OPERATIONS & MAINTENANCE ACTIVITY GUIDANCE MANUAL

MS4 PERMITTING PROGRAM COMPLIANCE AND IMPLEMENTATION

METROPOLITAN TRANSIT SYSTEM

FINAL

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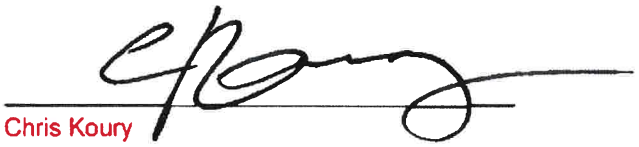

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ACKNOWLEDGEMENT FORM

I _____(full name of MTS employee or contractor)

hereby confirm that I have read the Operations and Maintenance Activity Guidance Manual and understand the procedures and actions expected of me when conducting Operations and Maintenance (O&M) activities as an employee/contractor of Metropolitan Transit System.

I further acknowledge that, where necessary, I have received training on and understand the elements of the MTS storm water pollution prevention program provided by MTS as part of its' Pollution Prevention/Good Housekeeping training program. The training consisted of implementing source control, maintenance facility and field source control best management practices when conducting O&M activities. The training included information on appropriate storm water BMPs to use during O&M activities conducted at MTS owned facilities by MTS employees and contractors.

I confirm that as a MTS employee/contractor, I shall comply with all of MTS' storm water best management practices (BMPs), good housekeeping practices, and standard operating procedures while performing O&M activities at MTS facilities and/or within their right of way.

_____

Employee/Contractor (signature)

_____

Date

_____

Employee ID No./Contract No.

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APPENDICES

1 INTRODUCTION

This Operations and Maintenance Activities Guidance Manual (Manual) is developed to provide information and guidance to the employees of the Metropolitan Transit Service (MTS) and their vendors. The information provided in this Manual is for guidance purposes only. Although the information is intended to be current, due to the variety of services, programs and projects, the guidance may not reflect current, actual conditions and could possibly be subject to change. The purpose of the guidance described herein is to assist MTS personnel and their vendors in complying with the National Pollutant Discharge and Elimination System (NPDES) permit issued by the State Water Resources Control Board and the San Diego Regional Water Quality Control Board. It is MTS' goal to reduce stormwater pollution to the maximum extent practicable through the implementation of the Best Management Practices (BMPs) referenced in this Manual.

1.1 PURPOSE AND SCOPE

MTS has developed this Manual as a handbook for the protection of water resources. This Manual provides detailed operational procedures on applying a BMP to an operational or maintenance (O&M) activity at a maintenance facility, MTS-owned property, offsite at a transit station or bus shelter, or within the right-of-way. For each O&M activity, the implementation of multiple BMPs may be required. Because it may not be efficient to review all the potentially applicable BMPs for each O&M activity, the Maintenance Fact Sheets have been organized according to the three categories listed below:

- Source Control Measures
- Field Program Source Control Measures
- Storm Drain Maintenance Measures

Each Maintenance Fact Sheet summarizes the purpose of the O&M activity, the pollutants of concern that may be encountered during the activity, detailed operational procedures related to inspection and maintenance along with training guidance. The intent of this Manual is to assist the user in understanding the water quality concerns that need to be considered when implementing O&M activities. The purpose of applying Maintenance BMPs is to implement water quality controls that will minimize pollutant discharges during O&M activities. For example, pollutants of concern associated with graffiti removal at a transit station are summarized in Table 1-1.

Table 1-1. Graffiti Removal and Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Painting over graffiti	Paint	Heavy metals, organic compounds
Fuel for mechanical equipment	Fuel	Total petroleum hydrocarbons, diesel range organics
Leaking maintenance vehicles	Vehicle Fluids	Oil and grease
Water associated with cleaning products	Non-stormwater	Chlorine, phosphate, VOCs, SVOCs
Graffiti removal products	Acids, bleaches, detergents, solvents, paint strippers	Chlorine, phosphate, VOCs, SVOCs, acetic acid, nitric acid
Mixing paint	Paint Thinner/Mineral Spirits	Organic compounds, sulfuric compounds

Potential impacts to water quality can be minimized by adhering to the operational procedures provided in the Maintenance Fact Sheet. O&M activities along with Maintenance BMPs would be applied by both MTS employees and vendors. All the Maintenance BMPs implemented would be consistent with the guidelines presented in the Maintenance Fact Sheets provided in the appendices. Table 1-2 displays typical MTS O&M activities along with some of the Maintenance BMPs that would be implemented.

Table 1-2. Maintenance BMPs

Maintenance Activity	BMP No.	Maintenance BMP
Catch Basin Maintenance	SDM-2 SDM-1 SDM-3	Storm Drain and Catch Basin Maintenance Drainage System Maintenance Storm Drain Inlet Protection
Landscaping	FSC-2 SC-3 SC-9	Grounds Maintenance and Landscaping Non-Stormwater Discharges Safer Alternative Products
Graffiti Removal	FSC-1 SC-9 SDM-3	Graffiti and Paint Removal Safer Alternative Products Storm Drain Inlet Protection

MTS employees or their contactors also inspect and maintain stormwater treatment measures referenced in the Post Construction Stormwater Management Manual (WSP, 2020). The objective of stormwater treatment measure maintenance is to ensure that a BMP functions as designed over its useful life. If stormwater treatment measures are maintained, their performance generally does not decline with age, assuming their original physical dimensions and influent quality remain constant. The potential, however, does exist for poorly maintained treatment measures to bypass influent, or in extreme cases, contribute pollutant load to the effluent. For example, a detention basin that has an excessive amount of accumulated sediment may bypass a portion of the influent due to lack of storage volume, and in an extreme case, contribute sediment to the effluent due to the creation of a high-energy environment in the sedimentation area from lack of storage volume. Overall, lack of, or deferred maintenance of treatment measures will negatively affect the effluent water quality from the stormwater treatment measure. To ensure continued effectiveness of stormwater treatment measures, this Manual provides guidance on the inspection and maintenance requirements associated with MTS-approved stormwater treatment measures. This information is provided in Section 2.4.

2 BEST MANAGEMENT PRACTICES

2.1 SOURCE CONTROL

Source Control BMPs are measures that can be implemented to avoid water quality impacts by managing pollutants at their source. Source control measures apply to both stormwater and non-stormwater discharges. Non-stormwater discharges are discharges of any substance (e.g., excess irrigation, leaks and drainage from trash dumpsters, cooling water and process wastewater) that is not comprised entirely of stormwater runoff. Any stormwater runoff that is mixed or comingled with non-stormwater flow is considered non-stormwater.

MTS has identified potential sources that require source control measures that must be implemented to the extent technically feasible to mitigate pollutant mobilization in stormwater and non-stormwater runoff from MTS facilities. These sources and measures are summarized in Table 2-1. Implementation of these BMPs would reduce or eliminate pollutants in stormwater runoff at their source through runoff reduction and by keeping pollutants and stormwater segregated. Some of the source control measures that are particularly important for MTS maintenance facilities and stations include the measures listed in Table 2-1. Source Control BMP fact sheets are provided in Appendix A.

Table 2-1. Source Control BMPs

BMP No.	BMP Name
SC-1	Housekeeping Practices
SC-2	Near-Water Activities
SC-3	Non-Stormwater Discharges
SC-4	Outdoor Loading and Unloading
SC-5	Outdoor Storage
SC-6	Outdoor Vehicle and Equipment Cleaning
SC-7	Outdoor Vehicle and Equipment Maintenance
SC-8	Parking and Storage Area Maintenance
SC-9	Safer Alternative Products
SC-10	Spill Prevention and Response
SC-11	Vehicle and Equipment Fueling
SC-12	Waste Handling and Disposal

2.2 FIELD PROGRAM SOURCE CONTROL

Field Program Source Control BMPs are measures that focus on water quality strategies that will be applied at offsite facilities such as bus rapid transit stations, bus shelters and trolley stations. Field Program BMPs are practices that can be implemented to avoid water quality impacts by managing pollutants at their source. The Field Program Source control measures that apply to both stormwater and non-stormwater discharges are listed in Table 2-2. Detailed fact sheets for each Field Program Source Control BMP are provided in Appendix B.

Table 2-2. Field Source Control BMPs

BMP No.	BMP Name
FSC-1	Graffiti and Paint Removal
FSC-2	Grounds Maintenance and Landscaping[1]
FSC-3	Painting
FSC-4	Pressure Washing
FSC-5	Sanitary Septic Waste Management
FSC-6	Surface Repair
FSC-7	Vegetation Control/Mowing

2.3 STORM DRAIN MAINTENANCE

In addition to Source Control and Field Program Source Control BMPs, three BMPs were developed to address the storm drain system. These BMPs have been termed Storm Drain Maintenance BMPs in this Manual and include catch basin maintenance, dewatering procedures along with storm drain inlet protection which is likely required during all O&M activities such as painting, landscaping and pressure washing. Storm Drain Maintenance BMPs are listed in Table 2-3 and the fact sheets are provided in Appendix C.

Table 2-3. Storm Drain Maintenance BMPs

BMP No.	BMP Name
SDM-1	Drainage System Maintenance
SDM-2	Storm Drain and Catch Basin Maintenance
SDM-3	Storm Drain Inlet Protection

2.4 STORMWATER TREATMENT MEASURES

Stormwater treatment measures are BMPs that improve water quality. Table 2-4 displays the stormwater treatment measures that MTS has approved. BMP Design fact sheets for these treatment measures are provided in the Post Construction Storm Water Management Manual (WSP, 2020). These stormwater treatment measures are implemented to minimize the long-term potential impacts associated with new development and redevelopment. The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of stormwater treatment measures. Stormwater treatment measures must be periodically inspected to ensure that they function as designed. The inspection will determine the appropriate maintenance that is required for the facility. In some cases, the maintenance responsibility may be assigned to vendors or contractors through special agreements.

[1] Landscaping activities and associated MTS guidelines for the use of chemicals and safer alternative products for pest management and vegetation control are provided in the Landscape Design and Maintenance Plan (WSP 2019).

Table 2-4. Stormwater Treatment Measures

BMP No.	BMP Name
INF-2	Bioretention
Proprietary*	Drain Inlet Insert
FT-4	Extended Detention Basin
Proprietary*	Gravity Separators
INF-1	Infiltration Basin/ Infiltration Trench/Dry Well
FT-2 /FT-3	Media/Sand Filter
SD-5	Sidewalk Planter/Flow-Through Planter
Proprietary*	Stormwater Filter
SD-1	Tree-Well Filter/Tree Wells
PR-1	Vegetated Buffer/Filter Strip
BF-1	Vegetated Swale

*Check with manufacturer for inspection and maintenance specifications for proprietary devices

2.4.1 INSPECTING STORMWATER TREATMENT MEASURES

All stormwater treatment measures are required to be inspected by a qualified individual at a minimum of once per year. In addition, all BMPs should be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the increased runoff. The stormwater treatment measures inspection form provides a record of the BMP inspection. Inspection forms for each BMP are provided in Appendix D.

2.4.2 MAINTAINING STORMWATER TREATMENT MEASURES

Stormwater treatment measures must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained. Required maintenance for stormwater treatment measures are separated into two broad categories of work: 1) Normal Expected Maintenance and 2) Non-Standard Maintenance of BMP Failure. Appendix D provides BMP Maintenance Fact Sheets for non-proprietary stormwater treatment measures. These Fact Sheets were developed for the San Diego County[2] Project Clean Water Program and are applicable to the MTS-approved stormwater treatment measures. Each fact sheet provides details regarding the two categories of work that should be anticipated for each BMP. The inspection forms in Appendix D also allow documentation of the maintenance performed at each BMP. Maintenance forms shall be completed by either the MTS employee or vendor completing the required maintenance items.

[2] http://www.projectcleanwater.org/

BIBLIOGRAPHY

- WSP. 2019. Landscape Design and Maintenance Plan. April 2019.
- WSP. 2020. Post Construction Stormwater Management Manual. January 2020.

APPENDIX

A SOURCE CONTROL MEASURES

SC-1
HOUSEKEEPING PRACTICES

Purpose

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, and automotive products.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Waste handling and storage	Trash	Bacteria, plastics, sediment, heavy metals, organic compounds, solids
Landscaping	Fertilizers – organic	Nitrate
	Fertilizers – inorganic	Nitrate, Phosphate
	Natural Earth (Sand, Gravel and Topsoil)	Turbidity, Sediment
	Lime	Alkalinity, pH
	Aluminum Sulfate	Total Dissolved Solids
	Sulfur-Elemental	Sulfate
	Soil Amendments	BOD, COD, Sulfate, Total Organic Carbon, Calcium, Sulfate
Chemical, hazardous, and automotive liquids handling and storage	Pesticides and Herbicides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Oil	Oils and greases
	Fuel	Hydrocarbons
	Cleaning supplies, degreasers	Organic compounds, antimicrobials, endocrine disruptors
	Paints and Coatings	Organic compounds

Application

Implementing precautions learned from the related BMP fact sheets to the everyday handling of materials and operations and maintenance activities will prevent and reduce contamination of stormwater.

Operational Procedures

General Operations & Maintenance

- Purchase only the amount of material necessary for the foreseeable future to minimize inventories therefore reducing risk of leaks and spills. In most cases this will result in cost savings in both purchasing and disposal. See SC-9 Safer Alternative Products fact sheet for additional information.
- Stay current with new products that are as effective with less environmental risk for less or the equivalent cost. Total cost must be used here including purchase price, transportation costs, storage costs, use related costs, cleanup costs and disposal costs.
- Keep work sites clean and orderly. Remove debris in a timely fashion and sweep areas consistently.
- Dispose of wash water, sweepings, and sediments, properly.
- Recycle or dispose of fluids properly.
- Establish a daily checklist of office, yard, hazardous material storage areas, and maintenance areas to confirm cleanliness and adherence to proper storage and security. Specific employees should be assigned specific inspection responsibilities and given the authority to remedy any problems found.
- Post waste disposal charts in appropriate locations detailing for each waste its hazardous nature (poison, corrosive, flammable), prohibitions on its disposal (dumpster, drain, sewer) and the recommended disposal method (recycle, sewer, burn, storage, landfill).
- Summarize the chosen BMPs applicable to your operation and post them in appropriate and conspicuous places.
- Follow the Facility Warehouse procedures regarding hazardous material use. This includes:
  - Signed checklists from every user of any hazardous material detailing amount taken, used, returned, and disposed;
  - 'Before audits of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating;
  - Documentation of records detailing water, air, soil, and solid waste quantities, qualities, and their disposition; and
  - Maintenance of the mass balance of incoming, outgoing, and on hand materials to determine unknown losses that need to be tracked down and accounted for.
- Use and reward employee suggestions related to BMPs, hazards, pollution reduction, work place safety, cost reduction, alternative materials and procedures, recycling and disposal.
- Have and review regularly, a contingency plan for spills, leaks, weather extremes, natural or manmade disasters, etc. Ensure all employees are aware of the plan and their specific role.
- Train all employees, including management, office, yard, and field in BMPs and stormwater pollution prevention and make them accountable.

SC-2
NEAR-WATER ACTIVITIES

Purpose

Near-water activities occur on roads, platforms, and terminals near rivers, lagoons, estuaries, and creeks. Given the proximity to natural waterways, near-water activities have a high risk of discharging pollutants directly to the environment.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Concrete channel maintenance	Heavy equipment fuel and fluids; Mobilization of sediment	Oil and grease Diesel range organics or total petroleum hydrocarbons
Power washing	Non-stormwater	Chlorine
Sand blasting	Dust	Particulate matter
Waste handling and storage	Trash	Bacteria, plastics, sediment, heavy metals, organic compounds, solids
Chemical, hazardous, and automotive liquids handling and storage	Pesticides Fertilizers Oil Fuel Cleaning supplies, degreasers Paints, coatings, thinners	Organic compounds Nitrates, phosphates Oils and greases Hydrocarbons Organic compounds, antimicrobials, endocrine disruptors Organic compounds, heavy metals, sulfuric compounds
Sweeping and handling of debris, litter and sediment	Trash, debris and sediment	Plastics, suspended solids, organic matter, heavy metals

Application

Minimizing near-water maintenance, keeping wastes contained within the working area, cleaning up spills and wastes immediately, and training employees about the specific risk prevents and reduces the discharge of pollutants from near-water activities. The procedures outlined in this fact sheet are extra safety measures in addition to the other BMP fact sheets that pertain to the specific Operations and Maintenance (O&M) activity.

Operational Procedures

General O&M

- Refer to the 'Storm Drain Inlet Protection' fact sheet for further BMPs to protect the stormwater drainage system.
- Perform all near-water activities in dry weather, with no rain in the forecast.
- Switch to non-toxic Safer Alternative Products for O&M when possible.
- Choose recyclable and biodegradable cleaning agents.
- Handle chemicals and materials in an area temporarily designed to contain spills and leaks if one were to occur, and select a work area that is the furthest away as possible from the watercourse.
- Ensure all employees performing O&M activities near-water are fully trained in the extra precautions to take to prevent pollution.
- Dry sweep prior to and following O&M activities.
- Provide regular training to employees and contractors regarding stormwater BMPs for near-water activities.
- Refer to SC-10 Spill Prevention and Response fact sheet for guidance regarding any leaks or spills, and the immediate clean-up of leaks and spills.

Cleaning, Power Washing, and Painting

- In addition to guidance provided in the 'Paint Removal', 'Graffiti Removal', 'Painting', and 'Pressure Washing' fact sheets, shelter any blasting, power washing, and spray painting activities by hanging wind blocking tarps to prevent sand blasting dust and overspray from escaping.
- Use secondary containment on paint cans and cleaning materials.
- Paint mixing should occur in a contained area that can hold the full volume of mixed paint if a spill were to occur.
- Vacuuming loose paint chips and paint dust as they are produced helps prevent paint and other chemical substances from entering waters.
- Properly dispose of surface chips, used blasting sand, residual paints, and other materials. Use temporary storage that is not exposed to rain or run-on.
- Select nontoxic Safer Alternative Products for cleaning that do not harm the environment.

SC-3
NON-STORMWATER DISCHARGES

Purpose

Any flow entering the storm drain conveyance system that does not entirely consist of stormwater is considered a non-stormwater discharge. The two sources of non-stormwater discharges are fixed facilities owned and/or operated by MTS or contracted operator, and public discharges discovered during normal field program operations. Some non-stormwater discharges are permitted, however, other non-stormwater discharges contaminated with pollutants that pose environmental concerns. These discharges originate from: illegal dumping, internal floor drains, industrial activities, sinks, and toilets illegally connected to nearby drains as referenced in the MTS Illicit Discharge Detection and Elimination (IDDE) Plan (WSP, 2019).

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Waste handling and storage	Trash	Bacteria, plastics, sediment, heavy metals, organic compounds, solids
Chemical, hazardous, and automotive liquids handling and storage	Pesticides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Oil	Oils and greases
	Fuel	Hydrocarbons
	Cleaning supplies, degreasers	Organic compounds, antimicrobials, endocrine disruptors
	Paints, coatings, thinners	Organic compounds, heavy metals, sulfuric compounds
Illicit Connection/Illegal Discharge	Source specific: wastewater, chemical spill, industrial process water, etc.	Bacteria, VOCs, SVOCs, chlorine, etc.
Chemical applications	Fertilizers	Nitrates, phosphates
	Pesticides and Herbicides	Organic compounds
Unstable earth from dying or damaged vegetation	Soil from erosion and runoff	Sediment, particulate matter, turbidity
Irrigation of landscaped areas	Soil from runoff	Sediment, particulate matter, turbidity
	Fertilizers	Nitrates, phosphates
	Pesticides and Herbicides	Organic compounds
Fueling equipment	Petroleum products	Organic compounds
		Oils and grease

Washing equipment	Soil Fertilizers Pesticides Vegetation Clippings Cleaning products	Sediment, suspended solids Nitrates, phosphates Organic compounds Nitrates, phosphates, invasive species Chlorine, acids, phosphate, VOCs, SVOCs
Painting activities	Paint, thinners, mineral spirits	Heavy metals, organic compounds, sulfuric compounds

Application

Prevention of non-stormwater discharges by MTS is achieved through implementation of the operational procedures described in the BMP fact sheets and the procedures outlined within this document. In addition, MTS employees in the field will be trained to identify non-stormwater discharges or areas that a future discharge may occur and report to the appropriate authority.

Operational Procedures

MTS Facility

- Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Stencil storm drains with messages such as "Dump No Waste Drains to Stream".
- Discourage dumping with beautification, lighting, and barriers in problem areas.
- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Clean up spill on paved surfaces with dry methods whenever possible, or minimal water usage. Use rags for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous or unknown, then the used cleanup materials are also hazardous and must be disposed of as hazardous waste.
- See the Spill Prevention and Response fact sheet (SC-10) for further guidance regarding large spills, hazardous spills, and proper reporting and disposal.
- When illicit connections are suspected, follow the Illicit Discharge Detection Process diagram at the end of this document regarding sampling, testing, and reporting.
  - Level I sampling and testing (pH, temperature, ammonia and flow; analyze "as built" piping schematics, notes, and photos) to be completed by MTS employees.
  - Level II sampling and testing (smoke testing, lab analysis, video inspection, dye testing) to be completed by the relevant third party as directed by a manager or the Environmental Health Specialist.

Field Operations

- Develop clear protocols and lines of communication for effectively prohibiting and reporting non-stormwater discharges, especially those not classified as hazardous, which are often not reported and/or responded to as effectively as necessary.
- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs
- During routine field program O&M activities, staff should look for evidence of illegal discharges or illicit connection:
  - Is there evidence of spills (i.e. paint, discoloration, foam, oil/rainbow sheen, etc.)?
  - Are there any odors associated with the drainage system?
  - Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.

Reporting

- A database is useful for defining and tracking the magnitude and location of the problem.
- Report prohibited non-stormwater discharges observed during daily activities so they can be investigated, contained, and cleaned up or eliminated.
- Document that non-stormwater discharges have been eliminated through observations of onsite drainage points.
- Maintain documentation of illicit connection and illegal dumping incidents, including repetitive but normally exempt discharges that are not properly managed.

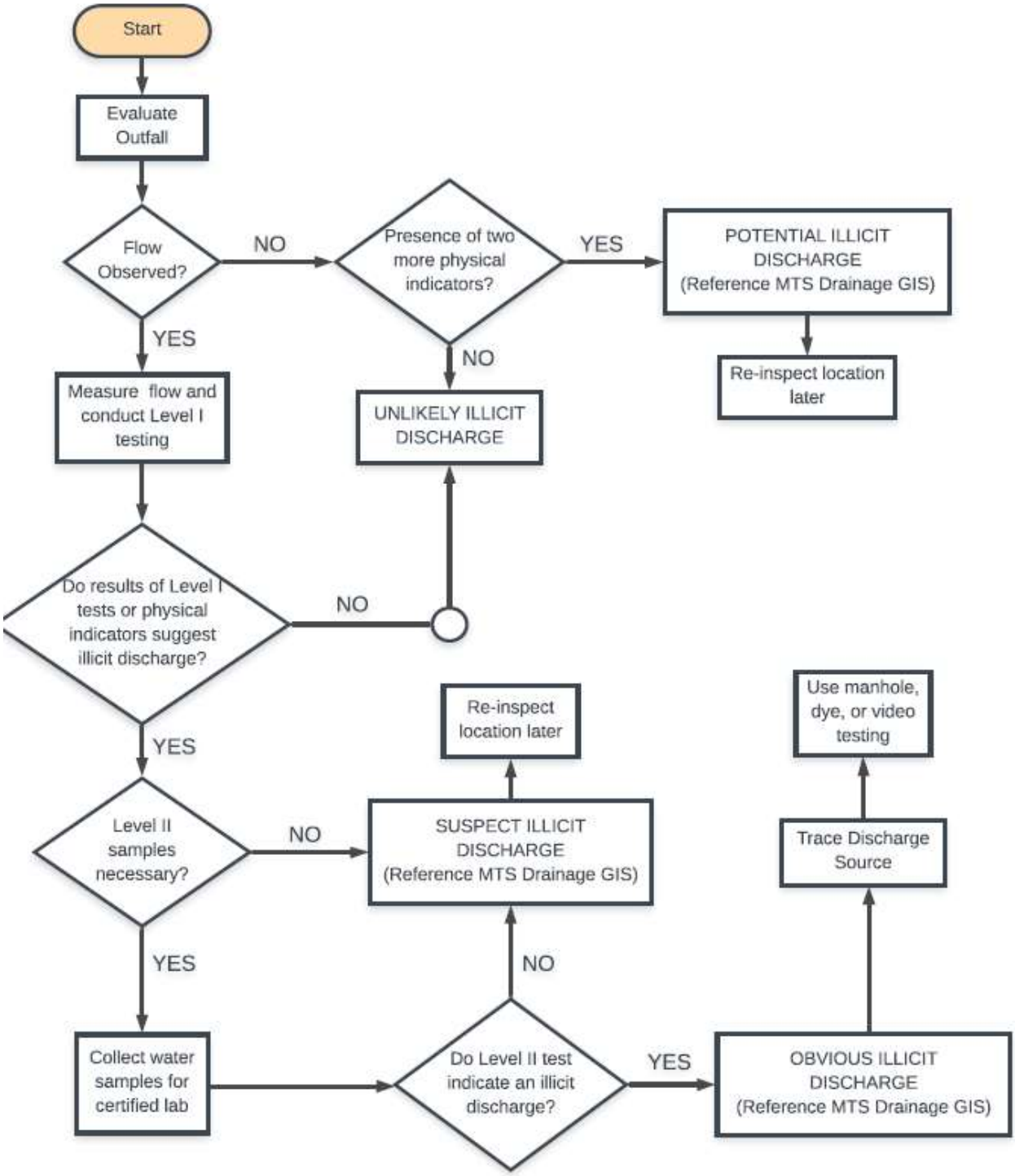
Education and Enforcement

- When an illicit discharge is identified:
  - Educate the responsible party on the impacts of their actions regarding polluting the environment and potentially causing blockages or damages to the system.
  - Explain what is considered stormwater, and is an allowable discharge to the stormwater drainage system.
  - Provide information regarding Best Management Practices as appropriate.
  - Initiate follow-up and/or enforcement procedures
- If an illegal discharge is traced to a commercial or industrial activity, coordinate information on the discharge to the Environmental Health & Safety Specialist.

Training

- Train staff to identify, document, and report illegal dumping and non-stormwater discharge incidents.
- Employees should have a thorough understanding of this document, the Illicit Discharge Detection Process diagram (see diagram on page 4), and other MTS fact sheets.
- The Spill Prevention and Response Plan should be familiar to all employees.
- Train employees in Level 1 sampling and testing procedures.
- Ensure all staff know who to contact when a non-stormwater discharge is identified.
- Educate the identified responsible party on the impacts of their actions.

Illicit Discharge Detection Process



SC-4
OUTDOOR LOADING & UNLOADING

Purpose

When loading, and unloading of materials takes place outside on docks, materials may be spilled, leaked or lost in the soil or on other surfaces with the potential of transporting with stormwater runoff or cleaning water to storm drains. Rainfall may also wash pollutants from machinery used to unload or move materials.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Spills and leaks from chemical and hazardous material loading, unloading, and pumping	Pesticides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Oil	Oils and greases
	Fuel	Hydrocarbons
	Cleaning supplies, degreasers	Organic compounds, biocides, endocrine disruptors
	Paints, coatings, thinners	Organic compounds, heavy metals, sulfuric compounds
Sweeping and handling of litter/sediment	Trash and sediment	Plastics, suspended solids, organic matter, heavy metals

Application

The following procedures are used where loading and unloading of materials occurs. Implementing these procedures will minimize the risk of loading/unloading activities polluting stormwater runoff and discharging into the stormwater drainage system and watercourses.

Operational Procedures

- Protect drain inlets and watercourses from potential spills (see Storm Drain Inlet Protection fact sheet) and when flooded water is pumped, convey to a landscaped area.
- Park, unload, and load delivery vehicles only in designated and covered areas.
- Prevent stormwater run-on to loading docks with proper grading, berming, and by directing runoff from roof downspouts away from the designated loading/unloading areas.
- Pave loading and unloading areas with concrete instead of asphalt.
- Grade and/or berm the loading and unloading areas to a drain connected to a dead-end sump.
- Do not conduct loading and unloading during wet weather, whenever possible.
- Tarps and similar control measures should be used to prevent spills or material drift from being deposited into storm water drainage system or watercourses.
- Use drip pans underneath hose and pipe connections during fluid transfer operations including making and breaking connections. Store drip pans in a covered location away from precipitation, and clean periodically while disposing of waste properly.

- Regularly check machinery used to load and unload materials for leaks; including valves, pumps, flanges, and connections.
- Regularly dry-sweep and/or vacuum areas to minimize pollutant discharge.
- Refer to SC-10 Spill Prevention and Response fact sheet for control and cleanup of spills, and always have a trained employee present during unloading and loading operations.
- Solid waste should be collected by vacuum or sweeping and secured in an appropriate container and reused, recycled or disposed of properly.
- Water used for cleaning and decontamination shall not be allowed to enter the storm water drainage system or watercourses.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.

SC-5
OUTDOOR STORAGE

Purpose

Raw materials, by-products, finished products, containers, and material storage areas exposed to rain, run-on, and runoff can pollute stormwater. Improper storage can result in accidental spills and leaks, that can accumulate in soils or on surfaces to then be carried away by rainfall runoff into the stormwater drainage system.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Waste storage	Trash	Bacteria, plastics, sediment, heavy metals, organic compounds, solids
Chemical, hazardous, and automotive liquids storage	Pesticides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Oil	Oils and greases
	Fuel	Hydrocarbons
	Cleaning supplies, degreasers	Organic compounds, antimicrobials, endocrine disruptors
	Paints, coatings, thinners	Organic compounds, heavy metals, sulfuric compounds
Sweeping and handling of litter/sediment	Trash and sediment	Plastics, suspended solids, organic matter, heavy metals

Application

Implementation of pollution prevention and source control methods such as, minimizing inventory of raw and/or hazardous materials; storing materials in a designated area that is enclosed, covered, and has secondary containment; training employees and subcontractors in standard operating procedures (SOP) and spill cleanup techniques; and conducting regular inspections to ensure efficacy of pollution prevention measures and to make improvements, will minimize the risk of polluting stormwater runoff and discharging into the stormwater drainage system and watercourses.

Operational Procedures

Storage Areas

- Follow the SOP for loading and unloading, and refer to the SC-4 Outdoor Loading and Unloading fact sheet for related BMP information.
- Keep a current and accurate inventory of stored materials. Re-evaluate inventory needs and consider purchasing Safer Alternative Products. Properly recycle and dispose expired products.
- Store materials in their original containers that describe their contents and specific spill response actions, or if a transfer container is used then properly label in compliance with the globally

harmonized system GHS). Maintain associated Safety Data Sheets (SDS) in the MTS online SDS database.

- When inside storage is not feasible, ensure storage areas are protected from rainfall, run-on, runoff, and wind dispersal:
  - Cover the designated storage areas with a roof to protect from rain. At the very minimum use a temporary waterproof covering made of polyethylene, polypropylene or a similar material.
  - Minimize run-on by enclosing the area and using berms.
  - Use covered dumpsters for waste product containers.
- Keep liquids in a designated area on a paved impervious surface within a secondary containment system using dikes, liners, vaults, or double walled tanks.
- Employ safeguards against accidental releases:
  - Provide overflow protection devices to warn operator or automatic shutdown transfer pumps.
  - Provide protection guards around tanks and piping to prevent vehicle or forklift damage
  - Provide clear tagging or labeling, with valve restrictions to reduce human error.
  - Provide secure storage to prevent vandalism and theft.
  - Ensure container lids are tight fitting and secure.
- Ensure storage containers are in good condition, lacking corrosion, leaks, cracks, scratches, and other physical damage that may weaken the container system.
- Keep storage containers off the ground using pallets, racks, or a similar method.
- Place drip pans or absorbent materials beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers. Clean drip pans periodically and all collected liquids and soiled absorbent materials must be reused, recycled, or properly disposed.
- Storage of hazardous materials (reactive, ignitable, or flammable) must comply with the environmental, fire, and hazardous waste codes.
  - Surround stored hazardous materials and waste with a curb or dike to provide the volume to contain 10% of the volume of all the containers, or 110% of the volume of the largest container, whichever is greater. The area inside the curb should slope to a drain leading to a dead-end sump.
  - Store corrosive materials in appropriate containers resistant of corrosion.

Inspection

- Provide routinely scheduled, and ‘as necessary’ inspections with thorough record keeping and reporting, checking for:
  - Evidence of leaks, spills, or drips due to faulty containers, operator error, or failure of piping systems and valves.
  - External corrosion, cracks, or other structural failures of material containers, tank foundations, connections, coatings, and tank walls.
  - Leaks or spills during pumping of liquids or gases from delivery trucks to a storage facility or vice versa.
  - Loose fittings, poor welding, and improper or poorly fitted gaskets on new tank or container installations.
  - Improperly labelled new or secondary containers.
- Following inspections, take immediate corrective actions including replacement of faulty or at-risk equipment and containers, further training of employees, and process adjustments to prevent leaks and spills and record all inspection findings and responses in a log.

Training

- Train employees to have a full understanding of the current Spill Prevention and Response plan and fact sheet so employees have the tools and knowledge to immediately begin cleaning up a spill and taking corrective actions if one should occur.
- Educate employees about the risks of improper storage described within this fact sheet related to stormwater pollution prevention.
- Use a training log or similar method to document initial and ongoing training, including further training following inspections.

Further Details on Dikes and Curbs

Dikes

One of the best protective measures against contamination of stormwater is diking. Containment dikes are berms or retaining walls that are designed to hold spills. Diking is an effective pollution prevention measure for above ground storage tanks and tank truck loading and unloading areas. The dike surrounds the area of concern and holds the spill, keeping spill materials separated from the stormwater side of the dike area.

- For single-wall tanks, containment dikes should be large enough to hold the contents of the storage tank for the facility plus rainwater.
- For trucks, diked area volume should equal the volume of the largest tank truck compartment that makes deliveries.
- Diked material should be strong enough to safely hold spilled materials.
- Dike materials can consist of earth, concrete, synthetic materials, metal, or other impervious materials.
- Strong acids or bases may react with metal containers, concrete, and some plastics.
- Where strong acids or bases are stored, alternative dike materials should be considered. More active organic chemicals may need certain special liners for dikes.
- Dikes may also be designed with impermeable materials to increase containment capabilities.
- Inspect dikes during or after significant storms or spills to check for washouts or overflows.
- Regularly inspect dikes to ensure they can contain spills based on potential spill volume (e.g. tank replacement, new material)
- Inability of a structure to retain stormwater, dike erosion, soggy areas, or changes in vegetation indicate problems with dike structures. Damaged areas should be patched and stabilized immediately.
- Accumulated stormwater in the containment area should be analyzed for pollutants before it is released to surface waters. If pollutants are found or if stormwater quality is not determined, then methods other than discharging to the MS4 or surface waters should be employed (e.g., discharge to sanitary sewer).
- Earthen dikes may require special maintenance of vegetation such as mulching and irrigation.

Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is like containment diking in the way that it prevents spills and leaks from being released into the environment. Curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and transfer liquid materials occur. Curbing can redirect stormwater away from the storage area. It is useful in areas where liquid materials are transferred from one container to

another. Asphalt is a common material used for curbing; however, curbing materials include earth, concrete, synthetic materials, metal, or other impenetrable materials.

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

SC-6
OUTDOOR VEHICLE AND EQUIPMENT CLEANING

Purpose

Vehicle and equipment cleaning outdoors can contribute toxic hydrocarbons and other organic compounds, oils and greases, nutrients, phosphates, heavy metals, and suspended solids to stormwater runoff.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Wash water from outdoor vehicle and equipment cleaning	Chlorinated water	Chlorine
	Detergents	Phosphates
	Solids (dirt and metal fragments)	Sediment and Metals
	Pesticides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Vehicle Fluids	Oils and greases
	Fuel	Hydrocarbons
	Cleaning liquids, degreasers	Organic compounds, antimicrobials, endocrine disruptors

Application

Utilizing the procedures outlined below can prevent and reduce the potential for pollutant discharge through source control prevention, storm drain inlet protection (see fact sheet SDM-3), and BMP implementation. Thorough and continuous employee training is paramount in effective implementation of stormwater pollution prevention methods related to vehicle and equipment cleaning.

Operational Procedures

Vehicle and Equipment Cleaning

- Use properly maintained off-site washing and steam cleaning businesses whenever possible as these businesses are specifically designed to manage contaminated water.
- Implement good housekeeping practices to minimize wash water's exposure to contaminants.
- Sweep wash areas frequently to remove solid debris.
- Provide waste containers in the wash area per the SC-12 Waste Handling and Disposal fact sheet.
- Map on-site storm drain locations and follow procedures outlined in the 'Storm Drain Inlet Protection' fact sheet to protect the drainage system.
- Biodegradable and approved safer alternative products without phosphates should be used where practical and effective.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.

- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.
- Designate and clearly mark a wash area with signs stating that only washing is allowed in that area and that discharges to the storm drain are prohibited.
- Design wash areas to completely collect and dispose of wash water when chemical additives, solvents, or degreasers are used. Installation of sumps, drain lines, berms, and grading can segregate, direct, and collect wash water and prevent stormwater run-on to wash areas.
- Cover the outdoor wash area, and post signs indicating washing procedures specific to that area and that no other activities are permitted in the wash area. Placing tarps over the pavement when not in use will help deter other activities occurring in the area and will prevent contact with rain water.
- Use automatic shutoff nozzles when hoses are left unattended.
- Perform power washing and steam cleaning in specifically designated areas as this runoff has higher pollutant concentrations. No power washing or steam cleaning in areas designated as wellhead protection areas for public potable water supply.

Disposal

- Consider filtering and recycling wash water whenever possible.
- Discharge all equipment wash water to a holding tank or a primary clarifier treatment system.
- Discharge vehicle wash water to a holding tank, a primary clarifier treatment system, or to an enclosed recycling system.
- Discharge wash water to the sanitary sewer only where allowable/permitted by the local sewer authority; pretreatment may be necessary. If in doubt, ask your Supervisor.
- Refer to the 'Spill Prevention and Response' fact sheet in the event of large spills or leaks from holding tanks, treatment systems, and wash area containment areas.
  - Keep the spill and response plan for each facility current and easily accessible.
  - Stock adequate spill cleanup materials and check supplies with routine inspections.
  - All employees shall have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Training

- Train employees to have a thorough understanding of this fact sheet and conduct continuous refresher training sessions.
- Train staff on only performing washing activities in the wash area, and for proper housekeeping and maintenance of the wash area.
- Conduct inspections to ensure effective implementation of vehicle and equipment cleaning procedures and address instances immediately when a procedure is not followed, or potential contamination pathways are identified.

SC-7
OUTDOOR VEHICLE AND EQUIPMENT MAINTENANCE

Purpose

Vehicle and equipment maintenance includes bus, LRV, and operational equipment maintenance and repair. Pollutants from routine maintenance and repairs (e.g. parts cleaning, part replacements, oil changes) can impact water quality if stormwater runoff comingles with leaked fluids or equipment stored outside.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Vehicle and Equipment Cleaning	Chlorinated water	Chlorine
	Detergents	Phosphates
	Solids (dirt and metal fragments)	Sediment and Metals
	Vehicle Fluids	Oils and greases
	Cleaning liquids, degreasers	SVOCs, VOCs, Acids
Vehicle and Equipment Repair	Vehicle and Equipment Fluids	Ethylene glycol, propylene glycol, sulfuric acid, lead, oil and grease, total petroleum hydrocarbons, diesel range organics

Application

Utilization of the following procedures where maintenance of vehicles and MTS assets occurs will prevent or greatly reduce the discharge of pollutants to the stormwater drainage system.

Operational Procedures

- Keep accurate maintenance logs, inventory, and associated Safety
- Data Sheets (SDS) so current use and storage of materials is known.
- Switch to non-toxic, solvent free, and potentially recyclable materials for maintenance and cleaning whenever possible.
- Recycle used oils, vehicle fluids, and equipment parts whenever possible.
- Avoid hosing down work areas, alternatively dry sweep the MTS facility routinely to keep litter and sediment out of drainage systems. If work areas are washed, collect and direct wash water to a designated area (i.e., holding tank, recycled water system, or treatment system).
- Use a vehicle maintenance area designed to prevent stormwater pollution and minimize contact of stormwater with outside operations through berming, and appropriate drainage routing (see Storm Drain Inlet Protection fact sheet).
- Keep equipment clean by not allowing excessive build-up of oil and grease whenever possible to reduce waste and discharge.
- Refer to FSC-3 Pressure Washing BMP fact sheet for appropriate cleaning protocols while using pressure washers and steam cleaners.
- Use signage on storm drain inlets indicating they are not to receive liquid or solid wastes.

- Use signage at sinks to remind employees that pouring wastes down the drain is prohibited.
- Clean all MTS facility storm drain inlets regularly using dry methods of sweeping, litter removal, and vacuums; and cover during dry weather, where applicable.
- Permanently cover outdoor maintenance and repair areas, or move activities inside to limit exposure to rainfall.
- If equipment or vehicles are stored outside, (e.g. temporarily/permanently out of use, wrecked/damaged vehicles or machinery) ensure oil and other fluids are drained first.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are more easily recycled if kept separate.
- Drain pans are generally too small to contain antifreeze, plan accordingly by purchasing larger drip pans or fabricate appropriately sized and shaped pans.
- Promptly transfer fluids to the proper waste or recycling drums and store in an appropriately designed area that can contain spills. Drip pans are used temporarily, and should never act as storage containers.
- Dispose oil filters properly by draining into a waste oil recycling drum and then recycle filters with your oil supplier or recycler.
- Store cracked and/or dead batteries in a non-leaking covered secondary container and dispose of properly at recycling or hazardous waste facilities.
- Place permanent curbs around the immediate boundaries of the process equipment.
- Do not remove original product label from chemical containers as it contains important spill cleanup and disposal information.
  - If a product is concentrated and must be diluted before use, transfer the diluted product to a secondary container. Ensure that the secondary container label complies with the labelling requirements of the globally harmonized system (GHS).
- Use the entire product before disposing of the container.
- Do not locate stockpiles near drain inlets or watercourses.
- Refer to the Parking and Storage Area Maintenance fact sheet for more storage area considerations.
- Refer to the Spill Prevention and Response fact sheet in the event of spills or leaks.
  - Keep the spill and response plan for each facility current, with updates from incidents, regulation changes, and inspections.
  - Stock adequate spill cleanup materials readily accessible to the specific MTS facility and routinely check storage areas for sufficient supplies.
- All wastes should be put into containers and stored appropriately until it can be recycled or disposed of properly.
- All materials of environmental concern shall be properly stored in appropriate secure containment.
- Recycling materials is always preferable to disposal, and purchasing products (e.g. engine oil, transmission fluid, antifreeze, hydraulic fluid) made of recycled materials is preferred.
- Separating wastes allows for easier recycling and may reduce disposal costs by separating hazardous and non-hazardous wastes. Do not mix oil and solvents and separate chlorinated solvents from other solvents.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.

SC-8
PARKING AND STORAGE AREA MAINTENANCE

Purpose

The risk of pollutants like trash, suspended solids, hydrocarbons, oil, grease, and heavy metals entering the storm drain system from parking and storage areas through stormwater runoff or non-stormwater discharges is high and must be mitigated.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Parking and storage area surfaces	Runoff	Suspended Solids/Sediment, polycyclic aromatic hydrocarbons, trash
	Brake pad dust	Metals
	Chlorinated water for pressure washing	Chlorine
	Vehicle Fluids	Oil and Grease
Landscape areas	Fertilizers	Nutrients
	Pesticides	Organics
	Irrigation runoff	Sediment and turbidity
Storage Area	Spills and leaks	Source specific

Application

The following procedures reduce the risk of pollutant discharge into the stormwater system from parking and storage areas. Using proper housekeeping practices, following appropriate cleaning BMPs, training employees, and incorporating alternative designs and maintenance strategies for impervious parking lots will prevent water quality impacts.

Operational Procedures

- Protect storm drain inlets and watercourses from potential spills (see 'Storm Drain Inlet Protection' and 'Spill Response and Prevention' fact sheets).
- Ensure employees understand common spill response and protection practices.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices and utilize sand filters or oleophilic collectors for low concentrations of oily waste.
- Prevent stormwater run-on to parking lots and storage areas with proper grading, berming, and by directing runoff from roof downspouts away from the paved surfaces and storage areas.
- Design lot to include semi-permeable hardscape and innovative bio filters.
- Post "No Littering" signs and enforce anti-litter laws and provide adequate litter receptacles in walking and parking areas.
- Empty and clean out litter receptacles frequently to prevent spillage, and anticipate high traffic times during events for more frequent clean outs.

- Regularly dry-sweep, shovel, and vacuum areas to minimize litter and pollutant discharge into the stormwater conveyance system.
- Establish frequency of parking lot sweeping based on usage and field observations of waste accumulation and inspect sweepers for leaks on a regular basis.
- If there is evidence of illegal dumping, bag and load the material onto an MTS vehicle and return to a MTS facility for disposal.
- Sweep all parking and storage areas before the onset of the wet season.
- When water is used during surface cleaning, follow the procedures below:
  - Completely block the storm drain or contain runoff.
  - Wash water should be collected and reused, pumped to the sanitary sewer, or discharged to a pervious (vegetated) surface, do not allow water to enter storm drains during cleaning.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- When cleaning heavy oil deposits, use absorbent materials on oil spots prior to sweeping and dispose of used absorbents properly.
- Tarps and similar control measures should be used to prevent spills or material drift from storage areas.
- Solid waste should be collected by vacuum or sweeping and secured in an appropriate container and reused, recycled or disposed of properly.
- Water used for cleaning and decontamination shall not be allowed to enter storm water drainage system or watercourses.
- Refer to the 'Surface Repair' fact sheet for procedural requirements during surface repair.
- The MTS Environmental Health & Safety Specialist must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials according to the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.

SC-9
SAFER ALTERNATIVE PRODUCTS

Purpose

Promote the use of less harmful products. Alternatives exist for most product classes including chemical fertilizers, pesticides, cleaning solutions, janitorial chemicals, automotive and paint products, and consumables (e.g. batteries, fluorescent lamps).

Pollutants of Concern

This BMP encourages the replacement of chemicals and consumables with safer alternative products, therefore, this BMP has no pollutants of concern. Follow the procedures in the Landscape Design and Maintenance Plan (WSP, 2019), available on the MTS Intranet, or from the Environmental Health and Safety Specialist regarding disposal of pesticide containers and unusable pesticides or other chemicals that are replaced with a safer alternative product. It is important to note that although alternative products are safer, they are not completely safe and BMPs should be followed per usual.

Application

The usage of Safer Alternative Products reduces the harm to the environment that O&M materials and products have if they come into contact and contaminate stormwater. Although Safer Alternative Products are not 100% safe, they are less harmful, in many cases cheaper, and readily available.

Operational Procedures

Approach

Develop a comprehensive program based on the:

- “Precautionary Principle,” which is an alternative to the "Risk Assessment" model that says it's acceptable to use a potentially harmful product until physical evidence of its harmful effects are established and deemed too costly from an environmental or public health perspective. For instance, a risk assessment approach might say it's acceptable to use a pesticide until there is direct proof of an environmental impact. The Precautionary Principle approach is used to evaluate whether a given product is safe, whether it is necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program, which minimizes the purchase of products containing hazardous ingredients used in the facility's custodial services, fleet maintenance, and facility maintenance in favor of using alternate products that pose less risk to employees and to the environment.
- Integrated Pest Management (IPM) or Less-Toxic Pesticide Program, which uses a pest management approach that minimizes the use of toxic chemicals and gets rid of pests by methods that pose a lower risk to employees, the public, and the environment.
- Energy Efficiency Program, which includes a no-cost and low-cost energy conservation and efficiency actions, that can reduce both energy consumption and electricity bills, along with long-term energy efficiency investments.
- Consider the following mechanisms for developing and implementing a comprehensive program:
  - Policies
  - Procedures

    - Landscape Design and Maintenance Plan
    - Standard operating procedures (SOPs)
    - Purchasing guidelines and procedures
    - Bid packages (services and supplies)
  - Materials
    - Preferred or approved product and supplier lists
    - Product and supplier evaluation criteria
    - Training sessions and manuals
    - Fact sheets for employees
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.
- This BMP has no regulatory requirements. Existing regulations already encourage facilities to reduce the use of hazardous materials through incentives such as reduced:
  - Specialized equipment storage and handling requirements,
  - Stormwater runoff sampling requirements,
  - Training and licensing requirements, and
  - Record keeping and reporting requirements.

SC-10
SPILL PREVENTION AND RESPONSE

Purpose

Given that MTS has an existing Spill Prevention, Control, and Countermeasure (SPCC) Plan which is updated regularly; MTS provides SPCC training annually; and each MTS department has a Spill Response standard operating procedure (SOP), this BMP Maintenance Fact Sheet has been developed in support of the existing MTS SPCC Plan, training and existing departmental spill prevention SOPs. Improperly controlled spills and leaks can adversely impact the storm drain conveyance system, and ultimately the receiving waters. Proper spill prevention and response training of municipal employees can minimize the impact of spills to the environment and prevent common spills before they happen.

Pollutants of Concern

This BMP provides guidance regarding small and large non-hazardous spills as well as hazardous spills. Any spill more than 42 gallons is managed by the MTS hazmat vendor. MTS is only responsible for containing a spill to prevent it from entering a storm drain. Pollutants of concern are contaminant specific based on the nature of the spilled material. In addition to responding to the spill using the guidelines provided with this BMP, MTS employees shall protect all drain inlets and watercourses from spills during the response activity.

Application

The following procedures will help minimize the possibility of spills occurring and establish effective spill response measures when they do happen. In combination with thorough training of MTS staff the risk of spill pollutants entering the stormwater system and receiving waters is greatly reduced.

Operational Procedures

- Major steps in the Spill Prevention and Response plan are as follows:
  - Thorough training of employees of prevention, response, and reporting techniques.
  - Follow spill and leak prevention measures to minimize the risk of spills.
  - When a spill occurs, follow the spill response procedures outlined in the SPCC Plan.
  - Proper reporting and record keeping of employee training, spill prevention successes and failures, and spill response activities will provide data to improve the process in the future.

Prevention

- Implement the procedural guidelines as indicated in the MTS SPCC Plan and/or appropriate department Spill Prevention SOP.
- In combination with the measures referenced in the SPCC Plan, the following records will help minimize spills and provide supplementary information if one occurs.
  - Facility description including the address, activities, and materials involved.
  - Identification of key spill response personnel beginning with the MTS Environmental Health and Safety Specialist
    - MTS Environmental Health and Safety Specialist and onsite “Designated Person(s) Accountable for Discharge Prevention”

(1) Depending on the facility this may be the Facilities Supervisor, Foreman, Maintenance Manager, etc.

  - Hazmat Contractor/Vendor
  - Local Fire Department
  - Local Police Department
  - Nearest Hospital
  - Hazardous Materials Division/Certified Unified Program Agency 858-505-6880
- Identification of the potential spill areas or operations prone to spills and leaks.
- Identification of which areas should be or are bermed to contain spills and leaks.
- Facility map identifying the key locations of areas, activities, materials, structural BMPs all with risks of spills and leaks.

Material Handling Procedures

Spill response procedures for each at risk area, activity, material, etc.:

- Assess the site and potential impacts including proper identification and labeling of all containers
- Material containment
- Proper personnel notification and evacuation procedures
- Site clean up
- Waste material disposal
- Record keeping
- Product substitution with approved safer alternative products where practical and effective. Safer alternative products are less harmful to the environment, but not harmless. Always use the materials per the manufacturer's instructions and continue to follow BMPs to keep the materials out of the stormwater drainage system and watercourses.
- Recycle, reclaim, or reuse of materials whenever possible to reduce the amount of materials transferred into the facility or into the field.
- If possible, move material handling indoors, under cover, and away from storm drains or watercourses.
- Properly label all containers so the contents are easily identifiable.
- Berm storage areas to contain material if a spill or leak occurs.
- Cover outside storage areas with a permanent structure, or if not feasible then cover with a tarp to protect from rainfall and pollutant discharge.
- Check containers, berms, and at-risk areas often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect and spilled and leaked materials by dry methods if possible and properly dispose of them.
- Store, contain and transfer liquid materials in such a manner that if the container is ruptured or the contents spilled, they will not discharge, flow, or mix with rainfall and end up in the stormwater drainage system.
- Place drip pans or absorbent materials beneath all mounted taps and at all potential drip and spill locations during the filling and unloading of containers. Collected liquids or soiled absorbent materials should be reused and recycled or properly disposed.
- For field programs and maintenance activities, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a designated area within MTS yard areas that are designed to contain spills and leaks.
- If paved, sweep and clean storage areas monthly, and do not use water unless all the water will be collected and disposed of properly.

- Install a spill control device (such as a tee section) in any catch basins that collect runoff from storage areas containing oil, gas, or other materials that separate and float on water. This allows for easier cleanup if a spill occurs.
- Protect catch basins and storm drains (see 'Storm Drain Inlet Protection' fact sheet) while conducting field activities to contain materials if a spill occurs during operation and maintenance.
- Ensure each potential risk area and maintenance activity area always has spill cleanup materials readily available, supplies are routinely checked, and all employees are familiar with their location.

Training

- Provide initial and continued spill prevention, spill response, and cleanup training on an annual basis.
- Review past incidents from filed records to provide relatable examples to employees
- Well-trained employees can reduce human errors that lead to leaks and spills, and can give insight on how to prevent future problems.
- Each employee should immediately have the resources, tools and education to prevent, contain, and clean up leaks and spills.
- Employees should be familiar with this fact sheet, all relevant MTS Source Control Fact Sheets pertaining to maintenance activities they are responsible for, and the MTS Illicit Discharge Detection and Elimination Plan, SOPs and SPCC Plan.
- Focus training on recognizing and reporting potential or current spills and leaks, steps taken to mitigate risk, and where employees can find more help if necessary when a spill or leak occurs.
- Employees responsible for aboveground storage tanks and liquid transfers from large bulk containers should be thoroughly and routinely trained with the Spill Prevention and Control procedures and the plan should be readily available for reference on site and/or within their MTS vehicle.
- Employees should understand where spill cleanup materials are available for each at risk activity and at every facility where leaks and spills may occur.

Definition

Minor Spill poses no significant harm or threat to human health and safety or to the environment:

- Less than 42 gallons
- Is easily stopped
- Localized near sources
- Has not entered storm drain and has not left the property
- Little risk to human health or safety
- Little risk of fire or explosion

Major Spill cannot be safely controlled or cleaned up by facility personnel:

- Exceeds 42 gallons in amount of spillage
- Requires special equipment or training to clean up
- Large enough to spread beyond immediate discharge area
- Material enters storm drain or leaves the property
- Danger of fire or explosion
- Material is highly toxic, corrosive, flammable, or reactive and poses a significant hazard to human health or safety

Spill Cleanup Procedures

- If a spill occurs, stop the spill (if needed).
- Notify the key spill response personnel immediately.
    - If safe to do so, take steps below to contain the material and block any nearby storm drains. If the material is unknown or hazardous wait for instruction from properly trained personnel (i.e., Immediate Supervisor or onsite "Designated Person(s) Accountable for Discharge Prevention" to contain the materials.
    - Minor Spills and leaks
        - Use a rag, damp cloth or absorbent materials for general cleanup of liquids
        - Use brooms or shovels for the general cleanup of dry materials
        - If water is used, it must be collected and properly disposed of; wash water cannot enter the storm drain.
        - Dispose of any waste materials properly
        - Clean or dispose of any equipment used to clean up the spill properly
    - Major Spills
        - Foreman should direct Mechanics and Servicers to stop the spill (if safe to do so)
        - All Mechanics and Servicers should immediately evacuate the area of the spill
        - and report to the Foreman at the designated muster point.
        - The Foreman shall direct Mechanics and Servicers to pass the word to evacuate
        - any areas, at MTS or at nearby properties, that would be potentially endangered
        - by, or exposed to the spill.
            1. For liquid spill, give particular attention to the downhill movement; and
            2. For gas, pay attention to direction of wind movement.
        - The Foreman shall contact the Facilities Manager and Communication
        - Supervisor, who in turn shall contact the Maintenance/Transportation Directors
        - and C.O.O.
        - Foreman shall contact emergency spill response vendor for assistance, then
        - notify MTS' Environmental Health & Safety Specialist.
        - Every effort must be made to prevent spilled liquids from entering the storm drain
        - or leaving the property – block storm drains in the event of a liquid spill.
        - The Foreman and emergency response personnel shall direct Mechanics and
        - Servicers to perform specific functions to assist in stopping and cleaning up the
        - spill
        - The Foreman shall follow and comply with requirements set forth in the yellow
        - Emergency Procedures Binder located in the Shop Foreman's office.
    - For any sized hazardous or major spill, a private cleanup company or Hazmat team may need to be contacted to assess and control the situation, at the decision of the onsite "Designated Person(s) Accountable for Discharge Prevention".
        - Absorbents, gels, and foams are potential chemical adsorbents used to clean up hazardous spills, and proper disposal per regulations is required
        - If the spill material is hazardous, then any cleanup materials are also deemed hazardous and proper disposal or transfer to a certified laundry is required.

Reporting

- Report any spills and leaks immediately to the identified key spill response personnel as each event can be used as a learning opportunity to prevent future spills. Report spills in accordance

with applicable reporting laws. Significant releases that put human health or the environment at risk must be reported immediately to:
  - 9-1-1, then notify
  - California Office of Emergency Services (OES) State Warning Center at 800-852-7550, and the
  - Unified Program Agency
- Federal regulations require immediate notification of any oil spill into a water body or onto an adjoining shoreline to the following agencies:
  - Coast Guard, San Diego Sector 619-278-7033
  - San Diego Regional Water Quality Control Board and
  - Department of Fish and Wildlife, Office of Spill Prevention and Response (OSPR).

For reportable quantities of an oil spill, Federal regulations require immediate notification to the
- National Response Center (NRC) at 800-424-8802 (available 24/7)

Following containment and cleanup of the spill, a detailed report about the incident should be generated and kept on file; briefing staff about the incident can help with training and preventing future spills.

Reports should include:
  - Date and time of the incident
  - Weather conditions (temperature, rain, cloud cover)
  - Duration of the event
  - Cause of the spill, leak, and/or discharge (if unknown give all known information surrounding the before, during, and after of the incident)
  - All response procedures implemented and persons notified from the moment the spill was noticed in a timeline format
  - Environmental Problems associated with the incident
  - Additional field notes, timed and dated photos or videos, drawings, and maps are highly encouraged
- Establish separate record keeping systems to document all housekeeping, routine preventative maintenance inspections and training logs.

  Inspection documentation should contain:
  - The date and time the inspection was performed
  - Name of the inspector and employees present
  - Items, activities, or areas inspected
  - At risk storage, process, or activity thoroughly explained
  - Corrective action taken (relocate materials, alter a process, further training)
  - Date of corrective action
  - Additional field notes, timed and dated photos or videos, drawings, and maps are highly encouraged

Special Considerations

- Facilities with a storage capacity of 10,000 gallons or more of petroleum are required by Federal regulation (40 CFR Part 112) to prepare a Spill Prevention Control and Countermeasure (SPCC) Plan.
- The state regulates hazardous material storage (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the release or potential release of hazardous materials.
- If permitted, consider requiring a connection of smaller secondary containment areas (less than 200 sq. ft.) to the sanitary sewer while hard connections to the storm drain are prohibited.

- Prevention of leaks and spills is inexpensive and achieved simply with continued training, education, and continued updates to procedures to best fit each specific at-risk activity or area. Containment, treatment, and disposal of soil, water, and material wastes from spills and leaks is exponentially more expensive than prevention.

SC-11
VEHICLE AND EQUIPMENT FUELING

Purpose

Vehicle and equipment fueling includes fueling of MTS fleet vehicles, busses, street sweepers, generators, and any other fuel transfer activity. When stormwater mixes with fuel transfer leaks and spills, hydrocarbons, oil and grease, and heavy metals can be discharged into the stormwater drainage system and watercourses. The possibility of discharging pollutants into stormwater is mitigated when the following procedures are incorporated into fueling operations.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Leaks and Spills	Fuel	Total Petroleum Hydrocarbons
		Diesel Range Organics
		Metals
		Oil and Grease

Application

A reduction of pollutant discharge is achievable through effective implementation of the BMPs laid out within this document. Thorough and regular training of employees on the operational procedures for fuel transfer activities and general pollution prevention strategies will encourage effective implementation.

Operational Procedures

General Upkeep

- “Spot clean” small spills, leaks, and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.
- Use officially maintained offsite fueling stations whenever possible as these businesses are better equipped to handle fuel leaks and spills properly.
- Educate employees about pollution prevention measures and goals.
- Focus pollution prevention education on minimizing or eliminating leaks and spills and proper containment during liquid transfer activities.
- Post signs that ban changing engine oil or other fluids at fueling stations.
- Immediately report leaking vehicles and ensure that they are taken out of service.
- Install and routinely maintain inlet catch basins equipped with a small sedimentation basin or grit chamber to remove large particles from stormwater in highly impervious areas.
- Releasing non-contaminated stormwater in secondary containment/storage will increase capacity prior to rain events.
- Ensure overflow protection devices on tank systems warn the operator to automatically shut down transfer pumps when the tank reaches full capacity.
- Inspect protective guards around tanks and piping to prevent vehicle or forklift damage.
- Clearly tag and label all valves to reduce human error.
- Ensure all fuel hoses will automatically shut off if severed or detached.

- Address repairs and maintenance as soon as possible to prevent putting fueling station out of service.

Onsite Fuel Dispensing Areas

- Maintain clean fuel-dispensing areas using dry cleanup methods routinely, such as sweeping for removal of litter, debris, sediment, and absorbents, and use rags and absorbents for leaks and spills. Do not wash down areas with water.
- Fit underground storage tanks with spill containment and overfill prevention systems meeting the requirements of Section 2635(b) of Title 23 of the California Code of Regulations.
- Fit fuel dispensing nozzles with hold-open latches that act as automatic shutoffs except where prohibited by local fire departments. Install vapor recovery nozzles to help control drips and minimize air pollution from volatile organic compounds (VOCs).
- Post signs at fueling locations warning vehicle operators “No Topping Off Fuel Tanks.”
- Design fueling areas to prevent stormwater run-on and runoff to/from fueling areas respectively using berms, curbs, and sloping and pave areas with concrete (Portland cement concrete is preferred) or an equivalent smooth impervious surface rather than asphalt.
- Cover fueling area while routing roof runoff directly to storm drains and avoiding fuel dispensing areas.
- Use a perimeter drain around the covered fueling area or slope pavement inward with drainage to a dead-end sump. Proper maintenance and disposal of water in dead-end sump is required. Use of extruded curbs along the upstream side of fueling areas to prevent stormwater run-on is another option.
- Where asphalt is already in use, apply a suitable sealant that decreases the porosity of the surface therefore creating a more easily cleaned surface when leaks or spills occur.
- Keep equipment clean by not allowing excessive build-up of oil and grease without the use of liquid cleaners whenever possible to reduce waste and discharge.
- Use signage on storm drain inlets indicating they are not to receive liquid or solid wastes.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Seal off storm drains in the vicinity during fuel transfer.
- Use only watertight waste receptacles, keep the lids closed, and implement one of the following: a cover, a low containment berm, or use and maintain drip pans under the waste receptacles. Always dispose of collected water properly and if drip pans are in use, keep several stored nearby in a covered location.
- All wastes should be put into containers and stored appropriately until it can be recycled or disposed of properly.
- Use signage at sinks to remind persons that pouring wastes down the drain is prohibited.
- Clean all MTS facility storm drain inlets regularly using dry methods of sweeping, litter removal, and vacuums.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are more easily recycled if kept separate.
- Promptly transfer fluids to the proper waste or recycling drums and store in an appropriately designed area that can contain spills. Drip pans are used temporarily, and should never act as storage containers.
- Appropriately label all secondary containers.
- Follow all federal and state requirements regarding underground storage tanks, or install above ground tanks also per regulations.
- Refer to the ‘Spill Prevention and Response’ fact sheet in the event of large spills or leaks.

  - Keep the spill and response plan for each facility current, with updates from incidents, regulation changes, and inspections.
  - Stock adequate spill cleanup materials and ensure that they are readily accessible to the specific MTS facility. Routinely inspect storage areas for sufficient supplies.
  - Store portable absorbent brooms in unbermed fueling areas.
  - Install and maintain an oil and water separator (clarifier) and connect to the sanitary sewer, not the stormwater drainage system.
- Approved safer alternative products should be used where practical and effective.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.

Design Considerations of New Installations

- Fuel dispensing areas must be paved with Portland cement concrete or an equivalent smooth impervious surface, with a 2-4% slope to prevent ponding. To prevent stormwater run-on to the extent practicable, the fueling area must be separated from the rest of the site by a grade break. The fuel dispensing area extends 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus 1 foot, whichever is less. The paving around the fuel dispensing area may exceed the minimum dimensions of the "fuel dispensing area" stated above.
- A permanent cover is required over the fuel dispensing area, with minimum dimensions equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain stormwater onto the fuel dispensing area. Convey stormwater runoff from the permanent cover away from the fueling area to avoid contamination from leaks and spills outside of the fueling area.
- If necessary install and maintain an oil control device (e.g. clarifier) in the appropriate catch basins to treat runoff from the fueling area.
- To the extent practicable, grade and pave the outdoor waste receptacle area to prevent stormwater run-on to the fueling area.
- To the extent practicable, grade and pave the air/water supply area to prevent run-on of stormwater to the fueling area.

SC-12
WASTE HANDLING AND DISPOSAL

Purpose

Toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants may enter the stormwater drainage system through improper storage, handling, and disposal of solid wastes.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Waste handling and storage	Trash	Bacteria, plastics, sediment, heavy metals, organic compounds, solids
Chemical and hazardous materials/waste	Pesticides and Herbicides	Organic compounds
	Fertilizers	Nitrates, phosphates
	Cleaning supplies	Organic compounds, antimicrobials, endocrine disruptors
	Treated Wood Products	Arsenic, Total Chromium, Copper and Zinc
Landscaping and other products	Aluminum Sulfate	Aluminum, TDS, Sulfate
	Sulfur – Elemental	Sulfate
	Fertilizers – Inorganic	Nitrate, phosphate, TKN, potassium
	Fertilizers – Organic	Nitrate, TOC, COD, organic nitrogen (TKN)
	Natural Earth (Sand, Gravel and Topsoil)	Sediment
	Herbicide	Chemical specific; check SDS
	Pesticide	Chemical specific; check SDS
	Lime	pH altering substance

Application

Prevention and reduction of pollutant discharge from waste handling starts with tracking current waste generation, storage and disposal methods. Establishing a thorough understanding of current habits reveals methods of reducing waste generation and disposal through source reduction, re-use, and recycling. Preventing run-on to and runoff from waste storage areas in combination with reducing waste production and modifying current waste disposal methods will prevent and reduce pollutant discharge to stormwater.

Operational Procedures

- Reduce waste generation by continuing to implement the following source controls:
  - Production planning and sequencing
  - Process and equipment modification
  - Raw material substitution or elimination
  - Material reuse and recycle
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Utilize the MTS material tracking system (i.e. SAP) to increase awareness about material usage and disposal, and encourage material reuse and recycle whenever possible through awareness and training.
- Identify problem areas through inspections and respond with further training, employee awareness, and process modification.
- Switch to non-toxic, solvent free, reusable and recyclable materials and use the entire product before disposing the container.

Waste Receptacle Area Maintenance

- Use leak proof containers with lids for storage. Cover waste piles except when in use (tarps are acceptable) and prevent stormwater run-on and runoff with a berm.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Properly dispose of grease, oil, and absorbents as garbage.
- Inspect storage containers weekly for leaks and to ensure lids prevent stormwater from entering the containers. Remove from service and replace any containers that are leaking, corroded, or otherwise deteriorating.
- Transfer waste from damaged containers into safe containers immediately.
- Do not hose down work areas, alternatively dry sweep the MTS facility routinely to keep litter and sediment out of drainage systems. If work areas are washed, collect and direct wash water to a primary clarifier or a oil/water separator and not to the street or storm drain.
- Take special care when loading or unloading wastes to minimize losses and pollution. Loading systems can minimize spills and fugitive emission losses from dust, mist, etc. Vacuum transfer systems can minimize waste loss.
- Clean up spills immediately and refer to the Spill Prevention, Control and Countermeasure (SPCC) Plan, department SOP or the SC-10 Spill Prevention and Response fact sheet for thorough procedural actions to follow when leaks and spills occur.
- Stencil prohibitive dumping and no littering messages on the facility's property near storm drains (e.g. "Dump No Waste, Drains to River").

Litter Control

- Post "No Littering" signs, enforce anti-litter laws, and encourage awareness of pollution from litter and wastes to employees.
- Provide enough litter receptacles in multiple locations for each facility based on waste tracking inspections and logging.

- Empty litter receptacles frequently and ensure covers are operational to prevent spillage.

Waste Collection

- Keep waste collection areas clean using dry methods whenever possible.
- Secure and close lids of waste containers tightly when not in use or during transfer.
- Place waste containers under cover whenever possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure only appropriate solid wastes are added to the waste container. Hazardous wastes, fluorescent lamps, pesticides, etc. are not permitted in solid waste containers.
- Do not mix wastes as this can cause chemical reactions, makes reuse or recycle impossible, and complicates disposal.
- Ensure vehicles transporting wastes are supplied with spill prevention equipment that secures waste during transport, and spill response materials in the event a spill occurs.
  - Vehicles equipped with baffles and sealed gates can prevent liquid waste spills. Vehicles equipped with spill guards prevents solid waste spills.

Chemical and Hazardous Wastes

- Designate separate hazardous waste collection areas at each facility.
- Store hazardous materials and wastes per local, state, and federal codes including fire hazard compliance.
- Place hazardous waste containers in secondary containment.
- Ensure hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Reusing or recycling hazardous wastes is not permitted and proper disposal is required by a licensed hazardous waste handler.

Run-on and Runoff Prevention

- Prevent stormwater run-on from entering the waste management area by enclosing the area or building a berm, and covering the area to prevent contact with rain.
- Acceptable covers are permanent structures or temporary covers like reinforced tarpaulin, polyethylene, polyurethane, or chlorosulfonated polyethylene (CSPE) sheets.
- Cover waste piles, waste receptacle areas, and dumpsters.
- Inspect covers and waste receptacles for holes, cracks and damage and take out of use, repair, and replace to prevent stormwater contact with waste.
- Move waste management activities indoors when all safety concerns such as fire hazard and ventilation are addressed.

Inspection Considerations

- Establish a routine inspection schedule of all waste management activities and equipment including:
  - Pumps, hoses, and machinery used for waste collection and transfer
  - Dumpsters, waste receptacles, and cleaning equipment
  - Spill prevention and response supplies
  - Valves, lines, seals, and pumps

  - Temporary and permanent waste pile and waste area covers
  - Schedules of waste collection from receptacles to prevent overflow
  - Note areas with litter problems
- Take out of use, repair whenever possible, and replace before using damaged equipment.
- Correct waste receptacle schedules when overflow occurs.
- Place additional “No Littering” signage where litter problems occur and rethink waste receptacle placements and quantities.

Training

- Train new and existing staff continuously about pollution prevention and waste handling/disposal.
- Provide employees and contractors with proper spill containment and cleanup procedure training as outlined in the ‘Spill Prevention and Response’ fact sheet. Each employee should have the tools and knowledge to immediately initiate a response to a spill if one should occur.
- Train employees and contractors in proper hazardous waste management.
- Train employees to complete thorough inspections to identify issues before they become a leak, spill, or safety concern.
- Educate employees about which materials are reusable, recyclable, or single-use, and other waste reduction techniques as outlined in this fact sheet.
- Ensure all employees have a working knowledge of this document.

APPENDIX

B FIELD PROGRAM SOURCE CONTROL MEASURES

FSC-1
GRAFFITI AND PAINT REMOVAL

Purpose

Graffiti and paint are removed from portable toilets, bus shelters and interior walls of transit stations. Graffiti and paint removal includes using support equipment and graffiti and paint removal products or sanding to clean concrete walls, portable toilets, buses and LRVs. This activity may be performed indoors at an MTS Maintenance facility or onsite at a transit station or bus shelter.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Paint removal	Paint Strippers	VOCs, SVOCs
Graffiti removal products	Acids, bleaches, detergents, solvents, paint strippers	Chlorine, phosphate, VOCs, SVOCs, acetic acid, nitric acid
Painting over graffiti	Paint	Heavy metals, organic compounds
Fuel for mechanical equipment	Fuel	Total petroleum hydrocarbons, diesel range organics
Leaking maintenance vehicles	Vehicle Fluids	Oil and grease
Water associated with cleaning products	Non-stormwater	Chlorine, phosphate, VOCs, SVOCs
Sanding equipment	Fugitive Dust	Particulates (PM_{10} $PM_{2.5}$)
Graffiti removal products	Acids, bleaches, detergents, solvents, paint strippers	Chlorine, phosphate, VOCs, SVOCs, acetic acid, nitric acid
Mixing paint	Paint thinner/Mineral Spirits	Organic compounds, sulfuric compounds

Application

The following procedures are used where graffiti or paint removal is required at bus shelters and interior walls of transit stations. These procedures are required when grit and non-stormwater may pollute stormwater runoff or discharge to storm water drainage systems and watercourses

Limitations

The BMPs presented for this activity provide operating methods or measures only for storm water pollution prevention. The applicable local, state and federal hazardous materials, employee safety and fire prevention requirements are not presented.

Operational Procedures

- This activity shall not be performed during rain events or prior to predicted rain events.
- Secure paint while transporting to avoid spills.

- Protect drain inlets and watercourses from potential spills (see Storm Drain Inlet Protection fact sheet).
- Tarps and similar control measures should be used to prevent spills or material drift from being deposited into storm water drainage system or watercourses.
- Only MTS pre-approved graffiti removal products should be used.
- Mix paint indoors or in a containment area away from drain inlets.
- Water used for cleaning and decontamination shall not be allowed to enter storm water drainage system or watercourses.
- Waste from cleaning paint equipment or brushes should be collected and put into a bucket or drum with a secure lid for transport back to the maintenance facility to be reused, recycled or disposed of properly.
- Paint waste, especially if it is oil based or contains paint thinner, would need approval from the publicly owned treatment works to dispose of in sewer.
- Solid waste should be collected by vacuum or sweeping and secured in an appropriate container for transport back to the Maintenance facility to be reused, recycled or disposed of properly.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials according to the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.
- The following operational procedures shall be used for graffiti and paint removal from portable toilets, buses and LRVs
  - Remove paint from buses and LRVs inside the paint booth building at the Maintenance facility
  - Remove paint from portable toilets onsite, wherever the portable toilet is located
  - Protect internal drain inlets; inspect drains every 2 to 3 weeks
  - Clean surface of buses, LRV and portable toilet with a damp cloth
  - Use suction sanders for paint and graffiti removal
  - Any remaining solid waste should be collected by sweeping and secured in an appropriate container with a lid

FSC-2
GROUNDS MAINTENANCE AND LANDSCAPING

Purpose

Grounds maintenance at MTS facilities includes care of landscaped areas and sweeping pavements. As referenced in the MTS Landscape Design and Maintenance Plan (WSP, 2019), trees and shrubs of planted landscape vegetation along the MTS right-of-way are pruned to preserve their health, protect utilities, maintain sight distances, preserve aesthetics and prevent property damage. Remove dead or diseased branches, trees and shrubs to protect public safety.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Sweeping and handling of vegetation, litter and sediment	Trash, vegetation debris and sediment	Plastics, suspended solids, organic matter, invasive species
Chemical vegetation control	Fertilizers – organic and inorganic Pesticides and Herbicides Lime Aluminum Sulfate Sulfur-Elemental Soil Amendments	Nitrates, phosphates Organic compounds Alkalinity, pH Total Dissolved Solids Sulfate BOD, COD, Sulfate, Total Organic Carbon, Calcium, Sulfate
Unstable earth from dying or damaged vegetation	Soil from erosion and runoff Natural Earth (Sand, Gravel and Topsoil)	Sediment, particulate matter Turbidity, Sediment
Irrigation of landscaped areas	Non-stormwater runoff Fertilizers – organic and inorganic Pesticides	Suspended solids, particulate matter, turbidity Nitrates, phosphates Organic compounds
Washing equipment	Soil Non-stormwater Fertilizers Pesticides Vegetation Clippings	Sediment, suspended solids Chlorine Nitrates, phosphates Organic compounds

		Nitrates, phosphates, invasive species
Fueling of mowing, blowing, and other motorized groundskeeping equipment	Petroleum products	Organic compounds, oils and grease, diesel range organics

Application

The following procedures are used where grounds maintenance may pollute storm water runoff or discharge to storm water drainage system and watercourses.

Operational Procedures

- The MTS facility should be routinely swept to keep litter and sediment out of drainage systems.
- Apply fertilizers and pesticides sparingly and in accordance with the label instructions and the Landscape Design and Maintenance Plan (WSP, 2019). Refer to the Safety Data Sheet (SDS).
- Do not remove original product label from chemical containers as it contains important spill cleanup and disposal information.
- Use the entire product before disposing of the container.
- If a product is concentrated and must be diluted, before use, transfer the diluted product to a secondary container. Ensure that the secondary label complies with the labelling requirements of the globally harmonized system (GHS).
- Avoid excessive irrigation of landscaped areas to minimize potential runoff.
- Control erosion and sediment runoff by referencing the BMPs in the MTS Storm Water Management Plan (WSP, 2019) or the Post Construction Stormwater Management Manual (WSP, 2020)
- Preserve existing vegetation and replace damaged vegetation as needed.
- Do not locate stockpiles near drain inlets or watercourses.
- Brush cuttings that are not chipped should be transported to the maintenance facility for proper disposal.
- All wastes should be put into containers and stored appropriately until it can be recycled or disposed of properly.
- All materials of environmental concern shall be properly stored in appropriate secure containment, in accordance with applicable state and federal regulations.
- If possible, fuel equipment at the maintenance facility before heading out to the job site. If equipment must be fueled at the job site, then do not fuel equipment near drain inlets or watercourses.
- Use the guidance provided in the SDM-3 Storm Drain Inlet Protection fact sheet to identify drain inlets and protect them from potential spills and vegetative debris.
- Keep vegetation debris, clippings and mulch out of the storm water drainage system and watercourses. Brush cuttings chipped into wood mulch should not be used at locations prone to washout.
- If rinsing equipment is necessary, wait until the end of the day. Return the equipment to the maintenance facility and rinse the equipment at yard. Sediment from equipment rinsing shall not

be discharged to the storm water drainage system or watercourses. Rinse equipment in designated rinsing areas to prevent discharge to the storm water drainage system

FSC-3
PAINTING

Purpose

Painting operations apply to the painting of buses or LRVs but may also include painting of surfaces to cover graffiti at facilities away from MTS Maintenance facilities. Routine maintenance of painting equipment is also included in this activity.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Painting	Paint, Thinners, Resins, Sealants, Solvents, Lacquers, Varnish, Enamels and Turpentine	COD, VOC, SVOC
Paint removal	Paint Strippers	VOCs, SVOCs
Fuel for mechanical equipment	Fuel	Total petroleum hydrocarbons, diesel range organics
Water associated with cleaning	Non-stormwater	Chlorine, phosphate, VOCs, SVOCs
Sanding equipment	Fugitive Dust	Particulates (PM_{10} $PM_{2.5}$)

Application

The following procedures are used where paint may pollute storm water runoff or discharge to storm water drainage system and watercourses.

Operational Procedures – Offsite Facilities

- This activity shall not be performed during rain events or prior to predicted rain events, unless required by emergency conditions.
- Make sure paint containers are secure during transport to prevent spillage to the roadway.
- Mix paint indoors away from drain inlets or in a containment area.
- Protect drain inlets and watercourses from potential spills including painting products.
- Monitor weather and wind when using spray equipment.
- Use tarps or canvas under work area to capture excess paint or paint chips. Tarps and other control measures should be used to prevent spills or material drift to watercourse (e.g., when working adjacent to water courses).
- Transfer material captured into a waste container for proper disposal at a Maintenance facility.
- Do not remove original product label from paint or other hazardous materials containers as it contains important spill cleanup and disposal information. Use the entire product before disposing of the container.
- Appropriately label all secondary containers.
- Collect all paint equipment wash water and return it to a Maintenance facility for proper disposal.

Operational Procedures – Paint Booth(s) at MTS Maintenance Facilities

- Protect internal drain inlets from potential spills including painting products.
- Close all doors of paint booth prior to implementing any painting operation
- Clean affected surface of vehicle with a damp cloth
- Perform painting in a contained area within booth and ensure downdraft is conveyed to the filtration chamber
  - Dispose of filter at a frequency recommended by the manufacturer
  - Discard VOC waste in designated drum with secondary containment
- Use shop vac at rails to remove any water
  - Dispose of water in designated drum in the containment area
  - Ensure contractor removes drum for disposal on a weekly basis
- Sweep up solid waste daily and place in trash can with lid

FSC-4
PRESSURE WASHING

Purpose

BRT Stations, trolley platforms, MTS O&M facilities and bus shelters are cleaned by power washing regularly. Tasks include the operation of washing equipment, vacuums, storm drain inlet protection devices and sweeper vehicles.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Pressure washing	Runoff	Suspended Solids/Sediment, Debris, Trash
	Cleaning products	Acids, Chlorine, Phosphate
	Chlorinated water	Chlorine

Application

The following procedures are used at MTS BRT Stations, trolley platforms and bus shelters. Cleaning activities may pollute stormwater runoff or discharge to storm water drainage systems and watercourses.

Operational Procedures

- If possible, check the pressure washing unit prior to heading out to the job site. This includes:
  - Removing dirt or debris from the screen on the intake hose
  - Checking all hoses and connections for water leaks
  - Replenishing oil levels in the motor and pump mechanism
  - Fueling the motor with unleaded gasoline
  - Fueling the burner tank on the hot pressure washer with diesel
- If outdoor cleaning is required, this activity shall not be performed during rain events or prior to predicted rain events.
- Identify all drain inlets, watercourses and manholes and protect from potential spills including sediment, debris and wash water (See 'Storm Drain Inlet Protection' fact sheet).
- Do not use sand bags in lieu of other storm drain inlet protection devices as they create sediment loads in the drainage system when ruptured.
- Prior to power washing, dry clean the area (sweep, collect, and dispose of debris and trash).
  - Use a street sweeper to remove sediment and debris from transit driveways and paved concrete areas.
- For power washing MTS bus shelters and benches, identify the low point in the gutter and install a temporary trap using a sand snake.
  - Use a wet vac to collect the accumulated wash water from the temporary trap
    - Filter and recycle wash water, or
    - Transfer wash water to a tank on the truck for reuse or proper disposal
    - Ensure all surfaces are dry prior to leaving the job site
- Water used for cleaning shall not be allowed to enter storm water drainage system or watercourses.

  - At BRT Stations, recycle wash water back through the washing system or convey water to a landscaped area.
  - If detergent is required for heavily soiled areas at MTS bus shelters
    - Use safer alternative products approved by MTS Environmental Health & Safety Specialist
    - Collect accumulated wash water and transfer to a tank on the truck for proper disposal
    - At times, wash water is transferred to a clarifier at the Maintenance Facility for offsite discharge.
- The MTS Environmental Health & Safety Specialist Supervisor must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless.
- Use the materials according to the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.

FSC-5
SANITARY/SEPTIC WASTE MANAGEMENT

Purpose

Portable toilet units are used at locations where permanent bathrooms are unavailable. Sanitary/septic waste management procedures and practices are designed to minimize or eliminate the discharge of sanitary/septic waste to storm drain systems or watercourses.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Spills	Wastewater	E. coli, fecal coliform, bacteria and pathogens
	Biocides	Chlorine most common; check SDS
	Detergents	Surfactant

Application

Sanitary/septic waste management practices shall be implemented at all MTS facilities that use portable toilet units. Proper sanitary and septic waste management requires providing well-maintained facilities and arranging for regular service and disposal.

Implementation

MTS contracts with a vendor for portable toilet service and maintenance. The vendor is responsible for ensuring that the sanitary wastes are properly disposed per local and state requirements for sewage disposal or as a hazardous waste. Temporary toilet units are serviced three times per week; permanent toilet units are serviced daily.

Operational Procedures

- Locate portable toilets away from drainage facilities, watercourses and from traffic circulation.
- If site conditions allow, locate portable toilets at least 50 feet away from drainage conveyances, gutters and traffic areas. When subjected to risk of high winds, portable toilets shall be secured to prevent overturning.
- Portable toilets shall be equipped with double containment and an undertray to prevent the discharge of pollutants to the stormwater drainage system or receiving water.
- To prevent leakage, inspect portable toilet units during maintenance.
  - If graffiti is observed, the unit shall be cleaned immediately.
- Vacuum all waste and liquid onsite by pumping liquid waste into the tank of the vacuum truck.
  - Vacuum truck is designed with a holding capacity of 900 gallons for waste and 400 gallons of water
- Inspect hose and connections to prevent leaks during vacuum operations
- Sanitary/septic waste should be discharged to a sanitary sewer or disposed of as a hazardous waste by a licensed hauler.

- Sanitary/septic waste storage and the disposal procedures should be managed to prevent non-storm water discharge.
  - If there is a spill, use bleach, pump accumulated liquid waste into the tank of the vacuum truck and follow the procedures in SC-10, Spill Prevention and Response fact sheet.

FSC-6
SURFACE REPAIR

Purpose

Minimizing the risk of pollutants such as silica, hydrocarbons, oil, grease, and heavy metals from entering the storm drain system by implementing surface repair operations.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Surface Repair	Hot Asphalt	Polycyclic Aromatic Hydrocarbons, Silica, and Total Petroleum Hydrocarbons
	Asphalt Emulsion	
	Liquid Asphalt (tack coat)	
	Seal Coat	
	Cold Mix	
	Crumb Rubber	
	Asphalt Concrete (Any type)	

Application

The following procedures are used to reduce the risk of stormwater pollution during surface repair operations that MTS employees and subcontractors conduct at MTS maintenance facilities, bus and trolley terminals and parking lots.

Operational Procedures

- Protect nearby storm drain inlets, manholes and watercourses with waterproof material or mesh before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until the entire job is complete and until all water from emulsified oil sealants has drained or evaporated. Using dry methods if possible, clean any debris from these covered manholes and drains for proper disposal.
- Schedule concrete, asphalt, and seal coat repairs during dry weather and not prior to predicted rain events to prevent contamination by contacting stormwater runoff.
- Pre-heat, transfer, and load hot bituminous material away from storm drain inlets.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.
- When working on a bridge or platform, use suspended netting, tarps, additional vacuums and/or berms to contain materials.
- Store materials away from streets, gutter areas, storm drain inlets, watercourses, and irrigation (sprinklers). During wet weather, inspect stored materials to ensure stormwater is not transporting pollutants into the storm system.
- Tarps and similar control measures should be used to prevent spills or material drift from storage areas in wet and dry weather.
- If dust control is required, completely block the storm drain and use only as much water to achieve dust control and to avoid runoff.

- Dry-sweep and never hose down streets during cleanup. Use a hand broom, street sweeper or vacuum truck. Never dump vacuumed liquid into storm drains. Reuse, recycle or properly dispose waste materials.
- When cleaning heavy oil deposits, use absorbent materials on oil spots prior to sweeping or washing and dispose of used absorbents properly.
- Water used for cleaning and decontamination shall not be allowed to enter storm water drainage system or watercourses.
- The MTS Environmental Health and Safety Specialist must approve safer alternative products.
- Approved safer alternative products should be used where practical and effective.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses.
- Ensure employees understand common spill prevention and response practices (see 'Spill Prevention and Response' fact sheet).

FSC-7
VEGETATION CONTROL/MOWING

Purpose

Mowing includes removal of grasses and weeds at facilities, and within the MTS right-of-way using machinery and mobile equipment. Mowing is used to protect preferred vegetation, to maintain unobstructed views and to improve MTS facility appearance.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Vegetation	Clippings, Fertilizers	Invasive Species, Sediment, Debris, Nitrates
Vehicles and Equipment	Leaks, Brake Dust	Oil and Grease, Metals
Equipment fueling	Fuel	Total Petroleum Hydrocarbons, Diesel Range Organics
Equipment Rinsing	Non-stormwater	Sediment, Debris, Chlorine

Application

The following procedures are used to prevent releases of clippings, sediment and equipment fluids to the storm water drainage system and watercourses.

Operational Procedures

- If possible, fuel equipment at the maintenance facility before heading out to the job site. If equipment must be fueled at the job site, then do not fuel equipment near drain inlets or watercourses.
- Identify drain inlets and protect them from potential spills and vegetative debris.
- Keep vegetation and clippings out of the storm water drainage system and watercourses. Collect vegetation and clippings and transfer them to the maintenance facility for disposal as a solid waste.
- If rinsing equipment is necessary, wait until the end of the day. Return the equipment to the maintenance facility and rinse the equipment at yard. Sediment from equipment rinsing shall not be discharged to the storm water drainage system or watercourses. Rinse equipment in designated rinsing areas, such as wash bays, to prevent discharge to the storm water drainage system.

APPENDIX

C STORM DRAIN MAINTENANCE MEASURES

SDM-1
DRAINAGE SYSTEM MAINTENANCE

Purpose

The stormwater conveyance system collects and transports urban runoff that contains contaminants, therefore debris, litter, and pollutants collect within the drainage system.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Catch Basin Debris	Urban runoff	Suspended Solids/Sediment, Trash and Debris, Pathogens
	Brake pad dust	Metals
	Pesticides	Organics
	Chlorinated water for flushing	Chlorine
	Fertilizers	Nutrients
	Vehicle Fluids	Oil and Grease

Application

Routine maintenance of catch basins, stormwater inlets, and other stormwater conveyance structures will remove pollutants and debris from the system resulting in prevention of clogging the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system flows properly to avoid flooding. In combination with the source control methods of storm water pollution prevention outlined in the other BMP fact sheets, cleaning and maintenance is a critical part of a successful stormwater pollution prevention plan.

Operational Procedures

- Utilizing methods outlined in the 'Storm Drain Inlet Protection' fact sheet will prevent and greatly reduce the frequency and volume of waste in the drainage system.
- MTS staff shall regularly inspect facilities to ensure the following activities are performed in a timely manner:
  - Inspect catch basins, sumps, inlet structures and pipes, and clarifiers for deterioration threatening structural or performance integrity.
  - Clean sumps before they are 40% full. Clean catch basins frequently and when debris is noticed during inspection to lengthen time between sump cleanings due to 40% capacity.
  - Ensure stenciled warnings (see Waste Handling and Disposal fact sheet) remain visible and legible (e.g. "Dump No Waste, Drains to River").
- Clean catch basins, storm drain inlets structures, and clarifiers before the wet season to remove sediments and debris accumulated during summer.
- Conduct inspections more often during the wet season, and clean and repair as soon as an issue or problem arises.
- Keep accurate logs of inspections; detailing cleanings, repairs, and high sediment or trash accumulation areas and the amount of waste collected at each specific location.

- Handle and store wastes as outlined in the 'Waste Handling and Disposal' fact sheet to prevent discharge back to the storm drain through run-on, runoff, or mishandling.
- Cleaning of small devices may be done manually, but many will need mechanical cleaners like eductors, vacuums, or bucket loaders.

Conveyance System

- In pipes with deposit problems, develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent with a vacuum truck and ensure proper disposal.
- Clean conveyance systems and any pumps prior to the wet season to remove silt and trash, and ensure proper disposal.
- Conduct routine inspections of pumps and the conveyance system and clean and repair as necessary in addition to the scheduled cleanings.

Chemical and Hazardous Waste

- If what is suspected to be hazardous waste is found, immediately dispose of any contaminated water and debris properly per local, state and federal codes including fire hazard compliance.
- Refer to the 'Spill Prevention and Response' fact sheet for thorough steps in managing leaks, spills, and waste within the stormwater system.

Training

- Train MTS maintenance staff and MTS vendors for a thorough understanding of this fact sheet, and associated fact sheets pertaining to drainage system maintenance activities.
- Only properly trained individuals can handle hazardous materials and wastes.
- Train all employees (drivers, maintenance workers, painters, etc.) to recognize and report illegal dumping and illicit discharges to supervisor and Environmental Health and Safety Specialist.
- Train staff as to what is permitted to go down the drain, and what needs filtration, sedimentation, conveyance to the sanitary sewer, or is considered waste to be disposed of.

SDM-2
STORM DRAIN & CATCH BASIN MAINTENANCE

Purpose

Catch basins trap trash, sediment, decaying debris and other solids from stormwater runoff. Catch basin cleaning reduces foul odors, prevents clogs in the storm drain system, and reduces the loading of suspended solids, nutrients and bacteria to receiving waters.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Catch Basin Debris	Urban runoff	Suspended Solids/Sediment, Trash and Debris, Bacteria and Pathogens
	Brake pad dust	Metals
	Pesticides	Organics
	Fertilizers	Nutrients
	Chlorinated water for flushing	Chlorine
	Vehicle Fluids	Oil and Grease

Application

Routine maintenance of catch basins and storm drains will remove pollutants and debris from the system resulting in prevention of clogging the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system flows properly to avoid flooding. In combination with the source control methods of storm water pollution prevention outlined in the other BMP fact sheets, cleaning and maintenance is a critical part of a successful stormwater pollution prevention plan (SWPPP).

Operational Procedures

Inspection

- Conduct catch basin inspections more often during the wet season, and clean and repair as soon as an issue or problem arises.
- Inspect storm drains twice per year (biannually).
- During the inspection, if the drainage facility has trapped sediment and/or debris and the level is at approximately 20 percent or more, maintenance is required.
- During the inspection MTS staff shall regularly check for evidence of illicit discharges and deterioration threatening structural or performance integrity.
- Report any suspected illegal connections, illicit discharges or illegal dumping to the Environmental Health and Safety Specialist at: 619-446-4920
- Ensure stenciled warnings (see Waste Handling and Disposal fact sheet) remain visible and legible (e.g. "Dump No Waste, Drains to River").
- Keep accurate logs of inspections; detailing cleanings, repairs, and high sediment or trash accumulation areas and the amount of waste collected at each specific location.

Maintenance

- Clean catch basins frequently and when observations indicate that basin is more than 40 percent full.
- Clean storm drains when observations indicate that the drainage facility is more than 20 percent full.
- Clean filter units in the Continuous Deflector System (CDS) and the filters associated with the catch basin inserts.
- Clean catch basins before the wet season to remove sediments and debris accumulated during summer.
- Using a shovel or clamshell bucket, remove solid waste (e.g., sediment, leaves, twigs, sand, trash) from the catch basin and dispose of as a solid waste. No solid waste material may re-enter the MS4.
- Using a mini-vactor truck dewater standing liquid in catch basin and storm drainage facility. Transfer liquid waste to an appropriate disposal facility. Liquid waste may not re-enter the MS4.
- If flushing is required, use water from a fire hydrant and ensure water from jetting and flushing inlets and lines is not discharged into the storm drain system.

Solid and Liquid Waste Handling

- Use a mini-vacuum truck to vacuum flush water downstream while jetting and flushing inlets and lines upstream.
- Decant wastewater from the vactor truck into the sanitary sewer, if permitted. Water may need to be filtered prior to discharge to sanitary sewer.
- If discharge to sanitary sewer is not allowed, pump or vacuum to a tank for proper disposal. Do not dewater near a storm drain.
- Solids and/or debris shall be sent to a waste disposal facility.
- If necessary, stockpile debris removed from catch basin and storm drain in an area that has an impervious surface or liner or in a temporary/satellite storage area or container. Follow stockpile management guidelines for debris stockpiles (see Figure 1).
- Always inspect and maintain the debris storage area. Check area for run-on, run-off and debris scattering.
- Remove debris from the temporary storage area and transfer to the permanent disposal site regularly.
- Sample collected sediments for waste profiling or if illicit discharges in the watershed have occurred.

Chemical and Hazardous Waste

- MTS requires waste profiling of any soil or sediment.
  - Contact the Environmental Health and Safety Specialist if a chemical spill is suspected.
  - If the solid or liquid waste is suspected to be a hazardous waste, immediately dispose of any contaminated water and debris properly per local, state and federal codes including fire hazard compliance.
- Refer to SC-10 Spill Prevention and Response fact sheet for thorough steps in managing leaks, spills, and waste within the stormwater system.

Training

- Train MTS maintenance staff and MTS vendors for a thorough understanding of this fact sheet, and associated fact sheets pertaining to drainage system maintenance activities.
- Only properly trained individuals can handle hazardous materials and wastes.
- Train all employees (drivers, operations staff, maintenance workers, facility crews, painters, etc.) to recognize and report illegal dumping.
- Train staff as to what is permitted to go down the drain, and what needs filtration, sedimentation, conveyance to the sanitary sewer, or is considered waste to be disposed of.

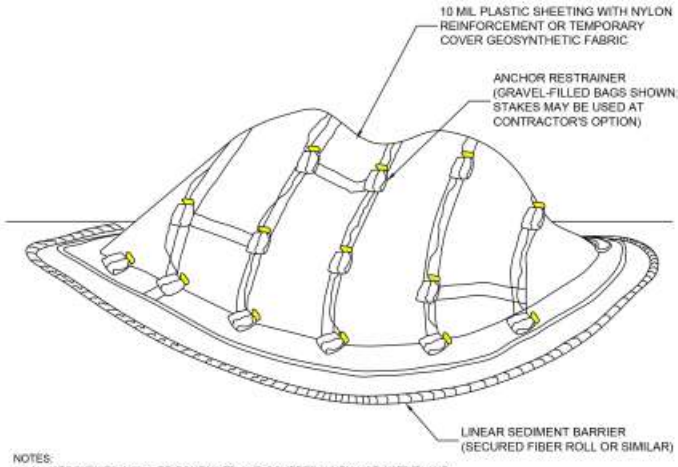


Figure 1. Stockpile Management for Temporary Storage of Solids and Debris

SDM-3
STORM DRAIN INLET PROTECTION

Purpose

Every storm drain inlet receiving runoff from active work areas should be protected. Inlet protection is used for maintenance activities, such as hot and cold pressure washing, to capture solid materials and prevent pollutants from entering the storm drain system.

Pollutants of Concern

Source	Material(s)	Pollutant(s) of Concern
Catch Basin Debris	Runoff from active work area	Suspended Solids/Sediment; oil and grease; trash and debris; metals; nitrate; phosphate; organics
Pressure Washing	Non-stormwater	Chlorine
	Cleaning products	Acids, chlorine, phosphate

Limitations

- Drainage area should not exceed 1 acre.
- Straw bales or sandbags should not be used.
- Requires an adequate area for water to pond without flooding structures and property or creating a hazard.
- Frequent maintenance may be required during extended periods of O&M to remove captured materials and pollutant build up and to ensure the efficacy of the inlet protection.

Design and Layout

Identify existing storm drain inlets that have the potential to receive runoff from the O&M activity.

- Anticipate where ponding and diversion may occur when selecting the most effective and safe use of storm drain inlet protection.
  - Determine the acceptable location and extent of ponding near the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection without flooding structures and property or creating a hazard.
  - Determine the extent of potential runoff diversion caused by the type of inlet protection. Ponded runoff may flow around the device towards the next downstream inlet and in some cases, this is acceptable; in other cases, downstream property damage may occur. The possibility of runoff diversions will influence if storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- Appropriate placement of the inlet protection device(s) usually controls the location and extent of ponding, and the extent of diversion. In some cases, moving the inlet protection a short distance upstream of the inlet can reduce flow velocity and increase the efficiency of sediment control, limit ponding to desired areas, and prevent or control diversions.
  - Placement of protection upstream of the inlet creates the possibility of using secondary protection downstream to handle anticipated runoff diverted by the primary device or when space is too limited for the primary device to handle anticipated flow.
- Four types of inlet protection are presented below.

Type 1: Gravel bag barrier: Used to create a small sediment trap upstream of inlets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
Type 2: Temporary Geotextile Storm Drain Inserts: Different products provide different features. Refer to the manufacturer's specifications for targeted pollutants, additional features and installation guidelines.
Type 3: Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
Type 4: Fiber Roll: Allow filtered run-off to pass through the roll while retaining sediment and potentially other pollutants.

- Regardless of the type of storm drain inlet protection chosen, removal of all devices shall occur immediately following completion of O&M, and all materials shall be stored for reuse and recycled whenever possible while waste is disposed of properly. Remove sediment accumulation using dry methods.

Installation

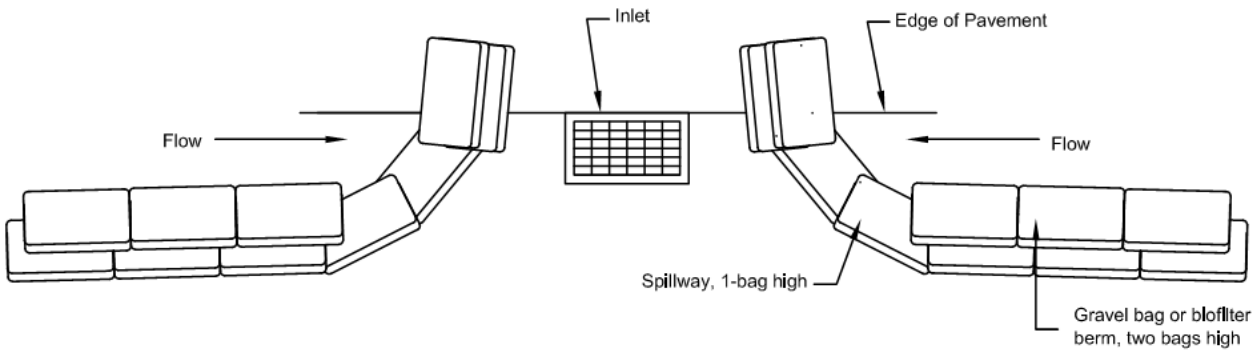
- Type 1 - Gravel bag – Gravel bags should be used due to their high permeability and capability to handle flows greater than 0.5 cfs. Construct the gravel bag berm per typical installation details below.
  - Construct on gently sloping street.
  - Leave room upstream of barrier for water to pond and solid materials to settle.
  - Place two layers of gravel bags – overlapping the bags and packing them tightly together.
  - Leave a gap of one bag on the top row to serve as a spillway.
  - Turn the ends of the gravel bag barriers up slope to minimize runoff diversion around the berm.
  - Bag Material: Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with ASTM D3786, and UV stability exceeding 70% in conformance with ASTM D4355.
  - Bag Size: Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and weight of approximately 33 lbs.
  - Fill Material: Fill material should be 0.5 to 1.0 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.
- Type 2 – Temporary Geotextile Insert (proprietary) – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable, and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer's specifications for installation. Following the O&M activity, the insert shall be cleaned and stored per manufacturer's instructions and stored at the maintenance facility. These can be used in tandem with the other BMPs, or as a stand-alone device when minimal ponding is expected due to light sediment collection.
- Type 3 - Biofilter bags – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed below.
  - Construct in a gently sloping area.
  - Biofilter bags should be placed around inlets to intercept runoff flows.

  - All bag joints should overlap by 6 in., not abutted.
  - Bags are filled with 100% recycled wood product waste.
  - Leave room upstream for water to pond and for solid materials to settle out.
  - Stake bags to the ground if possible. Stakes may be omitted if bags are placed on a paved surface.
  - Bags will rapidly fill with sediment and reduce permeability.
  - Not effective where water velocities or volumes are high, as the Biofilter bag is potentially buoyant during high flow rates.
  - When staked into ground:
    - Lay into a 1 to 2 in. deep trench with a width equal to the bag.
    - Drive one stake at each end of the bag.
    - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
  - Biofilter media may be used on-site, if allowed.
- Type 4 – Fiber Rolls – Fiber rolls are biodegradable material wrapped by netting. Some fiber rolls are weighted with gravel cores for use on paved areas.
  - Not intended for use when high flows are expected above 0.5 cfs.
  - Effective when anchored with gravel bags or when gravel core fiber rolls are used for paved applications.
  - Fiber rolls are prefabricated, and may contain polyacrylamide (PAM), a flocculating agent, to provide additional sediment removal. PAM fiber rolls are used in areas with fine, clayey, or silty soils to provide additional sediment removal capabilities.
  - All bag joints should overlap by 6 in., not abutted.

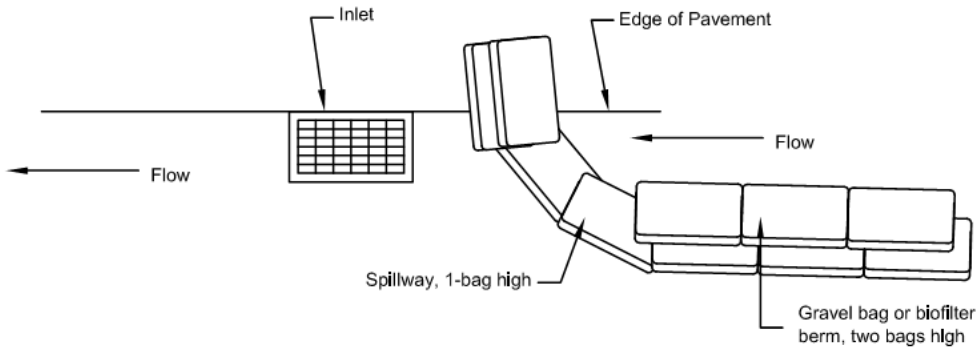
Operational Procedure

- Sediment that accumulates in the BMP should be periodically inspected and removed to maintain BMP effectiveness, and no later than when accumulation reaches one-third the designated sediment storage depth.
- Remove storm drain inlet protection after the O&M activity is completed.
- Clean area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris after the O&M activity is completed.
- If wash water was conveyed to a dead-end sump, the sump should be serviced regularly.
- Wash water containing cleaning solutions such as detergents, degreasers or hydrocarbons shall be prevented from entering the storm water drainage system or watercourses.
- While safer alternative products may be less harmful to the environment, they are not harmless. Use the materials per the manufacturer's instructions and keep the materials out of the storm water drainage system and watercourses using the storm drain inlet design and installation specifications.

BMP Protection Type 1 and 3



TYPICAL PROTECTION FOR INLET ON SUMP



TYPICAL PROTECTION FOR INLET ON GRADE

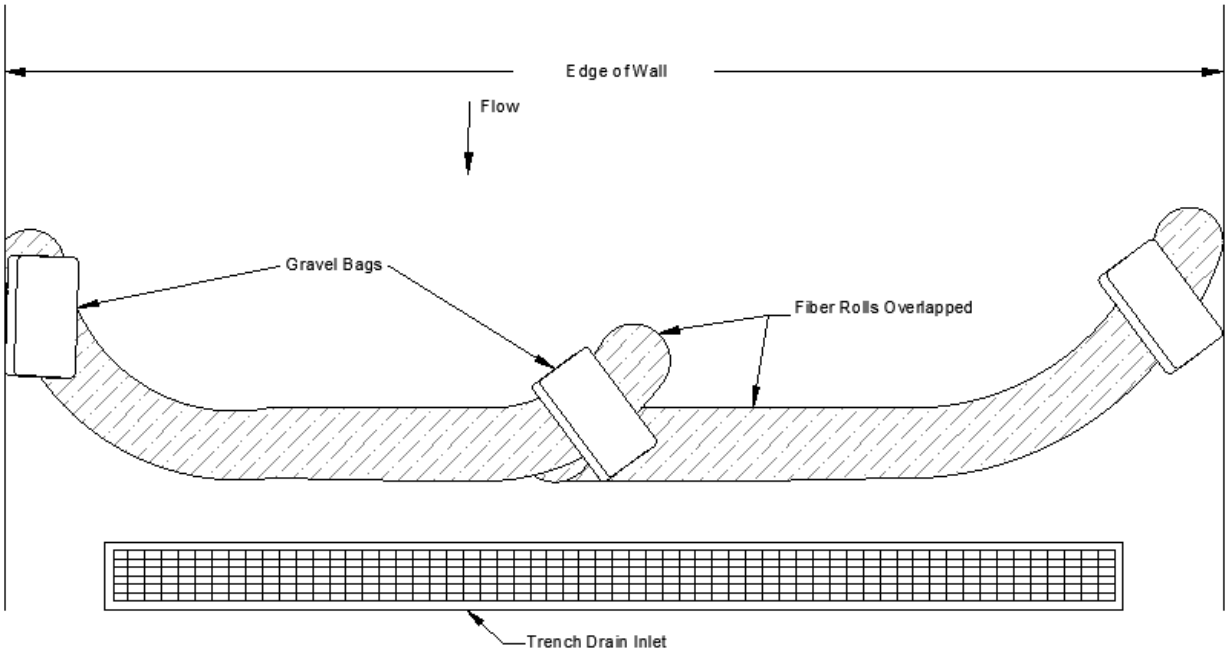
NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed.
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even though it is not immediately adjacent to the inlet.

BMP Protection Type 2

Refer to the manufacturer's specifications for targeted pollutants, additional features and installation guidelines.

BMP Protection Type 4



TYPICAL FIBER ROLL INSTALLATION ON GRADE

NOTES:
1. Intended for short-term use.
2. Use to inhibit non-storm water flow and prevent stormwater pollution.
3. Allow for proper maintenance and cleanup.
4. Rolls must be removed after adjacent operation is completed.
5. Gravel bags are placed to anchor the fiber roll and at overlap locations.

APPENDIX

D STORMWATER TREATMENT MEASURES

INF-1
Infiltration Basin

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP INF-1 INFILTRATION BASIN

An **infiltration basin** typically consists of an earthen basin with a flat bottom constructed in uncompacted native soils. An infiltration basin retains storm water and allows it to evaporate and/or percolate into the underlying soils. Infiltration basins can also be constructed as linear trenches or as underground infiltration galleries. Typical infiltration basin components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Forebay to provide pretreatment, or other pretreatment device (e.g., drainage inlet inserts, hydrodynamic separator installed within storm drain system)
- Surface ponding for captured flows
- Vegetation or other surface cover such as mulch or rocks selected based on basin use, climate, and ponding depth
- Uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Infiltration basins require routine maintenance to: remove accumulated materials such as sediment, trash or debris from the forebay and the basin; maintain vegetation health if the BMP includes vegetation; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the underlying native soils, or clogging of covers applied at the basin surface such as topsoil, mulch, or rock layer. The specific cause of the drainage issue must be determined and corrected. For surface-level basins (i.e., not underground infiltration galleries), surface cover materials can be removed and replaced, and/or native soils can be scarified or tilled to help reestablish infiltration. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, or if the infiltration surface area is not accessible (e.g., an underground infiltration gallery) the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation has filled the forebay or other pretreatment device within one month, or if no forebay or other pretreatment device is present, has filled greater than 25% of the surface ponding volume within one maintenance cycle. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require adding a forebay or other pretreatment measures within the tributary area draining to the BMP to intercept the materials if no pretreatment component is present, or increased maintenance frequency for an existing forebay or other pretreatment device. Pretreatment components, especially for sediment, will extend the life of the infiltration basin.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

If the infiltration basin is vegetated: Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

INF-1
Infiltration Basin

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris in forebay and/or basin	Remove and properly dispose of accumulated materials, (without damage to vegetation when applicable).	• Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found within the infiltration area at each inspection. • When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the infiltration area.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Poor vegetation establishment (when the BMP includes vegetated surface by design)	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation (when the BMP includes vegetated surface by design)	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation (when the BMP includes vegetated surface by design)	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in infiltration basin without subsurface infiltration gallery for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Standing water in subsurface infiltration gallery for longer than 24-96 hours following a storm event	This condition requires investigation of why infiltration is not occurring. If feasible, corrective action shall be taken to restore infiltration (e.g., flush fine sediment or remove and replace clogged soils). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-1 INFILTRATION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. For subsurface infiltration galleries, ensure access covers are tight fitting, with gaps or holes no greater than 1/16 inch, and/or install barriers such as inserts or screens that prevent mosquito access to the subsurface storage. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.

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https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet INF-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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INF-1
Infiltration Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Materials must be removed from the forebay when the forebay is 25% full*. In any case, materials must be removed if accumulation blocks flow to the infiltration area. Materials must be removed from the infiltration area any time accumulation is observed in the infiltration area. Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, (without damage to the vegetation when applicable) ☐ If accumulation within the forebay is greater than 25% in one month, increase the inspection and maintenance frequency** ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).
**If no forebay is present, if sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month, add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials.

INF-1
Infiltration Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Poor vegetation establishment (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Dead or diseased vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

INF-1
Infiltration Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

INF-1
Infiltration Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-1 INFILTRATION BASIN PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in infiltration basin without subsurface infiltration gallery for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. ☐ Other / Comments:		
Standing water in subsurface infiltration gallery for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ If feasible, take corrective action to restore infiltration (e.g., flush fine sediment or remove and replace clogged soils). BMP may require retrofit if infiltration cannot be restored. The [City Engineer] shall be contacted prior to any repairs or reconstruction. ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or subsurface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the underlying native soils, or clogging of covers applied at the basin surface such as topsoil, mulch, or rock layer. The specific cause of the drainage issue must be determined and corrected. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, or if the infiltration surface is not accessible (e.g., an underground infiltration gallery) the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

INF-2
Bioretention

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP INF-2 BIORETENTION

Bioretention (bioretention without underdrain) facilities are vegetated surface water systems that filter water through vegetation and soil, or engineered media prior to infiltrating into native soils. Bioretention facilities are designed to infiltrate the full design capture volume (DCV) into native soils. They have no underdrain, and no impermeable liner. Typical bioretention components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the optional aggregate storage layer
- Optional aggregate storage layer for additional infiltration storage
- Uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Bioretention requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underlying native soils, or outlet structure. The specific cause of the drainage issue must be determined and corrected. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Bioretention is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-2 BIORETENTION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR INF-2 BIORETENTION (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or repairing/replacing clogged or compacted soils. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
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San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet INF-2.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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INF-2
Bioretention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-2 BIORETENTION PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-2 BIORETENTION PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-2 BIORETENTION PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-2 BIORETENTION PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

INF-2
Bioretention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR INF-2 BIORETENTION PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or repairing/replacing clogged or compacted soils. ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected. If it is determined that the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria because the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

PR-1

Biofiltration with Partial Retention

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP PR-1 BIOFILTRATION WITH PARTIAL RETENTION

Biofiltration with partial retention facilities are vegetated surface water systems that filter water through vegetation and soil or engineered media prior to infiltrating into native soils, discharge via underdrain, or overflow to the downstream conveyance system. These BMPs have an elevated underdrain discharge point that creates storage capacity in the aggregate storage layer. Typical biofiltration with partial retention components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration with partial retention requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.

- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Biofiltration with partial retention is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

PR-1
Biofiltration with Partial Retention

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Underdrain clogged	Clear blockage.	• Inspect if standing water is observed for longer than 24-96 hours following a storm event. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
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http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

PR-1

Biofiltration with Partial Retention

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR PR-1 BIOFILTRATION WITH PARTIAL RETENTION PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

BF-1
Biofiltration

BMP MAINTENANCE FACT SHEET
FOR
STRUCTURAL BMP BF-1 BIOFILTRATION

Biofiltration facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Biofiltration facilities have limited or no infiltration. They are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Typical biofiltration components include:

- Inflow distribution mechanisms (e.g., perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure

Normal Expected Maintenance

Biofiltration requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Biofiltration is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

BF-1
Biofiltration

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	• Inspect annually. • Maintenance when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR BF-1 BIOFILTRATION (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Underdrain clogged	Clear blockage.	• Inspect if standing water is observed for longer than 24-96 hours following a storm event. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet BF-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, without damage to the vegetation ☐ If sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month (25% full*), add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials. ☐ Other / Comments:		
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		
2/3 of mulch has decomposed, or mulch has been removed Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Underdrain clogged (inspect underdrain if standing water is observed for longer than 24-96 hours following a storm event) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

BF-1
Biofiltration

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR BF-1 BIOFILTRATION PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24-96 hours following a storm event* Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

FT-2
Media Filter

BMP MAINTENANCE FACT SHEET
FOR
FLOW-THRU STRUCTURAL BMP FT-2 MEDIA FILTER

Media filters are manufactured devices that consist of a series of modular filters packed with engineered media that can be contained in a catch basin, manhole, or vault that provide treatment through filtration and sedimentation. The manhole or vault may be divided into multiple chambers where the first chamber acts as a presettling basin for removal of coarse sediment while the next chamber acts as the filter bay and houses the filter cartridges. A variety of configurations and media types are available from various manufacturers. Typical media filter components include:

- Vault for flow storage and media housing
- Inlet and outlet
- Media filters

Normal Expected Maintenance

Media filters require routine maintenance to: remove accumulated materials such as sediment, trash, and debris; replace filter cartridges; and maintain integrity of any internal components such as weirs and piping. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

The normal expected maintenance described above ensures the BMP functionality. Lapses in the normal expected maintenance can lead to clogging of the BMP and potentially blocking the storm drain system. If clogging is observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. In addition, clogged BMPs can lead to flooding, standing water and mosquito breeding habitat. Maintenance is critical to ensure the flood protection capacity of the storm drain system is not compromised. If proper routine maintenance is not performed, corrective maintenance and increased inspection and maintenance will be required. For persistent clogging or presence of mosquitos, contact the [City Engineer] to determine a permanent solution. For example, adding pretreatment measures within the tributary area draining to the BMP to intercept sediment, trash, and debris. Pretreatment components, especially for sediment, will extend the life of the filter media. For mosquitos, a Vector Management Plan, prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

Other Special Considerations

Media filters are proprietary systems that include proprietary media that must be replaced as part of normal expected maintenance. They are typically installed underground and may require entry into the underground vault to perform the maintenance. The BMP owner is responsible to hire a maintenance operator qualified to service the units. The maintenance operator must obtain the appropriate filter media and/or any parts that need to be replaced. If maintenance conditions require maintenance personnel to enter the underground structure, the maintenance personnel must be trained and certified in confined space entry. To find a qualified maintenance operator, the BMP owner shall contact the manufacturer of the proprietary BMP.

The design of media filters includes consideration of the specific pollutants expected from the area tributary to the media filter and the specific pollutants of concern for the downstream waterways. Therefore, it is expected that the filter media selected during design of the project will not be substituted. If a need arises to substitute a different filter configuration or filter media, the [City Engineer] shall be contacted prior to any changes.

FT-2
Media Filter

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-2 MEDIA FILTER		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris. The threshold for removal of materials depends on the specific type of proprietary filter and configuration and shall be based on the manufacturer's recommendation. In any case, materials must be removed if accumulation blocks flow through the BMP.	Remove and properly dispose of accumulated materials.	• Inspect monthly. • Remove materials annually (minimum), or more frequently when BMP reaches manufacturer's threshold for removal of materials in less than one year, or if accumulation blocks outlet.
Spent or clogged filter media. The threshold for changing media depends on the specific type of proprietary media and shall be based on the manufacturer's recommendation. In any case, media must be replaced if flow cannot pass through the media or passes through at less than the design capacity.	Remove and properly dispose filter media, and replace with fresh media.	• Inspect condition of media annually or more frequently if recommended by manufacturer. • Inspect BMP drainage monthly and after every 0.5-inch or larger storm event. If standing water has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed based on manufacturer's threshold/indicator for the specific media, or if standing water in the BMP indicates flow cannot pass through the media.
Any other recommendations pursuant to the proprietary filter manufacturer's maintenance guide.	Any other actions pursuant to the proprietary filter manufacturer's maintenance guide.	• As recommended by the proprietary filter manufacturer's maintenance guide
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-2 MEDIA FILTER (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove and properly dispose any standing water; second, remove any accumulated materials that obstruct flow through the BMP to restore BMP drainage to prevent standing water. Ensure access covers are tight fitting, with gaps or holes no greater than 1/16 inch, and/or install barriers such as inserts or screens that prevent mosquito access to the subsurface storage. If the BMP includes a permanent sump, contact the [City Engineer] to determine a permanent solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Damage to structural components of the filtration system such as weirs, underdrains, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet FT-2.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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FT-2
Media Filter

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-2 MEDIA FILTER PAGE 1 of 2			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials ☐ Other / Comments:		
Spent or clogged filter media Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose filter media, and replace with fresh media ☐ Other / Comments:		
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		

FT-2
Media Filter

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-2 MEDIA FILTER PAGE 2 of 2			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose standing water ☐ Remove accumulated materials that obstruct flow through the BMP* ☐ Other / Comments:		
Damage to structural components of the filtration system such as weirs, underdrains, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		
Any other recommendations pursuant to the proprietary filter manufacturer's maintenance guide Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Any other recommendations pursuant to the proprietary filter manufacturer's maintenance guide ☐ Other / Comments:		

*If the BMP includes a permanent sump, contact the [City Engineer] to determine a permanent solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

FT-3
Sand Filter

BMP MAINTENANCE FACT SHEET
FOR
FLOW-THRU STRUCTURAL BMP FT-3 SAND FILTER

Sand filters operate by filtering storm water through a constructed sand bed with an underdrain system. Runoff enters the filter and spreads over the surface. As flows increase, water backs up on the surface of the filter where it is held until it can percolate through the sand. The treatment pathway is downward (vertical) through the media to an underdrain system that is connected to the downstream storm drain system. Sand filter beds can be enclosed within concrete structures or within earthen containment. There is usually a forebay at the inlet to trap sediment, trash and debris so that only the runoff is passed through the sand bed without the solid materials. Typical sand filter components include:

- Forebay for pretreatment / energy dissipation
- Surface ponding for captured flows
- Sand filter bed
- Aggregate storage layer with underdrain(s)
- Overflow structure

Normal Expected Maintenance

Sand filters require routine maintenance to: remove accumulated materials such as sediment, trash, and debris from the forebay; and clear the underdrain(s). To ensure runoff is passed through the sand bed, sand at the top of the sand bed (approximately 2 inches, or more if necessary) must be removed and replaced to restore flow when the drain time exceeds 24-96 hours. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

The normal expected maintenance described above ensures the BMP functionality. Lapses in the normal expected maintenance can lead to clogging of the BMP and runoff bypassing the filter. If clogging is observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. In addition, clogged BMPs can lead to flooding, standing water and mosquito breeding habitat. Corrective maintenance and increased inspection and maintenance will be required. For persistent clogging or presence of mosquitos, contact the [City Engineer] to determine a permanent solution. For example, adding pretreatment measures within the tributary area draining to the BMP to intercept sediment, trash, and debris. Pretreatment components, especially for sediment, will extend the life of the sand bed. For mosquitos, a Vector Management Plan, prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

FT-3
Sand Filter

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-3 SAND FILTER		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris in forebay and/or filter bed	Remove and properly dispose of accumulated materials.	• Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found within the filter bed at each inspection. • When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the filter bed.
Standing water in BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures to restore drainage such as removing obstructions of debris from the forebay, clearing underdrains or repairing/replacing clogged sand bed.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Clogged sand bed This is indicated when the drain time of the surface of the sand bed exceeds 24-96 hours.	Remove and properly dispose sand from the top of the sand bed (approximately 2 inches of sand, or as much as needed to restore flow). Restore sand depth to the design depth.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-3 SAND FILTER		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove and properly dispose any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Damage to structural components of the BMP such as weirs, underdrains, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet FT-3.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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FT-3
Sand Filter

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 1 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Materials must be removed from the forebay when the forebay is 25% full*. In any case, materials must be removed if accumulation blocks flow through the filter bed. Materials must be removed from the filter bed any time accumulation is observed in the filter bed. Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials ☐ If accumulation within the forebay is greater than 25% in one month, increase the inspection and maintenance frequency** ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).
**If no forebay is present, if sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month, add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials.

FT-3
Sand Filter

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 2 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in BMP for longer than 24-96 hours following a storm event* Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make appropriate corrective measures to restore drainage such as removing obstructions of debris from the forebay, clearing underdrains, or repairing/replacing clogged sand bed ☐ Other / Comments:		
Clogged sand bed This is indicated when the drain time of the surface of the sand bed exceeds 24-96 hours. Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose sand from the top of the sand bed (approximately 2 inches of sand, or as much as needed to restore flow) ☐ Restore sand depth to the design depth ☐ Other / Comments:		
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		

*Surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the sand bed, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected. For persistent clogging, the [City Engineer] shall be contacted to determine a solution.

FT-3
Sand Filter

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 3 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose standing water** ☐ Remove accumulated materials that obstruct flow through the BMP** ☐ Other / Comments:		
Damage to structural components of the filtration system such as weirs, underdrains, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

**If mosquitos persist following corrective measures to remove standing water, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

FT-4

Dry Extended Detention Basin

BMP MAINTENANCE FACT SHEET
FOR
FLOW-THRU STRUCTURAL BMP FT-4 DRY EXTENDED DETENTION BASIN

Dry extended detention basins are basins that have been designed to detain storm water for an extended period to allow sedimentation and typically drain completely between storm events. The slopes, bottom, and forebay of above-ground dry extended detention basins are typically vegetated. Dry extended detention basins may serve multiple uses including parks, playing fields, tennis courts, open space, and overflow parking lots. This BMP category also includes detention basins that serve a purpose of flow control for hydromodification management only, which may or may not include vegetation. They can be underground structures, in many possible configurations, including both proprietary and non-proprietary systems. They may be constructed of a single large vault, one or multiple large pipes, or other modular units. Outlet structures control outflow from either above-ground or underground detention systems; outlet structures may be weirs, orifice plates, risers, or other control structures. Typical dry extended detention basin components include:

- Forebay for pretreatment
- Surface ponding for captured flows
- Vegetation selected based on basin use, climate and ponding depth (above-ground basins)
- Low flow channel, outlet, and overflow device
- Impermeable liner or uncompacted native soils at the bottom of the facility

Normal Expected Maintenance

Dry extended detention basins require routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or underground ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of underlying native soils and/or the outlet structure. The specific cause of the drainage issue must be determined and corrected. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations

Some above-ground dry extended detention basins are vegetated structural BMPs. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario**.

Underground dry extended detention basins are typically designed to be cleaned from above-ground using a vactor. If maintenance conditions require maintenance personnel to enter the underground structure, the maintenance personnel must be trained and certified in confined space entry.

FT-4
Dry Extended Detention Basin

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Accumulation of sediment, litter, or debris in forebay and/or basin	Remove and properly dispose of accumulated materials, (without damage to vegetation when applicable).	• Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found within the basin area at each inspection. • When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the basin.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Poor vegetation establishment (when the BMP includes vegetated surface by design)	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation (when the BMP includes vegetated surface by design)	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation (when the BMP includes vegetated surface by design)	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintenance when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
Standing water in above-ground BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Standing water in underground BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as removing obstructions at the outlet, clearing underdrains, or flushing fine sediment from aggregate layer when applicable. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN (Continued from previous page)		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove and properly dispose any standing water; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. For underground detention basins, ensure access covers are tight fitting, with gaps or holes no greater than 1/16 inch, and/or install barriers such as inserts or screens that prevent mosquito access to the subsurface storage. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.	• Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.
https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook

County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet FT-4.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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FT-4

Dry Extended Detention Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 1 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Accumulation of sediment, litter, or debris Materials must be removed from the forebay when the forebay is 25% full*. In any case, materials must be removed if accumulation blocks flow to the basin area. Materials must be removed from the basin area any time accumulation is observed in the basin area. Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove and properly dispose of accumulated materials, (without damage to the vegetation when applicable) ☐ If accumulation within the forebay is greater than 25% in one month, increase the inspection and maintenance frequency* ☐ Other / Comments:		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).
**If no forebay is present, if sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month, add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials.

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 2 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Poor vegetation establishment (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Dead or diseased vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation (when the BMP includes vegetated surface by design) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		

FT-4

Dry Extended Detention Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 3 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Erosion due to concentrated irrigation flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas and adjust the irrigation system ☐ Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan ☐ If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction ☐ Other / Comments:		

FT-4

Dry Extended Detention Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 4 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Obstructed inlet or outlet structure Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Clear blockage ☐ Other / Comments:		
Damage to structural components such as weirs, inlet or outlet structures Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Repair or replace as applicable ☐ Other / Comments:		

FT-4

Dry Extended Detention Basin

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 5 of 5			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in above-ground BMP for longer than 24-96 hours following a storm event*	☐ Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or repairing/replacing clogged or compacted soils.* ☐ Other / Comments:		
Standing water in underground BMP for longer than 24-96 hours following a storm event*	☐ Make appropriate corrective measures such as removing debris obstructions, clearing underdrains, or flushing fine sediment from aggregate layer when applicable.* ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.** ☐ Other / Comments:		

*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the outlet structure or the underlying soils. The specific cause of the drainage issue must be determined and corrected. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

**If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

SD-1
Tree Wells

BMP MAINTENANCE FACT SHEET
FOR
SITE DESIGN BMP SD-1 TREE WELLS

Tree wells as site design BMPs are trees planted in configurations that allow storm water runoff to be directed into the soil immediately surrounding the tree. The tree may be contained within a planter box or structural cells. The surrounding area will be graded to direct runoff to the tree well. There may be features such as tree grates, suspended pavement design, or shallow surface depressions designed to allow runoff into the tree well. Typical tree well components include:

- Trees of the appropriate species for site conditions and constraints
- Available growing space based on tree species, soil type, water availability, surrounding land uses, and project goals
- Entrance/opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression)
- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Normal Expected Maintenance

Tree health shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the tree well as designed. That is, the opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression) shall not be blocked, filled, re-graded, or otherwise changed in a manner that prevents storm water from draining into the tree well. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

Tree wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected maintenance described above ensures the BMP functionality. If changes have been made to the tree well entrance / opening such that runoff is prevented from draining into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well, or a surface depression has been filled so runoff flows away from the tree well), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the tree well as designed.

Surface ponding of runoff directed into tree wells is expected to infiltrate/evapotranspirate within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils surrounding the tree. Loosen or replace the soils to restore drainage.

Other Special Considerations

Site design BMPs, such as tree wells, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the [City Engineer] may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the [City Engineer] to determine requirements.

SD-1
Tree Wells

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR SD-1 TREE WELLS		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Tree health	Routine actions as necessary to maintain tree health.	• Inspect monthly. • Maintenance when needed.
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	• Inspect monthly. • Maintenance when needed.
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health	Loosen or replace soils surrounding the tree to restore drainage.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any standing water from the tree well to nearby landscaping. Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water).	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well)	Make repairs as appropriate to restore drainage into the tree well.	• Inspect monthly. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet SD-1.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

SD-1
Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 1 of 2			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Dead or diseased tree Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased tree ☐ Replace per original plans ☐ Other / Comments:		
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Loosen or replace soils surrounding the tree to restore drainage ☐ Other / Comments:		

SD-1
Tree Wells

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-1 TREE WELLS PAGE 2 of 2			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Disperse any standing water from the tree well to nearby landscaping ☐ Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water) ☐ Other / Comments:		
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make repairs as appropriate to restore drainage into the tree well ☐ Other / Comments:		

SD-5
Impervious Area Dispersion

BMP MAINTENANCE FACT SHEET
FOR
SITE DESIGN BMP SD-5 IMPERVIOUS AREA DISPERSION

Impervious area dispersion (dispersion) refers to the practice of effectively disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops (through downspout disconnection), walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges, and reduce volumes. Typical dispersion components include:

- An impervious surface from which runoff flows will be routed with minimal piping to limit concentrated inflows
- Splash blocks, flow spreaders, or other means of dispersing concentrated flows and providing energy dissipation as needed
- Dedicated pervious area, typically vegetated, with in-situ soil infiltration capacity for partial or full infiltration
- Optional soil amendments to improve vegetation support, maintain infiltration rates and enhance treatment of flows
- Overflow route for excess flows to be conveyed from dispersion area to the storm drain system or discharge point

Normal Expected Maintenance

Vegetated area shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the vegetated area as designed. That is, the mechanism that allows storm water runoff from impervious area to flow into the pervious area (e.g., a curb cut allows runoff from a parking lot to drain onto adjacent landscaping area, or a roof drain outlet is directed to a lawn) shall not be removed, blocked, filled, or otherwise changed in a manner that prevents storm water from draining into the pervious area. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

Impervious area dispersion is a site design BMP that normally does not require maintenance actions beyond routine landscape maintenance. If changes have been made to the area, such as the vegetated area has been replaced with impervious area, or the mechanism that allows storm water runoff from impervious area to flow into the pervious area has been removed (e.g., roof drains previously directed to vegetated area have been directly connected to the street or storm drain system), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the pervious area as designed. If the pervious area has been removed, contact the [City Engineer] to determine a solution.

Runoff directed into vegetated areas is expected to be drained within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils. Loosen or replace the soils to restore drainage.

Other Special Considerations

Site design BMPs, such as impervious area dispersion, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the [City Engineer] may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the [City Engineer] to determine requirements.

SD-5
Impervious Area Dispersion

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR SD-5 IMPERVIOUS AREA DISPERSION		
The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district. Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.		
Threshold/Indicator	**Maintenance Action**	**Typical Maintenance Frequency**
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintenance when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintenance when needed.
Standing water in vegetated pervious area for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil). Make appropriate corrective measures such as adjusting irrigation system, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil). Loosen or replace soils to restore drainage (and prevent standing water)	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Entrance / opening to the vegetated pervious area is blocked such that storm water from impervious area will not drain into the pervious area (e.g., a curb cut opening is blocked by debris or a roof drain outlet has been directly connected to the storm drain system)	Make repairs as appropriate to restore drainage into the vegetated pervious area.	• Inspect monthly. • Maintenance when needed.

References

American Mosquito Control Association.
http://www.mosquito.org/
County of San Diego. 2014. Low Impact Development Handbook.
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html
San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet SD-5.
http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

SD-5

Impervious Area Dispersion

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:	Responsible Party Name and Phone Number:	
Property Address of BMP:	Responsible Party Address:	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-5 IMPERVIOUS AREA DISPERSION PAGE 1 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Poor vegetation establishment Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Dead or diseased vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans ☐ Other / Comments:		
Overgrown vegetation Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Mow or trim as appropriate ☐ Other / Comments:		

SD-5
Impervious Area Dispersion

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-5 IMPERVIOUS AREA DISPERSION PAGE 2 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Standing water in vegetated pervious area for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil). Make appropriate corrective measures to prevent standing water such as adjusting irrigation system, or repairing/replacing clogged or compacted soils ☐ Other / Comments:		
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Disperse any areas of standing water to nearby landscaping (i.e., spread it out to another portion of the pervious area so it drains into the soil) ☐ Make corrective measures (see above) to restore drainage (and prevent standing water) ☐ Other / Comments:		

SD-5

Impervious Area Dispersion

Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR SD-5 IMPERVIOUS AREA DISPERSION PAGE 3 of 3			
Threshold/Indicator	**Maintenance Recommendation**	**Date**	**Description of Maintenance Conducted**
Entrance / opening to the vegetated pervious area is blocked such that storm water from impervious area will not drain into the pervious area (e.g., a curb cut opening is blocked by debris or a roof drain outlet has been directly connected to the storm drain system) Maintenance Needed? ☐ YES ☐ NO ☐ N/A	☐ Make repairs as appropriate to restore drainage into the vegetated pervious area* ☐ Other / Comments:		

*If the pervious area has been removed, contact the [City Engineer] to determine a solution.