain or wash water discharges do not enter the storm drainage system; and
- If possible, connect to the sanitary sewer system. The local sewerage agency may require a permit.

4.2.2.2 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

4.2.3 Interior Floor Drains

Interior floor drains that are connected to the storm drainage system can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern are the same as for accidental spills and leaks and include hydrocarbons, coolant, solvents, paint and heavy metals. The District does not currently have any existing interior floor drains that are connected to the storm drainage system.

4.2.3.1 Design Objective:

- Prevent discharges of pollutants from interior floor drains into the storm drainage system.

4.2.3.2 Permanent Source Control Measures:

- Connect all new interior floor drains to the sanitary sewer system. Design improvements in accordance with local sewerage agency requirements.

4.2.3.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

4.2.4 Unauthorized Non-Storm Water Discharges

Unauthorized non-storm water discharges into the storm drainage system are effectively prohibited by the Small MS4 Permit. These types of discharges can contribute a number of pollutants.

However, the Small MS4 Permit ‘authorizes’ the following types of non-storm water discharges provided they are not a significant source of pollutants:

7. Water line flushing;
8. Diverted stream flows;
9. Rising ground waters;
10. Uncontaminated ground water infiltration (as defined at 40 CFR. §35.2005(20));
11. Uncontaminated pumped ground water;
12. Discharges from potable water sources;
13. Foundation drains;
14. Air conditioning condensation;
15. Springs;
16. Water from crawl space pumps;
17. Footing drains;
18. Flows from riparian habitats and wetlands;
19. Dechlorinated swimming pool discharges; and
20. Incidental irrigation runoff from landscaped areas.

4.2.4.1 Design Objective:

- Prevent discharges into the storm drainage system of unauthorized non-stormwater discharges, including excessive runoff from irrigated areas.

4.2.4.2 Permanent Control Measures:

- Unauthorized Non-Storm Water Discharges:
 - ✓ Wash water and wastewater. Construct the conveyance facilities needed to prevent discharges into the storm drainage system, including wash down from outdoor eating areas and pressure washing of structures and sidewalks. If conveyed to sanitary sewer system, design improvements in accordance with local sewerage agency requirements.
 - ✓ Storm drainage inlets. Add drainage inlet labels (“Drains to Creek” or similar message) to educate students, staff and contractors in high foot traffic areas or other areas where unauthorized non-storm water discharges could occur.

- Irrigation Runoff. Consider the following when designing irrigation systems to prevent excessive runoff:
 - ✓ Rain-triggered shutoff devices to prevent irrigation after precipitation. Flow reducers or shutoff valves, triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines;
 - ✓ Each landscape area's specific water requirements.
 - ✓ Local water conservation requirements, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.;
 - ✓ Timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system;
 - ✓ Plants that have low irrigation requirements (for example, native or drought tolerant species) and that will require minimal fertilizer and/or pesticides applications to sustain growth;
 - ✓ Using mulches (such as wood chips or bark) in planter areas without ground cover to minimize sediment in runoff; and
 - ✓ Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible.

4.2.4.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheets SD-12 Efficient Irrigation and SD-13 Storm Drain Signage. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-41 Building and Grounds Maintenance, SC-42 Building Repair and Construction, and BG-10 Animal Care and Handling Facilities. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Efficient Irrigation and Storm Drain Inlet Markings and Signage Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

4.2.5 Food Service Operations

Food service operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, trash, spills, food wastes, cleaners, detergents and pesticides.

4.2.5.1 Design Objective:

- Prevent discharges of pollutants into the storm drain system of food service-related wastewater or wash water.

4.2.5.2 Permanent Control Measures:

- Outdoor eating areas. Design so that any wash down runoff drains to landscaped areas or is conveyed to the sanitary sewer.
- Food handling facilities. Design so that all wastewater and wash water is conveyed to the sanitary sewer.
- New sanitary sewer connections. The local sewerage agency may require a permit, and/or installation of a grease trap or other device to pre-treat the discharge.
- Dumpster enclosure. Consider enclosing dumpster(s) containing food wastes in a roofed and bermed area to prevent exposure to precipitation and rainfall runoff.

4.2.5.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, BG-30 Food Service Facilities and BG-61 Mobile Cleaning Food Service Related. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

4.2.6 Fuel Dispensing Areas

Fuel dispensing area operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include spilled and leaked petroleum products and coolant.

4.2.6.1 Design Objective:

- Minimize exposure to rain and runoff, contain fuel spills and leaks, and prevent unauthorized non-storm water discharges into the storm drainage system.

4.2.6.2 Permanent Control Measures:

- Fuel dispensing facilities:
 - ✓ Provide structural roof or canopy to prevent exposure to precipitation. Extend cover a minimum of 6.5 feet from the corner of each dispenser (maximum length of hose and nozzle assembly plus 1 foot);
 - ✓ Construct roof or canopy over a base (e.g. portland cement concrete) that is impervious to potential leaks and spills;
 - ✓ Provide secondary containment facilities for spills and leaks (e.g. perimeter trench drains, containment curbs, drain pad towards the sanitary sewer or a dead-end containment sump, etc.);
 - ✓ Direct roof runoff and runoff from surrounding areas away from the facility;
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements;
- Fuel storage tank(s). Provide secondary containment facilities such as double-wall tanks that include a leak detection system that will allow District staff to easily determine whether the primary storage tank is leaking; and
- Storm drainage inlets. Do not place storm water drainage inlets near fuel dispensing or storage areas.

4.2.6.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-11 Spill Prevention, Control & Cleanup and SC-20 Vehicle and Equipment Fueling. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Fueling Areas Source Control Fact Sheet. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>

4.2.7 Loading Docks

Loading dock operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, cleaners, detergents, heavy metals, solvents and trash.

4.2.7.1 Design Objective:

- Minimize exposure to rain and runoff, contain spills and leaks, and prevent unauthorized non-storm water discharges into the storm drainage system.

4.2.7.2 Permanent Control Measures:

- Loading docks:
 - ✓ Design so loading and unloading occurs within an indoor loading bay or provide building overhang that extends at least 10 feet beyond the edge of the loading dock (or building face (if there is not a loading dock) to prevent exposure to precipitation;
 - ✓ Construct overhang over a base (e.g. portland cement concrete) that is impervious to potential leaks and spills. Drain the area beneath the overhang to the sanitary sewer or a dead-end sump to contain spills; and
 - ✓ Direct runoff from surrounding areas, including roof runoff, away from the facility.
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements.
- Spill control – outdoor loading area. Consider if there is the potential for a liquid spill or leak:
 - ✓ Hydraulically isolated area. Design so that all runoff from the first 6 ft. of pavement, as measured from the dock face (or from the building if there is no elevated loading dock) is hydraulically isolated (no runoff and no run-on from surrounding areas) using berms, grading, or interceptor drains.
 - ✓ Pretreatment device. Convey all drainage from the hydraulically isolated area to a pretreatment device (e.g., oil/water separator) and then to the sanitary sewer.
 - ✓ Spill containment vault. Install an emergency spill shut-off/diversion valve that would direct drainage to an adequately-sized* spill containment vault located a safe distance away from structures due to potential for explosive/fire reaction. The size of the spill containment vault should be equal to 125% of the volume of the largest container handled at the facility. Design improvements in accordance with the local sewerage agency and fire department requirements.
- Dumpster enclosure. Consider storing waste materials in a roofed and bermed area to prevent exposure to precipitation and rainfall runoff.
- Storm drainage inlets. Do not place storm water drainage inlets near loading docks.

4.2.7.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-11 Spill Prevention, Control & Cleanup and SC-30 Outdoor Loading/Unloading. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Loading Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

4.2.8 Outdoor Storage of Equipment or Materials

Outdoor storage of equipment or materials can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, spilled or leaking petroleum and non-petroleum products, heavy metals and trash.

4.2.8.1 Design Objective:

- Minimize exposure to rain and runoff, contain spills and leaks, and prevent unauthorized non-storm water discharges into the storm drainage system.

4.2.8.2 Permanent Control Measures:

- Equipment and material storage areas:
 - ✓ Provide structural roof or cover that extends beyond the storage area to prevent exposure to precipitation;
 - ✓ Construct over a base (e.g. portland cement concrete) that is impervious to potential leaks and spills. Drain the area beneath the cover to the sanitary sewer or a dead-end sump to contain spills; and
 - ✓ Direct roof runoff and runoff from surrounding areas away from the facility.
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements.
- Liquid storage. Provide secondary containment facilities (such as containment pallets, containment wall or double-wall tanks. The double-wall tanks should include a leak detection system that will allow District staff to easily determine whether the primary storage tank is leaking.
- Storm drainage inlets. Do not place storm water drainage inlets near outdoor material or equipment storage areas (unless the area is covered and contained).

4.2.8.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-11 Spill Prevention, Control & Cleanup, SC-30 Outdoor Loading/Unloading, SC-31 Outdoor Liquid Container Storage and SC-33 Outdoor Storage of Raw Materials. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Outdoor Storage Areas and Outdoor Work Areas Source Control Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

4.2.9 Pools, Spas, Ponds, Decorative Fountains, and Other Water Features

Pools, ponds, decorative fountains, and other water features can contribute pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include chlorine and/or chloramines, which are used as disinfectants. At low concentrations (above 0.08 mg/L) chlorine and chloramines can be toxic to aquatic life in surface waters.

Currently, the District only has one swimming pool. It is located at Jesse Baker Elementary. The pool does not include piping that would allow pool water to be discharged into the storm drainage system.

4.2.9.1 Design Objective:

- Prevent or reduce discharges of pollutants to the storm drainage system caused by pool, fountain, pond and/or other water feature maintenance activities.

4.2.9.2 Permanent Control Measures:

- Construct the pipelines needed to convey discharges to the sanitary sewer system. Design improvements in accordance with local sewerage agency requirements.

4.2.9.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SC-72 Fountains and Pools Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- Sacramento Stormwater Quality Partnership, *Keep Pools and Spas from Polluting Our Local Creeks and Rivers brochure*, 2012. Available online at: http://www.beriverfriendly.net/docs/files/File/Brochures/FoodHandling_English.pdf

4.2.10 Solid Waste Storage and Handling

Storage and handling of solid waste can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include trash, food and other wastes, and leaking liquids (e.g. milk).

4.2.10.1 Design Objective:

- Prevent or reduce discharges of pollutants into the storm drainage system caused by solid waste storage and handling activities.

4.2.10.2 Permanent Control Measures:

- Storage and handling areas:
 - ✓ Construct over an impervious surface (portland cement concrete) to mitigate spills. Drain the area beneath the cover to the sanitary sewer or a dead-end sump to contain spills;
 - ✓ Provide screen or wall to prevent off-site transport of trash; and
 - ✓ Direct runoff away from the facility.
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements.
- Storm drainage inlets. Do not place storm water drainage inlets near solid waste storage and handling areas (unless the area is covered and contained).

4.2.10.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-32 SC 32 Trash Storage Areas. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-11 Spill Prevention, Control & Cleanup, and SC-34 Waste Handling and Disposal. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Waste Management Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

4.2.11 Vehicle and Equipment Cleaning

Vehicle and equipment cleaning activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, cleaners, detergents, heavy metals, solvents and trash.

4.2.11.1 Design Objective:

- Prevent unauthorized non-storm water discharges into the storm drainage system caused by vehicle and equipment washing and cleaning activities.

4.2.11.2 Permanent Control Measures:

- Wash areas:
 - ✓ Provide structural roof or cover over the wash/steam cleaning area and extends at least 4 feet in all directions around the largest equipment/vehicle to prevent exposure to precipitation.
 - ✓ Construct cover over an impervious surface (portland cement concrete). Drain the area beneath the cover to the sanitary sewer or a recycling system;
 - ✓ Direct roof runoff and runoff from surrounding areas away from the facility.
 - ✓ Consider installing system that would allow for reuse of the wash water.
- Parts cleaning. Clean parts by steam cleaning or by use of self-contained parts cleaning device that either uses hot water or an aqueous solution. Recycle rinse water or discharge to the sanitary sewer.
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements.

4.2.11.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-33 Vehicle Washing Areas. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-11 Spill Prevention, Control & Cleanup, SC-21 Vehicle and Equipment Cleaning and BG-64 Mobile Cleaning - Vehicle and Equipment Washing. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Wash Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

4.2.12 Vehicle and Equipment Repair and Maintenance

Vehicle and equipment repair and maintenance activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include suspended solids, oil and grease, heavy metals and solvents.

4.2.12.1 Design Objective:

- Minimize exposure to rain and runoff, contain spills and leaks, and prevent unauthorized non-storm water discharges into the storm drainage system.

4.2.12.2 Permanent Control Measures:

- Work Area
 - ✓ Cover and/or enclose vehicle and equipment repair and maintenance facility;
 - ✓ Construct the facility on a base material (e.g. portland cement concrete) that is impervious to potential leaks and spills. Drain the area beneath the cover to the sanitary sewer;
 - ✓ Provide trench drains at the entrance to each bay to contain spills; and
 - ✓ Direct roof runoff away from the facility. Prevent run-on from surrounding areas.
- New sanitary sewer connections. Design improvements in accordance with local sewerage agency requirements.
- Liquid storage. Provide secondary containment facilities (such as containment pallets, sumps or walls or double-wall tanks. Double-wall tanks should include a leak detection system that will allow District staff to easily determine whether the primary storage tank is leaking.
- Storm drainage inlets. Do not place storm water drainage inlets near vehicle and equipment repair and maintenance facility (unless the facility is covered and contained).

4.2.12.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-11 Spill Prevention, Control & Cleanup, SC-22 Vehicle and Equipment Repair, BG-21 Automotive Service-Maintenance, and BG-23 Automotive Service-Recycling. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Outdoor Work Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

5.0 NUMERIC SIZING CRITERIA

5.1 Introduction

All facilities designed to evapotranspire, infiltrate, harvest/use and/or biotreat storm water must meet at least one of the following Volumetric or Flow-based hydraulic sizing criteria:

- Volumetric Criteria. This criteria is typically applicable to systems whose primary mode of pollutant removal and runoff reduction depends on detaining a volume of runoff for a period of time to allow for treatment and runoff reduction (e.g. porous pavement, soil quality improvement, rain barrels and cisterns, green roofs, infiltration trenches, and bioretention facilities). Assume 48- hour draw down for most areas. Only assume 24-hour draw down in areas with coarse soils that readily settle.
 - ✓ The maximized capture storm water volume for the tributary area based on historical rainfall records (Design Storm Method). Determine using the formula and the volume capture coefficients in Urban Runoff Quality Management, WEF Manual of Practice No. 23/American Society of Civil Engineers Manual of Practice No. 87 (1988) pages 175-178 (i.e. approximately 85th percentile 24-hour storm runoff event).

or

 - ✓ The volume of annual runoff required to achieve 80 % or more capture using rainfall data for Sacramento County (Percent Capture Method). Determine volume in accordance with the methodology in Section 5 of the CASQA 2003 New Development Manual.
- Flow-based Criteria. This criteria is typically applicable to systems whose primary mode of pollutant removal and runoff reduction depends on managing the rate of flow through the BMP (e.g. buffers and vegetated swales).
 - ✓ The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity.

or

 - ✓ The flow of runoff produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records.

5.1.1.1 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, May 2014. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Water Environment Federation, Urban Runoff Quality Management, WEF Manual of Practice No. 23/AMERICAN SOCIETY OF CIVIL ENGINEERS Manual of Practice No. 87, 1988.

6.0 STORM WATER TREATMENT AND BASELINE HYDROMODIFICATION MANAGEMENT MEASURES

6.1 Introduction

As noted in Section 2.0 after implementation of the Site Design Measures (presented in Section 3.0), the remaining runoff from impervious areas must be directed to one or more bioretention (or equivalent) facilities designed to infiltrate, evapotranspire, and/or bio treat the runoff. Bioretention systems are effective in removing sediments and attached pollutants, delaying runoff peaks by providing retention capacity and reducing runoff velocities.

Bioretention systems (also referred to as rain gardens, infiltration planters and flow-through planters) are a control measure that uses mulch, soil and plants to slow, infiltrate and treat storm runoff. It is a commonly used structural control measure because it can be incorporated in site landscaping. Typically, bioretention systems contain include layers of mulch, top soil, sand-peat and gravel. The runoff is treated as it infiltrates through the layers and into the surrounding soil (e.g. infiltration planter) and/or is collected in an underdrain system (e.g. a flow-through planter) and conveyed to the municipal storm drain or an enhanced infiltration device.

Storm water planters and rain gardens are all designed to temporarily flood with storm runoff to a depth of approximately 6-inches. Generally, a storm water planter is smaller, depressed structure or container and a rain garden is a larger, depressed vegetated garden bed.

Bioretention systems are described in greater detail below. The description includes design criteria, advantages, limitations, siting criteria and references.

6.2 Advantages

- Relatively inexpensive when integrated into site landscaping; and
- Suitable for sites with limited space.

6.3 Limitations

- Not appropriate for sites where industrial activities occur and/or where there is a potential for spills or leaks (e.g. material storage areas, vehicle maintenance facilities, etc.);
- Impractical in steep topography; and
- Maintenance is required. The level of effort must include:
 - ✓ Irrigation, revegetation and replacement of mulch as needed to sustain the vegetative cover;
 - ✓ Periodic removal of obstructions (e.g. accumulated litter, debris and sediment) and damaged or dead vegetation, and repair of erosion; and
 - ✓ Periodic removal of weeds and pest control while minimizing use of pesticides.

See subsection 8.2.9 for greater detail.

6.4 Siting Criteria

- Limited to treating runoff from areas smaller than 1 acre;
- Consult with geotechnical engineer to determine underlying soil permeability, required setbacks from building foundations, potential for seasonal shrink/swell and need for water barriers and underdrain;
- Impractical in steep topography; and
- Best with relatively flat slope.

6.5 Design Criteria/Guidance

Key design and sizing criteria are listed in **Table 6.1**.

- The design criteria that are identified as a “Minimum design criteria” are required by the Small MS4 Permit as mandatory. See subsection 6.7 for allowances to some of the mandatory criteria for special site conditions.
- The other listed criteria is based on information provided by the sources listed at the end of this subsection and are not intended to be exhaustive or mandated.
- Since the bioretention facilities are depressed, subject to ponding (up to 6-inches deep) and may be near walkways, protection (e.g. a fence or wall) should be provided to protect pedestrians.
- It is highly recommended that design details be discussed with the contractor at the pre-construction meeting; inspections are conducted during construction to assure conformance with contract specifications; and that the final grades for gravel layer and planting medium, and the elevations for the underdrain pipe and overflow grate are field verified.
- The O&M requirements for bioretention systems are described in subsection 8.2.9.

Parameter	Criteria	Comments
Design storm volume	See Numeric Sizing Criteria in Section 5.0	Minimum design criteria
Minimum depth to groundwater	10 feet below soil surface if there is no underdrain	To prevent groundwater contamination
Planting medium depth, minimum	18 inches	Minimum design criteria

Table 6.1 Bioretention Facility Design and Sizing (continued)		
Parameter	Criteria	Comments
Planting medium infiltration rate, minimum	5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal	Minimum design criteria
Planting medium mixture	60%-70% sand and 30%-40% compost. The sand must meet the specifications of American Society of Testing and Materials (ASTM) C33	
Soils beneath the bioretention system	Un-compacted. If necessary, rip or otherwise loosen existing soils	
Plant palette	Appropriate based on the specified planting medium and maximum available water use	
Surface reservoir volume, minimum	Bioretention system surface area times a depth of 6 inches	
Subsurface drainage/storage (gravel) layer area	Equal to the bioretention system surface area	
Subsurface drainage/storage (gravel) layer depth, minimum	12 inches	
Surface loading rate, maximum <u>or</u> Surface area, maximum	5 inches per hour based on the calculated flow rates; <u>or</u> 4% of tributary impervious area	Minimum design criteria (two alternatives)
Liners or barriers to prevent infiltration	None	Minimum design criteria (may be adjusted for the special site conditions described in subsection 6.7)
Underdrain discharge pipe invert elevation	At the top of gravel layer	
Underdrain discharge pipe	3 to 4 inch perforated pipe	To prevent long-term ponding in the surface reservoir
Inlet curb cuts, minimum width	12 inches	To prevent clogging
Overflow device	Connect to storm drainage system	To limit surface reservoir ponding depth to 6 inches
Design drawdown time, maximum	12 hours	To prevent potential for mosquitoes
Mulch	Well aged compost or fine bark, not wood chips or other material that may float	To remove pollutants and prevent erosion of underlying soils.

Sources: Small MS4 Permit and County 2014 Design Manual (Stormwater Planter).

6.6 Alternative Bioretention Facilities

Alternative bioretention facilities (or combinations of facilities) with different features may be allowed if the following measures of equivalent effectiveness are demonstrated:

- Equal or greater amount of runoff infiltrated or evapotranspired;
- Equal or lower pollutant concentrations in runoff that is discharged after bioretention;
- Equal or greater protection against shock loadings and spills; and
- Equal or greater accessibility and ease of maintenance

If alternative bioretention facilities are proposed, the designer must demonstrate them to be at least as effective as a bioretention system designed in accordance with the bioretention facility requirements described in subsection 6.1 and the minimum design criteria identified in Table 6.2 “Minimum design criteria”.

6.7 Allowed Adjustments for Special Site Conditions

The Small MS4 Permit allows the following adjustments to minimum the bioretention facility requirements described in subsection 6.5 for the following special site conditions:

- Facilities located within 10 feet of structures or other potential geotechnical hazards established by the geotechnical expert for the project may incorporate an impervious cutoff wall between the bioretention facility and the structure or other geotechnical hazard.
- Facilities in areas with documented high concentrations of pollutants in underlying soil or groundwater, facilities located where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the subsurface drainage/storage layer (this configuration is commonly known as a “flow-through planter”).
- Facilities located in areas of highly infiltrative soils or high groundwater, or where connection of underdrain to a surface drain or to a subsurface storm drain are infeasible, may omit the underdrain.

6.8 Exceptions to Bioretention Requirements

Contingent on a demonstration that use of a bioretention facility or another facility of equivalent effectiveness (per subsection 6.6) is infeasible, other types of biotreatment or media filters (such as tree-box-type biofilters or in-vault media filters) may be used for the following:

- Projects creating or replacing an acre or less of impervious area, and located in a designated pedestrian-oriented commercial district (i.e., smart growth projects), and having at least 85% of the entire project site covered by permanent structures;
- Facilities receiving runoff solely from existing (pre-project) impervious areas; and

- Historic sites, structures, or landscapes that cannot alter their original configuration in order to maintain their historic integrity.

6.9 References

- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #2: Bioretention/Landscaped Based Solutions. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- Central Coast Low Impact Development Initiative, Technical Assistance Memo LID Bioretention Guidance and Bioretention Standard Details and Specifications. Available online at: http://centralcoastlidi.org/Central_Coast_LIDI/LIDI_Details.html
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Stormwater Planter Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.0 OPERATIONAL SOURCE CONTROL MEASURES

7.1 Introduction

Operational Source Control Measures are measures that can be taken to prevent operations- and/or maintenance activities from causing storm water pollution. Each of the required Operational Source Control Measures is listed in **Table 7.1** and is described in the noted subsection.

- General Source Control Measures (e.g. source control measures to prevent or respond to accidental spills and leaks, etc.) are presented in subsections 7.2 through 7.9) apply to all facilities; and
- Facility-Specific Source Control Measures (e.g. source control measures that apply to food service operations, etc.) are presented in subsections 7.10 through 7.18 and only apply to the specified type of facility.

Table 7.1 Operational Source Control Measures	
Potential Pollutant-Generating Activity or Source	Subsection Number
<u>General</u>	
Accidental spills or leaks	7.2
Building and grounds maintenance	7.3
Drain and wash water from boiler and condensate drain lines, rooftop equipment, drainage sumps, and other sources	7.4
Fire sprinkler test water	7.5
Interior floor drains	7.6
Pest control, indoor and structural	7.7
Pesticide use, landscape and outdoor	7.8
Unauthorized non-storm water discharges	7.9

Table 7.1 Operational Source Control Measures (continued)	
Potential Pollutant-Generating Activity or Source	Subsection Number
<u>Facility-Specific</u>	
Food service operations	7.10
Fuel dispensing areas	7.11
Loading docks	7.12
Outdoor equipment and material storage areas	7.13
Parking and storage area maintenance	7.14
Pools, ponds, decorative fountains, and other water features	7.15
Solid waste storage and handling	7.16
Vehicle and equipment cleaning	7.17
Vehicle and equipment repair and maintenance	7.18

Related Permanent Source Control Measures (e.g. secondary containment facilities to prevent accidental spills and leaks) are presented in Section 4.0.

7.2 Accidental Spills and Leaks

Accidental spills and leaks can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include hydrocarbons, coolant, solvents, paint and heavy metals.

7.2.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by accidental spills and leaks.

7.2.2 Operational Source Control Measures:

- Prepare Plan. Prepare a Spill and Leak Prevention and Response Plan that contains:
 - ✓ A list of materials of concern (e.g. gasoline and waste oil) and the storage and handling procedures needed to reduce spill potential;
 - ✓ Spill prevention and response procedures and locations of spill cleanup and response equipment;
 - ✓ Staff responsible for Plan implementation; and
 - ✓ Reporting requirements (internal and, if needed, regulatory agencies).

The Plan should incorporate the Hazardous Materials Plans that have been prepared for specific District facilities and departments.

- Spill and Leak Prevention:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Label all liquid storage containers and place 55-gallon containers within or over secondary containment facilities (e.g. containment pallets and tubs);
 - ✓ Perform equipment and vehicle maintenance activities that involve liquids:
 - Indoors or in covered areas; or
 - In outdoor areas away from storm drains and drainage inlets.
 - ✓ Conduct preventive maintenance on vehicles and equipment to prevent leaks and spills from occurring; and
 - ✓ If illegal dumping is observed at the facility, post “No Dumping” signs, and, if appropriate, consider additional outdoor lighting and/or barriers to discourage dumping.

- Spill and Leak Response:
 - ✓ Repair leaking vehicles and equipment as soon as possible. Place drip pans beneath leaking equipment and vehicles awaiting service;
 - ✓ Contain and clean up leaks, drips, and other spills using as little water as possible. Use rags for small spills, damp mops for general cleanup; and dry absorbent material for larger spills;
 - ✓ Use the following three-step method for cleaning floors:
 - Clean spills with rags or other absorbent materials;
 - Sweep floor using dry absorbent material; and
 - Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.
 - ✓ If needed for large spills, enlist services of private spill cleanup company or Hazmat team;
 - ✓ Maintain an adequate supply of spill and leak cleanup materials (absorbents, booms, mats to seal drainage inlets, and spill kits) and store near locations where spills could occur;
 - ✓ Periodically cleanup deposits caused by equipment and vehicle leakage in outdoor areas (e.g. parking lots), especially prior to predicted storm events;
 - ✓ Maintain internal records regarding spills and leaks that have occurred and corrective actions taken; and
 - ✓ Report and document the following spills as required to comply with state and federal requirements, including:
 - California Office of Emergency Services (800 852-7550) for spills that pose an immediate threat to human health or the environment; and
 - United States Environmental Protection Agency National Response Center (800-424-8802) for petroleum product spills that enter a water body.
- Inspections. Conduct routine inspections to:
 - ✓ Verify spill prevention measures are being implemented;
 - ✓ Verify proper cleanup of all leaks and spills; and
 - ✓ Check condition of liquid storage and secondary containment facilities.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including spill prevention, response and cleanup. Document training using sign-in sheets.
- Record Keeping. Keep accurate and up to date records of spill and leak prevention and response actions, and staff training. Document training using sign-in sheets.

7.2.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-11 Spill Prevention, Control and Cleanup. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SC-11 Spill Prevention, Control and Cleanup. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Loading Areas, Outdoor Storage Areas and Outdoor Work Areas Source Control Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Elk Grove Unified School District, *Hazard Communication Training*, 2013.
- Elk Grove Unified School District, *Hazardous Materials Plans* (site-specific), current versions.

7.3 Building and Grounds Maintenance

Building and grounds maintenance activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease and other petroleum products, solvents, fertilizers, pesticides, suspended solids, heavy metals, high or low pH, and trash.

7.3.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by building and grounds maintenance activities.

7.3.2 Building Maintenance:

7.3.2.1 Specific Facilities

The source control measures for the following facilities are described in the noted subsections:

- Food service operations (7.10);
- Fuel dispensing areas (7.11);
- Loading docks (7.12);
- Outdoor equipment and material storage areas (7.13);
- Parking and storage area maintenance (7.14);
- Pools, ponds, decorative fountains and other water features (7.15);
- Solid waste storage and handling (7.16);
- Vehicle and equipment cleaning (7.17); and
- Vehicle and equipment repair and maintenance (7.18).

7.3.2.2 Other Facilities

The source control measures for all other facilities are as follows:

- Good Housekeeping:
 - ✓ Store materials indoors, in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff; and
 - ✓ Clean outdoor work areas on a regular basis, especially prior to predicted storm events.

- Spill Prevention and Response.
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Preventive Maintenance. Maintain equipment used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Pest Control. Implement the indoor and structural Pest Control source control measures described in subsection 7.7.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from pressure washing and outdoor area wash down (outdoor eating areas). Dispose of runoff by infiltration in landscaped areas or discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented, outdoor work areas are clean and unauthorized non-storm water discharges are not occurring; and
 - ✓ Check outdoor areas for leaks and spills.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.3.3 Grounds Maintenance:

- Good Housekeeping:
 - ✓ Store materials indoors, in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff;
 - ✓ Clean outdoor work areas on a regular basis, especially prior to predicted storm events;
 - ✓ Remove accumulated litter on at least a weekly basis and prior to predicted storm events; and
 - ✓ As needed, remove accumulated trash, debris and sediment from nearby storm drain inlets and catch basins at least annually before October 1 of each year.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Preventive Maintenance. Maintain equipment used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Landscape Management. Implement measures that rely on non-chemical solutions, including:
 - ✓ Create drought-resistant soils and soil microbial communities through the use of compost, compost tea, or inoculation;
 - ✓ Use native and/or climate appropriate plants to reduce the amount of water, pesticides, herbicides and fertilizers used;
 - ✓ Practice grass-cycling on decorative turf landscapes to reduce water use and the need for fertilizers;
 - ✓ Keep grass clippings and leaves away from waterways and out of the street using mulching, composting, or landfilling; and
 - ✓ Reduce mowing of grass to allow for greater pollutant removal, but not jeopardizing public safety.

- Pest Control.
 - ✓ Where possible, limit or replace herbicide and pesticide use (e.g., by conducting manual weed and insect removal);
 - ✓ Prohibit application of pesticides and herbicides as required by the regulations DPR 11-004 Prevention of Surface Water Contamination by Pesticides enacted by the Department of Pesticide Regulation; and
 - ✓ Implement the other outdoor Pesticide Use source control measures described in subsection 7.8.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from pressure washing and outdoor area (e.g. outdoor eating areas, etc.) wash down. Dispose of the runoff by spreading on-site (e.g. discharge onto turf covered playfields) or discharge into the sanitary sewer;
 - ✓ By definition, excessive irrigation runoff is an unauthorized non-storm water discharge. In order to prevent excessive irrigation runoff, the District is required to:
 - Detect (for example, from broken sprinkler heads) and correct the leaks within 72 hours of learning of the leak;
 - Properly design and aim sprinkler heads;
 - Not irrigate during precipitation events; and
 - Manage ponds containing recycled water (if any) such that no discharge occurs unless the discharge is a result of a 25-year, 24-hour storm event or greater, and the RWQCB is notified by email no later than 24 hours after the discharge.
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to
 - ✓ Verify that the source control measures are being implemented, outdoor work areas are clean and unauthorized non-storm water discharges are not occurring; and
 - ✓ Check outdoor areas for leaks and spills.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges. The training should include:
 - ✓ Educating applicators and distributors of storm water issues;
 - ✓ Implementing integrated pest management measures that rely on non-chemical solutions, including:
 - Use of native and climate appropriate plants (reduces water usage and fertilization) for decorative landscape applications ;

- Keeping clippings and leaves away from waterways and out of the street using mulching, composting, or landfilling;
 - Preventing application of fertilizers when two or more consecutive days with greater than 50% chance of rainfall are predicted by the National Oceanic and Atmospheric Administration;
 - Limiting or eliminating the use of fertilizers, including prohibiting application within five feet of pavement, 25 feet of a storm drain inlet, or 50 feet of a water body; and
 - Reducing mowing of grass to allow for greater pollutant removal, but not jeopardizing public safety.
- ✓ Collecting and properly disposing of unused fertilizers; and
 - ✓ Preventing excessive irrigation run-off.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.3.4 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-35 Safer Alternative Products, SC-32 Outdoor Equipment Operations, SC-40 Contaminated and Erodible Areas, SC-41 Building and Grounds Maintenance, SC-42 Building Repair and Construction, SC-44 Drainage System Maintenance, BG-10 Animal Care and Handling Facilities, BG-40 Landscape Maintenance, BG-60 Mobile Cleaning - Carpets and Upholstery, BG-62 Mobile Cleaning - Surface Cleaning and BG-65 Mobile Cleaning - Water Softeners. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SC-60 Housekeeping Practices, SC-70 Road and Street Maintenance, SC-71 Plaza and Sidewalk Cleaning and SC-76 Water and Sewer Utility Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-35 Outdoor Work Areas and SD-36 Outdoor Processing Areas. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Efficient Irrigation and Landscaping Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

- Sacramento Stormwater Quality Partnership, *Concrete and Creeks Don't Mix, Painting Without Polluting, Landscaping Stormwater Pollution Prevention Guidelines brochures* (2012); *Disposal of Carpet Cleaning Wastewater Fact Sheet* (2007); and *Preventing Stormwater Pollution: Your Guide to Best Management Practices (BMPs) for Pressure Washing and Steam Cleaning in the Greater Sacramento Area* (2008). Available online at: <http://www.beriverfriendly.net/documents/>
- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004*, adopted by February 5, 2013, Section F.5.f.9 Pesticide, Herbicide, and Fertilizer Application and New Landscape Design and Maintenance Management. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

7.4 Drain or Wash Water from Boiler Drain Lines, Condensate Drain Lines, Rooftop Equipment, Drainage Sumps, and Other Sources

Discharges of drain or wash water from boiler or condensate drain lines, rooftop equipment, drainage sumps, and other similar sources can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. These are prohibited as unauthorized non-storm water discharges. The potential pollutants of concern in the drain or wash water includes chlorine, metals, organics and other chemicals that have been added to the equipment process water for maintenance purposes.

7.4.1 Operational Objective:

- Eliminate discharges of drain or wash water from boiler or condensate drain lines, rooftop equipment, drainage sumps, and other sources to the storm drainage system.

7.4.2 Operational Source Control Measures:

- Unauthorized Non-Storm Water Discharge Prevention.
 - ✓ Do not allow equipment drain or wash water to be discharged into the storm drainage system; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to confirm that discharges of drain or wash water from boiler or condensate drain lines, rooftop equipment, drainage sumps, and other similar sources are entering the storm drainage system.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent unauthorized non-storm water discharges, including proper procedures for disposal of equipment drain or wash water.
- Record Keeping. Keep accurate and up to date records of inspections, corrective actions taken and staff training. Document training using sign-in sheets.

7.4.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- United States Environmental Protection Agency, *Storm Water Management Fact Sheet Non-Storm Water Discharges to Storm Sewers*, September 1999. Information available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_nonstorm.pdf

7.5 Fire Sprinkler Test Water

Fire sprinkler test water can contribute pollutants to storm water runoff and result in unauthorized non-storm water discharges. This type of discharge into the storm drainage system is prohibited as an un-authorized non-storm water discharge. The potential pollutants of concern are chlorine, turbidity and eroded sediment.

7.5.1 Operational Objective:

- Prevent fire sprinkler testing operations from causing storm water pollution or non-stormwater discharges.

7.5.2 Operational Source Control Measures:

- Unauthorized Non-Storm Water Discharge Prevention. Contain all fire sprinkler test water. Dispose of by spreading on-site (e.g. discharge onto turf covered playfields) or discharge into the sanitary sewer.
- Inspections. Conduct routine inspections to confirm that fire sprinkler test water is not being discharged into the storm drain system.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for disposal of fire sprinkler test water.
- Contractor Requirements. Require that contractors properly dispose of fire sprinkler test water so as to prevent unauthorized non-storm water discharges.
- Record Keeping. Keep accurate and up to date records of fire sprinkler test water disposal locations and staff training. Document staff training using sign-in sheets.

7.5.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- United States Environmental Protection Agency, *Storm Water Management Fact Sheet Non-Storm Water Discharges to Storm Sewers*, September 1999. Information available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_nonstorm.pdf

7.6 Interior Floor Drains

Interior floor drains can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern are the same as for accidental spills and leaks and include hydrocarbons, coolant, solvents, paint and heavy metals. The District does not currently have any existing interior floor drains that are connected to the storm drainage system.

7.6.1 Operational Objectives:

- Prevent any discharges of pollutants to the storm drainage system from interior floor drains.

7.6.2 Operational Source Control Measures:

- Waste Disposal. In general, do not pour liquids into floor drains.
- Staff Training. Educate and inform staff regarding the proper use of interior floor drains and proper locations for disposal of wastes and wastewater.
- Record Keeping. Keep accurate and up to date training records of staff training. Document training using sign-in sheets.

7.6.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- United States Environmental Protection Agency, *Storm Water Management Fact Sheet Non-Storm Water Discharges to Storm Sewers*, September 1999. Information available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_nonstorm.pdf

7.7 Pest Control, Indoor and Structural

Indoor and structural pest control activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern are pesticides that are toxic to aquatic life in surface waters. All pesticide applications within the District are currently performed by a single pest control vendor.

7.7.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by indoor or structural pest control activities.

7.7.2 Operational Source Control Measures:

- Food Service Facilities. Implement the Integrated Pest Management (IPM) techniques described in subsection 7.10.
- Other Facilities. Implement the following IPM techniques:
 - ✓ Reduce Habitat:
 - Keep indoor areas clean of food scraps;
 - Clean trash cans regularly;
 - Consider physical/structural modifications that may help to eliminate pest behavior; and
 - Seal cracks and crevices.
 - ✓ Monitor for Pests. Use sticky traps to monitor how well the pest control program is working. Pests caught in the traps warn of a possible problem.
 - ✓ Use Baits First:
 - Use baits for controlling pests. Remove bait when pests are gone, or else the bait may attract more pests; and
 - Use chemicals only as a last resort. If absolutely necessary, choose less toxic chemicals, and ask the pest control service to provide label information.
 - ✓ If Pesticides are Applied:
 - Contract with pest control vendors that are IPM-certified or practice IPM principals to provide pest control services;
 - Apply only if necessary, not on a regular schedule. Follow label directions; and
 - Do not apply around the exterior of a structure within 48 hours of predicted rainfall with greater than 50% probability as predicted by National Oceanic and Atmospheric Administration (NOAA).

- Spill Prevention and Response. Implement the Accidental Spills and Leaks source control measures described in subsection 7.2.
- Unauthorized Non-Storm Water Discharges.
 - ✓ Collect and properly dispose of unused pesticides and herbicides;
 - ✓ After spraying is finished triple-rinse applicator tank (rinse out 3 times) and spray apply the diluted rinse water within the spray area until it is used up. Do not allow the diluted rinse water to enter the storm drain system; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to verify that the source control measures are being implemented
- Training.
 - ✓ Train staff regarding use of IPM techniques for pest control in outdoor areas; and
 - ✓ Verify that pest control vendor takes steps to prevent storm water pollution and unauthorized non-storm water discharges, and properly disposes of unused pesticides and herbicides.
- Record Keeping. Keep accurate and up to date records of inspections, pest control activities and training. Document staff training using sign-in sheets.

7.7.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-41 Building and Grounds Maintenance and BG-30 Food Service Facilities. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- Elk Grove Unified School District, Integrated Pest Management Program.
- University of California Agricultural and Natural Resources, UC IPM website. Information available online at: <http://ucipm.ucdavis.edu/PMG/menu.homegarden.html>

7.8 Pesticide Use, Landscape and Outdoors

Landscape and other outdoor pesticide use can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern are pesticides and herbicides. All pesticide applications within the District are currently performed by a single pest control vendor.

7.8.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by landscape and other outdoor pesticide use.

7.8.2 Operational Source Control Measures:

- Integrated Pest Management (IPM). Utilize IPM techniques to control pests.
 - ✓ Reduce Habitat. Consider physical modifications that may help to eliminate pest behavior. Keep dumpster area clean inside and out. Keep garbage cans clean.
 - ✓ Monitor for Pests. Use sticky traps to monitor how well the pest control program is working. Pests caught in the traps warn of a possible problem.
 - ✓ Use Baits First:
 - Use baits for controlling pests. Remove bait when pests are gone, or else the bait may attract more pests;
 - Use chemicals only as a last resort. If absolutely necessary, choose less toxic chemicals, and ask the pest service to provide label information;
 - If possible, limit or replace herbicide and pesticide use (e.g., conducting manual weed and insect removal); and
 - Apply pesticides only if necessary, not on a regular schedule. Follow label directions.
 - ✓ If Pesticides are Applied:
 - Contract with pest control vendors that are IPM-certified or practice IPM principals to provide pest control services;
 - Do not apply during irrigation or within 48 hours of predicted rainfall with greater than 50% probability as predicted by National Oceanic and Atmospheric Administration (NOAA);
 - Use native and/or climate appropriate plants to reduce the amount of water, pesticides and herbicides used; and
 - Keep grass clippings and leaves away from waterways and out of the street using mulching, composting, or landfilling.
- Spill Prevention and Response. Implement the Accidental Spills and Leaks source control measures described in subsection 7.2.

- Unauthorized Non-Storm Water Discharges.
 - ✓ Collect and properly dispose of unused pesticides and herbicides;
 - ✓ After spraying is finished triple-rinse applicator tank (rinse out 3 times) and spray apply the diluted rinse water within the spray area until it is used up. Do not allow the diluted rinse water to enter the storm drain system; and
 - ✓ For additional information, see subsection 7.9.
- Training.
 - ✓ Train staff regarding use of IPM techniques for pest control in outdoor areas; and
 - ✓ Verify that pest control vendor takes steps to prevent storm water pollution and unauthorized non-storm water discharges, and properly disposes of unused pesticides and herbicides.
- Record Keeping. Keep accurate and up to date records of inspections, pest control activities and training. Document staff training using sign-in sheets.

7.8.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-40 Contaminated or Erodible Areas, SC-41 Building and Grounds Maintenance, BG-30 Food Service Facilities and BC 40 Landscape Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Modesto, *Pest Management Guide Stormwater Pollution Prevention*, Information available online at: <http://www.modestogov.com/pwd/utilities/wastewater/pollution/>
- Elk Grove Unified School District, Integrated Pest Management Program.
- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004*, adopted by February 5, 2013, Section F.5.f.9 Pesticide, Herbicide, and Fertilizer Application and New Landscape Design and Maintenance Management. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml
- University of California Agricultural and Natural Resources, UC IPM website. Information available online at: <http://ucipm.ucdavis.edu/PMG/menu.homegarden.html>

7.9 Unauthorized Non-Storm Water Discharges

Unauthorized non-storm water discharges into the storm drainage system are prohibited. These discharges, which could contribute a number of pollutants, include:

- Excessive irrigation runoff. This would consist of irrigation runoff that leaves the intended use area as part of facility design, excessive application, intentional overflow or application, or due to negligence.
- Other unauthorized non-storm water discharges. This would include runoff from wash down of buildings and sidewalks or outdoor eating areas and runoff resulting from vehicle and equipment washing.

However, the Small MS4 Permit identifies some discharges as authorized non-storm water discharges. The following non-storm water discharges are authorized provided they are not a significant source of pollutants:

- Water line flushing;
- Diverted stream flows;
- Springs, rising ground waters and uncontaminated pumped ground water;
- Uncontaminated ground water infiltration (as defined at 40 CFR §35.2005(20));
- Discharges from potable water sources;
- Foundation and footing drains;
- Air conditioning condensation;
- Water from crawl space pumps;
- Flows from riparian habitats and wetlands;
- Dechlorinated swimming pool discharges; and
- Incidental runoff from landscaped areas.

7.9.1 Operational Objectives:

- Prevent discharges of pollutants caused by un-authorized non-stormwater discharges, which includes managing runoff from landscaped areas so that it is only incidental.

7.9.2 Operational Source Control Measures:

- Excessive Irrigation Runoff. In order to prevent excessive irrigation runoff, the District must:
 - ✓ Detect leaks (e.g. from broken sprinkler heads) and repair immediately, or file an Irrigation Concern form and request that an irrigation technician repair the leak within 72 hours;
 - ✓ Properly design and aim sprinkler heads;

- ✓ Not irrigate during precipitation events; and
- ✓ Manage ponds containing recycled water such that no discharge occurs unless the discharge is a result of a 25-year, 24-hour storm event or greater, and the RWQCB is notified by email no later than 24 hours after the discharge (not currently applicable - the District does not have any ponds containing recycled water).
- Other Unauthorized Non-Storm Water Discharges:
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials.
 - ✓ Do not allow wash down water or pressure washing runoff to enter the storm drainage system. If pressure washing or wash down is needed, cover affected storm drain inlets first, and contain all runoff. Divert all runoff to landscaped areas or discharge into the sanitary sewer.
 - ✓ Add and/or maintain legibility of drainage inlet labels (“Drains to Creek” or similar message) in where maintenance activities occur indicating that they are not to be used for liquid or solid waste disposal.
 - ✓ For additional information, see subsection 7.9.
- Spill Prevention and Response. Implement the Accidental Spills and Leaks source control measures described in subsection 7.2.
- Inspections. Conduct routine inspections to verify that unauthorized non-storm water discharges are not occurring at District facilities.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent excessive runoff from irrigated areas and unauthorized non-storm water discharges.
- Record Keeping. Keep accurate and up to date records of inspections, irrigation management activities, and staff training. Document training using sign-in sheets.

7.9.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-41 Building and Grounds Maintenance, SC-42 Building Repair and Construction, SC-44 Drainage System Maintenance, BG-10 Animal Care and Handling Facilities, BG-60 Mobile Cleaning - Carpets and Upholstery, BG-62 Mobile Cleaning - Surface Cleaning and BG-65 Mobile Cleaning - Water Softeners. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Efficient Irrigation and Storm Drain Inlet Markings and Signage Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Sacramento Stormwater Quality Partnership, *Concrete and Creeks Don't Mix, Painting Without Polluting brochures* (2012); *Disposal of Carpet Cleaning Wastewater Fact Sheet* (2007); and *Preventing Stormwater Pollution: Your Guide to Best Management Practices (BMPs) for Pressure Washing and Steam Cleaning in the Greater Sacramento Area* (2008). Available online at: <http://www.beriverfriendly.net/documents/>
- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004*, adopted by February 5, 2013, Section B. Discharge Prohibitions. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml
- United States Environmental Protection Agency, *Storm Water Management Fact Sheet Non-Storm Water Discharges to Storm Sewers*, September 1999. Information available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_nonstorm.pdf

7.10 Food Service Operations

Food service operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, trash, spills, food wastes, cleaners, detergents and pesticides.

7.10.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by food service operations.

7.10.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ Store materials in indoors, in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff;
 - ✓ Confirm that all grease is being properly disposed of to prevent grease blockages in the sanitary sewer system that could result in sanitary sewer system overflows;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the outdoor areas affected by food service operations and remove accumulated litter;
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins; and
 - ✓ See subsections 7.12 (Loading Docks) and 7.16 (Solid Waste Storage and Handling) for greater details regarding source control measures that are necessary in the loading and unloading areas and near dumpster.
- Integrated Pest Management (IPM). Implement IPM techniques to minimize pesticide use.
 - ✓ Reduce Habitat;
 - Inspect the entire establishment – inside and out;
 - Make physical modifications that may help to eliminate pest behavior. Seal cracks and crevices;
 - If needed, change food storage or cleanup practices to eliminate food sources for pests;
 - Keep facility clear of food scraps;
 - Take out garbage each night in a closed container;
 - Refrigerate all food or store in pest-proof containers each night;
 - Keep ventilation system working properly to keep greasy residue off walls;
 - Keep dishwasher area clean. Check the trap nightly;

- Where possible, elevate appliances at least 6 inches off the floor. Clean under appliances nightly. Steam clean or wash appliances weekly, including under the counter, under the sink, and the refrigerator vent;
- Steam clean or scrub floor drains with a brush to help eliminate fruit flies; and
- Wash garbage cans regularly. Discharge wash water to the sanitary sewer.
- ✓ Check Supplies and Entry Points:
 - Check for pests before bringing supplies in to the kitchen. Roaches like corrugated boxes;
 - Don't store boxes in the kitchen – take boxes away or store in a refrigerated area;
 - Seal any gaps below doors; and
 - Place boric acid powder in wall voids.
- ✓ Monitor for Pests:
 - Use sticky traps to monitor how well the pest control program is working. Pests caught in the traps warn of a possible problem; and
 - When hiring a pest control service, look for a company that provides IPM services.
- ✓ Use Baits First:
 - Use baits for controlling pests. Remove bait when pests are gone, or else the bait may attract more pests;
 - Use chemicals only as a last resort. If absolutely necessary, choose less toxic chemicals, and ask the pest service to provide label information; and
 - Apply pesticides only if necessary, not on a regular schedule. Follow label directions. Do not apply pesticides around floor drains, sinks, or food.
- Preventive Maintenance. Maintain equipment used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and

- ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Verify that all runoff from can washers is conveyed to the sanitary sewer;
 - ✓ Verify all discharges cooling and refrigeration equipment is conveyed to the sanitary sewer;
 - ✓ Clean floor mats, and other equipment indoors. If mats are too big to clean indoors, clean in area that drains to the sanitary sewer or landscaped areas;
 - ✓ Inspect grease traps and interceptors regularly to verify they are properly maintained and have not overflowed;
 - ✓ Contain all runoff from pressure washing of outdoor eating and solid waste storage areas. Dispose of runoff by infiltration in landscaped areas or discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented at food service operations, adjacent outdoor work areas are clean and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including use of IPM techniques for pest control and spill response and cleanup.
- Record Keeping. Keep accurate and up to date records of inspections, spill and leak response actions and staff training. Document training using sign-in sheets.

7.10.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-44 Drainage System Maintenance, BG-30 Food Service Facilities, and BG-61 Mobile Cleaning Food Service Related. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- Harris County Watershed Protection Group, *Stormwater Best Management Practices Restaurants and Food Service Facilities brochure*, Information available online at: <http://www.cleanwaterways.org/downloads/brochures/restaurant%20brochure%20-%20eng.pdf>
- Sacramento Stormwater Quality Partnership, *Stormwater Compliance for Restaurants and Food Handling Facilities brochure*, 2012. Available online at: http://www.beriverfriendly.net/docs/files/File/Brochures/FoodHandling_English.pdf

7.11 Fuel Dispensing Areas

Fuel dispensing area operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include spilled and leaked petroleum products and coolant.

7.11.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by fuel dispensing area operations. Focus pollution prevention activities on spills and leaks, most of which may occur during liquid transfers.

7.11.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the fuel dispensing area and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance:
 - ✓ Maintain equipment located or used in outdoor areas in accordance with manufacturer recommendations;
 - ✓ Check vehicles and fuel dispensing equipment regularly for leaks, and, if found, repair immediately;
 - ✓ Below ground fuel tanks. Monitor leak containment and overfill prevention systems; and
 - ✓ Aboveground fuel tanks. Check for spills and overfills during fueling of vehicles and equipment; leaks or spills that occur during fuel deliveries; condition of tank (e.g. loose fittings, poor welding, improper or poorly fitted gaskets), foundations, connections, coatings, and tank walls and piping system; and physical damage.
- Spill Prevention and Response:
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Post signs to remind employees and customers not to top off the fuel tank when filling and to report leaking vehicles to fleet maintenance;

- ✓ Ensure the following safeguards are in place:
 - Overflow protection devices on fuel tank systems to warn the operator or to automatically shut down transfer pumps when the tank reaches full capacity;
 - Protective guards (bollards) around tanks and piping to prevent vehicle or forklift damage;
 - Clear tagging or labeling of all valves to reduce human error; and
 - Signage showing emergency shut-off and emergency phone number.
- ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
- ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from pressure washing and discharge into the sanitary sewer;
 - ✓ Cover storm drains in the fuel dispensing area vicinity during fuel deliveries; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in fuel dispensing areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for fueling, and spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.11.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-20 Vehicle and Equipment Fueling and SC-44 Drainage System Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, May 2014. Fueling Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.12 Loading Docks

Loading dock operations can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, cleaners, detergents, heavy metals, solvents and trash.

7.12.1 Operational Objective:

- Prevent or reduce the potential for discharges of pollutants related to loading dock operations.

7.12.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ Store materials in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the loading docks and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance. Maintain vehicles and equipment located or used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Pest Control. Implement the indoor and outdoor Pest Control source control measures described in subsections 7.7 and 7.8.

- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.

- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented at loading docks, adjacent outdoor areas are clean and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.

- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for loading and unloading (especially liquids), and spill prevention and response.

- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.12.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-30 Outdoor Loading/Unloading and SC-44 Drainage System Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Loading Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.13 Outdoor Equipment and Materials Storage Areas

Outdoor storage of equipment or materials can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, spilled or leaking petroleum and non-petroleum products, heavy metals and trash.

7.13.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by outdoor equipment and material storage operations.

7.13.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ Store materials in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the outdoor areas used for storage and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance. Maintain equipment located or used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Pest Control. Implement the outdoor Pest Control source control measures described in subsection 7.8.

- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in outdoor equipment and material storage areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for outdoor material storage, and spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.13.3 **References**

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-30 Outdoor Loading/Unloading, SC-31 Outdoor Liquid Container Storage, SC-33 Outdoor Storage of Raw Materials and SC-44 Drainage System Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Outdoor Storage Areas and Outdoor Work Areas Source Control Fact Sheets. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.14 Parking and Storage Area Maintenance

Parking and storage area maintenance activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease and other petroleum products, coolant and heavy metals.

7.14.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by parking lot and/or storage area maintenance activities.

7.14.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ Remove accumulated litter on at least a weekly basis and prior to predicted storm events;
 - ✓ Provide adequate number of litter receptacles. Cleanout receptacles frequently to prevent spillage. Post no littering signs;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the storage areas; and
 - ✓ On an annual basis (before October 1 of each year), sweep the parking lot and remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Paved surface repair:
 - ✓ Preheat, transfer or load hot bituminous material away from storm drain inlets;
 - ✓ Apply portland cement concrete, asphalt, and seal coat during dry weather and when rain is not predicted to prevent contamination from contacting stormwater runoff;
 - ✓ Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated;
 - ✓ Clean and properly dispose of any debris that accumulates on the covered manholes and inlets;
 - ✓ Use only as much water as necessary for dust control during sweeping to avoid runoff; and
 - ✓ Catch drips from paving equipment that is not in use using pans or absorbent material placed under the machines. Dispose of collected material and absorbents at a legal disposal site.

- Preventive Maintenance. Maintain equipment located or used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Pest Control. Implement the outdoor Pest Control source control measures described in subsection 7.8.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in parking lots and storage areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges related to parking lot and storage area maintenance activities, and spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.14.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-11 Spill Prevention, Control & Cleanup, SC-30 Outdoor Loading/Unloading, SC-31 Outdoor Liquid Container Storage, SC-33 Outdoor Storage of Raw Materials, SD-34 Outdoor Material storage Areas, SC-43 Parking Area Maintenance and SC-44 Drainage System Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Outdoor Storage Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.15 Pools, Ponds, Decorative Fountains, and Other Water Features

Pools, ponds, decorative fountains, and other water features can contribute pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern are chlorine and/or chloramines, which are used as disinfectants. At low concentrations (above 0.08 mg/L) chlorine and chloramines can be toxic to aquatic life in surface waters.

7.15.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by pool, fountain, pond and/or other water feature maintenance activities.

7.15.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ On at least a weekly basis and prior to predicted storm events, remove the trash and litter that accumulates near the water feature sweep; and
 - ✓ If the area around a pond is used by the public, provide an adequate number of litter receptacles. Cleanout receptacles as needed to prevent spillage.
- Swimming Pools. Dechlorinated drain water from swimming pools is an “authorized” non- storm water discharge and can be discharged into a storm drainage system.
- All Other Water Features:
 - ✓ Dispose of all drain water by gradually discharging onto landscaped areas or into the sanitary sewer;
 - ✓ Do not use copper-based algaecides. Control algae with chlorine or similar alternatives (sodium bromide);
 - ✓ Ponds:
 - Control erosion by maintaining vegetative cover on banks and other tributary areas;
 - Consider introducing fish species that consume algae;
 - Mechanically remove pond scum using a 60 micron net; and
 - Minimize fertilizer and herbicide use around ponds.
- Preventive Maintenance:
 - ✓ Maintain water feature equipment located or used in outdoor areas in accordance with manufacturer recommendations.; and
 - ✓ Prevent algae problems with regular cleaning, adequate chlorine levels and well maintained filtration and circulation systems.
- Spill Prevention and Response:

- ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
- ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
- ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
- ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer;
 - ✓ Do not discharge any drain water to storm drainage system except for dechlorinated swimming pool drain water;
 - ✓ Do not discharge any filter backwash or rinse water to the storm drainage system; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to verify that the source control measures are being implemented and unauthorized non-storm water discharges are not occurring.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges related to operation of pools, ponds, decorative fountains or other water features, including testing and maintenance of proper chlorine levels.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.15.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet SC-10 Non-Stormwater Discharges. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Municipal*, January 2003. BMP Fact Sheet SC-72 Fountains and Pools Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>

- Sacramento Stormwater Quality Partnership, *Keep Pools and Spas from Polluting Our Local Creeks and Rivers brochure*, 2012. Available online at:
http://www.beriverfriendly.net/docs/files/File/Brochures/FoodHandling_English.pdf

7.16 Solid Waste Storage and Handling

Storage and handling of solid waste can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern trash, spills, food wastes, and leaking liquids (e.g. milk).

7.16.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by solid waste storage and handling activities.

7.16.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ If possible, store solid wastes in covered areas or beneath a tarp to prevent contact with precipitation and storm runoff;
 - ✓ Keep dumpster lids closed and dumpster area clean – inside and out;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the outdoor areas used for solid waste storage and handling and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance. Maintain equipment located or used in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.
- Pest Control. Implement the outdoor Pest Control source control measures described in subsection 7.8.

- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain and cleanup any dumpster leakage. Do not allow leakage to enter storm drainage system. Replace leaking dumpsters;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in solid waste storage and handling areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for solid waste handling and storage, and spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.16.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC 32 Trash Storage Areas and SC-34 Waste Handling and Disposal, and SC-44 Drainage System Maintenance. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Waste Management Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>

7.17 Vehicle and Equipment Cleaning

Vehicle and equipment cleaning activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include oil and grease, cleaners, detergents, heavy metals, solvents and trash.

7.17.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by vehicle and equipment cleaning activities.

7.17.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the outdoor areas used for cleaning activities and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance. Maintain vehicles and equipment located, used or parked in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.

- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer;
 - ✓ Conduct all vehicle and equipment washing activities in areas that drain to the sanitary sewer or where runoff will infiltrate into the ground;
 - ✓ Conduct all other cleaning activities, including steam cleaning, in areas where the runoff will be conveyed to the sanitary sewer or stored and hauled to a legal disposal site; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in vehicle and equipment cleaning areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.17.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-21 Vehicle and Equipment Cleaning, SC-33 Vehicle Washing Areas, SC-44 Drainage System Maintenance, and BG-64 Mobile Cleaning - Vehicle and Equipment Washing. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Wash Areas Source Control Fact Sheet. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Sacramento Stormwater Quality Partnership, *Commercial Auto Washing and Detailing Businesses brochure*, 2012. Available online at: http://www.beriverfriendly.net/docs/files/File/Brochures/FoodHandling_English.pdf

7.18 Vehicle and Equipment Repair and Maintenance

Vehicle and equipment repair and maintenance activities can contribute a number of pollutants to storm water runoff and result in unauthorized non-storm water discharges. The potential pollutants of concern include suspended solids, oil and grease, heavy metals and solvents.

7.18.1 Operational Objective:

- Prevent or reduce discharges of pollutants caused by vehicle and equipment repair and maintenance activities.

7.18.2 Operational Source Control Measures:

- Good Housekeeping:
 - ✓ If possible, conduct all repair and maintenance activities indoors or in covered areas that drain to the sanitary sewer;
 - ✓ On at least a weekly basis and prior to predicted storm events, sweep the outdoor areas used for maintenance and repair and remove accumulated litter; and
 - ✓ On an annual basis (before October 1 of each year), remove accumulated trash, debris and sediment from nearby storm drain catch basins.
- Preventive Maintenance. Maintain vehicles and equipment located, used or parked in outdoor areas in accordance with manufacturer recommendations. Check regularly for leaks and, if found, repair immediately.
- Spill Prevention and Response:
 - ✓ Designate specific areas for loading and unloading. If possible, load and unload materials indoors or in covered areas;
 - ✓ Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all employees. Dispose of absorbent materials at legal disposal site;
 - ✓ Cleanup all spills and leaks immediately using absorbent. Sweep up used absorbent on at least a weekly basis and prior to predicted storm events;
 - ✓ Ensure that employees are familiar with proper spill cleanup procedures; and
 - ✓ Implement the other Accidental Spills and Leaks source control measures described in subsection 7.2.

- Unauthorized Non-Storm Water Discharges.
 - ✓ If possible, clean outdoor areas using brooms, blowers and/or absorbent materials;
 - ✓ Contain all runoff from wash down of outdoor areas. Dispose of runoff by discharge into the sanitary sewer; and
 - ✓ For additional information, see subsection 7.9.
- Inspections. Conduct routine inspections to:
 - ✓ Verify that the source control measures are being implemented in vehicle equipment repair and maintenance areas and unauthorized non-storm water discharges are not occurring;
 - ✓ Check outdoor areas for leaks and spills; and
 - ✓ On an annual basis (prior to October 1), inspect nearby catch basins (and those near the dumpsters) to determine if cleanout is required.
- Staff Training. Educate and inform staff regarding the steps that must be taken to prevent storm water pollution and unauthorized non-storm water discharges, including proper procedures for spill prevention and response.
- Record Keeping. Keep accurate and up to date records of inspections, preventive maintenance activities, spill and leak response actions and staff training. Document training using sign-in sheets.

7.18.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets SC-10 Non-Stormwater Discharges, SC-22 Vehicle and Equipment Repair, SC-44 Drainage System Maintenance, BG-21 Automotive Service-Maintenance, and BG-23 Automotive Service-Recycling. Information available online at:
<https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Outdoor Work Areas Source Control Fact Sheet. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>
- Sacramento Stormwater Quality Partnership, *Stormwater Compliance for Auto Repair and Maintenance brochure*, 2012. Available online at:
http://www.beriverfriendly.net/docs/files/File/Brochures/FoodHandling_English.pdf

8.0 O&M OF TREATMENT SYSTEMS AND HYDROMODIFICATION CONTROLS

8.1 Introduction

With respect to storm water treatment systems and hydromodification controls, the District is required to accomplish the following:

- Assume responsibility for proper O&M of all treatment systems and hydromodification controls;
- Coordinate with the Sacramento-Yolo Mosquito and Vector Control District and the RWQCB. This includes:
 - ✓ Establishing protocols for providing notification regarding installed treatment systems and hydromodification management controls.
 - ✓ On an annual basis, submitting a list that contains the newly installed storm water treatment systems and hydromodification management controls to the Sacramento-Yolo Mosquito and Vector Control District and the RWQCB. The list must include facility locations and descriptions of the systems and controls.
- Maintain a database or equivalent tabular format containing all projects that have installed treatment systems that contains the following information:
 - ✓ Name and address of the project ;
 - ✓ Specific description of the location(or a map showing the location of the installed treatment system(s) and hydromodification control(s);
 - ✓ Date that the treatment system and hydromodification controls were installed;
 - ✓ Description of the type and size of the treatment system and the Hydromodification controls installed;
 - ✓ Responsible operator of each treatment system and hydromodification control;
 - ✓ Dates and findings of inspections (routine and follow-up) of the treatment systems and hydromodification controls by the District; and
 - ✓ Any problems and corrective actions taken.

8.2 O&M Requirements

Table 8.1 lists each of the Site Design Measures described in Section 3.0, the bioretention facilities described in Section 6.0 and the other existing systems (infiltration basins, detention/retention basins, and water quality inlets) currently being operated by the District. The O&M requirements for each system and/or control are described in the noted subsection.

Table 8.1 Treatment System and Hydromodification Control O&M Requirements	
System/Control Measure	Subsection Number
<u>Site Design Measures</u>	
Stream Setbacks and Buffers	8.2.1
Vegetated Swales	8.2.2
Rooftop and Impervious Area Disconnection	8.2.3
Tree Planting and Preservation	8.2.4
Porous Pavement	8.2.5
Soil Quality Improvement and Maintenance	8.2.6
Rain Barrels and Cisterns	8.2.7
Green Roofs	8.2.8
<u>Bioretention Systems</u>	
Bioretention	8.2.9
<u>Other Existing Systems</u>	
Infiltration Trenches	8.2.10
Infiltration Basins	8.2.11
Detention/ Retention Basins	8.2.12
Water Quality Inlets	8.2.13

8.2.1 Stream Setbacks and Buffers

Stream setbacks and natural buffers are gently sloping undisturbed areas next to waterways that treat and infiltrate urban runoff. Maintenance is needed to repair of damage and remove accumulated debris, sediment and litter.

Man-made buffers are gently sloping landscaped areas that are used to treat and infiltrate urban runoff. Maintenance is needed to establish dense vegetation, remove accumulated debris, sediment and litter, and to assure proper drainage.

8.2.1.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.2**.

Table 8.2 Stream Setbacks and Buffers Recommended Inspection Activities	
Frequency	Description
After major storms	Inspect vegetation and soil for damage and erosion.
Semi-annual (beginning and end of wet season)	Inspect for erosion, channelization of flow, standing water, accumulated litter, debris and sediment.
	Inspect inlet, including level spreader (if applicable), for clogging and effectiveness.

8.2.1.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.3**.

Table 8.3 Stream Setbacks and Buffers Stream Recommended Maintenance Activities	
Frequency	Description
Natural and Man-made	
Seasonally (as needed)	Remove litter and other debris, obstructions and sedimentation causing channelization or standing water (to prevent mosquito breeding).
	Maintain inlet level spreader effectiveness (if applicable).
	Repair damage caused by erosion and channelization.
Man-made	
Following construction	Water plants daily for 2 weeks after construction is complete.
Seasonally (as needed)	Mow turf regularly to maintain vegetation height between 2 - 4 inches, and to promote thick, dense vegetative growth. Cut turf only when soil is dry to prevent damage to vegetation, soil compaction and flow concentrations.
	Irrigate when necessary to maintain the vegetation.
	Utilize IPM techniques to control pests. Minimize use of fertilizers, pesticides and herbicides.
Semi-annual (as needed)	Re-seed or re-vegetate (or replace with alternative species) bare areas and apply mulch. Treat diseased shrubs and remove dead vegetation.
	Remove sediment accumulating near culverts and in channels whenever it builds up to 3 in. at any spot, or covers vegetation. Fill eroded areas, gullies and channels with soil and install erosion control blankets.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 50 years (if properly maintained).

8.2.1.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-31 Vegetated Buffer Strip. Information available online at:
<https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Vegetated Filter Strip Control Measure. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Filter Strip BMP. Available online at:
<http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.2.2 Vegetated Swales

Vegetated swales are wide, shallow channels with dense vegetation that treat and infiltrate urban runoff. Maintenance is needed to establish dense vegetation, remove accumulated debris, sediment and litter, and to assure proper drainage.

8.2.2.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.4**.

Table 8.4 Vegetated Swales Recommended Inspection Activities	
Frequency	Description
After major storms	Inspect vegetation and soil for damage and erosion.
Semi-annual (beginning and end of wet season)	Inspect for erosion, channelization of flow, standing water, accumulated litter, debris and sediment.
	Inspect inlet, including level spreader (if applicable), for clogging and effectiveness.

8.2.2.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.5**.

Table 8.5 Vegetated Swales Recommended Maintenance Activities	
Frequency	Description
Seasonally (as needed)	Mow grass to maintain a height of 3–4 inches (or above depth of flow), for safety, aesthetic, or other purposes. Remove litter prior to mowing.
	Irrigate during whenever necessary to maintain the vegetation.
	Provide weed control. Utilize IPM techniques and minimize use of fertilizers, pesticides and herbicides.

Table 8.5 Vegetated Swales Recommended Maintenance Activities (continued)	
Frequency	Description
Semi-annual (as needed)	Remove litter, branches, rocks, blockages or other debris.
	Repair damaged areas caused by erosion and channelization. Remove obstructions or sedimentation causing standing water to prevent mosquito breeding. Sediment should be removed when it builds up to 3 inches at any spot, or covers vegetation. Replant damaged grass areas and bare areas as necessary.
	If applicable, maintain inlet level spreader effectiveness.
Annual (as needed)	Correct erosion problems in the sand/soil bed of dry swales.
	Reseed and apply mulch to damaged areas. Plant an alternative grass species if the original grass cover has not been successfully established.
	Limit fertilizer applications based on plant vigor and soil test results. Utilize IPM techniques to minimize use of fertilizers.
When needed	If it does not draw down within 48 hours, take steps to remediate.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 20 years (if properly maintained).

8.2.2.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-30 Vegetated Swale. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Vegetated Swale Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Bioswale BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.2.3 Rooftop and Impervious Area Disconnection

Disconnection allows drainage from rooftops, parking lots, sidewalks, courtyards and roadways to infiltrate onsite in pervious areas. Maintenance is needed to keep the drainage system operating properly and prevent long-term ponding.

8.2.3.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.6**.

Table 8.6 Rooftop and Impervious Area Disconnection Recommended Inspection Activities	
Frequency	Description
Prior to beginning and periodically during the wet season	Check operating condition of gutters, roof drains and overflow pipes.
	Check for standing water in area receiving impervious area runoff.

8.2.3.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.7**.

Table 8.7 Rooftop and Impervious Area Disconnection Recommended Maintenance Activities	
Frequency	Description
Prior to the wet season	As needed, remove debris and sediment from gutters, roof drain pipes, overflow pipes and adjacent impervious surfaces. Repair wire mesh or other features designed to keep leaves and other debris out of roof drain pipes.
Annual (as needed)	Unclog gutters, roof drain pipes and overflow pipes. Repair erosion in pervious are receiving runoff.
When needed	If pervious area does not draw down within 48 hours, take steps to remediate.
As needed during dry season	Irrigate vegetation in pervious area receiving the runoff to maintain infiltration and filtering capacity. Replace damaged or dead vegetation.

8.2.3.3 References

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Disconnected Roof Drains and Disconnected Pavements Control Measures. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- North Carolina Department of Environment and Natural Resources, *Stormwater Best Management Practices Manual*, draft Chapter 24 Disconnected Impervious Surfaces (draft 4/1/14). Information available online at: <http://portal.ncdenr.org/web/lr/bmp-manual>

8.2.4 Tree Planting and Preservation

Newly planted and existing trees absorb rainfall, reduce erosion, increase soil absorption and infiltration and draw up nutrients and large quantities of water from the soil (similar to natural conditions). Maintenance is needed to maintain tree health.

8.2.4.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.8**.

Table 8.8 Tree Planting and Preservation Recommended Inspection Activities	
Frequency	Description
Annual	Inspect trees to determine if pruning, removal or other maintenance is necessary.

8.2.4.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.9**.

Table 8.9 Tree Planting and Preservation Recommended Maintenance Activities	
Frequency	Description
New Trees	Add 4 to 6 inches of mulch around newly planted trees
As needed	Rake up leaves and tree debris to prevent it from being washed into the storm drain.
	Prune for safety reasons, to protect structures and to improve the health and structure of the trees.
	Irrigate as necessary to maintain tree health. Protect soil within drip line from erosion and compaction.
	Utilize IPM techniques to minimize use of fertilizers, pesticides and herbicides.

Table 8.9 Tree Planting and Preservation Recommended Maintenance Activities (continued)	
Frequency	Description
As needed (continued)	Minimize use of chemicals to maintain tree health. Conduct soil tests to determine if fertilizer is needed. Consider replacing mulch around the base of the tree in lieu of fertilizer. Keep turf at least 24 inches from trunk of tree (to prevent competition for water and nutrients).

8.2.4.3 References

- Cappiella, K., *Urban Watershed Forestry Manual Part 1: Methods for Increasing Forest Cover in a Watershed*, prepared for USDA Northeastern Area State and Private Forestry, Center for Watershed Protection, Ellicott City, MD, 2005. Chapter 3 Techniques for Maintaining and Increasing Cover in a Watershed. Information available at: <http://www.cwp.org/online-watershed-library-owl>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Interceptor Trees Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- United States Environmental Protection Agency, *Storm Water Technology Fact Sheet Vegetative Covers*. Available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_vegcvr.pdf

8.2.5 Porous Pavement

Porous pavement can significantly reduce the runoff volume and pollutant load. Maintenance is needed to prevent the system from being clogged with fine sediments and to prolong its lifespan.

8.2.5.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.10**.

Table 8.10 Porous Pavement Recommended Inspection Activities	
Frequency	Description
Annual	Inspect to check condition of pavement surface and the need for maintenance.
During wet season	Check pavement for standing water.

8.2.5.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.11**.

Table 8.11 Porous Pavement Recommended Maintenance Activities	
Frequency	Description
Quarterly to biannual (pervious concrete, modular block pavement, or cobblestone block pavement)	Vacuum sweep per manufacturer recommendations. The frequency should be based on the amount of fines (e.g. windblown sand and organics) that are deposited on the surface.

Table 8.11 Porous Pavement Recommended Maintenance Activities (continued)	
Frequency	Description
As needed	Keep the surface clean and free of leaves, debris, and sediment. Do not cover it with an impermeable paving surface.
	Do not store loose material such as bark or sand on porous pavement.
	Eliminate any standing water at the surface, since that provides an environment for insect larvae. If sprays are considered, then use a licensed pest controller to apply an approved mosquito larvicide.
	Avoid planting trees and shrubs near non-flexible porous pavement types because roots may crack pavement and excessive leaves may clog the surface. Use of structural soil material may alleviate this concern.
	For manufactured products, follow manufacturer’s maintenance recommendations.
As needed (reinforced grass or similar vegetated pavements)	Mow grass to less than four inches.
	Irrigate and fertilize. When needed, re-seed grasses planted in pavement.
	Keep grasses healthy and dense enough to filter runoff while protecting underlying soils from erosion.
	Where reinforcement products are used to stabilize grass or gravel, replace individual grids when they become damaged.
If there is an obvious high loss in infiltration capacity	Clean surface using pressure washer with soap and vacuum to restore infiltration capacity.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 20 to 30 years (if properly maintained).

8.2.5.3 References

- Cahill Associates, Porous Pavement Operation and Maintenance Protocol San Diego County facilities, prepared for County of San Diego. Information available online at: http://www.sandiegocounty.gov/reusable_components/images/dgs/Documents/Grants_Pr op40_AppendIII .pdf

- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #4: Pervious Pavements. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook New Development and Redevelopment*, January 2003. BMP Fact Sheet SD-20 Pervious Pavements. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook>
- California Department of Transportation. *Treatment BMP Technology Report (CTSWRT-09-239.06)*, April, 2010. Porous Surface BMP Fact Sheets. Available online at: <http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-09-239-06.pdf>.
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Porous Pavement Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Pervious Pavement BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Permeable Interlocking Concrete Pavement and Pervious Concrete Pavement BMP Fact Sheets*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/PostConstruction-Stormwater-Management-in-New-Development-and-Redevelopment.cfm>
- United States Environmental Protection Agency, *Storm Water Technology Fact Sheet Porous Pavements*. Available online at: <http://www.epa.gov/nscep/index.html>

8.2.6 Soil Quality Improvement and Maintenance

Soil quality improvement (e.g. compost amended soil) and maintenance can significantly increase the infiltration capacity of native soils. Maintenance is needed to assure that runoff continues to infiltrate properly in the area with improved soil.

8.2.6.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.12**.

Table 8.12 Soil Quality Improvement and Maintenance Recommended Inspection Activities	
Frequency	Description
Annual	Inspect for conditions that may decrease the amended soil's infiltration capacity, aeration, organic content, or cause diseased vegetation (including soil compaction, hydric or waterlogged soils, poor cover conditions, unanticipated improvements, and a decrease in organic content.
Semi-annual	Monitor for pests.
Twice per year during wet season	Inspect the amended soil area to determine if runoff is not infiltrating within 48 hours.

8.2.6.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.13**.

Table 8.13 Soil Quality Improvement and Maintenance Recommended Maintenance Activities	
Frequency	Description
As needed	If runoff does not infiltrate within 48 hours, take steps to remediate. If that is not effective, remove and replace amended soil in its entirety.
	Trim vegetation (as applicable) and remove diseased vegetation and weeds.
	Remove litter and debris from amended soil area.

Table 8.13 Soil Quality Improvement and Maintenance Recommended Maintenance Activities (continued)	
Frequency	Description
As Needed (continued)	Use IPM techniques to reduce use of pesticides and herbicides.

8.2.6.3 References

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Compost Amended Soil Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Pennsylvania Department of Environmental Protection, *Pennsylvania Stormwater Best Management Practices Manual*, 2006. BMP 6.7.3: Soil Amendment and Restoration. Available online at: <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305>

8.2.7 Rain Barrels and Cisterns

Rain barrels and cisterns capture runoff from roof and other impervious areas for subsequent irrigation use. Maintenance is needed to assure the rainfall storage and reuse system operates properly.

8.2.7.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.14**.

Table 8.14 Rain Barrels and Cisterns Recommended Inspection Activities	
Frequency	Description
Monthly during growing season	Inspect the storage and irrigation system and observe while in operation to verify proper operation regularly during periods of use.
Semi-annual (beginning and end of wet season)	Inspect gutter systems, pipes, and storage facilities for accumulated sediment and debris.
	Inspect rain barrels or cisterns to ensure they remain mosquito-proof.
	Underground cisterns. Inspect manhole to assure it is accessible, operational and secure.

8.2.7.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.15**.

Table 8.15 Rain Barrels and Cisterns Recommended Maintenance Activities	
Frequency	Description
Semi-annual spring and fall (as needed)	Remove sediment and debris that has accumulated on roof and in the gutter system and drainage pipe to prevent it from entering the rain barrels or cisterns.
	Repair holes and/or damaged, missing screens and/or other mosquito preventive measures.

Table 8.15 Rain Barrels and Cisterns Recommended Maintenance Activities (continued)	
Frequency	Description
Prior to the wet season (as needed)	Repair any leaks, broken spray heads, or other malfunctions with the irrigation system.
Monthly during wet season (as needed)	Clean pre- and post-storage filters.
Annual (as needed)	Remove sediment and debris that has accumulated in the rain barrels or cisterns.

8.2.7.3 References

- California Stormwater Quality Association, *California LID Portal*, LID 201: Design Guidelines for LID Practices Presentation #5: Rainwater Harvesting. Information available online at: <https://www.casqa.org/resources/lid/presentations-publications>
- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-12 Harvest and Reuse. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Rain Barrel and Cistern BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.2.8 Green Roofs

Green roofs capture stormwater within the pore space of the growth medium and then release the water slowly via evaporation, transpiration and discharge to the roof drains. Maintenance is needed to assure continued vegetation health and proper operation of the component layers (root barrier, drainage layer and water proofing membrane).

8.2.8.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.16**.

Table 8.16 Green Roofs Recommended Inspection Activities	
Frequency	Description
	<u>Vegetation</u>
2 to 3 times per year	Inspect growth medium for evidence of erosion from wind or water.
Monthly (during vegetation establishment)	Inspect condition of vegetation and monitor for standing water.
Quarterly (after vegetation establishment)	Inspect condition of vegetation and monitor for standing water.
	<u>Component Layers</u>
Semi-annual (during wet season)	Inspect drainage layer flow paths for proper operation. Determine if drain pipes and inlets are in good condition and check drain inlets for obstructions. Identify sources of obstructions.
2 to 3 times per year	Inspect waterproof membrane for proper operation, waterproofing integrity, and structural stability.

8.2.8.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.17**.

Table 8.17 Green Roofs Recommended Maintenance Activities	
Frequency	Description
	<u>Vegetation</u>
Per landscape architect instructions	Irrigate plants.
As needed	<ul style="list-style-type: none"> • Maintain vegetation to ensure at least 90% vegetative cover (visual guideline) at the end of the plant establishment period and thereafter. • Remove fallen leaves, debris and trash from deciduous plant foliage. • Repair/replace damaged or dead vegetation to maintain required cover. • Employ integrated pest management (IPM) practices to minimize or eliminate use of chemical pesticides and herbicides. Remove weeds manually whenever possible. Eliminate standing water. • Use fertilizers sparingly, if at all. • During drought conditions, apply mulch or shade cloth as needed to prevent excess solar damage and water loss. • Mow grasses (if applicable).
	<u>Component Layers</u>
Semi-annual during wet season (as needed)	Maintain drainage layer flow paths for proper operation. Clear inlet pipe of growth media, vegetation, debris or other materials. Remove obstructions.
2 to 3 times per year (as needed)	<ul style="list-style-type: none"> • Maintain waterproof membrane for proper operation, waterproofing integrity, and structural stability. • Repair erosion with additional growth medium and plants.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 10 to 40 years (if properly maintained).

8.2.8.3 References

- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Green Roof Control Measure. Information available online at:
<http://www.beriverfriendly.net/Newdevelopment/>
- United States Environmental Protection Agency, *Post-Construction Stormwater Management in New Development and Redevelopment. Green Roofs BMP Fact Sheet*. Available online at: <http://water.epa.gov/polwaste/npdes/swbmp/Green-Roofs.cfm>

8.2.9 Bioretention Systems

Bioretention systems use soil and plants to slow, infiltrate and treat storm runoff. Other names for bioretention include storm water planters, flow-through planters, infiltration planters and rain gardens. In addition to vegetation, bioretention systems typically include layers of mulch, top soil, sand-peat and gravel, overflow devices and underdrains. Maintenance is needed to assure the system continues to operate properly.

8.2.9.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.18**.

Table 8.18 Bioretention Systems Recommended Inspection Activities	
Frequency	Description
Twice per year during storm events and after every major storm	Inspect the planter to verify that runoff is infiltrating properly, the ground surface in the ponding area remains flat and even, and standing water does not remain longer than 72 hours and that the overflow device is functioning properly.
Periodically	Check irrigation system for leaks and breaks.
	Monitor for pests.

8.2.9.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.19**.

Table 8.19 Bioretention Systems Recommended Maintenance Activities	
Frequency	Description
At beginning of wet season	Remove fallen leaves that might inhibit infiltration within ponding area.

Table 8.19 Bioretention Systems Recommended Maintenance Activities (continued)	
Frequency	Description
As needed	Irrigate plants during dry months when they show signs of stress.
	Prune trees and shrubs and grasses when needed to maintain functionality. Remove/cut back vegetation blocking inlets. Remove weeds. Replace or add plants to maintain full cover.
	Fix erosion near inlets. Add energy dissipation (e.g. cobbles) and remove sediment deposited near inlets and in ponding area.
	Remove litter, trash and debris.
	Use integrated pest management (IPM) techniques to control pests.
If infiltration is significantly reduced	<ul style="list-style-type: none"> • Remove and replace topsoil and sand/peat layer; or • Reconstruct facility if it is no longer functioning.

8.2.9.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-32 Bioretention. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- Central Coast Low Impact Development Initiative, *Bioretention Area Design Trainings Module 8: Construction and Maintenance*. Available online at: http://centralcoastlidi.org/Central_Coast_LIDI/Bioret_Training.html
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Stormwater Planter Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- City of Portland Environmental Services, *Field Guide Maintaining Rain Gardens, Swales and Stormwater Planters*, 2013. Information available online at: <https://www.portlandoregon.gov/bes/article/454410>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Rain Garden BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

- United States Environmental Protection Agency, *Storm Water Technology Fact Sheet Bioretention*, September 1999. Information available online at:
http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_biortn.pdf

8.2.10 Infiltration Trenches

These trenches enhance onsite infiltration of storm water runoff. Maintenance is needed to prevent trench clogging and assure the system continues operate properly.

8.2.10.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.20**.

Table 8.20 Infiltration Trenches Recommended Inspection Activities	
Frequency	Description
At beginning and end of wet season and after major storms	Check depth of water in observation well. Keep records showing depth of water depth verses time.
	Inspect trench for potential problems including trash, litter or sediment accumulation or standing water.
	Inspect grass buffers strip (if applicable) for erosion or channelization.

8.2.10.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.21**.

Table 8.21 Infiltration Trenches Recommended Maintenance Activities	
Frequency	Description
As needed	Take steps to prevent erosion in tributary area (if any).
	Fix erosion problems in grass filter strip (if applicable). Fill channels and repair erosion.

Table 8.21 Infiltration Trenches Recommended Maintenance Activities (Continued)	
Frequency	Description
As needed (continued)	Remove accumulated sediment litter, trash and debris.
	Trim adjacent trees so canopy does not extend over trench surface.
If infiltration is significantly reduced	Clean trench: <ul style="list-style-type: none"> • Remove top layer of gravel and clogged filter fabric • Install new filter fabric. Wash gravel and replace back in trench.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 5 to 30 years.

8.2.10.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-10 Infiltration Trench. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Infiltration Trenches Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- United States Environmental Protection Agency, *Storm Water Technology Fact Sheet Infiltration Trench*, September 1999. Information available online at: http://water.epa.gov/scitech/wastetech/upload/2002_06_28_mtb_infltrenc.pdf

8.2.11 Infiltration Basins

Infiltration basins retain runoff and allow it to percolate into the underlying native soils. Maintenance is needed to assure the basin bottom does not clog and continues to percolate properly.

8.2.11.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.22**.

Table 8.22 Infiltration Basins Recommended Inspection Activities	
Frequency	Description
At beginning and end of wet season and after major storms	Check depth of water in pond. Keep records showing depth of water verses time.
	Inspect for potential problems including erosion of basin side slopes and bottom, trash, litter or sediment accumulation or standing water.
Throughout year	Monitor health of vegetation and replace as needed.

8.2.11.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.23**.

Table 8.23 Infiltration Basins Recommended Maintenance Activities	
Frequency	Description
As needed	Take steps to prevent erosion in tributary area (if any).
	Fix erosion problems on basin side slopes and bottom.
	Remove accumulated sediment litter, trash and debris.
	Replace vegetation if necessary. Irrigate turf (if applicable).
If infiltration is significantly reduced	Clean basin, re-grade and till basin bottom to restore capacity.

8.2.11.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-11 Infiltration Basin. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Infiltration Basin Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Infiltration Basin BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.2.12 Detention/Retention Basins

Detention basins (also referred to as retention basins, stormwater quality detention basins, water quality basins or extended detention ponds) hold stormwater runoff for subsequent downstream release at a regulated rate. There are three types of detention basins:

- Wet stormwater quality detention basins (wet basins) that store a permanent pond of water;
- Dry extended stormwater quality detention basins (dry extended basins) that temporarily store stormwater runoff; and
- Combination (wet/dry) stormwater quality detention basins (combination basins) that combine the wet and dry basin treatment systems.

Maintenance is needed to assure the basins continue to operate properly.

8.2.12.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.24**.

Table 8.24 Detention/Retention Basins Recommended Inspection Activities	
Frequency	Description
At beginning and end of wet season	Inspect for needed maintenance and operational condition of inlet and outlet structures.
Throughout year	Monitor health of vegetation (if applicable)

8.2.12.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.25**.

Table 8.25 Detention/Retention Basins Recommended Maintenance Activities	
Frequency	Description
As needed during establishment period and dry periods	Irrigate plants. Control weeds.

Table 8.25 Detention/Retention Basins (continued) Recommended Maintenance Activities	
Frequency	Description
As needed	Repair and prevent erosion in basin and tributary area.
	Use IPM techniques for pest control. Coordinate with Sacramento-Yolo Mosquito and Vector Control District regarding stocking of wet ponds with mosquito fish.
Semi-annual (as needed)	Remove accumulated trash and debris.
Annually each summer (as needed)	If applicable, remove sediment that accumulates in portland cement concrete low-flow channel and harvest vegetation around perimeter of permanent ponds so mosquito fish are not impeded.
Every 3 to 5 years (or when 6 to 12 inches have accumulated)	Remove accumulated sediment litter, trash and debris.
In the event of extensive vegetation die-off	Replant bare areas. Determine cause for die-off and take corrective action.
When no longer functioning	Reconstruct or replace. Estimated control measure lifespan: 25 years or more.

8.2.12.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheet TC-20 Wet Pond. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- City of Citrus Heights, City of Elk Grove, City of Folsom, City of Galt, City of Rancho Cordova, City of Sacramento and County of Sacramento, *Sacramento Region Storm Water Quality Design Manual*, Final Draft May 2014. Water Quality Detention Basins Control Measure. Information available online at: <http://www.beriverfriendly.net/Newdevelopment/>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Wet Basin BMP. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.2.13 Water Quality Inlets

Water quality inlets (also referred to as oil/water separators, baffled vaults, vortex or hydrodynamic separators) consist of one or more chambers that promote sedimentation of coarse materials and separation of free oil from stormwater. Maintenance needs include periodic removal of oil, solids and debris to assure the inlet continues to operate at its maximum efficiency.

8.2.13.1 Inspection Activities

Recommended inspection activities are summarized in **Table 8.26**.

Table 8.26 Water Quality Inlets Recommended Inspection Activities	
Frequency	Description
Quarterly during initial wet season	Inspect for accumulated trash, debris, sediment and floating oil.
At least annually during subsequent years	Inspect for accumulated trash, debris, sediment and floating oil.

8.2.13.2 Maintenance Activities

Recommended maintenance activities are summarized in **Table 8.27**.

Table 8.27 Water Quality Inlets Recommended Maintenance Activities	
Frequency	Description
Every one to two years before wet season (as needed to maintain effectiveness)	Remove accumulated sediment litter, trash and debris and floating oil to maintain device effectiveness. Base frequency on manufacturer's recommendations.

8.2.13.3 References

- California Stormwater Quality Association, *Stormwater Best Management Practice Handbook Portal Industrial and Commercial*, September 2014. BMP Fact Sheets TC-50 Water Quality Inlet, MP-51 Gravity Separators. Information available online at: <https://www.casqa.org/resources/bmp-handbooks/industrial-commercial>
- Tahoe Regional Planning Agency. *Best Management Practices Handbook, 2012*. Baffled Vault and Hydrodynamic Separator BMPs. Available online at: <http://www.tahoebmp.org/Documents/2012%20BMP%20Handbook.pdf>.

8.3 Existing Storm Water Treatment Systems and Hydromodification Controls

Table 8-28 lists the existing treatment systems and hydromodification controls that have been installed at District facilities.

Table 8.28 Existing Treatment Systems and Hydromodification Controls

Facility Name	Facility Address	Description (year installed in parenthesis)	Responsible Operator	Comments
Arnold Adreani Elementary School	9927 Wildhawk West Drive, Sacramento, CA 95829	Vegetated Swale (2005)	District Grounds Dept.	
Carroll Elementary School	10325 Stathos Drive, Elk Grove, CA 95757	Vegetated Swale (2006)	District Grounds Dept.	
Helen Carr Castello Elementary School	9850 Fire Poppy Drive, Elk Grove, CA 95757	Vegetated Swale (2005)	District Grounds Dept.	
Elk Grove Charter School	10065 Atkins Drive, Elk Grove, CA 95757	Vegetated Swale (2010)	District Grounds Dept.	
C.W. Dillard Elementary School	9721 Dillard Road, Wilton, CA 95693	Infiltration Trench (2015)	District Grounds Dept.	
Consumnes River Elementary School	13580 Jackson Road, Sloughouse, CA 95683	Dry Extended Detention Basin (2010)	District Grounds Dept.	

Table 8.28 Existing Treatment Systems and Hydromodification Controls (continued)

Facility Name	Facility Address	Description (date installed in parenthesis)	Responsible Operator	Comments
Arlene Hein Elementary School	6820 Bellatera Drive, Elk Grove, CA 95624	Vegetated Swale (2004)	District Grounds Dept.	
		Vegetated Filter Strip (2004)		
		Disconnected Roof Drains (2004)		
Anna Kirchgater Elementary School	8141 Stevenson Avenue, Sacramento, CA 95828	Vegetated Swale (2005)	District Grounds Dept.	
James A. McKee Elementary School	8701 Halverson Drive, Elk Grove, CA 95624	Vegetated Swale (2007)	District Grounds Dept.	
Monterey Trail High School	8661 Power Inn Road, Elk Grove, CA 95624	Water Quality Inlet followed by short and steep vegetated swale (2004)	District Grounds Dept.	
		Dry Extended Detention Basin (2004)	County	County owned and maintained

Table 8.28 Existing Treatment Systems and Hydromodification Controls (continued)

Facility Name	Facility Address	Description (date installed in parenthesis)	Responsible Operator	Comments
Marion Mix Elementary School	4730 Laguna Park Drive, Elk Grove, CA 95758	Vegetated Swale (2015)	District Grounds Dept.	
Pleasant Grove High School	9531 Bond Road, Elk Grove, CA 95624	Dry Extended Detention Basin (2005)	District Grounds Dept.	Basin that overflows into ephemeral channel that is tributary to private residential area ponds and Laguna Creek
Roy Herberger Elementary School	8670 Maranello Drive, Elk Grove, CA 95624	Vegetated Swale (2004)	District Grounds Dept.	
		Vegetated Filter Strip (2004)		
		Disconnected R of Drains (2004)		
Sunrise Elementary School	11821 Cobble Brook Drive, Rancho Cordova, CA 95742	Vegetated Swale (2006)	District Grounds Dept.	
		Disconnected Roof Drains (2006)		

9.0 RECORD KEEPING

9.1 Introduction

The District is required to maintain the following documentation to show the actions taken to comply with the Small MS4 Permit Post-Construction requirements:

- Project Design Records
 - ✓ Exempt Projects. The projects (e.g. that created or replaced less than 2,500 square feet of impervious surfaces) that were exempt from the post-construction requirements;
 - ✓ Small Projects. The Site Design Measure(s) that were included in new projects that created or replaced between 2,500 and 5,000 square feet of impervious surfaces; and
 - ✓ Large Projects. The Site Design and Source Control Measures, and bioretention facilities that were included in new projects that created or replaced 5,000 square feet or more of impervious surfaces.
- O&M Records
 - ✓ An updated list of all storm water treatment systems;
 - ✓ Records showing proper O&M was provided for all treatment systems and hydromodification controls; and
 - ✓ Records showing that annual notifications were made to the Sacramento-Yolo Mosquito and Vector Control District regarding the current list of installed treatment systems and hydromodification management controls.

Procedures for compliance with requirements are addressed below.

9.2 Project Design

The following records will be maintained by the District Facilities and Planning Department:

Exempt Projects. All projects that create and/or replace less than 2,500 square feet of impervious surfaces will be listed on the Exempt Project Record form included in Appendix A. As shown therein, the completed form will include:

- Project name and description.
- The square footage of impervious area created or replaced.
- The basis for the exemption:
 - ✓ Square footage;

-
- ✓ Nature of project (e.g. interior remodel, routine maintenance (e.g. exterior wall surface replacement, roof replacement, pavement resurfacing within existing footprint, etc.); and/or
 - ✓ Facility-specific reason (e.g. sidewalks that direct runoff to adjacent vegetated areas, etc.).

Small Projects. For all projects that create and/or replace between 2,500 square feet and 5,000 square feet of impervious surfaces, the basis for compliance will be documented on the Small Project Record form included in Appendix A. As shown therein, the completed form will include:

- Project name and description;
- The square footage of impervious area created or replaced;
- The Site Design Measure(s) included in the project; and
- The estimated runoff reduction resulting from implementation of the Site Design Measure(s). In most cases, the runoff reduction can be calculated using the SWRCB SMARTS Post-Construction Calculator (or equivalent).

Large Projects. For all projects that create and/or replace more than 5,000 square feet of impervious surfaces, the measures implemented must be documented on the Large Project Record form included in Appendix A. As shown therein, the completed form must include:

- Project name and description;
- The square footage of impervious area addressed by the project. This will include the square footage of impervious area created or replaced and, in certain cases (some remodel projects and road projects), the square footage of additional adjacent areas;
- Identification of the Site Design, Permanent Source Control and bioretention facilities included in the project; and
- Confirmation that a drainage study has been submitted showing the drainage management areas contributing the runoff and containing the calculations necessary for the District to demonstrate that the Site Design Measures and/or bioretention facilities were designed in compliance with the required Numeric Sizing Criteria.

9.3 Project O&M

The following records will be maintained by the District Maintenance and Operations Department:

All Existing Treatment Systems. On an annual basis in September of each year, the District will:

- Update the list of existing treatment systems and hydromodification controls presented in Table 8.28;
- Submit the updated list to the Sacramento-Yolo Mosquito and Vector Control District. This can be accomplished by submitting an updated copy of Table 8.28 to the Mosquito and Vector Control District.

Site Inspections. On a regular basis, the District will inspect its sites.

- The inspections will include observations to verify Source Control Measures are being properly implemented and that Site Design Measures and bioretention facilities are being properly maintained; and
- The results from the observations, including comments and resulting work orders, will be documented on the Monthly Checklists provided in Appendix B.

9.4 References

- State Water Resources Control Board, *General Permit for Waste Discharge Requirements (WDRS) for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems Order No. 2013-0001-DWQ NPDES No. CAS000004*, adopted by February 5, 2013. Information available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml
- Sacramento State Office of Water Programs, *California Phase II Sizing Tool*, LID BMP Fact Sheet: Amended Swale. Information available at <http://owp-web1.saclink.csus.edu/LIDTool/Start.aspx>
- State Water Resources Control Board, *Post-Construction Calculator for Small Projects*. Information available on-line at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

APPENDIX A: PROJECT DESIGN DOCUMENTATION

Post-Construction Standards Manual
Exempt Projects Record Form
Year: _____

Project and Description	Impervious Area Created or Replaced (sq. ft)	Basis for Exemption		
		< 2,500 sq. ft of Impervious Area?	Interior Remodel or Routine Maintenance?	Excluded Sidewalk, Lane or Trail Project?

Exempt from post construction standards requirements:

- Projects that creates or replaces less than 2,500 square feet of impervious area
- Interior remodels and routine maintenance or repair (e.g. exterior wall surface replacement, roof replacement or pavement resurfacing within existing foot print
- Sidewalk, lane or trail projects: a) Sidewalks or bicycle lanes built as part of new streets or roads and built to direct storm water runoff to adjacent vegetated areas; b) Impervious trails built to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees; and (c) Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.

Post-Construction Standards Manual
Small Projects Record Form

Year: _____

Project and Description	Impervious Area Created or Replaced (sq. ft)	Site Design Measure Included in Project (see list below)	Estimated Runoff Reduction (cu ft)

Qualifying Site Design Measures: (a) Stream Setbacks and Buffers; (b) Soil Quality Improvement and Maintenance; (c) Tree Planting and Preservation; (d) Rooftop and Impervious Area Disconnection; (e) Porous Pavement; (f) Green Roofs; (g) Vegetated Swales or (h) Rain Barrels and Cisterns

Post-Construction Standards Manual
Large Projects Record Form

Year: _____

Project and Description	Impervious Area Created or Replaced (sq. ft)	Site Design Measure Included in Project (see list below)	Estimated Runoff Reduction (cu ft)

Qualifying Site Design Measures: (a) Stream Setbacks and Buffers; (b) Soil Quality Improvement and Maintenance; (c) Tree Planting and Preservation; (d) Rooftop and Impervious Area Disconnection; (e) Porous Pavement; (f) Green Roofs; (g) Vegetated Swales or (h) Rain Barrels and Cisterns

APPENDIX B: INSPECTION FORMS

Elementary Education Sites - Monthly Checklist

Please complete this form and forward the original to Risk Management once a month. (Keep a photocopy for your IIPP Records Binder.) List each item requiring correction and IDENTIFY THE AREA, BUILDING, AND ROOM IN EACH CASE, using the space provided. Indicate specific action taken in REMARKS section on page 2.

Site: _____

Date: _____
 Month Day Year

Custodian Signature _____

Principal Signature _____

		SATISFACTORY		
		YES	NO	N/A
1.	FIRE ALARMS			
	Detectors undamaged on visual inspection?			
	Bells/horns functional during last drill?			
	Date of last fire drill (required monthly):	/	/	
	Date of last Earthquake Drill (required each semester):	/	/	
	Date of last Disaster Drill (required annually):	/	/	
	Date alarm tested:	/	/	
	Zones(s) tested:			
2.	FIRE EXTINGUISHERS			
	Monthly inspection performed?			
	Extinguishers hung properly & under 5'?			
	Fully charged?			
	Pin secured?			
	Accessible?			
	Annual inspection current?			
3.	AUTOMATIC FIRE SPRINKLERS			
	Valve locked in open position?			
	18" clearance below all sprinkler heads?			
	Extra heads and wrench available?			
	Date of last inspection:	/	/	
4.	INTRUSION ALARMS			
	Operable?			
	Date alarm tested:	/	/	
	Zone(s) tested:			
5.	FIRST AID KIT			
	Approved first aid kits accessible & useable?			
	Appropriate items properly stocked?			
	Appropriate inspection seal in place?			
6.	ELECTRICAL (INTERIOR AND EXTERIOR)			
	Switch/junction boxes covered?			
	Cords, plugs, wiring, receptacles in good condition?			
	Electrical panels unobstructed? (36" clearance)			
	Electrical panel rooms locked?			
7.	LIGHTS (INTERIOR AND EXTERIOR)			
	No broken lights?			
	No light burned out?			
	Adequate lighting?			
	Diffusers in place?			

		SATISFACTORY		
		YES	NO	N/A
8.	DRINKING FOUNTAINS			
	Are drinking fountains accessible?			
	Is water pressure adequate?			
	Is the fountain free of leaks or drips?			
	Is the fountain free of mold or moss?			
	Is the water clear and tasteless?			
9.	RESTROOMS in accordance with SB 892			
	Are restrooms clean and properly maintained?			
	Are restrooms fully operational?			
	Are restrooms stocked with toilet paper, soap and paper towels or functional hand dryers?			
	Are restrooms open during school hours?			
	Are restrooms free of debris or storage items?			
10.	HOUSEKEEPING			
	Trash and garbage properly stored?			
	Trash and garbage picked up on schedule?			
	Flammable liquids stored in approved safety cans and/or metal cabinet?			
	Dumpsters away from building?			
	Dumpster lids closed and not leaking?			
	No rooms with heavy fire load?			
	No high storage?			
	Oily rags stored in proper receptacles and emptied regularly?			
11.	AUDIOVISUAL EQUIPMENT, OFFICE MACHINES, COMPUTERS – (inspect one sample room monthly)			
	Stored in designated rooms or cabinets?			
	Permanently marked?			
	Secured to stands?			
	Transporting stands safe and adequate?			
12.	WINDOWS & SKYLIGHTS			
	Latch in good repair?			
	No broken windows/skylights			
13.	PREMISES (INTERIOR AND EXTERIOR)			
	Sidewalks, walking surfaces, parking lots, steps, stairways, hallways, ramps, etc., free from slip and trip hazards limbs, or obstructions?			
	Free of safety hazards caused by trees, limbs, or roots?			
	Handrails in place and secure?			

Elementary Education Sites - Monthly Checklist

		SATISFACTORY		
		YES	NO	N/A
14.	DOORS - EXTERIOR			
	Open, close and lock properly?			
15.	FENCES/GATES			
	Good repair?			
16.	GROUNDS			
	Damaged or missing valve covers?			
	Damaged or missing steel electrical access panels?			
	Sprinkler heads damaged creating trip or fall hazards?			
	Spill and leak response materials available?			
	Materials stored indoors or beneath cover to prevent storm water contact?			
	Secondary containment used (containers 55 gallons and above)?			
	Litter picked up?			
	Equipment used outdoors not leaking?			
	Oil deposits in parking lot properly cleaned up?			
	Any evidence of on-site erosion?			
	Integrated pest management techniques being used?			
	Any evidence observed of non-storm water discharges entering the storm drainage system?			
17.	PLAYGROUND EQUIPMENT			
	Good condition?			
	Sufficient fall surfacing material?			
18.	OUTSIDE/ATHLETIC FACILITIES			
	Fields in good condition?			
	Bleachers in good condition?			
	Dugouts in good condition?			
	Basketball courts in good condition?			
	No chain nets on baskets?			
	Soccer goals safely arranged?			

		SATISFACTORY		
		YES	NO	N/A
19.	CAFETERIA, AUDITORIUM, GYNNASIUM			
	In-wall tables in good condition?			
	Do portable tables close and stay closed?			
	Benches and seats in good condition?			
	Bleachers in good condition?			
	Exit lights operating?			
	Emergency lights operating?			
	Choking posters properly posted?			
	Daily Food & Nutrition Services checklists completed?			
20.	ELEVATORS/LIFTS			
	Are elevators/lifts working properly?			
	Any unusual noises while in operation?			
	Car stops within 1/2" of landing?			
	Gate Operational?			
	Emergency stop Switch Operates?			
	Are inspections current?			
21.	LADDERS			
	In good repair?			
	Inspection Tag affixed?			
	Shock hazard warning posted on aluminum ladders?			
22.	ARSON & CRIME PREVENTION			
	"We-Tip" posters in place?			
23.	ASBESTOS			
	Asbestos-containing building materials in good condition?			
24.	MATERIAL SAFETY DATA SHEETS			
	Accessible to employees?			
	MSDS' Current & Updated?			
25.	INDOOR AIR QUALITY			
	Are HVAC registers clean on visual inspection?			
	Any signs of mold or mildew?			
26.	OTHER: Specify			

REMARKS	Work Order Submitted	YES	NO
	#		
	#		

Secondary School Sites - Monthly Checklist

Please complete this form and forward the original to Risk Management once a month. (Keep a photocopy for your IIPP Records Binder.) List each item requiring correction and IDENTIFY THE AREA, BUILDING, AND ROOM IN EACH CASE, using the space provided. Indicate specific action taken in REMARKS section on page 2.

Site: _____

Date: _____
 Month Day Year

Custodian Signature _____

Principal Signature _____

		SATISFACTORY		
		YES	NO	N/A
1.	FIRE ALARMS			
	Detectors undamaged on visual inspection?			
	Bells/horns functional during last drill?			
	Date of last fire drill (required each semester):	/	/	
	Date of last Earthquake Drill (required each semester):	/	/	
	Date of last Disaster Drill (required annually):	/	/	
	Date alarm tested:	/	/	
	Zones(s) tested:			
2.	FIRE EXTINGUISHERS			
	Monthly inspection performed?			
	Extinguishers hung properly & under 5'?			
	Fully charged?			
	Pin secured?			
	Accessible?			
	Annual inspection current?			
3.	AUTOMATIC FIRE SPRINKLERS			
	Valve locked in open position?			
	18" clearance below all sprinkler heads?			
	Extra heads and wrench available?			
	Date of last inspection:	/	/	
4.	INTRUSION ALARMS			
	Operable?			
	Date alarm tested:	/	/	
	Zone(s) tested:			
5.	FIRST AID KIT			
	Approved first aid kits accessible & useable?			
	Appropriate items properly stocked?			
	Appropriate inspection seal in place?			
6.	ELECTRICAL (INTERIOR AND EXTERIOR)			
	Switch/junction boxes covered?			
	Cords, plugs, wiring, receptacles in good condition?			
	Electrical panels unobstructed? (36" clearance)			
	Electrical panel rooms locked?			
7.	LIGHTS (INTERIOR AND EXTERIOR)			
	No broken lights?			
	No light burned out?			
	Adequate lighting?			

		SATISFACTORY		
		YES	NO	N/A
	Diffusers in place?			
7.	DRINKING FOUNTAINS			
	Are drinking fountains accessible?			
	Is water pressure adequate?			
	Is the fountain free of leaks or drips?			
	Is the fountain free of mold or moss?			
	Is the water clear and tasteless?			
8.	RESTROOMS in accordance with SB 892			
	Are restrooms clean and properly maintained?			
	Are restrooms fully operational?			
	Are restrooms stocked with toilet paper, soap and paper towels or functional hand dryers?			
	Are restrooms open during school hours?			
	Are restrooms free of debris or storage items?			
9.	HOUSEKEEPING			
	Trash and garbage properly stored?			
	Trash and garbage picked up on schedule?			
	Flammable liquids stored in approved safety cans and/or metal cabinet?			
	Dumpsters away from building?			
	Dumpsters: lids closed and not leaking?			
	No rooms with heavy fire load?			
	No high storage?			
	Oily rags stored in proper receptacles and emptied regularly?			
	Outdoor work areas clean?			
10.	AUDIOVISUAL EQUIPMENT, OFFICE MACHINES, COMPUTERS - (inspect one sample room monthly)			
	Stored in designated rooms or cabinets?			
	Permanently marked?			
	Secured to stands?			
	Transporting stands safe and adequate?			
11.	WINDOWS & SKYLIGHTS			
	Latch in good repair?			
	No broken windows/skylights			
12.	PREMISES (INTERIOR AND EXTERIOR)			
	Sidewalks, walking surfaces, parking lots, steps, stairways, hallways, ramps, etc., free from slip and trip hazards limbs, or obstructions?			
	Free of safety hazards caused by trees, limbs, or roots?			
	Handrails in place and secure?			

Secondary School Sites - Monthly Checklist

SATISFACTORY			
YES NO N/A			
13.	DOORS - EXTERIOR		
	Open, close and lock properly?		
14.	FENCES/GATES		
	Good repair?		
15.	GROUNDS		
	Damaged or missing valve covers?		
	Damaged or missing steel electrical access panels?		
	Evidence of excessive irrigation or system break?		
	Sprinkler heads damaged creating trip or fall hazards?		
	Spill and leak response materials available?		
	Spills and leaks (e.g. in parking lot) properly cleaned up?		
	Materials stored indoors or beneath cover to prevent storm water contact?		
	Liquid containers 55-gal and above - secondary containment effective?		
	Equipment used outdoors checked for leaks?		
	Erosion repairs required?		
	Integrated pest management techniques being used?		
	Evidence of non-storm water discharges entering the storm drainage system?		
	Litter collected?		
	Catch basins clean?		
	Storm water BMPs inspected?		
	Storm water BMPs require maintenance?		
16.	OUTSIDE/ATHLETIC FACILITIES		
	Fields in good condition?		
	Bleachers in good condition?		
	Dugouts in good condition?		
	Basketball courts in good condition?		
	No chain nets on baskets?		
	Soccer goals safely arranged?		
17.	CAFETERIA, AUDITORIUM, GYNNASIUM		
	In-wall tables in good condition?		
	Do portable tables close and stay closed?		
	Benches and seats in good condition?		
	Bleachers in good condition?		

Exit lights operating?			
SATISFACTORY			
YES NO N/A			
CAFETERIA, AUDITORIUM, GYNNASIUM (continued)			
	Emergency lights operating?		
	Choking posters properly posted?		
	Daily Food & Nutrition Services checklists completed?		
18.	ELEVATORS/LIFTS		
	Are elevators/lifts working properly?		
	Any unusual noises while in operation?		
	Car stops within 1/2" of landing?		
	Gate Operational?		
	Emergency stop Switch Operates?		
	Are inspections current?		
	Is emergency radio or phone contact available?		
19.	LADDERS		
	In good repair?		
	Inspection Tag affixed?		
	Shock hazard warning posted on aluminum ladders?		
20.	ARSON & CRIME PREVENTION		
	"We-Tip" posters in place?		
21.	ASBESTOS		
	Asbestos-containing building materials in good condition?		
22.	MATERIAL SAFETY DATA SHEETS		
	Accessible to employees?		
	MSDS' Current & Updated?		
23.	INDOOR AIR QUALITY		
	Are HVAC registers clean on visual inspection?		
	Any signs of mold or mildew?		
24.	OTHER: Specify		

REMARKS	Work Order Submitted	YES	NO
	#		
	#		
	#		

Support Sites - Monthly Checklist

Please complete this form and forward the original to Risk Management once a month. (Keep a photocopy for your IIPP Records Binder.) List each item requiring correction and IDENTIFY THE AREA, BUILDING, AND ROOM IN EACH CASE, using the space provided. Indicate specific action taken in REMARKS section on page 2.

Site: _____

Date: _____
 Month Day Year

Inspector Signature _____

Site Supervisor/Lead Custodian Signature _____

		SATISFACTORY		
		YES	NO	N/A
1.	FIRE ALARMS			
	Detectors undamaged on visual inspection?			
	Bells/horns functional during last drill?			
	Date of last fire drill (required annually):	/	/	
	Date of last Earthquake Drill (required annually):	/	/	
	Date of last Disaster Drill (required annually):	/	/	
	Date alarm tested:	/	/	
	Zones(s) tested:			
2.	FIRE EXTINGUISHERS			
	Monthly inspection performed?			
	Extinguishers hung properly & under 5'?			
	Fully charged?			
	Pin secured?			
	Accessible?			
	Annual inspection current?			
3.	AUTOMATIC FIRE SPRINKLERS			
	Valve locked in open position?			
	18" clearance below all sprinkler heads?			
	Extra heads and wrench available?			
	Date of last inspection:	/	/	
4.	INTRUSION ALARMS			
	Operable?			
	Date alarm tested:	/	/	
	Zone(s) tested:			
5.	FIRST AID KIT			
	Approved first aid kits accessible & useable?			
	Appropriate items properly stocked?			
	Appropriate inspection seal in place?			
6.	ELECTRICAL (INTERIOR AND EXTERIOR)			
	Switch/junction boxes covered?			
	Cords, plugs, wiring, receptacles in good condition?			
	Electrical panels unobstructed? (36" clearance)			
	Electrical panel rooms locked?			
7.	LIGHTS (INTERIOR AND EXTERIOR)			
	No broken lights?			
	No light burned out?			
	Adequate lighting?			
	Diffusers in place?			

		SATISFACTORY		
		YES	NO	N/A
8.	DRINKING FOUNTAINS			
	Are drinking fountains accessible?			
	Is water pressure adequate?			
	Is the fountain free of leaks or drips?			
	Is the fountain free of mold or moss?			
	Is the water clear and tasteless?			
9.	RESTROOMS in accordance with SB 892			
	Are restrooms clean and properly maintained?			
	Are restrooms fully operational?			
	Are restrooms stocked with toilet paper, soap and paper towels or functional hand dryers?			
	Are restrooms open during school hours?			
	Are restrooms free of debris or storage items?			
10.	HOUSEKEEPING			
	Trash and garbage properly stored?			
	Trash and garbage picked up on schedule?			
	Flammable liquids stored in approved safety cans and/or metal cabinet?			
	Dumpsters away from building?			
	Dumpsters: lids closed and not leaking?			
	No rooms with heavy fire load?			
	No high storage?			
	Oily rags stored in proper receptacles and emptied regularly?			
	Outdoor work areas clean?			
11.	AUDIOVISUAL EQUIPMENT, OFFICE MACHINES, COMPUTERS - (inspect one sample office area monthly)			
	Stored in designated rooms or cabinets?			
	Permanently marked?			
	Secured to stands?			
	Transporting stands safe and adequate?			
12.	WINDOWS & SKYLIGHTS			
	Latch in good repair?			
	No broken windows/skylights			
13.	PREMISES (INTERIOR AND EXTERIOR)			
	Sidewalks, walking surfaces, parking lots, steps, stairways, hallways, ramps, etc., free from slip and trip hazards limbs, or obstructions?			
	Free of safety hazards caused by trees, limbs, or roots?			
	Handrails in place and secure?			

Support Sites - Monthly Checklist

		SATISFACTORY		
		YES	NO	N/A
14.	DOORS-EXTERIOR			
	Open, close and lock properly?			
15.	SHOP AREAS/MACHINERY/EQUIPMENT/POWER TOOLS (District Shop Areas)			
	Moving parts guarded?			
	Equipment properly grounded or double-insulated?			
	Tools in good condition?			
	Cords in good condition?			
	Housekeeping in shop area okay?			
	Personal protective equipment available and in good condition?			
	Materials stored indoors or beneath cover to prevent storm water contact?			
	Spill and leak response materials available?			
	Liquid containers 55-gal and above - secondary containment effective?			
16.	Grounds			
	Damaged or missing valve covers?			
	Damaged or missing steel electrical access panels?			
	Evidence of excessive irrigation or system break?			
	Sprinkler heads damaged creating trip or fall hazards?			
	Equipment used outdoors checked for leaks?			
	Spill and leak response materials available?			
	Spills and leaks (e.g. in parking lot) properly cleaned up?			
	Erosion repairs required?			
	Integrated pest management techniques being used?			
	Evidence of non-storm water discharges entering the storm drainage system?			
	Litter collected?			
	Catch basins clean?			
	Storm water BMPs inspected?			
	Storm water BMPs require maintenance?			

		SATISFACTORY		
		YES	NO	N/A
17.	ELEVATORS/LIFTS			
	Are elevators/lifts working properly?			
	Any unusual noises while in operation?			
	Car stops within 1/2" of landing?			
	Gate Operational?			
	Emergency stop Switch Operates?			
	Are inspections current?			
18.	LADDERS			
	In good repair?			
	Inspection Tag affixed?			
	Shock hazard warning posted on aluminum ladders?			
19.	ARSON & CRIME PREVENTION			
	"We-Tip" posters in place?			
20.	ASBESTOS			
	Asbestos-containing building materials in good condition?			
21.	MATERIAL SAFETY DATA SHEETS			
	Accessible to employees?			
	MSDS' Current & Updated?			
22.	INDOOR AIR QUALITY			
	Are HVAC registers clean on visual inspection?			
	Any signs of mold or mildew?			
23.	OTHER: Specify			

REMARKS	Work Order Submitted	YES	NO
	#		
	#		
	#		