Nassau County Storm Water Management Coalition
Minimum Control Measure Six
Pollution Prevention/Good Housekeeping

County of Nassau
DEPARTMENT OF PUBLIC WORKS

Capital Project No. 82010

Generic
Best Management Practices for Municipal Facilities/Operations

November 2007

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NASSAU COUNTY

PHASE II STORM WATER MANAGEMENT COALITION

MINIMUM CONTROL MEASURE NO. 6

POLLUTION PREVENTION AND GOOD HOUSEKEEPING

GENERIC BEST MANAGEMENT PRACTICES
FOR
MUNICIPAL FACILITIES/OPERATIONS

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Woodbury, New York

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1.0 INTRODUCTION

This introduction describes the federal and New York State regulatory framework for the Nassau County Storm Water Management Program and Coalition and the Generic Best Management Practices for Municipal Facilities/Operations document (hereafter referred to as "Generic BMPs").

1.1 Federal and State Storm Water Regulations

As part of the enforcement of the Federal Clean Water Act, a federal regulation, commonly known as Stormwater Phase II, requires permits for storm water discharges from Municipal Separate Storm Sewer Systems (MS4s) in urbanized areas and for construction activities disturbing one or more acres. The term MS4 does not solely refer to municipally owned storm sewer systems, but rather has broader application and includes, in addition to local jurisdictions: the New York State Department of Transportation, public universities, local sewer districts, public hospitals, military bases and prisons. A MS4 is not limited to a system of underground pipes; it can include roads with drainage systems, gutters and ditches. States that are "delegated" or authorized by the federal government are responsible for developing regulations on the State level to implement the federal program.

The United States Environmental Protection Agency's (USEPA) Stormwater Phase II Final Rule and New York State's MS4 Phase II Stormwater Permit Program require an operator of a regulated small MS4 to:

- Design and implement an operation and maintenance program to reduce and prevent discharge of pollutants to the maximum extent practicable from municipal operations and facilities;
- Include a training component in the program on pollution prevention and good housekeeping techniques in municipal operations;
- Select and implement management practices for pollution prevention and good housekeeping in municipal operations; and

- Develop measurable goals to ensure the reduction of all pollutants of concern in storm water discharges to the maximum extent practicable.

1.2 New York State General Permit Requirements

In its role as a delegated State, New York State, through the Department of Environmental Conservation (NYSDEC), issued two general permits, one for MS4s in urbanized areas and one for construction activities. The permits are part of the State Pollutant Discharge Elimination System (SPDES).

On January 8, 2003, the NYSDEC finalized new permits for storm water discharges. The new requirements are aimed at reducing water pollution caused by storm water. The NYSDEC prepared guidance materials and provided statewide seminars on the program to assist municipalities in meeting the requirements of the newly developed general permit.

Operators of regulated MS4s were required to apply for general permit coverage by March 10, 2003. Operators of construction activities that exist on or after March 10, 2003 and that involve one acre or more of land disturbance are also required to obtain SPDES permit coverage through either an individual permit or the new General Construction Permit.

1.3 Nassau County Storm Water Management Program and Coalition

While this document focuses on a specific storm water management element, namely Minimum Measure 6 – Pollution Prevention and Good Housekeeping, it is important to note that Nassau County, a regulated MS4, submitted its Notice of Intent (NOI) for coverage under the SPDES General Permit by the March 10, 2003 deadline. A copy of the General Permit is provided in Appendix A for reference. In conjunction with the NOI for the General Permit, the County also prepared its Storm Water Management Program Document. As required by the permit, the County Phase II Storm Water Management Program addresses the six Minimum Storm Water Management Control Measures. These are:

1) Public Education and Outreach on Storm Water Impacts

2) Public Involvement/Participation

3) Illicit Discharge Detection and Elimination

4) Construction Site Storm Water Runoff Control

5) Post-construction Storm Water Management

6) Pollution Prevention and Good Housekeeping for Municipal Operations.

Consistent with Phase II regulations and the General Permit, the County submits annual reports on the Storm Water Management Program and Municipal Compliance Certifications.

The scope of County operations encompassed by Minimum Control Measure 6 is focused on:

- Activities at County owned or operated facilities (e.g., buildings, parks, public works facilities or infrastructure); and

- Operations throughout the community that are the ordinary responsibilities of municipal departments (e.g., street maintenance, storm water drainage system maintenance).

Operations and maintenance activities undertaken by private contractors, but which serve County programs, facilities and responsibilities, are to be included in this scope. Operations that might serve the residential community, but which are municipal program responsibilities, are also included within this scope. However, this scope does NOT include pollution prevention and good housekeeping practices within commercial or industrial properties, or within residential properties, unless there is a direct connection to municipal program responsibilities.

As part of the overall Nassau County Storm Water Management Program and with the aid of a New York State grant, the County developed an intermunicipal partnership (hereafter referred to as the "Storm Water Coalition" or "Coalition") aimed at assisting villages and towns throughout the County in implementing their storm water management programs, particularly those aspects of the program related to Minimum Control Measures 1 (Public Education and

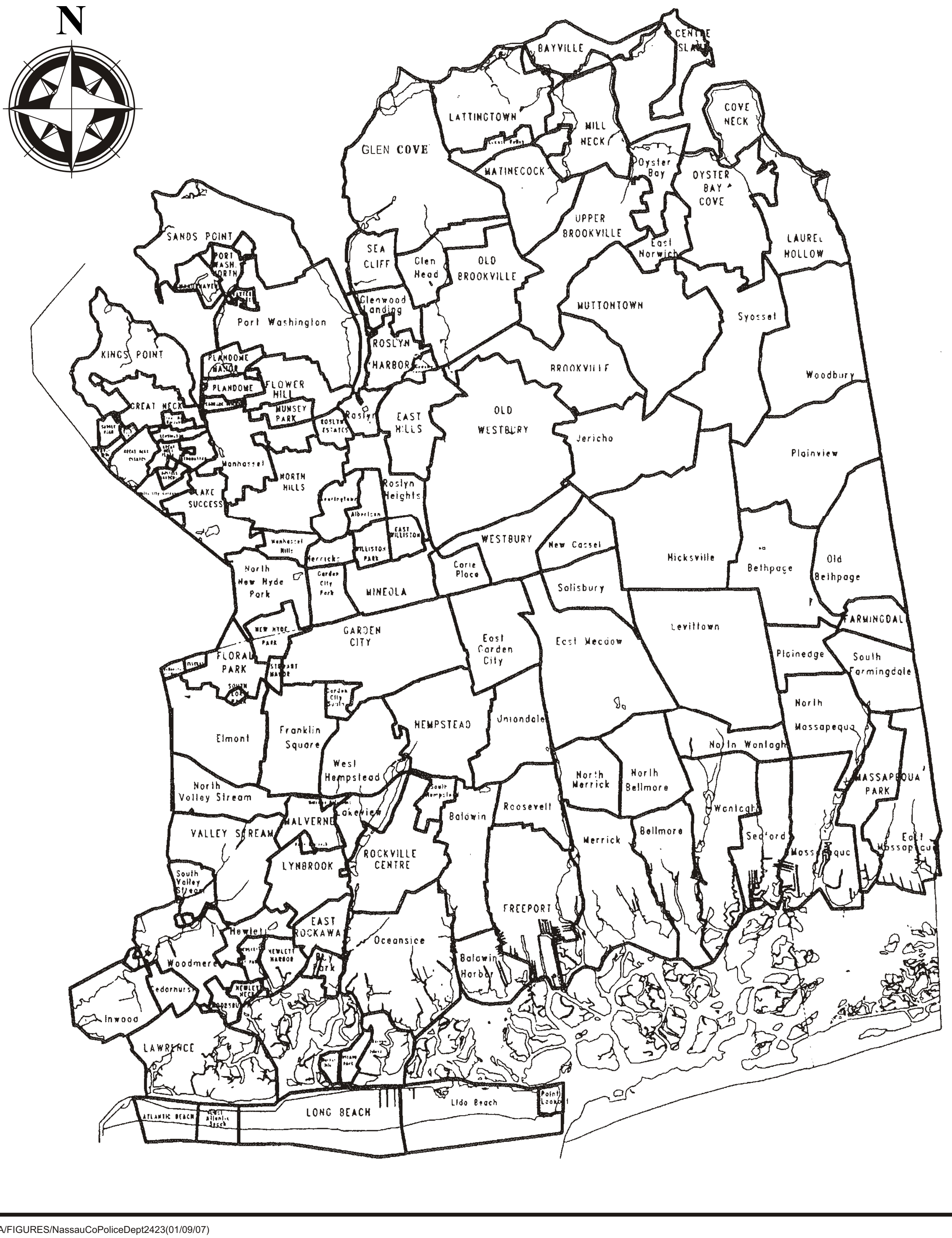
Outreach); 2 (Public Involvement and Participation) and 6 (Pollution Prevention and Good Housekeeping).

As part of the effort, the County created a "clearinghouse" of educational materials to disseminate to Coalition members and targeted groups and community activities. The County also distributed display stands and tabletop displays of educational bookmarks and other materials among libraries and Village Halls in the County. Educational materials were also distributed to environmentally-oriented fairs, festivals and teacher/school programs, as well as to local environmental groups. Activities covered relevant topics, including marine education, preserve cleanups, health and safety, landscaping and teacher education. Carousel stands stocked with brochures, posters and other handouts were also donated to village/town halls.

Participating municipalities in the Storm Water Coalition are listed below:

City of Glen Cove	Village of Great Neck Plaza	Village of Old Westbury
City of Long Beach	Village of Island Park	Village of Plandome
County of Nassau	Village of Hewlett Harbor	Village of Plandome Heights
Town of Hempstead	Village of Hewlett Bay Park	Village of Plandome Manor
Town of N. Hempstead	Village of Kensington	Village of Port Wash. North
Town of Oyster Bay	Village of Kings Point	Village of Roslyn
Village of Atlantic Beach	Village of Lake Success	Village of Roslyn Estates
Village of Baxter Estates	Village of Lattingtown	Village of Roslyn Harbor
Village of Bayville	Village of Laurel Hollow	Village of Russell Gardens
Village of Bellerose	Village of Lawrence	Village of Saddle Rock
Village of Brookville	Village of Lynbrook	Village of Sands Point
Village of Cedarhurst	Village of Matinecock	Village of Sea Cliff
Village of Cove Neck	Village of Malverne	Village of South Floral Park
Village of East Rockaway	Village of Manorhaven	Village of Stewart Manor
Village of East Hills	Village of Massapequa Park	Village of Thomaston
Village of Floral Park	Village of Mineola	Village of Upper Brookville
Village of Flower Hill	Village of Mill Neck	Village of Valley Stream
Village of Garden City	Village of Muttontown	Village of Westbury
Village of Great Neck	Village of New Hyde Park	Village of Williston Park
Village of Great Neck Estates	Village of Old Brookville	Village of Woodsburgh

The locations of these municipalities are provided in Figure 1-1.



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NASSAU COUNTY STORM WATER MANAGEMENT PROGRAM

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LOCATIONS OF NASSAU COUNTY MUNICIPALITIES

FIGURE 1-1

The Generic BMPs document provided herein is designed to be a utilized by participating municipalities as a comprehensive list of BMPs that can be referenced and/or adopted, as appropriate, for the activities and operations undertaken within each municipality's jurisdiction (i.e., vehicle maintenance, roadway maintenance, landscaping, spill control, waste management, materials storage, fueling operations, etc.).

New York State Department of Environmental Conservation (NYSDEC) Phase II regulations require that municipalities utilize federal and state standards, guidelines, and requirements in the implementation of its storm water management program. The Generic BMPs provided in the document are based on federal and state-approved BMPs, but also include supplemental measures, policies, and practices being successfully implemented in storm water jurisdictions throughout the country.

1.4 Generic Operational Storm Water Pollution Prevention Plan

Pollution prevention and good housekeeping policies and procedures are already in place in many County facilities. These activities are being performed either under direct control of the municipality or are contracted or shared with other public entities. New York State recommended that municipalities conduct a self-assessment of their existing policies, procedures and activities that relate to pollution prevention and good housekeeping. This assessment served to identify both strengths and potential gaps or revisions that need to be addressed for compliance with the Phase II Stormwater Permit. The County benefited from the assessment because it helped determine the necessary steps, staff and resources needed to achieve compliance with the Phase II Stormwater Permit requirements.

The New York State Department of Environmental Conservation recommends a coherent approach to setting priorities, policies and procedures, record keeping and worker training for all operations related to storm water management. In addition to hundreds of miles of County roads, there are approximately 80 buildings, structures or facilities owned and/or operated by Nassau County. Any operations that collect, store or release sediments, wastes or other potential pollutants are important elements of storm water management and should be addressed in the comprehensive pollution prevention and good housekeeping program.

It is also important to note that this Generic BMPs document provided herein is specific to Minimum Control Measure 6 (Pollution Prevention and Good Housekeeping for Municipal Operations). This should not be confused with the Storm Water Pollution Prevention Plan (SWPPP) that is prepared for a site-specific, construction or post-construction project or a SWPPP that is prepared for a facility covered under the "initial" phase (Phase I) of the federal storm water management regulations as one of the 11 categories of industrial facilities. Such SWPPPs relate to specific sites and specific projects, and are most relevant to Minimum Measures 4 and 5 of the Storm Water Management Program.

Most pollution prevention and good housekeeping practices should be implemented across the municipality, at all municipal facilities and in all municipal operations. Continued reevaluation of BMPs will also be very important. As the nationwide effort to reduce storm water pollution progresses, improved BMP references and documentation will be produced. New technology will also be field tested and become available. The results of program implementation may indicate the need for revising priorities. The municipal pollution prevention and good housekeeping program should be considered dynamic.

Section 2.0 of this Generic BMPs document identifies staff titles that comprise the primary pollution prevention team. Section 3.0 provides a description of the potential pollution sources and pathways that can occur at municipal facilities. The core of the Generic BMPs document is Section 4.0, which contains numerous activity-specific and facility-specific BMPs aimed at storm water pollution prevention. Appendix A contains reference material important in the overall understanding of the federal, state and county requirements for municipal programs aimed at preventing or reducing the impacts of storm water pollution. Appendices B and C contain relevant state storm water model laws and ordinances to help municipalities implement their Phase II Storm Water Program. Appendix D contains important excerpts from federal and state publications that are essential in the understanding and implementation of the BMPs that are described throughout this document.

2.0 POLLUTION PREVENTION TEAM

This section identifies job titles responsible for implementing, overseeing and monitoring the Generic BMPs, particularly the pollution prevention measures (Best Management Practices or “BMPs”) listed in Section 4.0. Also described below is the process for making plan revisions and updates.

2.1 Responsible Parties

Day-to-day responsibility for implementation and monitoring of the Generic BMPs lies with the supervisor of the particular municipal facility/operation. The supervisor will require all personnel to be aware of, and to practice, the pollution prevention measures consistent with periodic, municipally-provided, employee education and training on BMPs measures.

2.2 Plan Revision and Updates

To the extent that the existing Generic BMPs document requires revision or updating, the head manager or supervisor of the department will supervise changes in the plan suggested by the municipality or consultants retained to assist the municipality in plan implementation and monitoring.

3.0 POTENTIAL POLLUTION SOURCES

This section describes physical characteristics of typical municipal sites as they relate to pollution sources and pathways, and the potential for exposed materials and site operations to contribute to pollution in storm water runoff.

3.1 Site Drainage and Exposed Materials

Ideally, municipal facilities will have flat, paved surfaces that are appropriately graded so storm water runoff is directed towards storm drains. However, it is likely that most of the storm drain systems at municipal facilities were installed many years ago so detailed maps or charts of the overall storm water collection, storage and drainage system at any particular site may not be readily available. Review older maps, reports and other sources to determine the overall condition of storm drain systems at all municipal facilities.

The largest potential for pollution to enter storm drain systems comes from rain or snow melt contacting contaminated structures or materials. This storm water then enters a storm drain or catch basin, or in some cases, directly discharges to a nearby water body as sheet flow.

The major potential sources of storm water pollution at municipal facilities include:

- Vehicle fueling islands, pumps and dispensers
- Outdoor storage/parking of vehicles and other equipment.
- Storage, loading/unloading of materials.
- Storage of small containers or drums containing petroleum or chemical products.
- Storage sheds or bays with damaged or leaking roofs or covers.
- Outdoor vehicle and equipment wash areas.
- Uncovered or damaged solid waste containers (dumpsters, cans, etc.).
- Debris piles.

- Asphalt piles.
- Animal care, handling and waste disposal.
- Marina and over water activities.
- Winter road maintenance sand and salt piles.

3.2 Spills and Leaks

Accidental spills or leaks of chemical substances can occur anywhere they are stored or used. Minor drippings of gasoline or diesel fuel from fuel dispenser islands can occur while "topping off" the fuel tank. Spills of fertilizers and pesticides from their storage, transfer and application can occur due to operator error. Minor spills of automotive fluids can occur during vehicle maintenance. Spills are possible during the discharge of chlorinated swimming pool water. Spills and leaks occurring during over water activities are a direct source of pollutants into receiving water bodies.

Spills and leaks can also occur indoors. While indoor spills and leaks cannot come in contact with precipitation, poor housekeeping can result in some of these contaminants being transferred outdoors on the clothes and boots of workers, by rags and containers carried outside by site personnel or through vehicles and equipment.

3.3 Risk Identification

In addition to the potential sources of storm water pollution listed in Section 3.2, there are other municipal operations and activities on site that may pose a risk of storm water pollution. These are described below:

3.3.1 <u>Loading/Unloading Operations</u>

In addition to spills and leaks that can occur during operations virtually anywhere materials are handled, deliveries of materials in bulk and loaded or unloaded in uncovered outdoor areas at delivery ports or tank inlets can be a source of pollution. Catastrophic failure during a bulk delivery can allow a significant amount of contaminants to enter nearby storm water collection structures. Pollution sources from loading/unloading operations may also include fertilizers, pesticides, salt or sand deliveries. In addition, there are volatile or semivolatile organic contaminants from petroleum products or fuel additives and other chemicals from products such as cleaning fluids, anti-freeze and solvents.

3.3.2 Landscaping Activities

Municipal golf courses and parks often require the use of pesticides and fertilizers. Any necessary fertilizer or pesticide treatment is a potential storm water pollution source. Specific pollution parameters could include nitrogen and phosphorus from fertilizers and organic contaminants from pesticides including aldrin and dieldren. Improper maintenance of vegetated areas could lead to erosion of soil and add to the sediment load in storm water. In addition, cuttings and clippings from landscaping activities are potential sources of debris in storm water if not properly disposed of.

3.3.3 Waste Disposal Containers

Municipal facilities contain a number of solid waste containers (dumpsters or garbage cans) for garbage and refuse generated on-site. Generally, solid waste containers are equipped with hinged tops or other covers to prevent precipitation from rain or snow from coming into contact with the solid waste. Dumpsters or garbage cans left open or damaged can allow rain or snow to come in contact with pollutants in the garbage and leak out through seams, cracks or holes in the container. The polluted water can eventually leak out and into nearby storm drains or catch basins. Pollutants in garbage could include decaying organic matter from food waste and/or chemicals from improperly discarded “household hazardous waste” such as cleaners, solvents or disinfectants.

4.0 BEST MANAGEMENT PRACTICES FOR MINIMUM MEASURE 6

This section describes the Generic Best Management Practices (BMPs) for municipal facilities and operations. The BMPs in this section are a composite of recognized BMPs approved by the United States Environmental Protection Agency (USEPA), NYSDEC and other regulatory agencies and authorities across the country as effective measures for storm water pollution prevention.

Reference sources for the BMPs include the "Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State" developed by NYSDEC, and "Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices" and the "National Menu of Best Management Practices" developed by the USEPA. Other sources include fact sheets providing technical details, implementation strategies, suitability analysis and cost assessment strategies developed by USEPA and endorsed by NYSDEC for their BMPs. A selection of these materials is provided in the appendices, which are designed to provide technical guidance and assistance to operators implementing the BMPs described in this Section.

For storm water pollution prevention planning, the USEPA recommends that, in developing the plan, careful consideration is given to maintenance activities, maintenance schedules and inspection procedures for structural and nonstructural controls to reduce pollutants discharged from separate storm sewers. The opportunity for relatively clean runoff to contact potential pollutant sources must be minimized. Controlling pollutants at their source and preventing their wider release is more efficient and cost-effective than removing them from storm water runoff or other water treatment. Remove or capture contaminants before storm water contact, prevent erosion and provide multiple barriers to pollutant releases at storage and waste sites.

Identify all municipal facilities, operations and activities that could impact storm water quality and be potential pollution sources. Important considerations are controls for reducing or eliminating the discharge of pollutants and procedures for vehicle and equipment maintenance and washing, used oil recycling, material storage and handling, grounds maintenance, waste removed from storm sewers, roads, parking lots or buildings, landscaping and lawn care, lake and ponds, swimming pools, pet wastes, winter road maintenance and over water activities. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly develop and implement operation and maintenance programs to reduce the risk of water quality problems.

This Generic BMPs document addresses a number of generic and operational BMPs that can be directly or indirectly undertaken by municipal staff as part of a regular routine of daily practices and procedures. Typical practices are summarized on Table 4-1.

Specific BMPs are described below in Section 4.1 and 4.2. As stated previously, important storm water management references endorsed by USEPA and NYSDEC that should be utilized in implementing the BMPs described below are provided in Appendix D.

4.1 BMPs Operations and Maintenance

4.1.1 Fueling Operations

Storm water can become polluted, enter the storm sewer system and eventually impact water quality in the receiving waters when fuel (gasoline and diesel fuel) and heavy metals are spilled or leaked onto the ground during fueling operations. To prevent such storm water discharges, municipal officials can employ a variety of BMPs. Experience has shown that implementing vehicle-fueling BMPs will reduce the likelihood of spills reaching receiving waters. Written procedures should be provided to all employees who will be using fueling systems that describe these BMPs.

Table 4-1

TYPICAL OPERATIONAL BMPs FOR OPERATIONS AND MAINTENANCE CENTERS

Approach	Suggested Activities
Reduce Solvent Waste	• Keep number of solvents used to a minimum to make recycling easier and reduce hazardous waste management cost. • Perform all liquid cleaning at a centralized station to ensure that solvents and residues stay in one area. • Locate drip pans and draining boards to convey solvents back into solvent sink or holding tank for reuse.
Use Safer Alternatives	• Use non-hazardous cleaners when possible. • Replace chlorinated organic solvents with non-chlorinated ones like kerosene or mineral spirits. • Recycled products such as engines, oil, transmission fluid, antifreeze, and hydraulic fluid can be purchased to support the market of recycled products.
Clean up Spills	• Use little or no water to clean spills, leaks and drips. • Use rags to clean up small spills, dry absorbent material for larger spills and a mop for general cleanup. • Prepare a spill response plan or periodically review and update existing plan, if available.
Use Good Housekeeping	• Organize and conduct employee training and public outreach to reinforce proper disposal practices. • Conduct maintenance work such as fluid changes indoors. • Update facility schematics to accurately reflect all plumbing connections. • Closely monitor parked vehicles for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling. • Promptly transfer used fluids to recycling drums or hazardous waste containers. • Do not pour liquid waste down floor drains, sinks, or outdoor storm drain inlets. • Use drain mats to cover drains in the event of a spill. • Store waste or damaged batteries in leak-proof secondary containers.
Use Alternate Methods for Cleaning Parts and Equipment	• Use detergent-based or water-based cleaning systems instead of organic solvent degreasers. • Use steam cleaning and pressure washing to avoid solvent parts cleaning.

BMPs for fueling operations include the following:

- **Use off-site fueling stations when possible:** Commercial businesses are better equipped to handle fuel and spills properly.

- **Keep spill/overfill alarm equipment (i.e., alarms system) operational:** Overfill alarms warn the fuel delivery truck operator with a visual and audible indicator when the fuel tank is approximately 90% full, at which point the operator knows to end the tank filling process. Most electronic alarm systems have a test button that when pressed sound the audible alarm (buzzer) and visual alarm (red warning light). This indicates that the alarm system is functioning properly. The test button on the overfill alarm should be pressed by the fuel delivery truck driver before filling the tank(s) to ensure its operation. The alarm system should be tested in this manner at least once per month.

- **Avoid "topping off":** Gas pump hand dispensers automatically shut off when the vehicle fuel tank is almost full to prevent spills. Trying to completely fill the tank past this point often results in overfilling the tank and spilling fuel onto the pavement. Discourage topping off by training employees and posting signs at the fueling area.

- **Cover fueling areas:** Build a roof, shed or secure awning type structure over the fueling area. Figure 4-1 provides an example of a covered fueling area. The cover's minimum dimensions must be equal to or greater than the area within the grade break or the fueling area. The cover should not drain onto the fueling area. Use a perimeter drain or slope the pavement inward so that runoff drains to a blind sump. Install and maintain an oil control device in catch basins that might receive runoff from the fueling area.

- **Don't pave the fueling area with asphalt:** If possible, pave fuel areas with concrete, cement or an equivalent impervious surface instead of asphalt. Asphalt soaks up fuel or can be slowly dissolved by fuel, engine fluids or other liquids. Over time, the asphalt itself can become a source of storm water contamination.

- **Don't hose off the fueling area with water:** Wash water will pick up fuel, oil and grease and could end up in a storm drain. During routine cleaning, use a damp cloth on the pumps and a damp mop on the pavement instead of a hose. Sweep up any litter or debris. Use sorbent material such as speedy-dry, sawdust or straw to clean up small spills. Spills are not cleaned up until the absorbent is picked up and disposed of properly.

- **Direct any "run-on" away from fueling areas:** Run-on is storm water from other areas that flows or "runs on" to your property or from one area to another within your property. Minimize run-on by grading the fueling area with a 2% to 4% slope to

SOURCE: OR DPW

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EXAMPLE OF COVERED FUELING AREA

FIGURE 4-1

prevent ponding. Berm or curb the area around the fuel site, locate roof downspouts so storm water is directed away from fueling areas and use valley gutters to route storm water around the fueling area.

- **Designate a fueling area when fueling with mobile fuel trucks:** Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it will not enter the storm drain. Storm drains in the vicinity should also be covered. A form of secondary containment should be used when transferring fuel (i.e., liquid tight drip pan or absorbent pad). Install vapor recovery nozzles to help control drips as well as reduce air pollution.

- **Keep spill prevention plans and spill kits located nearby:** Spill kits should be purchased and made available at each fueling area and on each mobile fueling truck. Have designated trained person(s) available either on site or on call at all times to promptly and properly implement spill plans.

- **Inspect fueling areas regularly:** Inspectors should check for external corrosion and structural failure in tanks, for spills and overfills due to operator error and for piping system failures. New tank or container installations should be inspected for loose fittings, poor welds and improper or poorly fitted gaskets. Visually inspect tank foundations, connections, coatings, tank walls and piping systems. Look for corrosion, leaks, cracks, scratches and other physical damage that may weaken the tank or container system. A qualified professional should test aboveground tanks periodically for integrity.

4.1.2 Fleet and Equipment Maintenance

Various activities associated with indoor vehicle maintenance, such as temporary parking outside a facility, disposal of garage waste into outside dumpsters or pouring liquid waste materials down the drain have the potential to create a pathway for pollutants to enter storm sewer drainage systems. Source controls for equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment and training employees.

BMPs for fleet and equipment maintenance include the following:

- **Plan for repair work:** Schedule repairs for dry weather when possible. Use a vehicle maintenance area designed to prevent storm water pollution. Minimize contact of storm water with outside operations through berming and appropriate drainage routing. Consider enclosing maintenance in a building and connecting the floor drains to the sanitary sewer. Figure 4-2 provides an example of a clean indoor vehicle maintenance area. Cover outside work areas with a permanent roof. If temporary work is being conducted outside, use a tarp, ground cloth or drip pans beneath the vehicle or equipment to capture all spills and drips.

- **Check for leaking oil and fluids:** Park vehicles and store equipment indoors or under roofs or awnings to prevent storm water from coming into contact with them. Vehicles and equipment stored outdoors should be inspected regularly for leaks. Pans may be put under leaks to collect fluids for recycling or proper disposal. Don't leave drip pans or other open containers lying around. Vehicles or equipment to be stored outdoors for extended periods should be drained of fluids. The collected drips and spills must be disposed, reused or recycled properly. Store cracked batteries in leak proof secondary containers. Keep current records of all inspection and maintenance activities.

- **Use nontoxic or low-toxicity materials:** Keep the number of solvents used to a minimum. It makes recycling easier and it reduces hazardous waste management cost. Eliminate or reduce the use of hazardous materials in maintenance activities by substituting non-hazardous or less hazardous materials such as: non-caustic detergents instead of caustic cleaning agents; detergent-based or water-based cleaning systems instead of organic solvent degreasers; nonchlorinated solvents like kerosene or mineral spirits instead of chlorinated organic solvents like trichloroethane or methylene chloride.

- **Drain oil filters before disposal:** Drain excess oil in the oil filter in a funnel over the waste oil recycling container or tank. Do not dispose of oil filters in trashcans or dumpsters that may leak oil and contaminate storm water. Metal oil filters that are drained of all free liquids and taken to scrap metal yards for recycling are exempt from hazardous waste regulations.

- **Don't pour liquids down the drain**: While inside sinks and drains are connected to the sanitary sewer system, it is possible that parts of the system are "combined" with storm sewer systems. Don't pour cleaning solutions, solvents or automotive fluids down the drain. Promptly transfer used fluids to the proper waste containers, recycling drums or hazardous waste containers accordingly. Post signs at sinks to remind employees not to pour hazardous wastes down drains.

- **Recycle materials:** In addition to used oil, there are a number of other products left over from vehicle and equipment maintenance that can be recycled, including: degreasers, antifreeze, cleaning solutions, batteries and hydraulic fluids. Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from nonchlorinated solvents.

SOURCE: CAR-DOC AUTOMOTIVE

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EXAMPLE OF AN INDOOR VEHICLE MAINTENANCE AREA

FIGURE 4-2

- **Don't wash or hose down indoor or outdoor areas or spills with water:** Dry clean the work area regularly. All liquid cleaning should be done at a centralized station to ensure that solvents and residues stay in one designated area. Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.

- **Buy recycled products:** Buying recycled products supports the market and economics of recycling in general. Engine oil, transmission oil, antifreeze and hydraulic fluids are available in recycled form.

4.1.3 Vehicle and Equipment Washing

Wash water from municipal vehicle and equipment cleaning activities performed outdoors or in areas where wash water flows onto the ground can generate dry weather discharges to the storm sewers contaminated with detergents, suspended solids, nutrients, oils, grease and heavy metals. Washing vehicles and equipment in areas where wash water can be controlled, collected and treated is preferred. While vehicle and equipment washing is a common practice at municipal facilities, many centers do not have elaborate vehicle washing bays or automatic vehicle washing equipment. The use of the following BMPs can reduce the discharge of pollutants to storm water during vehicle and equipment cleaning.

BMPs for vehicle and equipment washing include the following:

- **Use commercial carwashes and steam cleaning businesses when possible:** Commercial car washing facilities are mandated under the regulatory authority of the NPDES program to treat and/or reuse wash water. Municipalities can negotiate with commercial car washes and steam cleaning businesses to handle their fleet vehicle washing. This option eliminates the cost of establishing wash areas and the liability of operating a wash facility. This option may be limited to smaller sized vehicles, however, since many car washes do not have bays large enough to handle large municipal vehicles.

- **Use a designated marked wash area:** If washing is done on-site, designated wash areas must be well marked with signs indicating where and how washing must be done. This area must be covered. Oil changes and other maintenance activities cannot be conducted in the designated washing area.

  The area should be paved and bermed or sloped to contain and direct wash water to a sump connected to the sanitary sewer or a holding tank, process treatment system or enclosed recycling system. Note that you must seek the permission of the sewer authority before discharging wastewater to the sanitary sewer and that special treatment requirements may be placed on such discharges. Alternately, the wash water could be recycled, thereby eliminating the pretreatment costs of discharging to the sanitary sewer.

For small jobs, temporarily berm the area surrounding the vehicle and use a wet/dry vacuum to capture the wash water for discharge to the sanitary sewer. For larger jobs, use a combination of berms and a vacuum truck (e.g., those used to clean storm and sanitary sewer systems) to capture and safely dispose of wash water. If detergents are used, clean the pavement to prevent this material from being carried to the storm drain during the next rainstorm.

- **Avoid detergents whenever possible**: Clean parts without using solvents whenever possible. If detergents are necessary, a phosphate-free, non-toxic, biodegradable soap is recommended. Detergents should be avoided if an oil/water separator is used for pretreatment prior to discharge to the sanitary sewer.

- **Stencil storm drains**: Facilities that store vehicles should stencil their storm drains to remind employees to wash vehicles and equipment within the designated wash area. Signage can also be posted with this message.

- **Keep spill kits located nearby:** Mount spill kits with absorbent containment materials and instructions near wash areas. Immediately contain and treat all spills accordingly. Refer to Section 4.1.8 on Spill Response and Control.

- **Inspect and maintain the wash area:** Paved surfaces and sumps should be inspected and cleaned periodically to remove buildups of particulate matter or other pollutants. Plumbing, recycling and pretreatment systems also require periodic inspection and maintenance. The surrounding area should be visually inspected for leaks, overspray or other signs of ineffective containment due to faulty design or physical damage to berms. Any defects should be corrected.

4.1.4 Used Oil Recycling

Used motor oil is categorized as a hazardous waste because it contains heavy metals picked up from the engine during use. It is the largest single source of pollution in our nation's waterways and is toxic to humans, wildlife and plants. Used oil can be recycled because it becomes dirty from use, rather than actually wearing out. As a result, motor oil should be disposed of at a local recycling or disposal facility.

Used motor oil is recycled in a number of different ways. It can be reprocessed into fuel for heating and cooling homes. Reprocessing is the most common method of recycling used oil in the United States. Approximately 750 million gallons of used oil are reprocessed every year and marketed to asphalt plants, steel mills, boilers, pulp and paper mills, cement/lime kilns and a number of other places. Motor oil can also be burned in furnaces for heat or in power plants to generate electricity for homes, businesses or schools. It can also be blended for marine fuels, mixed with asphalts for paving or be used in industrial burners. Used motor oil can be used in specially designed municipal garages, space heaters and automotive bays. Finally, used motor oil can be re-refined into lubricating oils that meet the same standards as virgin/new oil. All of these methods of recycling help to conserve valuable energy resources.

BMPs for used oil recycling include the following:

- **Store used oil in an appropriate clean container:** Before recycling, store used motor oil in a plastic or metal container with a secure lid indoors, rather than dumped in a landfill or down the drain. Containers must comply with State and local building and fire codes and clearly labeled "USED OIL" and with the capacity of the container. Underground containers must be labeled at the fill port. All used oil tanks, regardless of size, are subject to petroleum bulk storage requirements, including registration with NYSDEC. Do not use containers that previously stored household chemicals, such as bleach, gasoline, paint or solvents. Never mix used motor oil with other substances such as antifreeze, pesticides or paint stripper.

- **Provide the public with informational resources:** Programs should encourage the public to contact local service stations, municipal governments, the county government office or the local environmental or health departments, if they are unsure where to safely dispose of their oil. Figure 4-3 shows a used oil collection area.

4.1.5 Parking Lot and Building Maintenance

On-site parking lots or other paved areas can be exposed to leaks, drips and/or debris from the large number of parked motor vehicles, some of which are parked for long periods of time. Storm water runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals,

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EXAMPLE OF A USED OIL COLLECTION AREA

FIGURE 4-3

and abnormal pH. Cars and other motor vehicles can also track sediment and other debris from off-site paved streets, dirt roads or other areas onto parking lots. Pavement cleaning and street sweeping on a regular basis will minimize pollutant export to storm sewer systems or directly to receiving waters.

BMPs for parking lots and buildings maintenance include the following:

- **Regularly sweep paved areas:** Whether by individuals with brooms or by street sweeping vehicles, regular sweeping of parking lot areas is most effective in removing sediment debris and other pollutants that can potentially impact storm water collection systems and receiving waters. Recent improvements in mechanical street sweeper technology have enhanced the ability to pick up finer grained sediment particles that carry a significant portion of the pollutant load.

  Optimum frequency for parking lot sweeping at municipal facilities is once per week. However, if done with mechanized street sweepers, this activity can be done with less frequency but would require coordination so that parking lot sweeping takes place during non-business hours to avoid the need to find an alternate parking area at the site during the sweeping activities. During periods of heavy snowfall sweeping should be done as soon as possible after the snow melts. Removal of the accumulated sand, grit and debris after the snow melts reduces the amount of pollutants entering surface waters. On-site personnel should sweep smaller paved areas on a weekly basis. This will require the cooperation of on-site personnel.

- **Visually inspect paved areas:** Employ the same types of visual inspection recommended for vehicle maintenance BMPs in Section 4.1.2 for parking areas and other paved areas (i.e., periodic visual inspection of vehicles for leaks and cleanup of small leaks with rags or absorbent materials). On-site personnel can be made aware of the pollution potential and trained to carry out individual inspections of their own vehicles on a regular basis. In addition to protecting the environment, regular inspections can bring to attention a potential problem with their personal vehicles and the need for prompt servicing.

- **Control wash water from buildings, rooftops and other large objects:** Use a wastewater collection device that enables collection of wash water and associated solids from pressure washing in situations where soaps or detergents are used and the surrounding area is paved. Use a sump pump, wet vacuum or similarly effective device to collect the runoff and loose materials. Dispose of the collected runoff and solids properly. Screen wash water runoff if soaps or detergents are not used and the surrounding area is paved. Use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff from pressure washers. Disperse runoff as sheet flow as much as possible, rather than as a concentrated stream if you are pressure washing on a grassed area (with or without soap). Keep the wash runoff on the grass and do not drain to pavement. Ensure that this practice does not the kill grass.

- **Protect the ground during repairs and construction:** Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain. Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work and properly dispose of collected material daily. Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- **Clean tools properly:** Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- **Follow pollution prevention techniques:** Refer to other sections of this task for BMPs on materials storage and management, waste handling and disposal, maintenance of storm water structures, landscaping and lawn care.

4.1.6 Materials Storage and Management

Improper material storage areas containing raw materials, by-products, finished products and containers that are exposed to rain and/or runoff can pollute storm water runoff. Materials must be handled properly in all stages of development, use and disposal. Protecting storage areas from rainfall, run-on and runoff is the principal means of preventing potential pollutants from entering nearby storm water collection and conveyance systems.

BMPs for materials storage and management areas include the following:

- **Know what materials are on-site:** Keep an accurate, up-to-date inventory of the materials delivered and stored on-site. Always obtain the Material Safety Data Sheets from the supplier or vendor for any chemical used. These provide specific information about the materials. Inspect all shipments and return all unacceptable or damaged materials. Improve purchasing and inventory methods to ensure that materials do not exceed shelf life. Date all raw materials and chemicals and use the first-in, first-out method of inventory control. Reevaluate inventory needs and consider purchasing alternative products. Keep chemicals in their original containers when possible and well labeled. Properly dispose of outdated products. Whenever possible, return unused products to the supplier.

- **Store materials indoors:** Storing materials indoors, to the maximum extent possible, prevents rain, snow, storm water run-on or runoff from coming into contact with the materials. Enclose or cover containers where they are stored to prevent the entry of storm water. Do not store empty drums upright where they can collect precipitation. Rather, store all uncovered empty drums on their sides. Keep containers in good condition without corrosion or leaky seams. Replace containers if they are deteriorating to the point where leakage is occurring. Raise containers off the ground by use of pallet or similar methods with provisions for spill control and secondary containment. Do not store materials that can freeze in unheated areas. Train employees in proper storage measures. An example of a covered storage area with secondary containment is provided in Figure 4-4.

- **Cover storage areas with a permanent roof**: If sufficient indoor storage space is not available or practical and materials must be stored outdoors, a roof or permanent awning should be constructed to protect the area. Make sure all containers have secure lids.

- **Cover storage areas with a temporary covering:** If a permanent roof or cover is not practical or economical, temporary coverings made of polyethylene, polyurethane or polypropylene can be used as temporary coverings. These are often used to cover used battery storage areas or piles of sand or fill. Make sure all containers have secure lids.

- **Berm storage area:** Enclosing the area with a berm or curb can minimize storm water run-on and contain small spills. Clean up any spills immediately according to the material labeling and spill kit instructions.

- **Inspect storage areas regularly:** Check for leaks and spills around containers and during pumping of liquids and gases. Check containers for external corrosion, structural failure, scratches, spills and overfills. Inspect new tank or container installations for loose fittings, poor welds and poorly fitted gaskets. Replace damaged containers. If the liquid chemicals are corrosive, containers made of compatible materials must be used. Label new or secondary containers with all product information.

- **Minimize the amount of materials used and disposed of:** Procedures for operation and maintenance can be easily integrated into management plans. Substitute a less waste-producing product for those that generate higher quantities of waste. Simple processes, such as routine cleaning of work spaces, proper collection and disposal of wastes, maintenance of machinery, regular inspections of equipment and facilities, inventories and employee training to respond to spills or leaks all have significant effects on reducing the potential of polluting storm water runoff. Dispose of wastes before knowledge of their contents is lost and deterioration occurs.

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EXAMPLE OF A MATERIAL STORAGE AREA

FIGURE 4-4

- **Conduct regular inventories of hazardous materials:** Reduce the occurrence of overstocking hazardous materials, increase knowledge about what hazardous materials are present and how they are stored and provide training and documentation of proper handling of hazardous materials. Substitute less hazardous products for more hazardous ones, if possible.

  An inventory of hazardous materials present at a particular facility consists of three major steps:

  - Identify all hazardous and non-hazardous substances;

  - Label all containers with the name of the chemical, unit number, expiration date, handling instructions and health or environmental hazards; and

  - Make special note on the inventory of hazardous chemicals that require special handling, storage or disposal.

- **Do not mix materials and wastes in the same container:** Mixing of different materials will likely require the resulting mixture to be analytically tested and may present increased disposal restrictions. Do not dilute wastes with water in an attempt to make them nonhazardous.

- **Wrecked vehicles or damaged equipment stored on-site:** Be especially careful with wrecked vehicles, whether you keep them indoors or out, as well as with vehicles kept on-site for scrap or salvage. Wrecked or damaged vehicles often drip oil and other fluids for several days.

  Utilize the following measures for vehicles or equipment stored outside:

  - As the vehicles arrive, place drip pans under them immediately, even if you believe that all fluids have leaked out before the car reaches your shop.

  - Build a shed or temporary roof over areas where you park cars awaiting repairs or salvage, especially if you handle wrecked vehicles. Build a roof over vehicles you keep for parts.

  - Drain all fluids, including air conditioner coolant, from wrecked vehicles and "parts" cars. Also drain engines, transmissions and other used parts.

  - Store cracked batteries in a non-leaking secondary container. If you drop a battery, handle spilled acid from broken batteries with care. If you use baking soda to neutralize spilled acid during cleanup, remember that the residue is still dangerous to handle and must be disposed of as a hazardous waste.

4.1.7 Waste Handling and Disposal

On-site solid waste management is also important in reducing storm water pollution. Careless handling household garbage and other solid wastes generated at facilities by workers or visitors can contribute significant amounts of pollution to storm water collection systems. Common sense dictates that care should be taken in how waste materials are carried to, inserted in and stored in waste paper baskets, garbage cans or larger dumpster-type containers.

BMPs for waste handling and disposal include the following:

- **Take care when transferring waste from indoor to outdoor containers**: Smaller waste paper baskets and cans stored indoors will not come in direct contact with precipitation, but waste materials carelessly transferred from these containers to the larger containers outdoors can contribute to storm water debris.

- **Provide adequate trash containers:** Covered, solid trash containers prevent the entry and contamination of storm water. Provide a sufficient number of trash containers so that they do not become full from frequent use. Create a schedule to empty outdoor containers. Figure 4-5 provides an example of a covered trash container.

- **Inspect dumpsters and trash containers regularly:** Check for leaks, damaged covers or covers left open on a regular basis. The outside of the dumpsters should be inspected for boxed wastes or other materials left out of the container instead of being place inside the container, as appropriate. Dumpsters should also be rolled-out from their normal position at least once a month to allow cleaning/sweeping up any garbage, debris or sediment that has accumulated under or behind the dumpster over time.

- **Protect dumpsters:** Additional protection against storm water coming in contact with the dumpster or solid waste within it can be provided by a small roof or awning over the dumpster area. Figure 4-6 provides an example of a covered dumpster.

4.1.8 Spill Response and Control

Uncontrolled spills and leaks can damage storm drain systems and pollute receiving waters. Many activities that occur at or are directed from municipal facilities have a high

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EXAMPLE OF A COVERED TRASH CONTAINER

FIGURE 4-5

SOURCE: MASON CORP

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EXAMPLE OF A COVERED DUMPSTER

FIGURE 4-6

potential for accidental spills or leaks due to the nature of municipal operations. Thorough spill response planning and preparation allows municipal employees to efficiently respond to accidents and minimize the discharge of pollutants to the environment. Spill response and control plans should clearly state measures to stop the source, contain and clean up the spill and safely dispose of contaminated materials. Training personnel to prevent and control future spills, the availability of cleanup materials and regular inspections and supervision are all vital components of a successful spill response and control plan.

BMPs for developing a spill response and control plan include the following:

- **Identify materials and areas that could come in contact with storm water:** Materials such as vehicle and equipment maintenance products, salts and chemicals have the potential to pollute storm water. Make available a description and map of the facility and locations of all activities and materials used. Identify potential spill areas or operations where spills and leaks are likely to occur, including loading/unloading, storage, manufacturing, processing and waste disposal areas, warehouses, service stations, parking lots and access roads. Exercise the proper materials inventory and maintenance described in Section 4.1.6 to reduce the occurrence of spills and leaks.

- **Contain areas prone to spills and leaks:** Install berms or other measures to contain spills and prevent work surface runoff from entering storm drains.

- **Prepare a spill response and control plan:** Develop clear and concise spill prevention and response policies and procedures for any size spill at all facilities, especially those that use or store chemicals. Give step-by-step instructions for the response to spills at each facility and for all materials. Present spill response plans as procedural handbooks and post signs. Standardize the plan's operating procedures and employee training in an effort to minimize accidental pollutant releases. Update spill prevention and control plans with structural and procedural changes. Regularly inspect areas prone to spills to ensure that spill prevention procedures are posted and cleanup equipment is readily available.

  Include the following in the spill response and control plan:

  - Material handling procedures and storage requirements;
  - Spill and leak prevention measures;
  - Spill response personnel and contact information;
  - Material and area specific spill response procedures;

- Spill containment, diversion, isolation and cleanup procedures;
- Spill response equipment, including safety and cleanup equipment, and their locations;
- Safety measures for each specific waste;
- Contact information for the appropriate authorities, such as police and fire departments, hospitals or publicly-owned treatment works for assistance;
- Recordkeeping procedures; and
- Spill prevention and response employee training techniques.

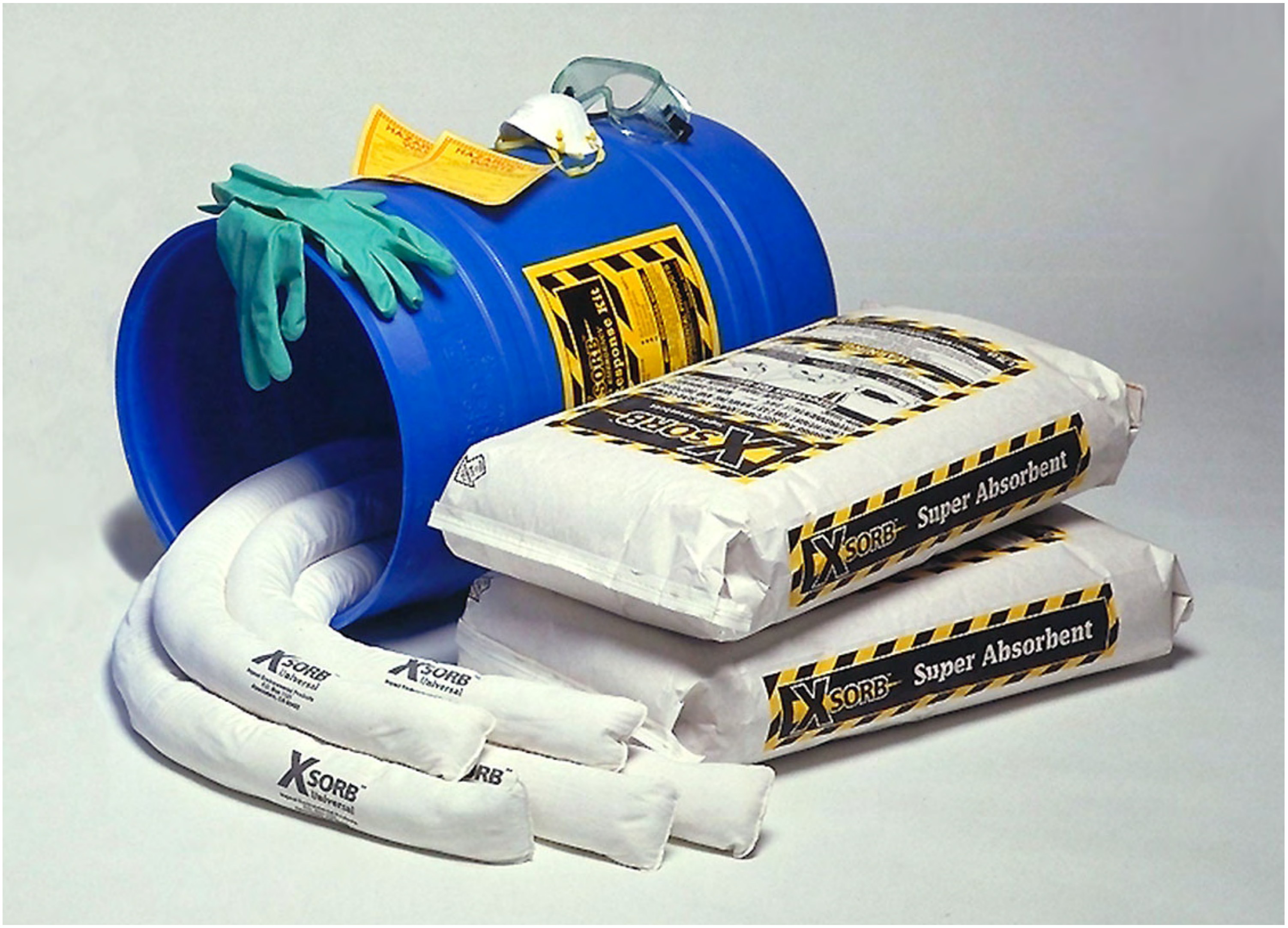
- **Keep spill response and control plans and spill kits located nearby:** Store and maintain appropriate handbooks, signs and spill cleanup materials in a nearby location known to all employees. Store spill kits in an impervious container and include items such as: salvage drums or containers; disposal bags; safety gloves, goggles, clothes and equipment; shovels or other soil removal equipment; oil containment booms, covers or berms for sewer drains; and absorbent clay or pads. An example of a spill kit is provided in Figure 4-7. Inspect each item regularly and replace as required.

If a spill occurs, immediately stop the operation, refer to the spill response and control plan, assess the safety of the situation and locate the spill kit.

BMPs for spill response and control include the following:

- **Notify the key spill response personnel immediately:** Contact the on-site personnel and emergency authorities identified in the spill response and control plan. Perform an assessment of the area where the spill occurred and the downstream area that could be impacted. Relay this information to the key spill response and cleanup personnel. Significant spills must be reported to the NYSDEC Bureau of Spills Management at 631-444-0320 or the NYSDEC Division of Spills Management Hotline at 1-800-457-7362. A NYSDEC spill response coordinator may assist in investigating the source of the spill and will provide instructions for addressing any emergency conditions. If appropriate, contact the National Response Center (NRC) at 1-800-424-8802. Notify the U.S. Coast Guard and the NRC if the spill can reach or has reached marine waters.

- **Contain the spill:** If safe to do so, contain the material and block the nearby storm drains so that the area impacted is minimized. Cover drains with drain mats. If the material is unknown or hazardous, wait for properly trained personnel to contain the spill.



SOURCE: SPILL CONTAINMENT

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EXAMPLE OF A SPILL KIT

FIGURE 4-7

- **Clean up the spill:** If safe to do so, immediately clean up leaks, drips and spills.

  For small non-hazardous spills:

  - Use a rag, damp cloth or absorbent materials for general cleanup of liquids.
  - Use brooms or shovels for the general cleanup of dry materials.
  - Spills should be cleaned up without water whenever possible. If water is used for cleanup, it must be collected and properly disposed of. Wash water cannot be allowed to enter storm drains.
  - Dispose of any waste materials properly.
  - Clean or dispose of any equipment used to clean up the spill properly.

  For large non-hazardous spills:

  - Use absorbent materials for general cleanup of liquids.
  - Use brooms, shovels or street sweepers for the general cleanup of dry materials.
  - Spills should be cleaned up without water whenever possible. If water is used for cleanup, it must be collected and properly disposed of. Wash water cannot be allowed to enter storm drains.
  - Dispose of any waste materials properly.
  - Clean or dispose of any equipment used to clean up the spill properly.

  For hazardous or very large spills:

  - A private cleanup company or Hazmat team may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.
  - Chemical cleanups of material can be achieved with the use of absorbents, gels and foams. Remove the adsorbent materials promptly and dispose of according to Federal, state and local regulations.
  - Used cleanup materials are also hazardous and must be sent to a certified laundry or disposed of as hazardous waste.

- **Keep records of spills:** A recordkeeping and reporting system should be set up for documenting reportable quantities of spills, leaks and discharges. Generate and keep on file a detailed report about the spill, the containment and cleanup. This information can be used to train staff about spill prevention and proper procedures. A good recordkeeping system helps a municipality minimize incident recurrence, correctly respond with appropriate containment and cleanup activities, and comply with legal requirements.

Include the following in the incident report:

- Date and time of the incident;
- Weather conditions;
- Quality and quantity of discharges to the storm drain;
- Duration of the spill;
- Cause of the spill;
- Response procedures implemented;
- Persons and authorities notified; and
- Environmental problems associated with the spill.

4.1.9 Maintenance of Storm Water Control Structures

The principal storm water control/conveyance structures at typical municipal facilities are building gutters and leaders, catch basins and storm drains. Identify, map and inspect all facilities' storm water control structures.

BMPs for storm water control structures include the following:

Roof Gutters and Leaders

Generally, rain falling on municipal building roofs are collected in gutters and conveyed by vertical leaders to the pavement near the base of the building. The runoff then usually follows the ground contours of the site to the nearest storm drain or catch basin. As designed, gutters and leaders do not control pollutants, but handle storm water runoff rates, volumes and direction. Develop building site drainage modifications to manage "clean water" and prevent or minimize contact with pollutant sources and maximize infiltration.

- **Clean and inspect gutters:** Roof gutters should be inspected and cleaned at least once per year and perhaps twice during the fall season if the facility is located near tall trees and brush. Leaves, twigs and even the remains of small birds and mammals can clog roof gutters, cause storm water pollution and impede proper drainage of roof areas.

Catch Basins

Catch basins are chambers or sumps, usually built at the curb line. They allow surface water runoff to enter the storm water conveyance system. Many catch basins have a low area below the invert of the outlet pipe intended to retain coarse sediment. By trapping sediment, the catch basin prevents solids from clogging the storm sewer and being washed into receiving waters. Catch basins must be cleaned periodically to maintain their ability to trap sediment and consequently their ability to prevent pollution loading. The removal of sediment, decaying debris and highly polluted water from catch basins has aesthetic and water quality benefits, including reducing foul odors, suspended solids and oxygen-demanding substances. Catch basin cleaning is an efficient and cost effective method for preventing the transport of sediment and pollutants to receiving water bodies.

BMPs for catch basin maintenance include the following:

- **Create a catch basin evaluation and cleaning program:** Catch basin cleaning should be performed at any facility with an on-site storm sewer system that includes catch basins and manholes. Although catch basin cleaning is easily implemented, it is often overlooked in an overall storm water management plan. In addition, many of the catch basin cleaning programs that have been implemented focus only on removal of debris from grate openings. Full implementation of the catch basin cleaning BMPs should also include removal of debris from the catch basin itself.

  Municipalities are advised to develop and implement a program to evaluate and, if necessary, clean catch basins and other storm water structures that accumulate sediment at least once a year, including a provision to identify and prioritize those structures that may require cleaning more than once a year. This task is a required condition of the Pollution Prevention/Good Housekeeping for Municipal Operations section in the development of a municipal storm water management plan as outlined in the MS4 Stormwater Permit.

- **Clean catch basins regularly:** Catch basins on-site should be inspected at least once a year and cleaned out by a vacuum, guzzler-type truck if they are 1/3 or more filled with sediment and/or debris. If a catch basin significantly exceeds the 1/3 depth standard during the annual inspection, then it should be cleaned more frequently. When sediment fills greater than 60% of sump volume, catch basins reach steady state. Storm flows may then bypass treatment as well as suspend sediments trapped in the catch basin. Frequent clean out can retain the volume in the catch basin sump available for treatment of storm water flows.

  Late fall is an ideal routine time to clean basins - after the leaves have fallen and before the first snowfall. Then, another cleaning in the spring is helpful to remove the buildup of sand, leaves and other debris that accumulated during the winter months. Areas which may contribute to higher pollutant loadings or which discharge to surface waters should be cleaned more frequently.

  A clogged catch basin will generally be obvious if a large amount of storm water is pooling around it during a storm and not draining out in a reasonable amount of time. Sometimes, all that is required is to remove accumulated leaves, twigs and other debris from the periphery of the catch basin grate. Catch basins can be cleaned either manually or by specially designed equipment. An example catch basin clean out truck is provided in Figure 4-8. This equipment may include bucket loaders and vacuum pumps. However, the use of an eductor truck (or vactor truck as it is commonly referred to) is typically used for cleaning catch basins.

- **Optimally design catch basins for effective sediment and pollution capture:** The performance of catch basins is related to the volume in the sump (i.e., the storage in the catch basin below the outlet). "Optimal" catch basin sizing criteria relates all catch basin dimensions to the diameter of the outlet pipe (D). Dimensions are:

  - The diameter of the catch basin should be equal to 4D.
  - The sump depth should be at least 4D. This depth should be increased if cleaning is infrequent or if the area draining to the catch basin has high sediment loads.
  - The top of the outlet pipe should be 1.5 D from the inlet to the catch basin.

  Catch basins can also be sized to accommodate the volume of sediment that enters the system. The catch basin sump is sized to accommodate the annual sediment load to the catch basin within a factor of safety. This method is preferable where high sediment loads are anticipated and the optimal design described above is suspected to provide little treatment.

  One design adaptation of the standard catch basin is to incorporate infiltration through the catch basin bottom. Two challenges are associated with this design. The first is the potential groundwater impacts and the second is the potential for clogging and preventing infiltration. Infiltrating catch basins should not be used in commercial or

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EXAMPLE OF A CATCH BASIN PUMP OUT TRUCK

FIGURE 4-8

industrial areas due to possible groundwater contamination. While it is difficult to prevent clogging at the bottom of the catch basin, it may be possible to incorporate some pretreatment into the design.

- **Retrofit your catch basins:** Many catch basins are not designed for sediment and pollutant capture. The ideal application of catch basins is as a pretreatment to another storm water management practice. Retrofitting existing catch basins may help to improve their performance substantially. A simple retrofit option of catch basins is to ensure that all catch basins have a hooded outlet to prevent floatable materials, such as trash and debris, from entering the storm drain system.

  A variety of other products, known as “catch basin inserts,” may also be used to filter runoff entering the catch basin. There are two basic types of catch basin inserts. One insert option consists of a series of trays, with the top tray serving as an initial sediment trap and the underlying trays comprised of media filters. Another option uses filter fabric to remove pollutants from storm water runoff. These devices have a very small volume compared to the volume of the catch basin sump and would typically require repeated sediment removal. These products require frequent cleaning and may not be effective at removing total suspended solids, partially due to scouring from relatively small (6-month) storm events.

- **Inspect catch basins for spills or hazardous substances:** Operators need to be properly trained in catch basin maintenance. Before removing sediment and debris from a catch basin or other drainage structure, municipal staff or contractors should evaluate whether the there is any evidence that the sediment and debris was polluted by a spill of oil or other hazardous substance. The catch basin evaluation will aid in determining if waste should be handled as an extremely contaminated waste or hazardous waste and determine what to test for if hazardous waste is suspected.

  Municipal staff or contractors conducting a field evaluation or engaged in cleaning catch basins should be aware of sediment in catch basins with obvious contamination such as unusual color, staining, corrosion, unusual odors, fumes and oily sheen. If the municipal staff or the contractor believes that a spill has occurred, it must be reported to the NYSDEC Spill Response at 631-444-0320. A NYSDEC spill response coordinator may assist in investigating the source of the spill and will provide instructions for addressing any emergency conditions. Once any emergency conditions have been addressed, any remaining material in the catch basin should be segregated until tested for all probable contaminants and then cleaned separately from non-contaminated catch basins.

- **Dispose of decant liquids and solids properly:** Sediment and debris removed from catch basins can potentially be classified as hazardous waste. As a result, the materials must be disposed in a proper manner to avoid negative environmental impacts. The contents of the vactor truck can be divided into decant liquids and solids which require specific disposal protocol and discharge permits.

Catch basin maintenance using a vactor truck can result in three types of discharges:

- Decant wastewater which is discharged from the vactor truck with a sediment trap and hose;

- Dump wastewater which is the discharge of both sludge and water from the vactor truck; and

- Rinse wastewater which is the discharge resulting from cleaning the inside of the truck after a dump discharge.

Material removed from catch basins is usually disposed in conventional landfills. Before any materials can be disposed, it is necessary to perform a detailed chemical analysis to determine if the materials meet applicable Federal, state and local regulations for hazardous waste. This will help determine how the materials should be stored, treated and disposed. The discharge of decant wastewater and/or any other wastewater associated with catch basin maintenance to a watercourse, wetland or returned to a catch basin or storm drain system is prohibited.

- **Keep records of catch basin maintenance:** Maintenance should include keeping a log of the amount of sediment collected and any data on the removal. The three keys words in field evaluation include awareness, reporting and segregation.

- **Be aware of catch basin limitations:** Limitations associated with cleaning catch basins include:

  - Catch basin debris usually contains appreciable amounts of water and offensive organic material that must be properly disposed.

  - Catch basins may be difficult to clean in areas with poor accessibility and in areas with traffic congestion and parking problems.

  - Cleaning is difficult during the winter when snow and ice are present.

  - Even carefully designed catch basins cannot remove pollutants as well as other storm water treatment practices, such as wet ponds, sand filters and storm water wetlands.

  - Unless frequently maintained, catch basins can become a source of pollutants through suspension of sediments in the sump.

  - Catch basins cannot effectively remove soluble pollutants or fine particles.

Storm Drain Cleaning

- **Clean storm drain systems (piping) regularly:** Routine cleaning reduces the amount of pollutants, trash and debris both in the storm drain system and in receiving waters. Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion. Benefits of cleaning include increased dissolved oxygen, reduced levels of bacteria and support of in-stream habitat. Areas with relatively flat grades or low flows should be given special attention because they rarely achieve high enough flows to flush themselves. If necessary, the municipality can hire professional plumbing services for assistance in removing trapped sediments and debris from storm drains with periodic flushing.

- **Be aware of important considerations in storm drain cleaning:**

    - Cleaning the storm drain by flushing is more successful for pipes smaller than 36 inches in diameter.

    - A water source is necessary for cleaning. The wastewater must be collected and treated once flushed through the system.

    - Depending on the condition of the wastewater, it may or may not be disposed to sanitary sewer systems.

    - The efficiency of storm system flushing decreases when the length of sewer line being cleaned exceeds 700 feet.

4.1.10 Maintenance of Treatment Control Structures

Numerous pollutants deposited on roadways and bridges affect the water quality of storm water runoff. Maintenance practices for treatment controls can improve the quality of road runoff. Vegetative cover stabilizes roadside soil, prevents sediment transfer to water bodies and improves aesthetics. Treatment controls include infiltration trenches and basins, retention ponds, detention basins, vegetated swales and buffer strips. Routine inspection and maintenance schedules are required to ensure that sediment, trash and overgrown vegetation are not impeding performance. Inspection and maintenance frequencies are specific to each site situation to best accommodate the local environmental, pollutant and regulatory conditions. Non-routine maintenance may be required to repair damaged structures, control erosion and remove unwanted vegetation.

BMPs for treatment control maintenance include the following:

- **Properly plan vegetated sites:** Proper site planning can reduce soil erosion and maintenance requirements. Select native species and locate plants in optimal growth areas. Species selection varies based on local climate, shade conditions, soil drainage, adaptability, maintenance requirements and the intended use of the area. Selection of roadside vegetation with higher salt tolerances will also help to maintain runoff-filtering vegetated swales and biofilters. Healthy plants better resist diseases and insects and require fewer control measures. Consulting with the County Soil and Water Conservation District, Cornell Cooperative Extension, USDA Natural Resources Conservation Service or local garden stores and suppliers can be helpful in making the best species selection.

  Adequate site distance for road safety requires low growing plants and turf. Otherwise the vegetative cover has to be maintained mechanically or with herbicides more frequently. Avoid planting trees and shrubs with deep root systems directly over or near water, gas, oil and sewer lines or buried telephone, data and power cables.

- **Consider proximity to receiving waters:** The plan must consider water bodies and potential for channel and bank erosion. Appropriate practices such as the addition of stabilization measures for erosion control and material and devices such as geotextile fabric and sediment mats should be used when necessary.

- **Design ditches for storm flow:** Ditches must be configured to handle peak storm flows without experiencing significant scour or channel failure.

- **Maintain vegetation in critical areas during soil disturbance:** Steep slopes and embankments above ditches should not be stripped of vegetation since this may result in severe erosion unless proper sediment and erosion control is employed. Vegetated areas should be reseeded as soon as possible after any soil disturbance.

- **Inspect structures post construction:** Inspect structures after every major storm for the first few months after construction to ensure proper functioning, bank stability and sufficient vegetation growth. Water infiltration rates need to be at 72 hours or less to prevent stagnant water from creating mosquito and other vector breeding habitats, increasing water temperatures, depleting oxygen and/or causing odor and aesthetic problems. Inspect outlet structure for clogging or unusual outflow release velocities.

- **Inspect structures frequently, especially after storm events:** Develop a regular inspection schedule to determine if the sediment removal structures require maintenance. Inspections in late winter provide a good opportunity to identify areas that need to be reseeded so that plantings can occur by mid-spring rainfall. Inspect:

- Controls for signs of wetness or damage, drainage time, channelization of flow, condition of riprap, contamination, standing water, solid wastes, dead or dying turf, invasive species, algal growth, graffiti, presence of burrows, differential sediment accumulation, erosion and slope stability

- Pretreatment devices (e.g., buffer strips and swales) and diversion structures for pollutants, debris, sediment buildup and structural damage

- Structures with filter fabric annually for sediment deposits by removing a small section of the top layer

- Newly established vegetation several times to determine if landscape maintenance is necessary

- Dams for cracking or settling, tree growth, leakage, damage to the emergency spillway and mechanical component condition

• **Focus maintenance procedures on upstream treatment controls first:** Concentrate primary maintenance procedures on pretreatment devices upstream of structures to prevent high sediment loads. Conduct all maintenance operations under dry conditions (i.e., late summer or early fall).

• **Perform standard maintenance:** Maintain access to critical areas of treatment controls for regular maintenance activities. Factors responsible for clogging should be repaired immediately. Manually remove weeds monthly during the first two growing seasons. Stabilize eroded banks. Repair undercut and eroded areas at inflow and outflow structures. Remove sediment, debris and pollutants from pretreatment devices and overflow structures. Some structures require the harvest of dense vegetation in the fall after plant die-back to prevent the release of excess organic material into receiving waters.

• **Perform semiannual maintenance:** Remove trash, debris, grass clippings, trees and other large vegetation from perimeters and dispose of properly. Mow and trim vegetation to prevent the establishment of woody vegetation and vector breeding habitats and for aesthetic reasons. Any standing water removed during the maintenance operation must be properly disposed of.

• **Perform annual maintenance:** Clean out all treatment and pretreatment controls if necessary. Remove trash, debris, grass clippings and sediment from the treatment controls. Clean structures and replace components when a loss of capacity is observed. Replant in eroded or barren spots to prevent erosion and accumulation of sediment. If reseeding is necessary, preparation of the seedbed, application of fertilizer, mulching, installation of silt fences and other measures may be necessary as part of the reseeding operation. Protect seeded areas for 1 year to allow development of a dense sod. Follow Integrated Pest Management policies. Limit the application of pest control chemicals or fertilizers around treatment controls. The removal of sediment may be necessary if standing water is observed during inspections. This is an expensive maintenance activity, which can be minimized through proper upstream control measures.

- **Perform long-term maintenance:** Seed or sod to restore ground cover. Make sure soils are properly aerated. Remove sediments, re-grade slopes and restore original design once infiltration rates reach a minimum threshold or there is evidence of re-suspension of trapped sediments.

- **Restrict the use of fertilizers, herbicides and pesticides:** Restrictions on the use of herbicides and pesticides on roadside vegetation and training to ensure that employees understand the proper handling and application of pesticides and other chemicals can help prevent contamination of storm water runoff. Test soils to determine the need for and the amount of fertilizers used. Handle all chemicals according to labeling.

- **Keep detailed records:** Describe in detail all inspections and maintenance operations in quantitative terms. Note any changes to the treatment controls. In-put records into databases that are easily accessible.

4.1.11 Landscaping and Lawn Care

Virtually every municipal facility contains at least small areas of grass, bushes or small trees. More extensive landscaping can be found at public parks and golf courses. Maintaining a healthy lawn might require fertilizers, pesticides and heavy watering. However, overuse can lead to excessive growth, increased pest problems, environmental damage and health risks. Lawn and garden activities, at any scale, can contaminate storm water with pesticide, fertilizer and soil runoff and reduce water quality. It is important for municipalities to set a good example for residents. Landscape management can protect the environment through careful planning and design, routine soil analysis, appropriate plant selection, use of practical turf areas and mulches, efficient water use and appropriate maintenance. Healthy and well-managed turf can actually slow runoff and trap pollutants. Site development considerations for landscaped areas and golf courses should aim to protect local water bodies by avoiding sensitive areas, providing sufficient buffers and ensuring erosion and sediment control during construction and maintenance activities.

BMPs for landscaping and lawn care include the following:

- **Limit watering:** Efficient watering practices reduce pollutant transport and erosion from runoff of wasted water. Use low-volume watering approaches, such as drip-type or sprinkler systems, to prevent the loss of water and soil. The amount of water applied depends on the normal rooting depth of the species used, the available water holding capacity of the soil and the efficiency of the irrigation system. Design an irrigation to have an average application rate that is less than the infiltration capacity of the soil to avoid surface ponding and to maximize water percolation. Carefully calibrate sprinklers to wet the soil to a depth of 6 inches without causing runoff. Water plants only when needed to enhance plant root growth and avoid runoff problems. Water in the early morning or overnight to reduce evaporation. Control the direction of the water to reduce runoff. Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring.

- **Regularly maintain vegetative cover:** Vegetative cover in critical areas should be maintained and inspected on a regular basis (at least annually) to ensure reestablishment of vegetation in exposed soils to stabilize the soil and prevent erosion. Inspections in late winter provide a good opportunity to identify areas that need to be reseeded so that plantings can occur by mid-spring. If reseeding is necessary, preparation of the seedbed, application of fertilizer, mulching, installation of silt fences and other measures may be necessary as part of the reseeding operation. Protect seeded areas for one year to allow development of a dense sod. Re-vegetation of disturbed areas is an effective practice in preventing soil erosion.

- **Restrict the use of fertilizers, herbicides and pesticides:** Discourage employees from using fertilizers, herbicides and pesticides, or if they are used, from over-applying them. Use chemicals on an as-needed basis. Test soils to determine the need for and the amount of fertilizers used at least every one to three years. Identify any potential pests to determine if they are truly harmful. Dig or pull out weeds. Spot treat weeds instead of universally applying chemical herbicides. Use less-toxic alternatives and slow release fertilizers. In any instance where a landscaped area requires re-planting or treatment by fertilizers or pesticides, care should be given to the appropriate selection of chemicals, methods and timing of application and appropriate storage of materials in indoor or covered areas. Till fertilizers into the soil rather than dumping or broadcasting onto the surface.

- **Properly handle all chemicals:** Construct or purchase chemical load/mix/wash down pads at each facility that handles pesticides, herbicides or fertilizers. Install backflow prevention devices to contain liquid chemical spills. When transporting chemicals, keep the federal labels and the Material Safety Data Sheets with the containers at all times in case of an emergency. Pesticides and fertilizers should always be transported inside spill-resistant containers or boxes in the trunk of the bed of a vehicle.

- **Increase the depth and organic content of the topsoil:** Use at least an eight-inch "topsoil" layer with at least 8 percent organic matter to provide a sufficient vegetation-growing medium. Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems. Amending existing landscapes and turf systems by increasing the percent organic matter and depth of topsoil can substantially improve the permeability of the soil, the disease and drought resistance of the vegetation and reduce fertilizer demand.

- **Aerate areas of heavy traffic:** Heavy traffic soils are often compacted, increasing runoff to the point that it is comparable to runoff on some pavements. Aerate lawns regularly in areas of heavy use where the soil tends to become compacted. Aeration should be conducted while the grasses in the lawn are growing most vigorously. Remove layers of thatch greater than ¾-inch deep.

- **Train employees on proper chemical use:** Designate a single full-time employee devoted to inspecting landscape areas for pest problems. Properly trained and certified persons should apply all fertilizers. Ensure that employees understand the proper handling and application of pesticides and other chemicals through restrictions and training on their use to help prevent contamination of storm water runoff. Do not apply chemicals if rainfall or wind is expected. The longer the period between fertilizer application and either rainfall or irrigation, the less fertilizer runoff occurs. Handle all chemicals, utilize the appropriate protective equipment and dispose of unused chemicals and wash water according to labeling.

- **Leave grass clippings on lawns:** Leave grass clippings to decompose on the lawn to reduce the amount of chemical fertilizer required. These clippings can provide nearly half of the required nutrients to the lawn and they hold in moisture, speed decomposition and relieve the burden of landfills to handle excess yard waste.

- **Compost:** To promote healthy plants, it is often beneficial to till composted material into the soil. Recycling of garden wastes by composting is also effective at reducing waste. However, compost bins and piles should not be located next to waterways or storm drains because leachate from compost materials can pollute runoff.

- **Select appropriate species for landscaping:** Proper site planning can reduce soil erosion and maintenance requirements. Select native species and locate plants in optimal growth areas. Species selection varies based on local climate, shade conditions, soil drainage, adaptability, maintenance requirements and the intended use of the area. Indigenous plant species are generally more water efficient and disease resistant. Furthermore, exotic plants can potentially invade local waterways. Healthy plants better resist diseases and insects and require fewer control measures. Consulting with the County Soil and Water Conservation District, Cornell Cooperative Extension, USDA Natural Resources Conservation Service or local garden stores and suppliers can be helpful in making the best species selection.

  If planting along roads, select species with higher salt tolerances. In addition, adequate site distance for road safety requires low growing plants and turf. Otherwise the vegetative cover has to be maintained mechanically or with herbicides more frequently.

- **Select appropriate species for turf:** Careful selection of turf can minimize watering and fertilizer requirements by choosing grasses that thrive in a particular climate. Turf grasses use water more efficiently and out-compete weeds better when kept at the higher end of the ideal mowing height range.

- **Do not mow grass too short:** Mowing is a stress-creating activity for grasses. When grass is mowed too short its productivity and root growth decrease. The turf becomes less tolerant of environmental stresses, more disease prone and more reliant on outside means such as pesticides, herbicides, fertilizers and irrigation. Tall turf competes more vigorously against weeds and can usually tolerate more insect and disease pressure. Set the mowing height at the highest acceptable level and mow at times and intervals designed to minimize stress on the turf. Do not cut grass shorter than 3 to 4 inches in height. Be aware that grass grows at different rates throughout the seasons.

- **Use alternate ground cover:** Minimizing turf area by replacing it with ground cover, wildflowers, shrubs and trees reduces mowing requirements, which subsequently reduces air, water and noise pollution. However, avoid planting trees and shrubs with deep root systems directly over or near water, gas, oil and sewer lines or buried telephone, data and power cables.

- **Use mulches:** Mulches stabilize exposed soils, retain moisture, prevent growth of nuisance vegetation and improve soil fertility through the slow release of nutrients from decomposition. Mulches usually contain wood bark chips, wood grindings, pine straws, nutshells, small gravel or shredded landscape clippings. Start a program to collect plant materials from maintenance activities as well as yard wastes from property owners. These materials can be converted to mulch and used at municipal properties or redistributed to property owners.

  Be aware that some mulch brands contain cocoa bean shells, a byproduct of chocolate manufacturing. Dogs may ingest this mulch due to its attractive odor. However, there can be high levels of the chemical theobromine, which is toxic to dogs. Avoid using cocoa bean mulch in landscaping around areas accessible to dogs.

4.1.12 Street Sweeping/Clearing

Streets, roads and highways accumulate significant amounts of pollutants that contribute to storm water pollutant runoff to receiving waters. Street sweeping can minimized pollutants, including sediment, debris, trash, road salt and trace metals. Street sweeping can also improve the aesthetics of municipal roadways, control dust and decrease the accumulation of pollutants in catch basins. An effective municipal street sweeping program can meet regulatory requirements, assess street sweeping effectiveness and minimize pollutants in roadways. Street sweeping may prove to be more cost-effective than certain structural controls, especially in more urbanized areas with greater areas of pavement. The parking lot and paved area maintenance BMPs covered in Section 4.1.5 are also applicable to off-site streets and paved surfaces including parking lots.

BMPs for street sweeping include the following:

- **Utilize regenerative air street sweepers where available:** Regenerative air street sweepers are most effective and efficient for areas with light to moderate debris accumulation, small debris spills and debris from vehicular accidents. Street sweepers are designed to dislodge debris and dirt from the road surface, transport it onto a moving conveyor and deposit it into a storage hopper. Mechanical brooms or hand tools can be used for small areas that are particularly dirty or aesthetically offensive.

  Regenerative air sweepers pickup debris by blowing air through a closed-loop, cyclonic effect onto the pavement to dislodge sediment and immediately vacuum it back up. Debris is moved underneath the chassis and into the pickup head by two outside gutter brooms. Air is constantly recirculated or regenerated in the unit, reducing the amount of air exhausted back into the environment. Some models are equipped with a water spraying system for further airborne dust control.

  Regenerative air sweepers are effective for single family residential areas. Regenerative air sweepers are generally more efficient than mechanical sweepers at removing finer sediments, which bind a higher proportion of pollutants (e.g., heavy metals). In areas where large debris is present, mechanical sweepers can be deployed ahead of regenerative air sweepers. The reduction of total suspended solids in storm water runoff from the use of regenerative air sweepers has been observed to range from 22 to 64 percent under good road conditions.

  Each type of street sweeper has it advantages and disadvantages concerning pollutant removal effectiveness, traveling speed, noise generation and cost. The initial capital costs of regenerative air sweepers are more expensive but overall operations and maintenance requirements are lower than those for mechanical sweepers. The lager number of moving parts in mechanical sweepers requires recurring replacement costs. As a result, regenerative air sweepers have a lower life cycle cost than that of mechanical sweepers.

- **Regularly schedule street sweepings:** It is important to remove pollutant loads from impervious surfaces along roadways before they are washed into storm water conveyance systems. It is recommended that schedules include minimum street sweeping frequencies of at least once a year. A successful program will need to be flexible to accommodate climate conditions and areas of concern. Areas of concern are based on traffic volume, land use, proximity to surface waters and field observations of sediment and trash accumulation. Street sweeping in these areas may need to be increased and the schedule adjusted. If abrasives are used for winter road maintenance, increase the frequency of sweepings after the snow melts.

Coordinating the schedule for street sweepings so that parked vehicles along roadways are not obstacles is a difficult aspect of any street sweeping programs. Codified parking/no-parking ordinances, such as Alternate Side Parking Regulations and Street Cleaning Rules, can be put in place in problematic areas. However, the lack of these ordinances in many areas, particularly unincorporated hamlets, may make street sweeping on a regular basis extremely difficult to schedule and implement. Distributed flyers can be used to notify residents of street sweeping schedules. To whatever extent controlled parking lots or neighborhoods with codified parking restrictions can be scheduled for street sweeping will have a positive impact on the overall goal of reducing pollution runoff to storm sewers or receiving waters.

- **Evaluate the effectiveness of the street sweeping program:** The effectiveness of street sweeping programs depends on the type and condition of the pavement; on operator skill and equipment performance; on parking, traffic and litter conditions; and on the management and operation of the program.

  Approximate and record the quantity of debris cleaned from streets, sidewalks and parking lots. Keep accurate logs of the number of curb-miles swept and the amount of waste collected. This information can be used to develop a written plan, schedule and periodic reevaluation for street sweeping to target those roadways with contributing land uses (e.g., high level of imperviousness, high level of industrial activity, etc.) with high pollutant concentrations and those roadways with proportionately greater amounts of materials between currently scheduled sweeps.

- **Dispose of sweepings pollutants properly:** Collected sweepings contain pollutants and are considered construction and demolition debris by NYSDEC. As such, collected sweepings can be disposed of at construction and demolition landfills. All federal and state regulations that apply to the disposal and reuse of sweepings should be followed.

  Municipalities are encouraged to develop comprehensive management plans for the handling of sweepings including proper locations for possibly storing the street sweepings. Storage locations should be equipped with secondary containment and possibly overhead coverage to prevent storm water runoff from contacting the piles of sweepings. It is also recommended to cover the piles of sweepings with tarps to prevent the generation of excessive dust. Storage locations should be sized accordingly to completely contain the volume of the disposed sweepings.

- **Maintain street sweeping equipment regularly:** Daily and weekly equipment maintenance of street sweeping equipment should be performed. Regular maintenance and daily start up inspections insures that street sweepers are kept in good working condition. The performance of street sweepers is related to the condition, adjustment and rotation of the broom brushes. Old sweepers should be replaced with new technologically advanced, modern sweepers that maximize pollutant removal.

- **Train equipment operators:** Perform operation and maintenance on equipment according to manufacturer's directions. Educate equipment operators about methods to optimize pollutant removal, including optimum sweeper speed, brush adjustment and rotation rate, sweeping pattern and interim storage and disposal methods.

4.1.13 Roadway Repair, Patching, Resurfacing

Streets, roads and highways are significant sources of pollutants in storm water discharges, and operation and maintenance practices, if not conducted properly, can contribute to the problem. These pollutants contain heavy metals, hydrocarbons and debris, which can threaten local water quality. Storm water pollution from roadway maintenance, including roadway patching and resurfacing should be addressed on a site-specific basis. Use of the procedures outlined below will reduce impacts from repair work on storm water runoff.

BMPs for roadway repair, patching and resurfacing include the following:

- **Plan for repair work:** Schedule patching, resurfacing and surface sealing for dry weather. Protect nearby storm drain inlets and adjacent watercourses prior to repairs.

- **Prevent materials from entering storm water:** Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff. Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses. Appropriately capture caustic wastewater and washout material from concrete mixing equipment. Limit the amount of fresh concrete or cement mortar mixed. Mix only what is needed for the job.

  Prevent concrete, steel, wood, metal parts, tools or other work materials from entering storm drains or watercourses. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate stockpile or dispose in the trash. Resurfacing operations can use porous asphalt for potholes and shoulder repair to reduce the amount of storm water runoff from road systems

Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete. Designate an area for clean up and proper disposal of excess materials.

- **Limit the use of water:** To avoid runoff, use only as much water as necessary for saw cuts or dust control. Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck when necessary. Do not dump vacuumed liquid in storm drains.

- **Maintain equipment:** Inspect equipment daily and repair any leaks. 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. If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses. Clean equipment including sprayers, sprayer paint supply lines and patch, paving and mud jacking equipment at the end of each day in a designated area. Clean in a sink or other area (e.g., vehicle wash area) that is connected to the sanitary sewer.

- **Thoroughly clean up the job site when the repair work is completed**: Sweep up all loose asphalt left on the road after patching. When cleaning guardrails or fences, follow the appropriate surface cleaning methods depending on the type of surface. When making saw cuts in pavement, shovel or vacuum the slurry residue from the pavement or gutter and remove from the site.

Graffiti Removal

Graffiti can occur on road overpasses, small bridges, highway signs and the facings of municipal buildings. To the extent that a municipality manages the removal of graffiti, the following BMPs should be taken into consideration.

- **Plan for graffiti removal:** Schedule graffiti removal activities for dry weather. Use recycled paint when possible. Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g., gels or spray compounds).

- **Protect storm water inlets:** Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g., filter fabric) to keep sand, particles and debris out of storm drains. Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks or other structures needing graffiti abatement. If a graffiti abatement method generates wash water containing a cleaning compound (e.g., high pressure washing with a cleaning agent), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.

- **Thoroughly clean up the job site when the removal work is completed:** Sweep or vacuum thoroughly. Properly dispose of any used absorbent.

4.1.14 Winter Road Maintenance

In colder climates, deicer applied to roadways can influence pollutant levels in road runoff and thereby affect local water quality. The application and storage of road deicing materials (most commonly salts such as sodium chloride or calcium chloride) can cause water quality problems. Mixtures of salts, gravel, sand and other materials are applied to roadways to reduce the amount of ice during winter storms. Salts lower the melting point of ice, allowing roadways to stay free of ice buildup during cold temperatures. Abrasives (sand and gravel) mixed in with the salt temporarily increase traction on the road. Deicers and abrasives can mix with the storm water and be conveyed to on-site storm sewers. The materials can also stick to the tires of the loading/unloading vehicles or salt spreaders and be tracked off-site to catch basins and storm sewers in roadways.

BMPs for winter road maintenance include the following:

- **Store salt piles indoors if possible:** Promote indoor operations where possible and place stockpiles inside storage structures to protect the salt from direct precipitation year-round. Sheltering is the most important component of the salt storage facility design and can often compensate for the lack of other practices. Properly constructed salt storage sheds can be highly effective in protecting surface and groundwater. An example of a salt dome is provided in Figure 4-9.

  Take into account various elements in the design of a storage structure to prevent the loss of salt from the facility. Design the storage facilities so that they are large enough to hold the maximum load of chemicals required seasonally without overflowing. Some structures provide a more efficient capacity than others depending on the intended methods of putting up the piles as well as in using the materials. Construct and position the roof and exterior of the storage structures out of waterproof material so that precipitation, moisture and snowdrifts are prevented from

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NASSAU COUNTY STORM WATER MANAGEMENT PROGRAM

EXAMPLE OF A SALT DOME

FIGURE 4-9

entering the building. Provision of a roof overhang, particularly where the door or opening is located, is a proper precaution.

- **Pave contact areas with impermeable surfaces:** It is particularly critical that municipalities initiate loading and unloading of salt on impermeable surfaces at locations where these activities are currently conducted on unpaved areas. Pave any site that comes in contact with salt or salt-contaminated storm water, including storage, mixing and loading areas, with a concrete mix that has the lowest permeability and can withstand alternate cycles of freezing and thawing. Do not install drains in the floor slab inside the storage building. Minimize the size of the loading and unloading area to reduce costs and the amount of storm water that needs to be contained.

- **Grade the area around the salt pile and loading area:** Raise the foundation to an elevation higher than the surrounding terrain to prevent run-on and to keep the interior slab dry. Develop and implement a detailed grading plan to prevent salt contaminated storm water runoff from coming into contact with unpaved areas where it can infiltrate into the groundwater. Paved areas should not contain slopes greater than 2.5 to 3%. Design the final grading to slope away for drainage purposes.

- **Design for storm water runoff control:** The first priority in storm water runoff control is to prevent the formation of brine and polluted storm water. However, chemicals do come into contact with storm water. Implement a system of controlling salt-laden runoff (from exposed piles or from spillage during loading/unloading operations) retained in the storm water management system. It may be advantageous to install ditches, pipes and tiles where necessary for effective drainage with a minimal environmental impact to receiving waters. Divert runoff from roofs and surrounding areas away from contaminated mixing and storage sites. Design and size drainage channels for the maximum volume of storm water. Use impervious and non-corrosive materials for all drainage facilities. Inspect drainage structures for damage, corrosion, obstructions and crystallized salt regularly.

- **Channel salt-laden runoff into collection areas:** It is an environmentally sound and cost-effective solution to channel salt-laden storm water runoff to a specially designed sump area or collection point for reuse as brine or a pre-wetting agent. Provide a brine storage/holding tank of sufficient capacity to prevent overflow from several minor storm events and avoid frequent pumping. Manage for the maximum volume of storm water runoff that can be expected during a 60-hour period. Design the storm water system to contain all salt contaminated storm water generated on the site so that no salt contaminated storm water will reach the unsaturated zone. If the holding tank is not large enough to contain several winter storms, then provide an overflow containment pond or adequately sized, impermeable storage area. Continue to capture salt-laden runoff for a short while after the end of the snow season after salt handling activities at the facility are over.

  Control salt-laden storm water runoff at all facilities by one of the following methods:

- Storage in a holding area, such as a storage tank, until the tank becomes relatively full and then removing the brine for use as a liquid snow and ice control material.

- Onsite storage of salt-laden runoff to be pumped back onto the storage pile as a pre-treating agent.

- Onsite storage for eventual disposal at a special facility.

- **Cover outdoor salt piles:** Not all road jurisdictions can afford to house all their stockpiles inside buildings. These maintenance facilities have a high potential for salt loss generally from unprotected salt or sand/salt piles and spillage during the handling of salt. Salt and sand/salt mixes must be covered to protect them from the elements and prevent runoff of salt-laden water to drainage systems year-round. Salt stored in bins or on pads must be covered with a suitable waterproof material and collection/treatment of runoff from uncovered materials is recommended. Coverings must be appropriate for the size and shape of the stockpile, and for the methods of receiving salt shipments and loading out during storms.

- **Uncovered piles should be windrow shaped:** This will minimize the impact of northwesterly winds upon the pile. The working face should be maintained perpendicular to the long axis of the pile by loading alternately left/right and right/left. Avoid creating a horseshoe shaped working face that results from removing the center of the pile and leaving extended edges or aprons. Plant vegetation around exposed piles to reduce the effect of winds.

- **Minimize salt losses:** Spillage during stockpiling and spreader loading is a major source of salt loss. Carry out these activities under cover (either indoors or under an outdoor canopy) to minimize salt loss. If loading and stockpiling activities are conducted outside, make an effort to collect any lost salt immediately following these activities. The presence of an outdoor canopy is essential to outdoor loading and stockpiling activities to prevent lost salt from entering storm water runoff.

- **Minimize other pollutants associated with salt storage:** Collect and dispose of onsite contaminants and wastes in accordance with local waste management legislation. Control emissions (drainage, noise, dust, litter, fumes) to prevent off-site impacts.

- **Use anti-icing techniques when possible:** Anti-icing is a technique where chemical freezing point depressants are applied at the beginning or onset of a storm to create road conditions that will prevent the initial formation of the snow/pavement bond. This approach requires less road salt than deicing. Most anti-icing programs use liquid chemical deicers because liquids adhere to the pavement better than solids. Liquids dry on the pavement, leaving behind a thin layer of salt that is not easily removed by traffic.

  While deicing is straight forward, it frequently leads to a compacted snow layer (pack) that is tightly bonded to the pavement surface. A subsequent deicing of the pavement is then necessary, usually requiring a large quantity of chemical to work its way through the pack to reach the snow/pavement interface and destroy or weaken the bond. Because this operation is reactionary (vs. anticipatory), it requires less judgment on the part of managers than anti-icing. Yet as a result of its inherent delay, it often provides less safety, at a higher economic burden, than anti-icing.

- **Plow prior to the application of chemicals:** The primary role of snowplowing in an anti-icing operation is to remove as much snow or loose ice as appropriate before applying chemicals so that excessive dilution is avoided and the applied chemical can be effective. Because, in anti-icing operations, the initial chemical treatment should be placed before a significant accumulation, plowing is generally more important for subsequent operations. However, prior to liquid applications, it is essential that the pavement be cleared of as much snow or loose ice as possible, which may be important even for the initial operation.

- **Do not use abrasive applications if salt will be effective:** Abrasive applications should not be a routine operation of a winter road maintenance program because of the cost associated with both application and clean up of roads and drainage facilities (clogged catch basins, etc.) and because of the potential airborne dust problem accompanying their use. In addition, the use of abrasives creates little improvement to winter roadway conditions. When anti-icing operations have successfully mitigated the hazards associated with packed snow or ice, straight abrasives will provide no significant increase in friction or improvement in pavement condition.

- **Use abrasives in the proper locations:** Abrasives should generally be used where low traffic volume and/or low pavement temperatures will preclude salt from working properly. Abrasives may be used initially in some circumstances where salt will work. These include steep slopes and other situations where the normal working time associated with salt could result in road blockage by vehicles stranded due to lack of traction.

- **Mix in a small amount of salt:** A small amount (approximately 5%) of salt must be added to abrasives in order to keep the sand in a workable or spreadable condition and have them adhere to the snow or ice. Mix sand and salt on sunny, calm days.

- **If abrasives are used, clean up after the thaw:** Such actions include: street sweeping and pick up of sand from roads and shoulders in a timely manner, removal of excess sand from intersections, ramps, gutters and paved ditches and clean up of catch basins near the end of the snow season. Clean up processes should be done manually or by sweepers, never by washing equipment that flushes the material to the storm water conveyance systems.

- **Use snowfences and shelter belts:** Strategic use of snowfences and shelter belts can prevent the drifting of snow onto heavily trafficked roadways. This can help reduce the cost and effort of snow removal on heavily trafficked roads prone to the accumulation of drifting snow. The possibility for more widespread implementation of this tactic should be evaluated.

- **Clear snow and ice from critical areas of storm water control structures:** In order to maintain safe roadways and protect against flooding and freezeovers, the tops of catch basins, drop inlets and bridge drainage systems should be cleared of snow and provided with reasonable means to prevent possible development of ice. Prior to thaws and subsequent runoff, remove packed snow and ice from the ends of culverts and their inlet and outlet ditches. At the beginning or middle of winter, the snow should not be removed if the water is flowing adequately underneath the snow because this might cause the water to freeze.

- **Track costs and effectiveness of winter road programs:** Review the results of the winter road maintenance to confirm that the program is achieving the desired results and to adjust the next year's maintenance options to respond to shortcomings and new opportunities. Quantify the total costs and per route costs of a storm even using materials, labor and equipment cost information. Include the costs of cleanup if abrasives were used during the storm. If possible, evaluate and compare alternative programs utilized in comparable municipalities. Update policies and procedures prior to next season. Integrate this review into the budgetary process to permit timely acquisitions of new equipment and to identify other funding needs. Communicate progress on implementation to senior management, local politicians, staff and the public.

4.1.15 Channel and Streambed Maintenance

Maintenance of streams interacts with storm water pollution planning. If local plans are intended to control or protect downstream environments by managing flows delivered to the channels, then the materials, forms and uses of the downstream riparian corridor should also be managed. Any proposal for stream alteration or management should be investigated for its potential flow and stability effects on upstream, downstream and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards and pollution transport. Each section of a channel is unique, influenced by its own distribution of roughness elements, management activities and stream responses.

BMPs for channel and streambed maintenance include the following:

- **Reserve stream corridors:** Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation and over bank flows allows streams to find their own form and generate less ongoing erosion. In addition, open stream corridors in urban developments have the potential to provide open space, recreation, irrigation of streamside plantings, wildlife habitat and the aesthetic amenity of flowing water.

- **Locate spill kits at stream sites:** Appropriately stocked spill kits, including booms, should be purchased, made available and maintained at each relevant stream site in case of spills or leaks from vehicles working in or near streams.

- **Stabilize the streambed and banks:** The use of armoring, vegetative cover and flow deflection may be used to influence a channel's form, stability and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. However, concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

  Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Do not cut grass, plants or vegetation that are along the edge of the stream. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

- **Restore streams where possible:** Geomorphic restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity and roots for bank stabilization, supplemented by plantings where necessary. A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

- **Control the grading of the streambed:** A grade control structure is a level shelf of a permanent material (e.g., stone, masonry, concrete) over which stream water flows. Grade control structures are called sills, weirs or drop structures, depending on the relation of its invert elevation to the upstream and downstream channels. A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below that the upstream channel cannot erode. A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity.

Weirs and drop structure control erosion by dissipating energy and reducing slope velocity. When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to be reclaimed.

- **Obtain the proper permits:** Stream alterations that could disturb a protected and/or navigable stream are required to obtain an Article 15-Protection of Waters Permit from their NYSDEC Regional Office. The Regional Office can tell you if the stream segment to be affected is on the protected list or is navigable under the program. The Regional Office can also advise you whether or not other permits are required.

4.1.16 Pond and Lake Maintenance

The pollutants of concern in municipal lakes or ponds are chemical algaecides that are added to control algae mainly for visual and odor control.

BMPs for pond and lake maintenance include the following:

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

- **Control the growth of harmful bacteria and algae:** To control bacteria, discourage the public from feeding birds and fish (e.g., place signs that prohibit feeding of waterfowl). Consider introducing fish species that consume algae. Mechanically remove pond scum (blue-green algae) using a 60-micron net. Educate the public on algae (e.g., controls are not necessary for certain types of beneficial algae). Cleanup activities at lakes and ponds may create a slight disturbance for local aquatic species. If the lake is recognized as a wetland, many activities, including maintenance, may be subject to regulation and permitting.

- **Control erosion:** Maintain vegetative cover on banks to prevent soil erosion. Do not cut grass short around ponds and lakes. Apply mulch or leave clippings to serve as additional cover for soil stabilization and to reduce the velocity of storm water runoff. Areas should be designed (sloped) to prevent runoff and erosion and to promote better irrigation practices. Provide energy dissipaters (e.g., riprap) along banks to minimize potential for erosion. Confine excavated materials to surfaces away from lakes. Material must be covered if rain is expected.

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

Avoid landscape wastes in and around lakes should be avoided by either using bagging equipment or by manually picking up the material. Collect trash and debris from within water bodies where feasible. Provide and maintain trash receptacles near recreational water bodies to hold refuse generated by the public. Increase trash collection during peak visitation months (generally June, July and August).

4.1.17 Swimming Pool Maintenance

Swimming pools are a significant source of polluted water discharged into sanitary and storm sewer systems. The primary pollutant of concern in municipal swimming pool water is disinfectants (e.g., chlorine or chloramines). Chlorinated water discharged to surface waters has an adverse impact on local water quality and can be toxic to aquatic life. An average swimming pool holds 19,000 gallons of highly concentrated chlorinated water. Pools in cooler climate are sometimes drained to reduce winter maintenance and potential damage from freezing during harsh weather. Pool water should not be discharged to the storm sewer system or directly into a water body.

BMPs for swimming pool maintenance include the following:

- **Properly maintain pools during operation:** Prevent algae problems with regular cleaning, consistent adequate chlorine levels, and well-maintained water filtration and circulation systems. Manage pH and water hardness to minimize corrosion of copper pipes. Do not use copper-based algaecides, which can interrupt normal algal and plant growth. Control algae with chlorine or other alternatives (e.g., sodium bromide).

- **Treat pool water before discharging:** Water quality must comply with the applicable water quality criteria if the only option for draining pool water is to discharge directly into the environment. Dechlorinate the water before draining the pool. Let pool water sit after the addition of chlorine or bromine until their levels are below 0.1 mg/l (do not use the facility during this time). Test water prior to discharge to ensure that chlorine is not present. The pH of discharge water must be between 6.5 and 8.5 before it is discharged. Total suspended solids must be below 60 mg/l. Allow suspended particles to settle out. Discharged water should not appear murky. Do not discharge settled material with pool water.

- **Discharge chlorinated water to the proper areas:** Do not discharge water to a street or storm drain. Put procedures in place for proper drainage and discharge of pool water. Discharges to the environment should be directed over a land surface so that some level of filtration by soil particles can occur. The above water quality requirements also apply to land-applied water.

Discharge water to the sanitary sewer if permitted to do so. Prevent backflow by maintaining an “air gap” between the discharge line and the sewer line (do not seal the connection between the hose and sewer line). Be sure to call the local wastewater treatment plant for further guidance on flow rate restrictions, backflow prevention and handling special cleaning waste (such as acid wash). Discharge flows should be kept to the low levels typically possible through a garden hose. Higher flow rates may be prohibited by local ordinances.

- **Follow spill containment procedures:** Provide drip pans or buckets beneath drainpipe connections to catch leaks. This will be especially pertinent if pool or spa water that has not been dechlorinated is pumped through piping to a discharge location. Have spill cleanup materials readily available and in a known location. Clean up spills immediately and use dry methods if possible. Properly dispose of spill cleanup material.

- **Follow materials storage procedures:** Follow Materials Storage and Management BMPs discussed in Section 4.1.6 for the handling and storage of all pool maintenance chemicals.

4.1.18 Over Water Activities

Marinas can have significant impacts on the concentrations of pollutants that enter the surface waters. Many of these pollutants build up in the benthic sediments, accumulate in the tissues of aquatic organisms, degrade water quality, are toxic to aquatic life and pose a threat to human health. Marinas and launch ramps border surface waters where there may be only minimal buffering during the discharge of chemicals or pollutants. Therefore, it is important to take steps to prevent or minimize the introduction of pollutants to waterways. The discharge of pollutants to receiving waters at these facilities can be prevented or reduced by minimizing over water maintenance, keeping wastes out of the water, cleaning up spills and wastes immediately and educating boat operators and employees.

BMPs for over water activities include the following:

- **Divert storm water away from marinas and launch ramps:** Install water bars to divert off-site storm water away from the marina. Construct grass areas, vegetated strips, wet ponds, infiltration basins or artificial wetlands between the marina and the nearby surface water to filter out any containments before they are discharged. Evaluate areas in the marina not committed to other uses for construction of such buffer areas. Where possible, encourage the use of pervious or semiprecious surfaces (e.g., gravel or porous pavement) in boat storage areas and parking lots. Pave only the areas necessary for operation. Keep catch basins clean.

- **Exercise proper materials maintenance:** Careful consideration must be given to fueling boat engines, recycling used oil and discarding worn motor parts into proper receptacles to prevent spills. Switch to non-toxic chemicals for maintenance when possible. Choose cleaning agents that can be recycled. Minimize the use of solvents. Clean parts without using solvents whenever possible.

  Provide storage facilities for liquid wastes. Recycle used motor oil, diesel oil and other vehicle fluids and parts whenever possible. Recyclable liquids should be stored in separate, labeled drums and never mixed. Fluids contaminated with other materials become more difficult to recycle. Keep the containers in a secure area. Refer to the BMPs listed in Section 4.1.6 for relevant Materials Storage And Management.

- **Perform maintenance on land and indoors:** Move maintenance and repair activities on-shore if possible. Designate and clearly mark work areas for boat maintenance. Do not permit work outside these areas. Brush snow and ice off of crafts before bringing them into the service shop. Perform paint and solvent mixing, fuel mixing and similar handling of liquids on-shore to avoid spillage directly in surface water bodies. This reduces some of the potential for direct pollution on water bodies. Perform boat repairs in an enclosed, roofed area. If this is not practical, use a plastic tarp under boats.

- **Control wash water:** Wash boats at an off-site commercial car wash when possible. If washing is done on-site, do not allow storm water runoff to mix with wash water. Do not use soap or detergents if the wash water is discharged into the marina basin or adjacent waters. To remove oil, grease and bottom paint chips, route wash water through an oil/water separator and grit chamber or some filtration device. For in-water washing, wash boats topside with plain water only. If needed, use minimal amounts of phosphate-free detergent on decks.

- **Take the necessary precautions when sandblasting, scraping and painting:** Prohibit in-water hull cleaning, scraping or any other process to remove paint from the hull, especially from boats with copolymer antifouling bottom paint. Copolymer antifouling paint remains soft and brushes off easily. Brushing or scraping copolymer paint will release pesticides into the environment.

  Take boats out of the water for hull scraping. If a boat has enough growth to require cleaning, it will need new bottom paint. Be aware that paint scrapings cannot be thrown in the dumpster if they fail a toxicity test. In-water hull cleaning is permissible where copolymers are not used and when it is done frequently enough so that fouling organisms (e.g., barnacles or mussels) can be removed with a brush rather than a scraper. Very few paint chips need to be released into the water during in-water hull cleaning if done properly.

Perform sandblasting and painting in an enclosed, roofed area to prevent paint, debris and blasting materials from mixing with storm water. Use a wind-blocking tarp to catch contaminants if maintenance needs to be performed outdoors. Use a ground cloth when caulking, scraping, fiberglassing or painting with a brush. If the vessels are in dry dock, remove paint, debris and blast materials prior to relaunching. All sandblasting grit, paint and debris should be collected and disposed of properly. These materials may need to be disposed of as hazardous waste if leachable metals (e.g., lead) are present in sufficiently high concentrations.

- **Use proper fueling techniques:** Place fuel docks in areas shielded from significant wave action and boat wakes. Cover fueling areas. Have employees supervise fueling. Make sure the automatic shut-off is working properly. Place drip trays beneath fuel connections at the dock to prevent fuel leakage from reaching the water. Follow the relevant vehicle fueling operations BMPs listed in Section 4.1.1.

- **Keep docks and launches clean:** Clean up spills on docks or boats immediately. Sweep maintenance yard areas, docks and boat ramps weekly to collect sandblasting material, paint chips, oils and other loose debris. Do not hose down the area to the water or a storm drain. If hosing is unavoidable, the hose water must be collected and conveyed to treatment. Provide an adequate number of covered trash and recyclables receptacles throughout the marina. Provide regular training to employees and/or contractors regarding storm water BMPs for over water activities.

- **Maintain boats in working order:** Fuel tank vents should have valves to prevent fuel overflows or spills. Boats with inboard engines should have oil absorption pads in bilge areas that should be changed when no longer useful or at least once a year. Keeping boat motors well tuned prevents fuel and lubricant leaks and improves fuel efficiency. Maintain automatic bilge pumps in a manner that will prevent waste material from being pumped automatically into surface water. Pump bilge water discharged at sea through an oil/water separator first and store the oil for discharge into storage tanks on shore for treatment. Collect bilge water that has an oily sheen on the surface for analysis, treatment and proper disposal rather than dumping in water or on land.

- **Designate a fish cleaning area:** Provide covered receptacles for fish carcasses. Fish carcasses should be disposed of offshore or outside the harbor, used as chum or bait, composted or disposed of in some other environmentally responsible manner. According to the NYS Environmental Conservation Law, do no leave waste fish on shore or in the water within 500 feet of the shore.

  If possible, provide an outdoor stainless steel sink that discharges to a sanitary sewer equipped with a garbage disposal unit. This will diminish odor, insects and other aesthetic problems. It will also prevent nutrients from accumulating in the water of the marina and causing algal and bacterial blooms.

- **Dispose of sanitary sewage properly:** Convey sanitary sewage to pump-out stations, portable on-site pump-outs or commercial mobile pump-out facilities or other appropriate onshore facilities. Provide adequate toilet facilities for marina patrons. Install dump station to empty portable heads. Inspect sanitary facilities on a regular basis. Install a pump-out facility to encourage the discharge of holding tanks shoreside. If the pump-out stations are self-service, post complete instructions for its operation. Do not allow any rinse water or residual waste in the hoses of vessel pumps to drain into the receiving waters. Post signs and distribute information explaining the benefits of proper sewage disposal at pump-out and dump stations. Set up training sessions.

- **Promote conscientious boat operation:** Establish and enforce no-wake zones. In addition to the nuisance and potential damage caused by wakes in a dockage area, wave action suspends benthic sediments, which increases turbidity and may contain contaminants and nutrients. Wakes may also damage rooted aquatic vegetation, which are important aquatic habitats for a wide variety of species. Row or pole small outboard powerboats in shallow areas. Discourage engine idling to reduce hydrocarbon emissions to the air and water.

- **Post signs on BMPs:** Indicate proper use and disposal of residual paints, rags, used oil, engine fluids, sanitary sewage and other wastes. Also inform of the reasons for measures and expected benefits. Use resources from NYSDEC and local organizations in providing educational materials.

- **Use proper spill clean up techniques:** Fix all leaks immediately. Develop a spill response plan. Select a spill response contractor that could respond to your location in a minimal amount of time. Train officers, employees and contractors in proper techniques for spill containment and cleanup. Place an adequate stockpile of spill cleanup materials where it will be readily accessible and in a location known to all employees. Clean leaks, drips and other spills with as little water as possible. Refer to Section 4.1.8 on Spill Response And Control.

4.1.19 Commercial Animal Handling

Municipal facilities occasionally host educational workshops, special events, fairs and festivals where live animals are kept, fed and handled. Commercial animal handling can generate pollutants from activities such as manure deposits, animal washing, grazing and feeding. Pollutants can include coliform bacteria, nutrients and total suspended solids.

BMPs for commercial animal handling include the following:

- **Keep animal areas clean:** Regularly sweep and clean animal keeping areas to collect and properly dispose of droppings, uneaten food and other potential storm water contaminants.

- **Don't hose down indoor or outdoor areas:** Do not hose down to storm drains or to receiving water those areas that contain potential storm water contaminants. Do not allow any wash waters to be discharged to storm drains or to receiving water without proper treatment.

- **Use proper ground cover:** If animals are kept in unpaved and uncovered areas, the ground must either have vegetative cover or some other type of ground cover such as mulch.

- **Enclose animals:** Designate areas where animals are to be housed, fed, washed and handled. If animals are not leashed or in cages, build a fence or another enclosure structure to keep the animals in the controlled area where these BMPs are used.

4.1.20 Canine Care and Pet Waste Management

A number of municipal operations require the presence of professional dogs (e.g., police departments, correctional facilities). In addition, many dog owners take advantage of the dog runs and open spaces provided by municipal parks. Dog wastes can wash into nearby water bodies or be carried by runoff into storm drains if not properly disposed of. Since most urban storm drains drain directly into surface waters, untreated animal waste can become a significant source of storm water runoff pollution. As pet waste decays in a water body, the degradation process uses oxygen and sometimes releases ammonia creating a toxic environment for aquatic life. Dog wastes also contain nutrients that promote weed and algae growth, which limit light penetration and the growth of aquatic vegetation. This in turn can reduce oxygen levels in the water, affecting fish and other aquatic organisms.

Perhaps most importantly, pet waste carries microbes, such as bacteria, viruses and parasites. It has been estimated that for watersheds of up to 20 square miles draining to small coastal bays, two to three days of droppings from a population of about 100 dogs would contribute enough bacteria and nutrients to temporarily close a bay to swimming and fishing.

BMPs for canine care and pet waste management include the following:

- **Keep canine areas clean:** Regularly sweep and clean areas. Do not hose down indoor or outdoor areas that contain potential storm water contaminants to storm drains or to receiving waters. Do not allow any wash waters to be discharged to storm drains or to receiving waters without proper treatment.

- **Establish ordinances:** Animal waste collection as a pollution source control involves using a combination of educational outreach and enforcement to encourage employees and residents to clean up after their animals. Control waste through warnings, citations, public education and signage. Repeal ordinances that require the curbing of dogs to reduce defecation and urination on impervious surfaces, which are then flushed into receiving waters by the next storm. Establish "pooper scooper" ordinances that govern pet waste cleanup. These laws can specifically require anyone who takes an animal off his or her property to carry a bag, shovel or scoop. Require the removal and proper disposal of pet waste from public areas before the dog owner leaves the immediate area. A fine can be associated with failure to perform this act.

- **Educate pet owners on the risks of pet waste pollution:** Public education programs are another way to encourage pet waste removal. Post signs and provide bags for waste in parks frequented by pet owners, send mailings and make public service announcements. Incorporated pet waste messages into a larger non-point source message relaying the effects of pollution on local water quality. Figure 4-10 provides an example of available educational materials for dog owners. Describe proper pet waste disposal techniques and create a storm drain-water quality link between pet waste and runoff in brochures and public service announcements. The provision of receptacles in parks for pet waste also encourages cleanup.

  The reluctance of many residents to handle dog waste is the biggest limitation to controlling pet waste. This strong resistance suggests that an alternative message may be necessary. One example might be to encourage the practice of rudimentary manure management by training dogs to use areas that are not hydraulically connected to the stream or close to a buffer.

  Promote cat spaying and dog sterilization programs in order to limit the growth of the animal population.

- **Educate pet owners on proper disposal of pet waste:** There is a need to dramatically improve watershed education efforts to increase public recognition about the effect of pet wastes on water quality and health risks. Pet owners have several options for properly managing pet waste:

  - The preferred method is to collect the waste and flush it down the toilet. The water from the toilet goes to a septic system or sewage treatment plant that

SOURCE: EARTH 911

RLA/FIGURES/NassauCoGenericBMP2423(01/17/07)

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

NASSAU COUNTY STORM WATER MANAGEMENT PROGRAM

EXAMPLE OF PET WASTE EDUCATIONAL MATERIAL

FIGURE 4-10

- removes most pollutants. To prevent plumbing problems, do not flush debris such as rocks, sticks or cat litter.

- Bury small quantities of waste in the yard. Waste decomposes slowly when buried at least 5 inches below the ground surface. Bury waste away from water bodies, ditches, wells, vegetable gardens and children's play areas. Do not add pet waste to compost piles. The pile won't get hot enough to kill disease organisms in pet waste.

- In public areas, the waste can be sealed in a plastic bag and thrown in the trash. However, this is not the best solution. Waste taken to landfill or incinerator can still cause pollution problems.

- **Designate a dog run in popular parks:** The concept of parks or portions of parks established specifically for dog owners has gained in popularity. With provisions for proper disposal of dog feces and design, these parks may represent another option for protecting local water quality.

  Establish specially designated dog parks where pets are allowed off-leash. Include signs reminding pet owners to remove waste. Design dog parks to mitigate storm water impacts. Install "pooper-scooper stations" in dog parks. These stations contain waste receptacles as well as a supply of waste collection bags, scoops and shovels. Use vegetated buffers and site parks out of drainage-ways, streams and steep slopes to control the impacts of dog waste on receiving waters.

  The following management options have been used in Australian dog parks and could be incorporated into other municipal dog parks:

  - "Doggy loos" – These disposal units are installed in the ground and decomposition occurs within the unit. Minimal maintenance is required (i.e., no refuse collection).

  - "Pooch patch" – A pole is placed in the park surrounded by a light scattering of sand. Owners are encouraged to introduce their dog to the pole on entry to the park. Dogs then return to the patch to defecate and special bins are provided in which owners then place the deposit.

  - "Long Grass Principle" – Dogs are attracted to long grass for defecating. Areas that are mowed less frequently can be provided for feces to disintegrate naturally. A height of around 4 inches is appropriate.

4.1.21 Horse Stables and Waste Management

A number of water quality problems can be associated with horse stables. Animal waste management is an important component of maintaining water quality. Horse wastes from stables contribute nutrients and pathogens to runoff and ground water. The handling of horses can generate pollutants from the following activities: washing, grazing, feeding, manure deposits, etc. Not only are the traditional problems of preventing the contamination of ground water and waterways an issue to be dealt with, but manure odor, fly problems and visual aesthetics must be also considered.

Without the use of proper management techniques, manure can have a significant impact on water quality. Pollutants can include coliform bacteria, nutrients and total suspended solids. This contamination of water can make it unsuitable for drinking, cause health problems in humans, destroy wildlife and aquatic habitat and make it unsuitable to use for recreational activities. Managing manure in order to keep nutrient, soil, parasites and pathogens from entering ground water and waterways can be challenging.

BMPs for horse stables and waste management include the following:

- **Keep horse areas clean:** Regularly sweep and clean areas to collect and properly dispose of droppings, uneaten grain and hay, bedding and other potential storm water contaminants.

- **Don't hose down indoor or outdoor areas:** Do not hose down to storm drains or to receiving water those areas that contain potential storm water contaminants. Do not allow any wash waters to be discharged to storm drains or to receiving water without proper treatment.

- **Use proper ground cover:** If horses are kept outdoors in unpaved areas, the ground must either have vegetative cover or some other type of ground cover such as mulch. Maintain as much vegetation as possible between animal areas and water bodies (e.g., vegetated buffer strips). Do not spread manure in these areas.

- **Enclose horses:** Site stables to drain away from water bodies. Construct berms or diversions around high-use areas to collect contaminated runoff for treatment. Designate areas where horses are to be housed, fed, washed and handled. If horses are not kept in stables, build a fence or another enclosure structure to keep them in the controlled area where these BMPs are used.

- **Maintain roof gutters, leaders and drainage systems:** The impact of rainwater around stables can be minimized by keeping roof runoff from dumping onto the ground near feeding and high traffic areas. The goal is to keep clean water from becoming contaminated and entering water bodies. Another benefit from diverting this clean water is less mud around the barn and feeding area resulting in a healthier environment for horses.

- **Compost manure and bedding:** Composting reduces the chances that manure contaminated runoff will reach surface water, ground water and private wells. Compost provides a cheap fertilizer, as it is rich in nutrients and organic material. The heat generated by manure during the composting process kills parasites, pathogens and weed seeds. The overall volume of the manure will be reduced by about half once composting is completed. Manure is virtually odorless when properly composted.

  Collect manure and bedding regularly. Protect stored manure from rainfall and runoff. The storage area needs to be dry and level so that surface water cannot run through it. Cover the storage with a tarp or roof to prevent the contamination of groundwater and surface water and decrease the potential for fly breeding. 144 square feet of confined space is needed to compost an average horse's yearly manure production. The storage must also allow manure to accumulate to a depth of 3 - 5 feet. A large number of horses will require a windrow system with a sloped concrete pad draining into a catch pond with a level spreader and filter area.

  Composting usually takes 30 to 90 days to complete. Keep the moisture content of the decomposing manure around 50%. Piled manure must have sufficient air spaces for the microorganisms to breathe while they decompose the manure and for the carbon dioxide produced to escape. The compost's composition can vary greatly, depending on the types of bedding used and the horse's diet. Trial and error will allow the composting process to be customized to fit the specific combination of manure, bedding and other organic materials.

  Vermicomposting is another method of composting. Earthworms are used to turn manure into a low odor, nutrient rich, earthy material that makes good potting soil. However, temperatures must range between 55 and 80 degrees Fahrenheit in order for the worms to survive and produce compost.

4.1.22 Pest Management

Controlling pests (e.g., weeds, rodents, mosquitoes, turf disease) in municipal buildings and grounds has the potential to pollute storm water with toxic chemicals and negatively affect water quality and aquatic and marine organisms. In addition to environmental and health concerns, pest control can be an expensive operation. Proper use of BMPs can lessen the environmental and water quality impacts while reducing costs by using smaller quantities of pesticides.

BMPs for pest management include the following:

- **Limit the use of pesticides:** Train and certify employees on proper use and application of pesticides. Inspect and monitor for pest evidence at least once or twice per year, even if there are no complaints pest of pest problems. Understand the environmental and ecological conditions (e.g., seasonal variations in day length, heat, rainfall, vegetation) affecting pest life cycles. Use physical control methods first (e.g., habitat modification, sticky traps, weed removal, etc.). Use pesticides only where and when needed. Do not apply pesticides in windy weather or when precipitation is predicted within the next 24 hours. Use less toxic alternatives, especially in areas near playgrounds and parks where children spend time.

- **Use landscaping techniques:** Use native plants where possible as they resist local diseases better than exotic plants. Develop buffer zones around water bodies to absorb pesticides. Plant tall vegetation in buffer zones to discourage pest waterfowl species. Aerate, remove thatch, manage pH levels and use other cultural methods to improve soil conditions. Adjust the terrain to incorporate storm drains in to vegetated areas, which can be left unmanaged and made aesthetically valuable.

- **Control mosquito populations:** Begin with surveillance to define the pest problem. Use habitat modification as the first step in controlling populations. If possible add mosquito fish to water bodies and eliminate standing water. Fill in depressions in the soil that accumulate standing water with sand or a porous soil to eliminate breeding sites for mosquitoes. If these measures are unsuccessful then the application of pesticides may be necessary.

- **Clean up pesticide spills:** Pesticides stored indoors are not a risk to water quality as long as spilled product is swept up immediately and used or properly discarded. Follow the spill response and control plan in case of an accidental spill.

- **Eliminate the points of entry and conditions that favor pests:** Eliminate the accumulation of wastes, overgrown vegetation and disturbed environments that could attract pests. Inspect shipments for pests in an isolated room or at a loading dock before bringing packages into a building. If warehouse and delivery vehicles are confirmed as a source of pests, insist that distributors take care of the problem or use a different distributor.

- **Calibrate equipment:** Equipment calibration ensures the proper application rate of pesticides and reduces the amount of pesticides lost to storm water. Inspect equipment multiple times per year to ensure proper functioning. Municipalities can contract with vendors to calibrate and inspect equipment.

- **Handle all pesticides according to instructions:** Mix pesticides on paved mixing pads. Use backflow prevention systems for adding water to sprayer tanks. Use portable mixing pads and spill containment pads to reduce the risk of contamination. Keep the Federal labels and the Material Safety Data Sheets with containers at all times in the case of an emergency. Transport pesticides in spill resistant containers or boxed in the trunk or the bed of a vehicle. Wear protective gear.

- **Record all pest and control incidences:** Map all areas where pest control methods are used. Build a database of pest problems and actions taken. Create a schedule for regular monitoring of weeds, insects, rodents and diseases.

4.2 Training, Reporting and Recordkeeping

4.2.1 Employee Training

In-house employee training programs are essential to teach employees about storm water management, pollution prevention and BMPs. Well-trained employees can reduce human errors that lead to accidental releases or spills. The employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur. Employee training programs should instill all personnel with a thorough understanding of their Storm Water Pollution Prevention Plan (SWPPP), including BMPs, processes and materials they are working with, safety hazards, practices for preventing discharges and procedures for responding quickly and properly to toxic and hazardous material incidents. Typically, most facilities have employee-training programs. Usually these address such areas as health and safety training and fire protection. Training on storm water management and BMPs can be incorporated into these programs.

BMPs for training include the following:

- **Provide general and targeted training:** Include a comprehensive training program that demonstrates the purpose and value of new procedures and ensures that personnel are competent to carry out their duties. Address worker training at an early stage. Municipal employees who are directly involved in potentially polluting activities should receive both general storm water and targeted BMP training tailored to their responsibilities. This will increase the likelihood that receiving waters and the storm drain system will be protected.

  It is important to train all municipal staff, however, regardless of field responsibilities, about general storm water awareness. Very often, municipal staffs are residents as well and improving the awareness of municipal employees may reduce residential impacts and increase reporting of illicit discharges, dumping and spills. Also, because municipalities expect residents and business owners to practice pollution prevention and good housekeeping, municipal employees should set an example for the rest of the community to follow.

- **Use multiple training techniques when available:** Perceptions vary, so training materials should be presented in a number of different ways. Instruction methods should include a combination of verbal and visual aids, group discussions and practical applications. Employees can be taught through:

  - Posters, employee meetings, courses, workshops, conferences, webcasts, videos, bulletin boards, paycheck inserts and email notices about storm water management, potential contaminant sources and prevention of contamination in surface water runoff; and

  - Field training programs that show areas of potential storm water contamination and associated pollutants, followed by a discussion of site-specific BMPs by trained personnel.

  Pollution prevention and storm water management BMP training materials are offered by numerous federal and state agencies and professional and nonprofit organizations. Establish and continue employee rewards or recognition programs for those who participate in pollution prevention programs. In addition, seek employee ideas on pollution prevention methods and priorities.

- **Include key program components:** These programs can be standardized and repeated as necessary, both to train new employees and to keep its objectives fresh in the minds of more senior employees. A training program is also flexible and can be adapted as a facility's storm water management needs change over time. Key program components and specific criteria for implementing an employee training program include:

  - Ensuring strong commitment and periodic input from senior management.

  - Communicating frequently to ensure adequate understanding of pollution prevention goals and objectives.

  - Utilizing experience from past pollution incidents (e.g., spills) to prevent future pollution.

  - Making employees aware of BMPs monitoring and reporting procedures.

  - Developing operating manuals and standard procedures.

- **Make training an on-going process:** An employee-training program should be a continuing, yearly process to ensure that the appropriate learning goals are taught, reinforced and tested. Meetings about pollution prevention and good housekeeping should be held, at least annually, possibly in conjunction with other training programs. Hold periodic refresher sessions to correct unacceptable behavior and reinforce expectations.

- **Track employee's work practices and training:** After training, it is helpful for managers to periodically check employees' work practices to ensure BMPs are implemented properly. Periodic unscheduled inspections of facilities and maintenance activities will allow managers to gauge what has been learned. Posting reminders (e.g., markers above drains prohibiting discharges of vehicle fluids and wastes, signs above faucets reminding employees not to use water to clean up spills) will reinforce employees of proper procedures. Stickers that list important information and contact numbers for reporting illicit discharges, dumping or spills can be adhered to all municipal vehicles. Stenciling or marking all storm drains at municipal facilities will prompt employees to be conscious of discharges. Facility SWPPP and BMPs guidance documents should be available to all employees as a reference to use after training.

  Table 4-2 illustrates a sample employee training worksheet. Worksheets such as these can be used to plan and track employee training programs. Program performance depends on employees' participation and on senior management's commitment to reducing storm water pollution. As a result, performance will vary among facilities. These programs require senior management's support to be effective.

4.2.2 Reporting

Internal reporting provides a framework for "chain-of-command" reporting of storm water management issues. Typically, a facility develops a team concept for implementing, maintaining and revising the facility's pollution prevention plan. The purpose of identifying a team is to clarify the chain of responsibility for storm water pollution prevention issues and to provide a point of contact for personnel outside the facility who need to discuss the plan. In addition, emphasize communication and coordination across key municipal departments and operations and county and state agencies, organizations and institutions.

BMPs for reporting include the following:

- **Establish an internal reporting structure**: It is important to select appropriate personnel at all levels to serve on the team. Both team and individual responsibilities should be designated with clear goals defined for proper storm water management.

Table 4-2

SAMPLE EMPLOYEE TRAINING WORKSHEET

<table>
<tr><td colspan="3">EMPLOYEE TRAINING</td><td>Name: ______
Title: _______
Date: _______</td></tr>
<tr><td colspan="4">Instructions: Describe the employee training program for your facility below. The program should, at a minimum, address spill prevention and response, good housekeeping, and material management practices. Provide a schedule for the training program and list the employees who attend the training sessions.</td></tr>
<tr><td>Training Topics</td><td>Brief Description of Training Program/Materials (e.g., film, newsletter, course)</td><td>Schedule for Training (list dates)</td><td>Participants</td></tr>
<tr><td>Spill Prevention and Response</td><td></td><td></td><td></td></tr>
<tr><td>Good Housekeeping</td><td></td><td></td><td></td></tr>
<tr><td>Material Management</td><td></td><td></td><td></td></tr>
<tr><td>Practices</td><td></td><td></td><td></td></tr>
<tr><td>Other Topics</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Source: U. S. EPA, 1992.

Internal reporting should be tied to other baseline BMPs, such as employee training, individual inspections and record keeping ensuring proper implementation. The performance and effectiveness of a facility's internal reporting system is highly variable and dependent upon several factors including:

- Commitment of senior management.
- Sufficient time and financial resources.
- Quality of implementation.
- Background and experience of the Team.

To ensure that an internal reporting system remains effective, the person or team responsible for maintaining the plan must be aware of any changes in facility operations or with key team members to determine if modifications must be made in the overall execution of the Generic BMPs.

- **Establish a qualified Storm Water Pollution Prevention Plan:** The key to implementing internal reporting, as a BMP, is to establish a qualified SWPPP. When setting up a SWPPP, it is important to identify key people on-site who are most familiar with the facility and its operations and who can also provide adequate structure and direction to the facility's entire storm water management program.

4.2.3 Record Keeping

It is recommended that all municipal facilities document their progress in the Pollution Prevention and Good Housekeeping program. Typical items that should be recorded include the results of routine inspections, material deliveries and reported spills, leaks or other discharges. Separate record keeping systems should be established to document housekeeping, preventive maintenance inspections, spill prevention and response and training activities.

Record keeping is usually coordinated with internal reporting and other BMPs and is often integrated into the development of a facility's operations and maintenance program. Record keeping is a basic business practice and is applicable to virtually all facilities. Keeping records of spills, leaks and other discharges can help a facility run more efficiently and cleanly. Records of past spills contain useful information for improving BMPs to prevent future spills. If a separate record keeping system for tracking BMPs, monitoring results, etc., is not currently in place at a facility, existing record keeping structures can be easily adapted to incorporate this data. NYSDEC recommends that record keeping reflect the organization of the municipal government and its operations. This should facilitate and simplify both collecting information and communicating BMPs information to field staff.

Records should include:

- The date, exact place and time of procedures, material inventories, site and equipment inspections, observations, equipment maintenance and calibrations, etc.
- Names of inspector(s) and observers(s).
- Analytical information (if sampling was done) including the date(s) and time(s) analyses were performed or initiated, the analysts' names, analytical techniques or methods used, analytical results and quality assurance/quality control results of such analyses.
- The date, time, exact location and a complete characterization of significant observations, including spills or leaks.
- Notes indicating the reasons for any exceptions to standard record keeping procedures.
- All calibration and maintenance records of instruments used in storm water monitoring.
- All original strip chart recordings for continuous monitoring equipment.
- Records of any non-storm water discharges.
- Incorporate geographic information systems (GIS) into pollution prevention planning.

APPENDIX A

NYSDEC SPDES MS4 GENERAL PERMIT

Please refer to the County website for viewing or printing out the SPDES General Permit for Storm Water Discharges from Municipal Separate Storm Sewer Systems (MS4s) currently in effect.

APPENDIX B

NYSDEC SAMPLE LOCAL LAW FOR STORM WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL

Sample Local Law for Stormwater Management and Erosion & Sediment Control *(Revised 3/06)*

This model local law is intended to be a guidance tool for communities that are subject to the Municipal Separate Storm Sewer System (MS4) Phase II stormwater management requirements of the National Pollutant Discharge Elimination System (NPDES) regulations, administered by New York State through the State Pollutant Discharge Elimination System (SPDES) regulations. The goal of providing this model law is to assist communities in amending existing laws and ordinances and/or adopting new provisions of local law to meet the new federal and state guidelines for stormwater control. In designing a model stormwater law for a New York State audience, we include suggestions for standard language and concepts that we believe a good stormwater management program should contain. This local law should not be construed as an exhaustive listing of all the language needed for a local law, but represents a good base that communities can build upon and customize to be consistent with the local conditions and staff resources available in their municipality.

Throughout the local law, there are sections in which you must insert the name of your municipality and the agency that you have given regulatory power over stormwater management issues. These sections are denoted by **bold** text placed in brackets. By using this document and customizing these sections, you can create a viable local law with minimal editing. Municipalities should work with their municipal attorney throughout the process.

Italicized text with this symbol ➲ should be interpreted as comments, instructions, or information to assist the local law writer. This text *should not appear* in your final local law.

The contents of this local law are as follows:

Sample Local Law for Stormwater Management and Erosion & Sediment Control

A local law to amend the **(Zoning Law/Subdivision Law/Site Plan Review Law/Erosion and Sediment Control Law)** of the **((City/Town/Village) of ______________),** Local law Number _______of the Year ________.

> ➲*Article 1 and Article 2 must be adopted for proper implementation. The municipality and its legal counsel, after reviewing their local codes and this model language, should pick additional provisions from Articles 3, 4, 5 and 6 to ensure review and enforcement of stormwater pollution prevention plans at the local level.*

Be it enacted by the **(City Council/Town Board/Village Board of Trustees)** of the **((City/Town/Village) of ______________)** as follows:

Article 1. General Provisions

Section 1. Findings of Fact

It is hereby determined that:

1.1 Land development activities and associated increases in site impervious cover often alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, flooding, stream channel erosion, or sediment transport and deposition;

1.2 This stormwater runoff contributes to increased quantities of water-borne pollutants, including siltation of aquatic habitat for fish and other desirable species;

1.3 Clearing and grading during construction tends to increase soil erosion and add to the loss of native vegetation necessary for terrestrial and aquatic habitat;

1.4 Improper design and construction of stormwater management practices can increase the velocity of stormwater runoff thereby increasing stream bank erosion and sedimentation;

1.5 Impervious surfaces allow less water to percolate into the soil, thereby decreasing groundwater recharge and stream baseflow;

1.6 Substantial economic losses can result from these adverse impacts on the waters of the municipality;

1.7 Stormwater runoff, soil erosion and nonpoint source pollution can be controlled and minimized through the regulation of stormwater runoff from land development activities;

1.8 The regulation of stormwater runoff discharges from land development activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will minimize threats to public health and safety.

1.9 Regulation of land development activities by means of performance standards governing stormwater management and site design will produce development compatible with the natural functions of a particular site or an entire watershed and thereby mitigate the adverse effects of erosion and sedimentation from development.

Section 2. Purpose

The purpose of this local law is to establish minimum stormwater management requirements and controls to protect and safeguard the general health, safety, and welfare of the public residing within this jurisdiction and to address the findings of fact in Section 1 hereof. This local law seeks to meet those purposes by achieving the following objectives:

2.1 Meet the requirements of minimum measures 4 and 5 of the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s), Permit no. GP-02-02 or as amended or revised;

2.2 Require land development activities to conform to the substantive requirements of the NYS Department of Environmental Conservation State Pollutant Discharge Elimination System (SPDES) General Permit for Construction Activities GP-02-01 or as amended or revised;

2.3 Minimize increases in stormwater runoff from land development activities in order to reduce flooding, siltation, increases in stream temperature, and streambank erosion and maintain the integrity of stream channels;

2.4 Minimize increases in pollution caused by stormwater runoff from land development activities which would otherwise degrade local water quality;

2.5 Minimize the total annual volume of stormwater runoff which flows from any specific site during and following development to the maximum extent practicable; and

2.6 Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management practices and to ensure that these management practices are properly maintained and eliminate threats to public safety.

➲ *The above list is a general set of objectives to reduce the impact of stormwater on receiving waters. Section 2.1 applies to regulated MS4s; a municipality not currently under this program may wish to leave this objective out, although the community may become regulated in the future. The advantage to adopting a local law for all municipalities is that the local government then has control over review and approval of Stormwater Pollution Prevention Plans (SWPPPs) during subdivision and site plan review. The local government may also wish to set some more specific objectives, based on priority water quality (refer to New York State 303 (d) list of priority waters at* www.dec.state.ny.us/website/dow/303dcalm.html *) and habitat problems (e.g., to reduce phosphorus loads being delivered to recreational lakes, to sustain a Class TS trout fishery).*

Section 3. Statutory Authority

In accordance with Article 10 of the Municipal Home Rule Law of the State of New York, the **(City Council/Town Board/Village Board of Trustees of ______________)** has the authority to enact local laws and amend local laws and for the purpose of promoting the health, safety or general welfare of the **((City/Town/Village) of ______________)** and for the protection and enhancement of its physical environment. The **(City Council/Town Board/Village Board of Trustees of ______________)** may include in any such local law provisions for the appointment of any municipal officer, employees, or independent contractor to effectuate, administer and enforce such local law.

Section 4. Applicability

4.1 This local law shall be applicable to all land development activities as defined in this local law, Article 2, Section 1**.**

4.2 The municipality shall designate a Stormwater Management Officer who shall accept and review all stormwater pollution prevention plans and forward such plans to the applicable municipal board. The

Stormwater Management Officer may (1) review the plans, (2) upon approval by the ((City Council/Town Board/Village Board of Trustees) of the (Town/Village/City) of ________________), engage the services of a registered professional engineer to review the plans, specifications and related documents at a cost not to exceed a fee schedule established by said governing board, or (3) accept the certification of a licensed professional that the plans conform to the requirements of this law.

4.3 All land development activities subject to review and approval by the **(applicable board of the (City/Town Village) of ______________)** under **(subdivision, site plan, and/or special permit)** regulations shall be reviewed subject to the standards contained in this local law

4.4 All land development activities not subject to review as stated in section 4.3 shall be required to submit a Stormwater Pollution Prevention Plan (SWPPP) to the Stormwater Management Officer who shall approve the SWPPP if it complies with the requirements of this law.

Section 5. Exemptions

The following activities may be exempt from review under this law.

➲ *The municipality may elect to include some or all of the exemptions in Section 5.*

5.1 Agricultural activity as defined in this local law.

5.2 Silvicultural activity except that landing areas and log haul roads are subject to this law.

5.3 Routine maintenance activities that disturb less than five acres and are performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility.

5.4 Repairs to any stormwater management practice or facility deemed necessary by the Stormwater Management Officer.

5.5 Any part of a subdivision if a plat for the subdivision has been approved by the **((City/Town/Village) of _____________)** on or before the effective date of this law.

5.6 Land development activities for which a building permit has been approved on or before the effective date of this law.

5.7 Cemetery graves.

5.8 Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles.

5.9 Emergency activity immediately necessary to protect life, property or natural resources.

5.10 Activities of an individual engaging in home gardening by growing flowers, vegetable and other plants primarily for use by that person and his or her family.

5.11 Landscaping and horticultural activities in connection with an existing structure.

Article 2. Zoning Law Amendment: Stormwater Control

➲*Municipalities that do not have zoning should add the language in Article 2 to Article 3 (Subdivision Regulation Amendment) or Article 4 (Site Plan Review Law Amendment) as applicable for their municipality.*

The Zoning Law is hereby amended to include Article ___, a new supplemental regulation titled Stormwater Control.

Section 1. Definitions

The terms used in this local law or in documents prepared or reviewed under this local law shall have the meaning as set forth in this section.

➲*Definitions should be incorporated into the appropriate section of the municipality's zoning law which contains definitions.*

Agricultural Activity - the activity of an active farm including grazing and watering livestock, irrigating crops, harvesting crops, using land for growing agricultural products, and cutting timber for sale, but shall not include the operation of a dude ranch or similar operation, or the construction of new structures associated with agricultural activities.

Applicant - a property owner or agent of a property owner who has filed an application for a land development activity.

Building - any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.

Channel - a natural or artificial watercourse with a definite bed and banks that conducts continuously or periodically flowing water.

Clearing - any activity that removes the vegetative surface cover.

Dedication - the deliberate appropriation of property by its owner for general public use.

Department - the New York State Department of Environmental Conservation

Design Manual - the *New York State Stormwater Management Design Manual*, most recent version including applicable updates, that serves as the official guide for stormwater management principles, methods and practices.

Developer - a person who undertakes land development activities.

Erosion Control Manual - the most recent version of the "New York Standards and Specifications for Erosion and Sediment Control" manual, commonly known as the "Blue Book".

Grading - excavation or fill of material, including the resulting conditions thereof.

Impervious Cover - those surfaces, improvements and structures that cannot effectively infiltrate rainfall, snow melt and water (e.g., building rooftops, pavement, sidewalks, driveways, etc).

Industrial Stormwater Permit - a State Pollutant Discharge Elimination System permit issued to a commercial industry or group of industries which regulates the pollutant levels associated with industrial stormwater discharges or specifies on-site pollution control strategies.

Infiltration - the process of percolating stormwater into the subsoil.

Jurisdictional Wetland - an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Land Development Activity - construction activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than one acre (*see ➲Note)*, or activities disturbing less than one acre of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land development activities may take place at different times on different schedules.

➲ *A community should review the local site plan, subdivision, zoning and erosion & sediment control laws and ordinances to see if there are minimum land disturbance requirements already specified in those laws. To meet the SPDES guidelines under GP-02-02, the municipality must require SWPPPs for construction activities that result in land disturbance equal to or greater than one acre, or activities disturbing less than one acre if they are part of a larger common plan of development or sale or in a specified watershed. The municipality may wish to reduce this threshold to a lesser amount of disturbance to conform to local standards which may be stricter than the standards set forth in the state regulations. Many communities regulate land disturbance activities of more than 5000 square feet (1/8 acre), with an exemption if the amount of impervious cover created does not exceed 1000 square feet.*

Landowner - the legal or beneficial owner of land, including those holding the right to purchase or lease the land, or any other person holding proprietary rights in the land.

Maintenance Agreement - a legally recorded document that acts as a property deed restriction, and which provides for long-term maintenance of stormwater management practices.

Nonpoint Source Pollution - pollution from any source other than from any discernible, confined, and discrete conveyances, and shall include, but not be limited to, pollutants from agricultural, silvicultural, mining, construction, subsurface disposal and urban runoff sources.

Phasing - clearing a parcel of land in distinct pieces or parts, with the stabilization of each piece completed before the clearing of the next.

Pollutant of Concern - sediment or a water quality measurement that addresses sediment (such as total suspended solids, turbidity or siltation) and any other pollutant that has been identified as a cause of impairment of any water body that will receive a discharge from the land development activity.

Project - land development activity

Recharge - the replenishment of underground water reserves.

Sediment Control - measures that prevent eroded sediment from leaving the site.

Sensitive Areas - cold water fisheries, shellfish beds, swimming beaches, groundwater recharge areas, water supply reservoirs, habitats for threatened, endangered or special concern species.

SPDES General Permit for Construction Activities GP-02-01 - A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to developers of construction activities to regulate disturbance of one or more acres of land.

SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems GP-02-02 - A permit under the New York State Pollutant Discharge Elimination System (SPDES) issued to municipalities to regulate discharges from municipal separate storm sewers for compliance with EPA established water quality standards and/or to specify stormwater control standards

Stabilization - the use of practices that prevent exposed soil from eroding.

Stop Work Order - an order issued which requires that all construction activity on a site be stopped.

Stormwater - rainwater, surface runoff, snowmelt and drainage

Stormwater Hotspot - a land use or activity that generates higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff, based on monitoring studies.

Stormwater Management - the use of structural or non-structural practices that are designed to reduce stormwater runoff and mitigate its adverse impacts on property, natural resources and the environment.

Stormwater Management Facility - one or a series of stormwater management practices installed, stabilized and operating for the purpose of controlling stormwater runoff.

Stormwater Management Officer - an employee or officer designated by the municipality to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater management practices

> ➲*The Stormwater Management Officer would likely be the Code Enforcement Officer or his/her staff. A consultant cannot be appointed as Stormwater Management Officer. Plan reviews and site inspections may be delegated to a consultant paid for through the applicant's escrow account, however the final approval must be made by a municipal employee or board member*.

Stormwater Management Practices (SMPs) - measures, either structural or nonstructural, that are determined to be the most effective, practical means of preventing flood damage and preventing or reducing point source or nonpoint source pollution inputs to stormwater runoff and water bodies.

Stormwater Pollution Prevention Plan (SWPPP) - a plan for controlling stormwater runoff and pollutants from a site during and after construction activities.

Stormwater Runoff - flow on the surface of the ground, resulting from precipitation

Surface Waters of the State of New York - lakes, bays, sounds, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

Storm sewers and waste treatment systems, including treatment ponds or lagoons which also meet the criteria of this definition are not waters of the state. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the state (such as a disposal area in wetlands) nor resulted from impoundment of waters of the state.

Watercourse - a permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carries surface water.

Waterway - a channel that directs surface runoff to a watercourse or to the public storm drain.

Section 2. Stormwater Pollution Prevention Plans

2.1. Stormwater Pollution Prevention Plan Requirement

No application for approval of a land development activity shall be reviewed until the appropriate board has received a Stormwater Pollution Prevention Plan (SWPPP) prepared in accordance with the specifications in this local law.

2.2 Contents of Stormwater Pollution Prevention Plans

2.2.1 All SWPPPs shall provide the following background information and erosion and sediment controls:

1. Background information about the scope of the project, including location, type and size of project.
2. Site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map should show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s); wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of off-site material, waste, borrow or equipment storage areas; and location(s) of the stormwater discharges(s);

➲*Site map should be at a scale no smaller than 1"=100' (e.g. 1"=500" is smaller than 1"=100")*

3. Description of the soil(s) present at the site;
4. Construction phasing plan describing the intended sequence of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance. Consistent with the New York Standards and Specifications for Erosion and Sediment Control (Erosion Control Manual), not more than five (5) acres shall be disturbed at any one time unless pursuant to an approved SWPPP.

➲ *A municipality may choose to reduce the amount of land that may be exposed at any one time.*

5. Description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in

stormwater runoff;

6. Description of construction and waste materials expected to be stored on-site with updates as appropriate, and a description of controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to stormwater, and spill -prevention and response;
7. Temporary and permanent structural and vegetative measures to be used for soil stabilization, runoff control and sediment control for each stage of the project from initial land clearing and grubbing to project close-out;
8. A site map/construction drawing(s) specifying the location(s), size(s) and length(s) of each erosion and sediment control practice;
9. Dimensions, material specifications and installation details for all erosion and sediment control practices, including the siting and sizing of any temporary sediment basins;
10. Temporary practices that will be converted to permanent control measures;
11. Implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and duration that each practice should remain in place;
12. Maintenance schedule to ensure continuous and effective operation of the erosion and sediment control practice;
13. Name(s) of the receiving water(s);
14. Delineation of SWPPP implementation responsibilities for each part of the site;
15. Description of structural practices designed to divert flows from exposed soils, store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable; and
16. Any existing data that describes the stormwater runoff at the site.

2.2.2 Land development activities as defined in Section 1 of this Article and meeting Condition "A", "B" or "C" below shall also include water quantity and water quality controls (post-construction stormwater runoff controls) as set forth in Section 2.2.3 below as applicable:

<u>Condition A</u> - Stormwater runoff from land development activities discharging a pollutant of concern to either an impaired water identified on the Department's 303(d) list of <u>impaired</u> waters or a Total Maximum Daily Load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment.

<u>Condition B</u> - Stormwater runoff from land development activities disturbing five (5) or more acres.

<u>Condition C</u> - Stormwater runoff from land development activity disturbing between one (1) and five (5) acres of land during the course of the project, exclusive of the construction of single family residences and construction activities at agricultural properties.

2.2.3 SWPPP Requirements for Condition A, B and C:

1. All information in Section 2.2 .1 of this local law
2. Description of each post-construction stormwater management practice;
3. Site map/construction drawing(s) showing the specific location(s) and size(s) of each post-construction stormwater management practice;
4. Hydrologic and hydraulic analysis for all structural components of the stormwater management system for the applicable design storms
5. Comparison of post-development stormwater runoff conditions with pre-development conditions

6. Dimensions, material specifications and installation details for each post-construction stormwater management practice;
7. Maintenance schedule to ensure continuous and effective operation of each post-construction stormwater management practice.
8. Maintenance easements to ensure access to all stormwater management practices at the site for the purpose of inspection and repair. Easements shall be recorded on the plan and shall remain in effect with transfer of title to the property.
9. Inspection and maintenance agreement binding on all subsequent landowners served by the on-site stormwater management measures in accordance with Article 2, Section 4 of this local law.
10. For Condition A, the SWPPP shall be prepared by a landscape architect, certified professional or professional engineer and must be signed by the professional preparing the plan, who shall certify that the design of all stormwater management practices meet the requirements in this local law.[1]

2.3 Other Environmental Permits

The applicant shall assure that all other applicable environmental permits have been or will be acquired for the land development activity prior to approval of the final stormwater design plan.

2.4 Contractor Certification

2.4.1 Each contractor and subcontractor identified in the SWPPP who will be involved in soil disturbance and/or stormwater management practice installation shall sign and date a copy of the following certification statement before undertaking any land development activity : "I certify under penalty of law that I understand and agree to comply with the terms and conditions of the Stormwater Pollution Prevention Plan. I also understand that it is unlawful for any person to cause or contribute to a violation of water quality standards."

2.4.2 The certification must include the name and title of the person providing the signature, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

2.4.3 The certification statement(s) shall become part of the SWPPP for the land development activity.

2.5 A copy of the SWPPP shall be retained at the site of the land development activity during construction from the date of initiation of construction activities to the date of final stabilization.

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[1] Revised 3/06 - formerly Section 2.3. This section was moved under Section 2.2.3 to more closely meet the New York State requirements for Condition A in Section 2.2.2. The NY SPDES General Permit for Stormwater Runoff from Construction Activities (GP-02-01) requires that SWPPPs be prepared by a licensed professional for land development activities discharging a pollutant of concern to an impaired water identified on the Department's 303(d) list of <u>impaired</u> waters or to a Total Maximum Daily Load (TMDL) designated watershed for which pollutants in stormwater have been identified as a source of the impairment.

Section 3. Performance and Design Criteria for Stormwater Management and Erosion and Sediment Control

All land development activities shall be subject to the following performance and design criteria:

3.1 Technical Standards

For the purpose of this local law, the following documents shall serve as the official guides and specifications for stormwater management. Stormwater management practices that are designed and constructed in accordance with these technical documents shall be presumed to meet the standards imposed by this law:

3.1.1 The New York State Stormwater Management Design Manual (New York State Department of Environmental Conservation, most current version or its successor, hereafter referred to as the Design Manual)

3.1.2 New York Standards and Specifications for Erosion and Sediment Control, (Empire State Chapter of the Soil and Water Conservation Society, 2004, most current version or its successor, hereafter referred to as the Erosion Control Manual).

➲ *The New York State technical guidance documents may be ordered from The Department. An order form as well as downloadable versions of the Manuals are available on the Internet at;*

http://www.dec.state.ny.us/website/dow/toolbox/escstandards/index.html

http://www.dec.state.ny.us/website/dow/toolbox/swmanual/

3.2 Equivalence to Technical Standards[2]

Where stormwater management practices are not in accordance with technical standards, the applicant or developer must demonstrate equivalence to the technical standards set forth in Article 2, Section 3.1 and the SWPPP shall be prepared by a licensed professional.

3.3 Water Quality Standards

Any land development activity shall not cause an increase in turbidity that will result in substantial visible contrast to natural conditions in surface waters of the state of New York.

Section 4. Maintenance, Inspection and Repair of Stormwater Facilities[3]

4.1 Maintenance and Inspection During Construction[4]

4.1.1 The applicant or developer of the land development activity or their representative shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the applicant or developer to achieve compliance with the conditions of this local law. Sediment shall be removed from sediment

[2] Added 3/06 to ensure that the local law addresses the New York State requirement for applicants to demonstrate through preparation by a licensed professional that stormwater management practices that are not prepared in accordance with NYSDEC technical standards will work in the field to prevent soil erosion and maintain water quality.
[3] Revised 3/06 to add the word "Inspection" to the title to more closely reflect the content of the section.
[4] Revised 3/06 to add the word "Inspection" to the title to more closely reflect the content of the section.

traps or sediment ponds whenever their design capacity has been reduced by fifty (50) percent.

4.1.2 For land development activities as defined in Section 1 of this Article and meeting Condition A, B or C in Section 2.2.2, the applicant shall have a qualified professional conduct site inspections and document the effectiveness of all erosion and sediment control practices every 7 days and within 24 hours of any storm event producing 0.5 inches of precipitation or more. Inspection reports shall be maintained in a site log book.[5]

4.1.3 The applicant or developer or their representative shall be on site at all times when construction or grading activity takes place and shall inspect and document the effectiveness of all erosion and sediment control practices.[6]

- ➲ *4.1.3 is an optional clause for municipalities that are interested in requiring more oversight by the developer during construction activities.*

4.2 Maintenance Easement(s)

Prior to the issuance of any approval that has a stormwater management facility as one of the requirements, the applicant or developer must execute a maintenance easement agreement that shall be binding on all subsequent landowners served by the stormwater management facility. The easement shall provide for access to the facility at reasonable times for periodic inspection by the **((City/Town/Village) of _________)** to ensure that the facility is maintained in proper working condition to meet design standards and any other provisions established by this local law. The easement shall be recorded by the grantor in the office of the County Clerk after approval by the counsel for the **((City/Town/Village) of _________)**.

4.3 Maintenance after Construction

The owner or operator of permanent stormwater management practices installed in accordance with this law shall ensure they are operated and maintained[7] to achieve the goals of this law. Proper operation and maintenance also includes as a minimum, the following:

4.3.1 A preventive/corrective maintenance program for all critical facilities and systems of treatment and control (or related appurtenances) which are installed or used by the owner or operator to achieve the goals of this law.

4.3.2 Written procedures for operation and maintenance and training new maintenance personnel.

4.3.3 Discharges from the SMPs shall not exceed design criteria or cause or contribute to water quality standard violations in accordance with Article 2, section 3.3.

4.4 Maintenance Agreements

The **((City/Town/Village) of _________)** shall approve a formal maintenance agreement for stormwater management facilities binding on all subsequent landowners and recorded in the office of the County Clerk as a deed restriction on the property prior to final plan approval. The maintenance agreement shall be

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[5] Revised 3/06. This clause was rewritten to more closely meet the New York State requirements for Conditions A, B and C in Section 2.2.2. The NY SPDES General Permit for Stormwater Runoff from Construction Activities (GP-02-01) requires that inspections be conducted every 7 days and within 24 hours of any storm event producing 0.5 inches of precipitation or more for all projects that are required to prepare full SWPPPs as stated in Conditions A, B and C, and to copy such reports to a site log book.

[6] Revised 3/06. Originally part of 4.1.2, this clause was relocated as a separate section to show that it is optional.

[7] Revised 3/06 to correct a grammatical error.

consistent with the terms and conditions of Schedule B of this local law entitled Sample Stormwater Control Facility Maintenance Agreement. The **((City/Town/Village) of _________)**, in lieu of a maintenance agreement, at its sole discretion may accept dedication of any existing or future stormwater management facility, provided such facility meets all the requirements of this local law and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

Section 5. Severability and Effective Date

5.1 Severability

If the provisions of any article, section, subsection, paragraph, subdivision or clause of this local law shall be judged invalid by a court of competent jurisdiction, such order of judgment shall not affect or invalidate the remainder of any article, section, subsection, paragraph, subdivision or clause of this local law.

5.2 Effective Date

This Local Law shall be effective upon filing with the office of the Secretary of State.

Approved by: _________________________________ Date ___________________

Article 3. Subdivision Regulation Amendment

Sections ___ and ___ of the Subdivision Regulations of the **((City/Town/Village) of __________)** are hereby amended by adding the following to the information requirements:

A. *For Preliminary Subdivision Plat add*: <u>Stormwater Pollution Prevention Plan:</u> A Stormwater Pollution Prevention Plan (SWPPP) consistent with the requirements of Article 1 and 2 of this local law shall be required for Preliminary Subdivision Plat approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Preliminary Subdivision Plat shall be consistent with the provisions of this local law.

B. *For Final Subdivision Plat approval add*: <u>Stormwater Pollution Prevention Plan:</u> A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law and with the terms of preliminary plan approval shall be required for Final Subdivision Plat approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Final Subdivision Plat shall be consistent with the provisions of this local law.

➲ *If the municipality has only one requirement for a final plan (no preliminary) then use Paragraph A language only.*

Article 4. Site Plan Review Regulation Amendment

Sections ___ and ___ of the Site Plan Review regulations of the **((City/Town/Village) of __________)** are hereby amended by adding the following to the information requirements:

For Site Plan Approval add: <u>Stormwater Pollution Prevention Plan:</u> A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law shall be required for Site Plan Approval. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law. The approved Site Plan shall be consistent with the provisions of this local law.

Article 5. Erosion & Sediment Control Law Repeal or Amendment[8]

Repeal:
The Erosion & Sediment Control Law of the **((City/Town/Village) of _________)** is hereby repealed.

➲ *By adopting Articles 1 and 2 (and 3, 4 and 6 where necessary) of the Model Local Law for Stormwater Management and Erosion & Sediment Control, the municipality will have regulatory authority for both erosion & sediment control and post-construction stormwater management so a separate erosion & sediment control law is not needed.*

OR

Amendment:
Section _________of the Erosion & Sediment Control Law of the **((City/Town/Village) of __________)** is hereby amended by adding the following clause: Stormwater Pollution Prevention Plan: A Stormwater Pollution Prevention Plan consistent with the requirements of Article 1 and 2 of this local law shall be required. The SWPPP shall meet the performance and design criteria and standards in Article 2 of this local law**.** The approved erosion control permit shall be consistent with the provisions of this local law.

➲ *The municipality must also adopt Articles 1, 2, 3 and 4 (as applicable for their municipality) in order to address post-construction stormwater runoff control in stormwater pollution prevention plans.*

Article 6. Administration and Enforcement

➲***The following provisions for construction inspection, performance guarantees and bonds, and enforcement are important to include in a stormwater control program, but may already exist in local law. Therefore the municipality and its counsel should review their existing provisions for these activities, compare them with the following provisions, and consider whether revisions or amendments are necessary to achieve the purposes of this local law.***

Section 1. Construction Inspection

1.1 Erosion and Sediment Control Inspection

The **((City/Town/Village) of _________)** Stormwater Management Officer may require such inspections as necessary to determine compliance with this law and may either approve that portion of the work completed or notify the applicant wherein the work fails to comply with the requirements of this law and the stormwater pollution prevention plan (SWPPP) as approved. To obtain inspections, the applicant shall notify the **((City/Town/Village) of _________)** enforcement official at least 48 hours before any of the following as required by the Stormwater Management Officer:

[8] Revised 3/06 to clarify that adoption of this Sample Local Law provides all the required language for local regulation of erosion & sediment control, therefore repeal of an existing erosion & sediment control law and replacement with the Sample Local Law may be the best option for many municipalities.

1.1.1 Start of construction
1.1.2 Installation of sediment and erosion control measures
1.1.3 Completion of site clearing
1.1.4 Completion of rough grading
1.1.5 Completion of final grading
1.1.6 Close of the construction season
1.1.7 Completion of final landscaping
1.1.8 Successful establishment of landscaping in public areas.

If any violations are found, the applicant and developer shall be notified in writing of the nature of the violation and the required corrective actions. No further work shall be conducted except for site stabilization until any violations are corrected and all work previously completed has received approval by the Stormwater Management Officer.

1.2 Stormwater Management Practice Inspections

The **((City/Town/Village) of _________)** Stormwater Management Officer, is responsible for conducting inspections of stormwater management practices (SMPs). All applicants are required to submit "as built" plans for any stormwater management practices located on-site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be certified by a professional engineer.

1.3 Inspection of Stormwater Facilities After Project Completion

Inspection programs shall be established on any reasonable basis, including but not limited to: routine inspections; random inspections; inspections based upon complaints or other notice of possible violations; inspection of drainage basins or areas identified as higher than typical sources of sediment or other contaminants or pollutants; inspections of businesses or industries of a type associated with higher than usual discharges of contaminants or pollutants or with discharges of a type which are more likely than the typical discharge to cause violations of state or federal water or sediment quality standards or the SPDES stormwater permit; and joint inspections with other agencies inspecting under environmental or safety laws. Inspections may include, but are not limited to: reviewing maintenance and repair records; sampling discharges, surface water, groundwater, and material or water in drainage control facilities; and evaluating the condition of drainage control facilities and other stormwater management practices.

➲*Inspections may be performed by local government staff or the local government may designate an inspector required to have a Professional Engineer's (PE) license or Certified Professional in Erosion and Sediment Control (CPESC) certificate, as long as the designated inspector is required to submit a report.*

1.4 Submission of Reports

The ((City/Town/Village) of _________) Stormwater Management Officer may require monitoring and reporting from entities subject to this law as are necessary to determine compliance with this law.

1.5 Right-of-Entry for Inspection

When any new stormwater management facility is installed on private property or when any new connection is made between private property and the public storm water system, the landowner shall grant to the **((City/Town/Village) of _________)** the right to enter the property at reasonable times and in a reasonable manner for the purpose of inspection as specified in paragraph 1.3.

Section 2. Performance Guarantee

2.1 Construction Completion Guarantee

In order to ensure the full and faithful completion of all land development activities related to compliance with all conditions set forth by the **((City/Town/Village) of _____________)** in its approval of the Stormwater Pollution Prevention Plan, the **((City/Town/Village) of _____________)** may require the applicant or developer to provide, prior to construction, a performance bond, cash escrow, or irrevocable letter of credit from an appropriate financial or surety institution which guarantees satisfactory completion of the project and names the **((City/Town/Village) of _____________)** as the beneficiary. The security shall be in an amount to be determined by the (**(City/Town/Village) of _____________)** based on submission of final design plans, with reference to actual construction and landscaping costs. The performance guarantee shall remain in force until the surety is released from liability by the **((City/Town/Village) of _____________)**, provided that such period shall not be less than one year from the date of final acceptance or such other certification that the facility(ies) have been constructed in accordance with the approved plans and specifications and that a one year inspection has been conducted and the facilities have been found to be acceptable to the **((City/Town/Village) of _________).** Per annum interest on cash escrow deposits shall be reinvested in the account until the surety is released from liability.

2.2 Maintenance Guarantee

Where stormwater management and erosion and sediment control facilities are to be operated and maintained by the developer or by a corporation that owns or manages a commercial or industrial facility, the developer, prior to construction, may be required to provide the **((City/Town/Village) of _____________)** with an irrevocable letter of credit from an approved financial institution or surety to ensure proper operation and maintenance of all stormwater management and erosion control facilities both during and after construction, and until the facilities are removed from operation. If the developer or landowner fails to properly operate and maintain stormwater management and erosion and sediment control facilities, the **((City/Town/Village) of _____________)** may draw upon the account to cover the costs of proper operation and maintenance, including engineering and inspection costs.

2.3 Recordkeeping

The ((City/Town/Village) of _____________) may require entities subject to this law to maintain records demonstrating compliance with this law.

Section 3. Enforcement and Penalties

3.1 Notice of Violation.

When the **((City/Town/Village) of _________)** determines that a land development activity is not being carried out in accordance with the requirements of this local law, it may issue a written notice of violation to the landowner. The notice of violation shall contain :

3.1.1 the name and address of the landowner, developer or applicant;

3.1.2 the address when available or a description of the building, structure or land upon which the violation is occurring;

3.1.3 a statement specifying the nature of the violation;

3.1.4 a description of the remedial measures necessary to bring the land development activity into compliance with this local law and a time schedule for the completion of such remedial action;

3.1.5 a statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;

3.1.6 a statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.

3.2 Stop Work Orders

The **((City/Town/Village) of _________)** may issue a stop work order for violations of this law. Persons receiving a stop work order shall be required to halt all land development activities, except those activities that address the violations leading to the stop work order. The stop work order shall be in effect until the **((City/Town/Village) of _________)** confirms that the land development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a stop work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this local law.

3.3 Violations

Any land development activity that is commenced or is conducted contrary to this local law, may be restrained by injunction or otherwise abated in a manner provided by law.

3.4 Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this local law shall be guilty of a violation punishable by a fine not exceeding three hundred fifty dollars ($350) or imprisonment for a period not to exceed six months, or both for conviction of a first offense; for conviction of a second offense both of which were committed within a period of five years, punishable by a fine not less than three hundred fifty dollars nor more than seven hundred dollars ($700) or imprisonment for a period not to exceed six months, or both; and upon conviction for a third or subsequent offense all of which were committed within a period of five years, punishable by a fine not less than seven hundred dollars nor more than one thousand dollars ($1000) or imprisonment for a period not to exceed six months, or both. However, for the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this local law shall be deemed misdemeanors and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.

3.5 Withholding of Certificate of Occupancy

If any building or land development activity is installed or conducted in violation of this local law the Stormwater Management Officer may prevent the occupancy of said building or land.

3.6 Restoration of lands

Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the **((City/Town/Village) of _________)** may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

Section 4. Fees for Services

The **((City/Town/Village) of _________)** may require any person undertaking land development activities regulated by this law to pay reasonable costs at prevailing rates for review of SWPPPs, inspections, or SMP maintenance performed by the **((City/Town/Village) of _________)** or performed by a third party for the **((City/Town/Village) of _________)**.

Schedule A

Stormwater Management Practices Acceptable for Water Quality (*From: New York State Stormwater Management Design Manual, Table 5.1*)		
Group	**Practice**	**Description**
Pond	Micropool Extended Detention Pond (P-1)	Pond that treats the majority of the water quality volume through extended detention, and incorporates a micropool at the outlet of the pond to prevent sediment resuspension.
	Wet Pond (P-2)	Pond that provides storage for the entire water quality volume in the permanent pool.
	Wet Extended Detention Pond (P-3)	Pond that treats a portion of the water quality volume by detaining storm flows above a permanent pool for a specified minimum detention time.
	Multiple Pond System (P-4)	A group of ponds that collectively treat the water quality volume.
	Pocket Pond (P-5)	A stormwater wetland design adapted for the treatment of runoff from small drainage areas that has little or no baseflow available to maintain water elevations and relies on groundwater to maintain a permanent pool.
Wetland	Shallow Wetland (W-1)	A wetland that provides water quality treatment entirely in a shallow marsh.
	Extended Detention Wetland (W-2)	A wetland system that provides some fraction of the water quality volume by detaining storm flows above the marsh surface.
	Pond/Wetland System (W-3)	A wetland system that provides a portion of the water quality volume in the permanent pool of a wet pond that precedes the marsh for a specified minimum detention time.
	Pocket Wetland (W-4)	A shallow wetland design adapted for the treatment of runoff from small drainage areas that has variable water levels and relies on groundwater for its permanent pool.
Infiltration	Infiltration Trench (I-1)	An infiltration practice that stores the water quality volume in the void spaces of a gravel trench before it is infiltrated into the ground.
	Infiltration Basin (I-2)	An infiltration practice that stores the water quality volume in a shallow depression before it is infiltrated into the ground.
	Dry Well (I-3)	An infiltration practice similar in design to the infiltration trench, and best suited for treatment of rooftop runoff.
Filtering Practices	Surface Sand Filter (F-1)	A filtering practice that treats stormwater by settling out larger particles in a sediment chamber, and then filtering stormwater through a sand matrix.
	Underground Sand Filter (F-2)	A filtering practice that treats stormwater as it flows through underground settling and filtering chambers.
	Perimeter Sand Filter (F-3)	A filter that incorporates a sediment chamber and filter bed as parallel vaults adjacent to a parking lot.
	Organic Filter (F-4)	A filtering practice that uses an organic medium such as compost in the filter in place of sand.
	Bioretention (F-5)	A shallow depression that treats stormwater as it flows through a soil matrix, and is returned to the storm drain system.
Open Channels	Dry Swale (O-1)	An open drainage channel or depression explicitly designed to detain and promote the filtration of stormwater runoff into the soil media.
	Wet Swale (O-2)	An open drainage channel or depression designed to retain water or intercept groundwater for water quality treatment.

Schedule B

SAMPLE STORMWATER CONTROL FACILITY MAINTENANCE AGREEMENT

Whereas, the Municipality of ________________("Municipality") and the _______________ ("facility owner") want to enter into an agreement to provide for the long term maintenance and continuation of stormwater control measures approved by the Municipality for the below named project, and

Whereas, the Municipality and the facility owner desire that the stormwater control measures be built in accordance with the approved project plans and thereafter be maintained, cleaned, repaired, replaced and continued in perpetuity in order to ensure optimum performance of the components. Therefore, the Municipality and the facility owner agree as follows:

1. This agreement binds the Municipality and the facility owner, its successors and assigns, to the maintenance provisions depicted in the approved project plans which are attached as Schedule A of this agreement.

2. The facility owner shall maintain, clean, repair, replace and continue the stormwater control measures depicted in Schedule A as necessary to ensure optimum performance of the measures to design specifications. The stormwater control measures shall include, but shall not be limited to, the following: drainage ditches, swales, dry wells, infiltrators, drop inlets, pipes, culverts, soil absorption devices and retention ponds.

3. The facility owner shall be responsible for all expenses related to the maintenance of the stormwater control measures and shall establish a means for the collection and distribution of expenses among parties for any commonly owned facilities.

4. The facility owner shall provide for the periodic inspection of the stormwater control measures, not less than once in every five year period, to determine the condition and integrity of the measures. Such inspection shall be performed by a Professional Engineer licensed by the State of New York. The inspecting engineer shall prepare and submit to the Municipality within 30 days of the inspection, a written report of the findings including recommendations for those actions necessary for the continuation of the stormwater control measures.

5. The facility owner shall not authorize, undertake or permit alteration, abandonment, modification or discontinuation of the stormwater control measures except in accordance with written approval of the Municipality.

6. The facility owner shall undertake necessary repairs and replacement of the stormwater control measures at the direction of the Municipality or in accordance with the recommendations of the inspecting engineer.

7. The facility owner shall provide to the Municipality within 30 days of the date of this agreement, a security for the maintenance and continuation of the stormwater control measures in the form of (a Bond, letter of credit or escrow account).

8. This agreement shall be recorded in the Office of the County Clerk, County of _____________together with the deed for the common property and shall be included in the offering plan and/or prospectus approved pursuant to ______________.

9. If ever the Municipality determines that the facility owner has failed to construct or maintain the stormwater control measures in accordance with the project plan or has failed to undertake corrective action specified by the Municipality or by the inspecting engineer, the Municipality is authorized to undertake such steps as reasonably necessary for the preservation, continuation or maintenance of the stormwater control measures and to affix the expenses thereof as a lien against the property.

10. This agreement is effective ____________ .

________________________________ ______________________________

***From: Lake George Park Commission Model Stormwater Management Ordinance, Schedule** E*

APPENDIX C

NYSDEC MODEL LOCAL LAW TO PROHIBIT ILLICIT DISCHARGES, ACTIVITIES AND CONNECTIONS TO SEPARATE STORM SEWER SYSTEMS

Model Local Law
to
Prohibit Illicit Discharges, Activities and Connections to Separate Storm Sewer System

Introduction

This model local law is intended to be a tool for communities that are currently or may soon be responsible for meeting the Phase II stormwater management requirements of the National Pollutant Discharge Elimination System (NPDES) regulations, administered by New York State through the State Pollutant Discharge Elimination System (SPDES) regulations. The goal of providing this model law is to assist communities in adopting provisions of local law to meet the new federal and state guidelines for prohibiting illicit discharges to municipal separate storm sewer systems. In designing a model illicit discharge law for a New York State audience, we include suggestions for standard language and concepts that we believe a good illicit discharge law should contain. This local law should not be construed as an exhaustive listing of all the language needed for a local law, but represents a good base that communities can build upon and customize to be consistent with the local conditions and staff resources available in their municipality.

Throughout the local law, there are sections in which you must insert the name of your municipality and the agency that you have given regulatory power over stormwater management issues. These sections are denoted by **bold text** placed in brackets. By using this document and customizing these sections, you can create a viable local law with minimal editing.

Italicized text with this symbol ➲ should be interpreted as comments, instructions, information or optional language to assist the local law writer. The text <u>next to the arrow should be deleted</u> and the optional sections converted to non-italicized text or deleted as appropriate in your final local law. Sections 2.5, 2.9, 7, 8.2, and 9.2 are optional for municipalities that are regulating failing individual sewage treatment systems because stormwater discharge from the MS4 meets one of the Special Conditions in Section 2.18 or for municipalities that choose to include these standards for certain water resource protection objectives.

Model Local Law
to
Prohibit Illicit Discharges, Activities
and Connections to
Separate Storm Sewer System

SECTION 1. PURPOSE/INTENT.

The purpose of this law is to provide for the health, safety, and general welfare of the citizens of the **((City/Town/Village) of _____________)** through the regulation of non-stormwater discharges to the municipal separate storm sewer system (MS4) to the maximum extent practicable as required by federal and state law. This law establishes methods for controlling the introduction of pollutants into the MS4 in order to comply with requirements of the SPDES General Permit for Municipal Separate Storm Sewer Systems. The objectives of this law are:

1.1 To meet the requirements of the SPDES General Permit for Stormwater Discharges from MS4s, Permit no. GP-02-02 or as amended or revised;

1.2 To regulate the contribution of pollutants to the MS4 since such systems are not designed to accept, process or discharge non-stormwater wastes;

1.3 To prohibit Illicit Connections, Activities and Discharges to the MS4;

1.4 To establish legal authority to carry out all inspection, surveillance and monitoring procedures necessary to ensure compliance with this law; and

1.5 To promote public awareness of the hazards involved in the improper discharge of trash, yard waste, lawn chemicals, pet waste, wastewater, grease, oil, petroleum products, cleaning products, paint products, hazardous waste, sediment and other pollutants into the MS4.

SECTION 2. DEFINITIONS.

Whenever used in this law, unless a different meaning is stated in a definition applicable to only a portion of this law, the following terms will have meanings set forth below:

2.1 Best Management Practices (BMPs). Schedules of activities, prohibitions of practices, general good house keeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

2.2 Clean Water Act. The Federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

2.3 Construction Activity. Activities requiring authorization under the SPDES permit for stormwater discharges from construction activity, GP-02-01, as amended or revised. These activities include construction projects resulting in land disturbance of one or more acres. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

2.4 Department. The New York State Department of Environmental Conservation.

➲ *The following section in italics is optional for those municipalities that are regulating failing individual sewage treatment systems to address Special Conditions or water resource objectives:*

2.5 Design professional. New York State licensed professional engineer or licensed architect.

2.6 Hazardous Materials. Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

2.7 Illicit Connections. Any drain or conveyance, whether on the surface or subsurface, which allows an illegal discharge to enter the MS4, including but not limited to:
1. Any conveyances which allow any non-stormwater discharge including treated or untreated sewage, process wastewater, and wash water to enter the MS4 and any connections to the storm drain system from indoor drains and sinks, regardless of whether said drain or connection had been previously allowed, permitted, or approved by an authorized enforcement agency; or
2. Any drain or conveyance connected from a commercial or industrial land use to the MS4 which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

2.8 Illicit Discharge. Any direct or indirect non-stormwater discharge to the MS4, except as exempted in Section 6 of this law.

➲ *The following section in italics is optional for those municipalities that are regulating failing individual sewage treatment systems to address Special Conditions or water resource objectives:*

2.9 Individual Sewage Treatment System. A facility serving one or more parcels of land or residential households, or a private, commercial or institutional facility, that treats sewage or other liquid wastes for discharge into the groundwaters of New York State, except where a permit for such a facility is required under the applicable provisions of Article 17 of the Environmental Conservation Law.

2.10 Industrial Activity. Activities requiring the SPDES permit for discharges from industrial activities except construction, GP-98-03, as amended or revised.

2.11 MS4. Municipal Separate Storm Sewer System.

2.12 Municipal Separate Storm Sewer System. A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

1. Owned or operated by the **((City/Town/Village) of _________________)**;
2. Designed or used for collecting or conveying stormwater;
3. Which is not a combined sewer; and
4. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40CFR 122.2

2.13 Municipality. The **((City/Town/Village) of _________________)**

2.14 Non-Stormwater Discharge. Any discharge to the MS4 that is not composed entirely of stormwater.

2.15 Person. Any individual, association, organization, partnership, firm, corporation or other entity recognized by law and acting as either the owner or as the owner's agent.

2.16 Pollutant. Dredged spoil, filter backwash, solid waste, incinerator residue, treated or untreated sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards.

2.17 Premises. Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

2.18 Special Conditions.

1. Discharge Compliance with Water Quality Standards. The condition that applies where a municipality has been notified that the discharge of stormwater authorized under their MS4 permit may have caused or has the reasonable potential to cause or contribute to the violation of an applicable water quality standard. Under this condition the municipality must take all necessary actions to ensure future discharges do not cause or contribute to a violation of water quality standards.

2. 303(d) Listed Waters. The condition in the municipality's MS4 permit that applies where the MS4 discharges to a 303(d) listed water. Under this condition the stormwater management program must ensure no increase of the listed pollutant of concern to the 303(d) listed water.

3. Total Maximum Daily Load (TMDL) Strategy. The condition in the municipality's MS4 permit where a TMDL including requirements for control of stormwater discharges has been approved by EPA for a waterbody or watershed into which the MS4 discharges. If the discharge from the MS4 did not meet the TMDL stormwater allocations prior to September

10, 2003, the municipality was required to modify its stormwater management program to ensure that reduction of the pollutant of concern specified in the TMDL is achieved.

4. The condition in the municipality's MS4 permit that applies if a TMDL is approved in the future by EPA for any waterbody or watershed into which an MS4 discharges. Under this condition the municipality must review the applicable TMDL to see if it includes requirements for control of stormwater discharges. If an MS4 is not meeting the TMDL stormwater allocations, the municipality must, within six (6) months of the TMDL's approval, modify its stormwater management program to ensure that reduction of the pollutant of concern specified in the TMDL is achieved.

2.19 State Pollutant Discharge Elimination System (SPDES) Stormwater Discharge Permit. A permit issued by the Department that authorizes the discharge of pollutants to waters of the state.

2.20 Stormwater. Rainwater, surface runoff, snowmelt and drainage.

2.21 Stormwater Management Officer (SMO). An employee, the municipal engineer or other public official(s) designated by the **((City/Town/Village) of ___________)** to enforce this local law. The SMO may also be designated by the municipality to accept and review stormwater pollution prevention plans, forward the plans to the applicable municipal board and inspect stormwater management practices.

2.22 303(d) List. A list of all surface waters in the state for which beneficial uses of the water (drinking, recreation, aquatic habitat, and industrial use) are impaired by pollutants, prepared periodically by the Department as required by Section 303(d) of the Clean Water Act. 303(d) listed waters are estuaries, lakes and streams that fall short of state surface water quality standards and are not expected to improve within the next two years.

2.23 TMDL. Total Maximum Daily Load.

2.24 Total Maximum Daily Load. The maximum amount of a pollutant to be allowed to be released into a waterbody so as not to impair uses of the water, allocated among the sources of that pollutant.

2.25 Wastewater. Water that is not stormwater, is contaminated with pollutants and is or will be discarded.

SECTION 3. APPLICABILITY.

This law shall apply to all water entering the MS4 generated on any developed and undeveloped lands unless explicitly exempted by an authorized enforcement agency.

SECTION 4. RESPONSIBILITY FOR ADMINISTRATION.

The Stormwater Management Officer(s) (SMO(s)) shall administer, implement, and enforce the provisions of this law. Such powers granted or duties imposed upon the authorized enforcement official may be delegated in writing by the SMO as may be authorized by the municipality.

SECTION 5. SEVERABILITY.

The provisions of this law are hereby declared to be severable. If any provision, clause, sentence, or paragraph of this law or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this law.

SECTION 6. DISCHARGE PROHIBITIONS.

6.1 Prohibition of Illegal Discharges.
No person shall discharge or cause to be discharged into the MS4 any materials other than stormwater except as provided in Section 6.1.1. The commencement, conduct or continuance of any illegal discharge to the MS4 is prohibited except as described as follows:

6.1.1 The following discharges are exempt from discharge prohibitions established by this local law, unless the Department or the municipality has determined them to be substantial contributors of pollutants: water line flushing or other potable water sources, landscape irrigation or lawn watering, existing diverted stream flows, rising ground water, uncontaminated ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains, crawl space or basement sump pumps, air conditioning condensate, irrigation water, springs, water from individual residential car washing, natural riparian habitat or wetland flows, dechlorinated swimming pool discharges, residential street wash water, water from fire fighting activities, and any other water source not containing pollutants. Such exempt discharges shall be made in accordance with an appropriate plan for reducing pollutants.

➲ *These discharge exemptions are allowed by the Federal regulations and the Department; however, municipalities may choose to delete certain exemptions if it is important to control that discharge to protect local water resources.*

6.1.2 Discharges approved in writing by the SMO to protect life or property from imminent harm or damage, provided that, such approval shall not be construed to constitute compliance with other applicable laws and requirements, and further provided that such discharges may be permitted for a specified time period and under such conditions as the SMO may deem appropriate to protect such life and property while reasonably maintaining the purpose and intent of this local law.

6.1.3 Dye testing in compliance with applicable state and local laws is an allowable discharge, but requires a verbal notification to the SMO prior to the time of the test.

6.1.4 The prohibition shall not apply to any discharge permitted under an SPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Department, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the MS4.

6.2 Prohibition of Illicit Connections.

6.2.1 The construction, use, maintenance or continued existence of illicit connections to the MS4 is prohibited.

6.2.2 This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

6.2.3 A person is considered to be in violation of this local law if the person connects a line conveying sewage to the municipality's MS4, or allows such a connection to continue.

➲ *The following section in italics is optional for those municipalities that are regulating failing individual sewage treatment systems to address Special Conditions or water resource objectives:*

SECTION 7. PROHIBITION AGAINST FAILING INDIVIDUAL SEWAGE TREATMENT SYSTEMS

No persons shall operate a failing individual sewage treatment system in areas tributary to the municipality's MS4. A failing individual sewage treatment system is one which has one or more of the following conditions:

7.1 The backup of sewage into a structure.
7.2 Discharges of treated or untreated sewage onto the ground surface.
7.3 A connection or connections to a separate stormwater sewer system.
7.4 Liquid level in the septic tank above the outlet invert.
7.5 Structural failure of any component of the individual sewage treatment system that could lead to any of the other failure conditions as noted in this section.
7.6 Contamination of off-site groundwater.

SECTION 8. PROHIBITION AGAINST ACTIVITIES CONTAMINATING STORMWATER

8.1 Activities that are subject to the requirements of this section are those types of activities that:

8.1.1 Cause or contribute to a violation of the municipality's MS4 SPDES permit.
8.1.2 Cause or contribute to the municipality being subject to the Special Conditions as defined in Section 2 (Definitions) of this local law.

➲ *The following section in italics is optional for those municipalities that are regulating failing individual sewage treatment systems to address Special Conditions or water resource objectives:*

8.2 Such activities include failing individual sewage treatment systems as defined in Section 7, improper management of pet waste or any other activity that causes or contributes to violations of the municipality's MS4 SPDES permit authorization.

8.3 Upon notification to a person that he or she is engaged in activities that cause or contribute to violations of the municipality's MS4 SPDES permit authorization, that person shall take all reasonable actions to correct such activities such that he or she no longer causes or contributes to violations of the municipality's MS4 SPDES permit authorization.

SECTION 9. REQUIREMENT TO PREVENT, CONTROL, AND REDUCE STORMWATER POLLUTANTS BY THE USE OF BEST MANAGEMENT PRACTICES.

9.1 Best Management Practices
Where the SMO has identified illicit discharges as defined in Section 2 or activities contaminating stormwater as defined in Section 8 the municipality may require implementation of Best Management Practices (BMPs) to control those illicit discharges and activities.

9.1.1 The owner or operator of a commercial or industrial establishment shall provide, at their own expense, reasonable protection from accidental discharge of prohibited materials or other wastes into the MS4 through the use of structural and non-structural BMPs.

9.1.2 Any person responsible for a property or premise, which is, or may be, the source of an illicit discharge as defined in Section 2 or an activity contaminating stormwater as defined in Section 8, may be required to implement, at said person's expense, additional structural and non-structural BMPs to reduce or eliminate the source of pollutant(s) to the MS4.

9.1.3 Compliance with all terms and conditions of a valid SPDES permit authorizing the discharge of stormwater associated with industrial activity, to the extent practicable, shall be deemed compliance with the provisions of this section.

➲ *The following section in italics is optional for those municipalities that are regulating failing individual sewage treatment systems to address Special Conditions or water resource objectives:*

9.2 Individual Sewage Treatment Systems - Response to Special Conditions Requiring No Increase of Pollutants or Requiring a Reduction of Pollutants

Where individual sewage treatment systems are contributing to the municipality's being subject to the Special Conditions as defined in Section 2 of this local law, the owner or operator of such individual sewage treatment systems shall be required to:

9.2.1 Maintain and operate individual sewage treatment systems as follows:

1. *Inspect the septic tank annually to determine scum and sludge accumulation. Septic tanks must be pumped out whenever the bottom of the scum layer is within three inches of the bottom of the outlet baffle or sanitary tee <u>or</u> the top of the sludge is within ten inches of the bottom of the outlet baffle or sanitary tee.*
2. *Avoid the use of septic tank additives.*
3. *Avoid the disposal of excessive quantities of detergents, kitchen wastes, laundry wastes, and household chemicals; and*

4. *Avoid the disposal of cigarette butts, disposable diapers, sanitary napkins, trash and other such items*

➲*Most tanks should be pumped out every two to three years. However, pumping may be more or less frequent depending on use. Inspection of the tank for cracks, leaks and blockages should be done by the septage hauler at the time of pumping of the tank contents.*

9.2.2 Repair or replace individual sewage treatment systems as follows:

1. *In accordance with 10NYCRR Appendix 75A to the maximum extent practicable.*
2. *A design professional licensed to practice in New York State shall prepare design plans for any type of absorption field that involves:*
   1. *Relocating or extending an absorption area to a location not previously approved for such.*
   2. *Installation of a new subsurface treatment system at the same location.*
   3. *Use of alternate system or innovative system design or technology.*
3. *A written certificate of compliance shall be submitted by the design professional to the municipality at the completion of construction of the repair or replacement system.*

SECTION 10. SUSPENSION OF ACCESS TO MS4. Illicit Discharges in Emergency Situations.

10.1 The SMO may, without prior notice, suspend MS4 discharge access to a person when such suspension is necessary to stop an actual or threatened discharge which presents or may present imminent and substantial danger to the environment, to the health or welfare of persons, or to the MS4. The SMO shall notify the person of such suspension within a reasonable time thereafter in writing of the reasons for the suspension. If the violator fails to comply with a suspension order issued in an emergency, the SMO may take such steps as deemed necessary to prevent or minimize damage to the MS4 or to minimize danger to persons.

10.2 Suspension due to the detection of illicit discharge. Any person discharging to the municipality's MS4 in violation of this law may have their MS4 access terminated if such termination would abate or reduce an illicit discharge. The SMO will notify a violator in writing of the proposed termination of its MS4 access and the reasons therefor. The violator may petition the SMO for a reconsideration and hearing. Access may be granted by the SMO if he/she finds that the illicit discharge has ceased and the discharger has taken steps to prevent its recurrence. Access may be denied if the SMO determines in writing that the illicit discharge has not ceased or is likely to recur. A person commits an offense if the person reinstates MS4 access to premises terminated pursuant to this Section, without the prior approval of the SMO.

SECTION 11. INDUSTRIAL OR CONSTRUCTION ACTIVITY DISCHARGES.

Any person subject to an industrial or construction activity SPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the municipality prior to the allowing of discharges to the MS4.

SECTION 12. ACCESS AND MONITORING OF DISCHARGES.

12.1 Applicability. This section applies to all facilities that the SMO must inspect to enforce any provision of this Law, or whenever the authorized enforcement agency has cause to believe that there exists, or potentially exists, in or upon any premises any condition which constitutes a violation of this Law.

12.2 Access to Facilities.

12.2.1 The SMO shall be permitted to enter and inspect facilities subject to regulation under this law as often as may be necessary to determine compliance with this Law. If a discharger has security measures in force which require proper identification and clearance before entry into its premises, the discharger shall make the necessary arrangements to allow access to the SMO.

12.2.2 Facility operators shall allow the SMO ready access to all parts of the premises for the purposes of inspection, sampling, examination and copying of records as may be required to implement this law.
12.2.3 The municipality shall have the right to set up on any facility subject to this law such devices as are necessary in the opinion of the SMO to conduct monitoring and/or sampling of the facility's stormwater discharge.

12.2.4 The municipality has the right to require the facilities subject to this law to install monitoring equipment as is reasonably necessary to determine compliance with this law. The facility's sampling and monitoring equipment shall be maintained at all times in a safe and proper operating condition by the discharger at its own expense. All devices used to measure stormwater flow and quality shall be calibrated to ensure their accuracy.

12.2.5 Unreasonable delays in allowing the municipality access to a facility subject to this law is a violation of this law. A person who is the operator of a facility subject to this law commits an offense if the person denies the municipality reasonable access to the facility for the purpose of conducting any activity authorized or required by this law.

12.2.6 If the SMO has been refused access to any part of the premises from which stormwater is discharged, and he/she is able to demonstrate probable cause to believe that there may be a violation of this law, or that there is a need to inspect and/or sample as part of a routine inspection and sampling program designed to verify compliance with this law or any order issued hereunder, then the SMO may seek issuance of a search warrant from any court of competent jurisdiction.

SECTION 13. NOTIFICATION OF SPILLS.

Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting or may result in illegal discharges or pollutants discharging into the MS4, said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the municipality in person or by telephone or facsimile no later than the next business day. Notifications in person or by telephone shall be confirmed by written notice addressed and mailed to the municipality within three business days of the telephone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

SECTION 14. ENFORCEMENT.

14.1 Notice of Violation.

When the municipality's SMO finds that a person has violated a prohibition or failed to meet a requirement of this law, he/she may order compliance by written notice of violation to the responsible person. Such notice may require without limitation:

14.1.1 The elimination of illicit connections or discharges;

14.1.2 That violating discharges, practices, or operations shall cease and desist;

14.1.3 The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;

14.1.4 The performance of monitoring, analyses, and reporting;

14.1.5 Payment of a fine; and

14.1.6 The implementation of source control or treatment BMPs. If abatement of a violation and/or restoration of affected property is required, the notice shall set forth a deadline within which such remediation or restoration must be completed. Said notice shall further advise that, should the violator fail to remediate or restore within the established deadline, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

14.2 Penalties

In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this local law shall be guilty of a violation punishable by a fine not exceeding three hundred fifty dollars ($350) or imprisonment for a period not to exceed six months, or both for conviction of a first offense; for conviction of a second offense both of which were committed within a period of five years, punishable by a fine not less than three hundred fifty dollars nor more than seven hundred dollars ($700) or imprisonment for a period not to exceed six months, or both; and upon conviction for a third or subsequent offense all of which were committed within a period of five years, punishable by a fine not less than seven hundred dollars nor more than one thousand dollars ($1000) or imprisonment for a period not to exceed six months, or both. However, for the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this local law shall be deemed misdemeanors and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.

SECTION 15. APPEAL OF NOTICE OF VIOLATION.

Any person receiving a Notice of Violation may appeal the determination of the SMO to the **(City Council/Town Board/Village Board of Trustees)** within 15 days of its issuance, which shall hear the appeal within 30 days after the filing of the appeal, and within five days of making its decision, file its decision in the office of the municipal clerk and mail a copy of its decision by certified mail to the discharger.

SECTION 16. CORRECTIVE MEASURES AFTER APPEAL.

16.1 If the violation has not been corrected pursuant to the requirements set forth in the Notice of Violation, or, in the event of an appeal, within 5 business days of the decision of the municipal authority upholding the decision of the SMO, then the SMO shall request the owner's permission for access to the subject private property to take any and all measures reasonably necessary to abate the violation and/or restore the property.

16.2 If refused access to the subject private property, the SMO may seek a warrant in a court of competent jurisdiction to be authorized to enter upon the property to determine whether a violation has occurred. Upon determination that a violation has occurred, the SMO may seek a court order to take any and all measures reasonably necessary to abate the violation and/or restore the property. The cost of implementing and maintaining such measures shall be the sole responsibility of the discharger.

SECTION 17. INJUNCTIVE RELIEF.

It shall be unlawful for any person to violate any provision or fail to comply with any of the requirements of this law. If a person has violated or continues to violate the provisions of this law, the SMO may petition for a preliminary or permanent injunction restraining the person from activities which would create further violations or compelling the person to perform abatement or remediation of the violation.

SECTION 18. ALTERNATIVE REMEDIES.

18.1 Where a person has violated a provision of this Law, he/she may be eligible for alternative remedies in lieu of a civil penalty, upon recommendation of the Municipal Attorney and concurrence of the Municipal Code Enforcement Officer, where:

18.1.1 The violation was unintentional
18.1.2 The violator has no history of pervious violations of this Law.
18.1.3 Environmental damage was minimal.
18.1.4 Violator acted quickly to remedy violation.
18.1.5 Violator cooperated in investigation and resolution.

18.2 Alternative remedies may consist of one or more of the following:

18.2.1 Attendance at compliance workshops
18.2.2 Storm drain stenciling or storm drain marking
18.2.3 River, stream or creek cleanup activities

SECTION 19. VIOLATIONS DEEMED A PUBLIC NUISANCE.

In addition to the enforcement processes and penalties provided, any condition caused or permitted to exist in violation of any of the provisions of this law is a threat to public health, safety, and welfare, and is declared and deemed a nuisance, and may be summarily abated or restored at the violator's expense, and/or a civil action to abate, enjoin, or otherwise compel the cessation of such nuisance may be taken.

SECTION 20. REMEDIES NOT EXCLUSIVE.

The remedies listed in this law are not exclusive of any other remedies available under any applicable federal, state or local law and it is within the discretion of the authorized enforcement agency to seek cumulative remedies.

SECTION 21. ADOPTION OF LAW.

This law shall be in full force and effect __ days after its final passage and adoption. All prior laws and parts of law in conflict with this law are hereby repealed.

PASSED AND ADOPTED this ____day of ___________, 20__, by the following vote:

APPENDIX D

ADDITIONAL INFORMATION ON TYPICAL BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping for Municipal Operations

Regulatory Text

You must develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations. Using training materials that are available from EPA, your State, Tribe, or other organizations, your program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

Guidance

EPA recommends that, at a minimum, you consider the following in developing your program: maintenance activities, maintenance schedules, and long-term inspection procedures for structural and nonstructural storm water controls to reduce floatables and other pollutants discharged from your separate storm sewers; controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations and snow disposal areas operated by you, and waste transfer stations; procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris); and ways to ensure that new flood management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices. Operation and maintenance should be an integral component of all storm water management programs. This measure is intended to improve the efficiency of these programs and require new programs where necessary. Properly developed and implemented operation and maintenance programs reduce the risk of water quality problems.

BMP Fact Sheets

Source controls

Materials management

Additional Fact Sheets

Municipal Facilities Management

Municipal Employee Training and Education

Municipal Landscaping

Municipal Vehicle Fueling

Municipal Vehicle and Equipment Maintenance

Municipal Vehicle and Equipment Washing

Source controls

Pet Waste Collection

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Pet waste collection as a source control involves using a combination of educational outreach and enforcement to encourage residents to clean up after their pets. The presence of pet waste in storm water runoff has a number of implications for urban stream water quality, with perhaps the greatest impact from fecal bacteria. According to recent research, nonhuman waste represents a significant source of bacterial contamination in urban watersheds. Genetic studies by Alderiso et al. (1996) and Trial et al. (1993) both concluded that 95 percent of fecal coliform found in urban storm water were of nonhuman origin. Bacterial source-tracking studies in a watershed in the Seattle, Washington, area also found that nearly 20 percent of the bacteria isolates that could be matched with host animals were matched with dogs. These bacteria can pose health risks to humans and other animals and result in the spread of disease. It has been estimated that for watersheds of up to 20 square miles draining to small coastal bays, 2 or 3 days of droppings from a population of about 100 dogs would contribute enough bacteria and nutrients to temporarily close a bay to swimming and shellfishing (USEPA, 1993).

Animal waste dispensers can increase waste collection by providing an convenient method for disposal

Pet waste may also be a factor in the eutrophication of lakes. The release of nutrients from the decay of pet waste promotes weed and algae growth, limiting light penetration and the growth of aquatic vegetation. This situation, in turn, can reduce oxygen levels in the water, affecting fish and other aquatic organisms.

Pet waste collection programs use pet awareness and education, signs, and pet waste control ordinances to alert residents to the proper disposal techniques for pet droppings. In some parts of the country, the concept of parks or portions of parks established specifically for urban dog owners has gained in popularity. With provisions for proper disposal of dog feces and siting and design to address storm water runoff, these parks may represent another option for protecting local water quality.

Applicability

Pet ownership is not limited by factors such as region of the country, climate, or topography. For this reason, educational outreach regarding pet waste is appropriate throughout the country. In a survey of Chesapeake Bay residents, it was found that about 40 percent of households own a dog. Just about half of these dog owners actually walked their dog in public areas. Of the half that did walk their dog, about 60 percent claimed to pick up after their dog (Swann, 1999), which is generally consistent with other studies (Table 1). Men were found to be less prone to pick up after their dog than women were (Swann, 1999).

Residents seem to be of two minds when it comes to dog waste. While a strong majority agree that dog waste can be a water quality problem (Hardwick, 1997; Swann, 1999), they generally rank it as the least important local water quality problem (Syferd, 1995 and MSRC, 1997). This finding strongly suggests the need to dramatically improve watershed education efforts to increase public recognition about the water quality and health consequences of dog waste.

Table 1. A comparison of three resident surveys about cleaning up after dogs

Study	Survey Results
Maryland (HGIC, 1996)	• 62% always cleaned up after the dog, 23% sometimes, 15% never • Disposal method: trash can (66%), toilet (12%), other 22%
Washington (Hardwick, 1997)	• Pet ownership: 58% • 51% of dog owners do not walk dogs • 69% claimed that they cleaned up after the dog • 31% do not pick up • Disposal methods: trash can 54%, toilet 20%, compost pile 4% • 4% train pet to poop in own yard • 85% agreed that pet wastes contribute to water quality problems
Chesapeake Bay (Swann, 1999)	• Dog ownership: 41% • 44% of dog owners do not walk dogs • Dog walkers who clean up most/all of the time 59% • Dog walkers who never or rarely cleanup 41% • Of those who never or rarely clean up, 44% would not cleanup even with fine, complaints, or improved sanitary collection or disposal methods • 63% agreed that pet wastes contribute to water quality problems

Design Considerations

Programs to control pet waste typically use "pooper-scooper" ordinances to regulate pet waste cleanup. These ordinances require the removal and proper disposal of pet waste from public areas and other people's property before the dog owner leaves the immediate area. Often a fine is associated with failure to perform this act as a way to encourage compliance. Some ordinances also include a requirement that pet owners remove pet waste from their own property within a prescribed time frame.

Public education programs are another way to encourage pet waste removal. Often pet waste messages are incorporated into a larger non-point source message relaying the effects of pollution on local water quality. Brochures and public service announcements describe proper pet waste disposal techniques and try to create a storm drain-water quality link between pet waste and runoff. Signs in public parks and the provision of receptacles for pet waste will also encourage cleanup.

Another option for pet waste management could be the use of specially designated dog parks where pets are allowed off-leash. These parks typically include signs reminding pet owners to remove waste, as well as other disposal options for pet owners. The following management options have been used in Australian dog parks and could be incorporated for dog parks in the United States (Harlock Jackson et al., 1995):

- *Doggy loos*. These disposal units are installed in the ground and decomposition occurs within the unit. Minimal maintenance is required (no refuse collection).
- *Pooch patch*. A pole is placed in the park surrounded by a light scattering of sand. Owners are encouraged to introduce their dog to the pole on entry to the park. Dogs then return to the patch to defecate and special bins are provided in which owners then place the deposit.
- *The "Long Grass Principle."* Dogs are attracted to long grass for defecating and areas that are mowed less frequently can be provided for feces to disintegrate naturally. A height of around 10 cm (about 4 inches) is appropriate.

The design of these dog parks should be done to mitigate storm water impacts. The use of vegetated buffers, pooper-scooper stations, and the siting of parks out of drainageways, streams, and steep slopes will help control the impacts of dog waste on receiving waters.

Limitations

The reluctance of many residents to handle dog waste is the biggest limitation to controlling pet waste. According to a Chesapeake Bay survey, 44 percent of dog walkers who do not pick up indicated they would still refuse to pick up, even if confronted by complaints from neighbors, threatened with fines, or provided with more sanitary and convenient options for retrieving and disposing of dog waste. Table 2 provides factors that compel residents to pick up after their dog, along with some rationalizations for not doing so.

This strong resistance to handling dog wastes suggests that an alternative message may be necessary. One such example might be to encourage the practice of rudimentary manure management by training dogs to use areas that are not hydraulically connected to the stream or close to a buffer.

Table 2. Dog owners rationale for picking up or not picking up after their dog (Source: HGIC, 1996)

Reasons for not picking it up	Reasons for picking up
• because it eventually goes away • just because • too much work • on edge of my property • it's in my yard • it's in the woods • not prepared • no reason • small dog, small waste • use as fertilizer • sanitary reasons • own a cat or other kind of pet	• it's the law • environmental reasons • hygiene/health reasons • neighborhood courtesy • it should be done • keep the yard clean

Effectiveness

The pollutant removal abilities of pet waste collection programs has never been quantified. There is ample evidence that programs such as these are required in urban areas. For example, in the Four Mile Run watershed in Northern Virginia, a dog population of 11,400 is estimated to contribute about 5,000 pounds of solid waste every day and has been identified as a major contributor of bacteria to the stream. Approximately 500 fecal coliform samples have been taken from Four Mile Run and its tributaries since 1990, and about 50 percent of these samples have exceeded the Virginia State water quality standard for fecal coliform bacteria (NVRC, 2001). A project is currently underway to pinpoint the source of bacterial contamination through DNA fingerprinting.

There is plenty of evidence that pets and urban wildlife can be significant bacterial sources. According to van der Wel (1995) a single gram of dog feces can contain 23 million fecal coliform bacteria. Dogs can also be significant hosts of both *Giardia* and *Salmonella* (Pitt, 1998). A 1982 study of Baltimore, Maryland, catchments reported that dog feces were the single greatest contributor of fecal coliform and fecal strep bacteria (Lim and Olivieri, 1982). This evidence points to a need for enforcement and education to raise resident awareness regarding the water quality impacts of this urban pollutant source.

Cost Considerations

The cost of pet waste collection programs will vary depending on the intensity of the effort and the paths chosen to control pet waste. The most popular way is through an ordinance, but managers must consider the cost of enforcement, including staff and equipment requirements. Public education program costs are determined by the type of materials produced and the method of distribution selected. Signs in parks may initially have a higher cost than printed materials, but can last for many years. Signs may also be more effective because they act as on-site reminders to dog owners to clean up in parks.

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Automobile Maintenance

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

This pollution prevention measure involves creating a program of targeted outreach and training for businesses and municipal fleets (public works, school buses, fire, police, and parks) involved in automobile maintenance about practices that control pollutants and reduce storm water impacts. Automotive maintenance facilities are considered to be storm water "hot spots" where significant loads of hydrocarbons, trace metals, and other pollutants can be produced that can affect the quality of storm water runoff. Some of the waste types generated at automobile maintenance facilities and at homes of residents performing their own car maintenance include the following:

Improper disposal of pollutants from automobile maintenance can be prevented by taking used antifreeze to designated waste collection facilities

- Solvents (paints and paint thinners)
- Antifreeze
- Brake fluid and brake lining
- Batteries
- Motor oils
- Fuels (gasoline, diesel, kerosene)
- Lubricating grease.

Estimates show that each year over 180 million gallons of used oil is disposed of improperly (Alameda CCWP, 1992) and that a single quart of motor oil can pollute 250,000 gallons of drinking water (DNREC, 1994). For this reason, automotive maintenance facilities' discharges to storm and sanitary sewer systems are highly regulated. Fluid spills and improper disposal of materials result in pollutants, heavy metals, and toxic materials entering ground and surface water supplies, creating public health and environmental risks. Alteration of practices involving the cleanup and storage of automotive fluids and cleaning of vehicle parts can help reduce the influence of automotive maintenance practices on storm water runoff and local water supplies.

Applicability

The automotive repair industry is the leader in number of generators and amount of total waste produced for small quantity generators of hazardous waste in the United States (USEPA, 1985). Common activities at maintenance shops that generate this waste include the cleaning of parts, changing of vehicle fluids, and replacement and repair of equipment. These activities are also performed by residents at home in their driveway in the course of normal vehicle care. Since the use of automobiles is not limited by geographic or climatic conditions, maintenance facilities are present nationwide and the concerns involving waste created during vehicle repair are similar across the country. In ultra-urban areas, the impacts of automotive maintenance practices are more pronounced due to the greater concentrations of vehicles and higher levels of impervious surface.

Design Considerations

The most effective way to minimize the impacts of automotive maintenance generated waste is by preventing its production. Pollution prevention programs seeking to reduce liquid discharges to sewer and storm drains from automotive maintenance should stress techniques that allow facilities to run a dry shop. Among the suggestions for creating a dry operation are the following:

- Spills should be cleaned up immediately, and water should not be used for clean up whenever possible.
- Floor drains that are connected to the sanitary sewer should be sealed off.
- A solvent service might be hired to supply parts and cleaning materials, and to collect the spent solvent.

Those facilities that are not able to eliminate discharges to the sanitary sewer system may be required to treat their wastewater prior to release from the site. There are several methods for preventing untreated wastewater from entering storm water runoff. Some municipalities require the use of structural treatment devices to pretreat wastes before they are discharged for treatment at sewage treatment plants. These devices prevent oils and grease from entering the sewer system, often by separating the oil and solids from the water through settling or filtration.

Other methods are also available to help prevent or reduce the discharge of pollutants from vehicle maintenance. Table 1 lists some of the common suggestions found regarding practices that can reduce vehicle maintenance and repair impacts. Many of these practices apply both to business owners and to residents who maintain their own vehicles. Additionally, these practices also apply to maintaining municipal fleets, including school buses, public works, fire, police, parks, and other types of municipal fleets. This list is not comprehensive, and many other suggestions for reducing impacts are available to those responsible for managing storm water runoff from maintenance facilities.

Table 1. Recommendations for reducing the storm water impacts of automotive maintenance

Pollution Prevention Method	Suggested Activities
Waste Reduction	• The number of solvents used should be kept to a minimum to make recycling easier and to reduce hazardous waste management cost. • Do all liquid cleaning at a centralized station to ensure that solvents and residues stay in one area. • Locate drip pans and draining boards to direct solvents back into solvent sink or holding tank for reuse.
Using Safer Alternatives	• Use non-hazardous cleaners when possible. • Replace chlorinated organic solvents with nonchlorinated ones like kerosene or mineral spirits. • Recycled products such as engines, oil, transmission fluid, antifreeze, and hydraulic fluid can be purchased to support the market of recycled products.
Spill Clean Up	• Use as little water as possible to clean spills leaks, and drips. • Rags should be used to clean small spills, dry absorbent material for larger spills, and a mop for general cleanup. Mop water can be disposed of via the sink or toilet to the sanitary sewer.
Good Housekeeping	• Employee training and public outreach are necessary to reinforce proper disposal practices. • Conduct maintenance work such as fluid changes indoors. • Update facility schematics to accurately reflect all plumbing connections. • Parked vehicles should be monitored closely for leaks and pans placed under any leaks to collect the fluids for proper disposal or recycling. • Promptly transfer used fluids to recycling drums or hazardous waste containers. • Do not pour liquid waste down floor drains, sinks, or outdoor storm drain inlets. • Obtain and use drain mats to cover drains in the event of a spill. • Store cracked batteries in leakproof secondary containers.
Parts Cleaning	• Use detergent-based or water-based cleaning systems instead of organic solvent degreasers. • Steam cleaning and pressure washing may be used instead of solvent parts cleaning. The wastewater generated from steam cleaning can be discharged to the on-site oil/water separator.

Limitations

There are a number of limitations to implementing recommendations for automotive maintenance facilities. Space and time constraints may make performing work indoors unfeasible. Containment of spills from vehicles brought on-site after working hours may not be possible. Proper disposal education for employees must continually be updated. Installation of structural BMPs for pretreatment of wastewater discharges can be expensive. Prices for recycled materials and fluids may be higher than those of non-recycled materials. Some facilities can be limited by a lack of providers of recycled materials and by the absence of businesses to provide services such as hazardous waste removal, structural BMP maintenance, or solvent recycling equipment.

Maintenance Considerations

For facilities responsible for pretreating their wastewater prior to discharging, the proper functioning of structural BMPs is an important maintenance consideration. Routine cleanout of oil and grease is required for the devices to maintain their effectiveness, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure that pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

Effectiveness

The effectiveness of automotive maintenance best management practices at removing pollutants is difficult to quantify. However, there are studies that demonstrate the effect pollution prevention practices can have in reducing impacts from automotive fluids. A 1994 study of auto recycling facilities demonstrates the effect that using best management practices can have on reducing storm water toxicity and pollutant loads. Through the use of structural and nonstructural BMPs, the study facility was able to reduce concentrations of lead, oil, and grease to levels approaching USEPA benchmarks.

A program that has had great success in controlling contaminated flows from vehicle maintenance facilities is the Clean Bay Business Program in Palo Alto, California. In exchange for allowing inspectors to visit a facility once a year and implementing recommended management practices, the facility is designated as a Clean Bay Business. This entitles the facility to promotional tools like listings twice a year in full-page newspaper ads, decals for shop windows, and other Clean Bay Business materials. Other promotions involving prize drawings and discount coupon giveaways help generate business for the facilities in the program. The effectiveness of the program at creating behavioral changes is evident in the increase in the number of facilities that have received the Clean Bay Business designation. In 1992 when the program began, only 4 percent of businesses used all of the recommended management practices. By 1998, 94 percent of businesses had instituted the practices suggested (NRDC, 1999).

The effectiveness of those programs aimed at altering behaviors detrimental to storm water is impressive. After participation in the program, the changes facilities made had the following impacts:

- 78 direct discharges to storm drains were eliminated by ceasing or modifying the practices used for activities such as parking lot cleaning, vehicle washing, and wet sanding.
- Violations of storm drain protection requirements fell by 90 percent from 1992 through 1995.
- The number of shops conducting outdoor removal of vehicle fluids without secondary containment fell from 43 to 4.

Cost Considerations

The initial per-facility cost for the program was approximately $300, with a cost of $150 for each subsequent year. This cost includes inspector visits and follow-up work, outreach materials, mailing lists, and database management. The program has been expanded to include auto parts stores and outreach to local high schools and adult education repair classes.

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Vehicle Washing

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Using commercial car wash facilities can reduce storm water impacts caused by car washing because such facilities must treat their wash water discharges before release

This management measure involves educating the general public, businesses, and municipal fleets (public works, school buses, fire, police, and parks) on the water quality impacts of the outdoor washing of automobiles and how to avoid allowing polluted runoff to enter the storm drain system. Outdoor car washing has the potential to result in a high loads of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain. Commercial car wash facilities often recycle their water or are required to treat their wash water discharge prior to release to the sanitary sewer system, so most storm water impacts from car washing are from residents, businesses, and charity car wash fundraisers that discharge polluted wash water to the storm drain system. According to the surveys, 55 to 70 percent of households wash their own cars, with the remainder going to a commercial car wash. Sixty percent of residents could be classified as "chronic car-washers" who wash their cars at least once a month (Smith, 1996, and Hardwick, 1997). Between 70 and 90 percent of residents reported that their car wash water drained directly to the street and, presumably, to the nearest stream. It has been estimated that 25 percent of the population of the United States may be classified as chronic car washers, which translates into about 27 million potential residential car wash polluters (Center for Watershed Protection, 1999).

Applicability

Car washing is a common routine for residents and a popular way for organizations such as scout troops, schools, and sports teams to raise funds. This activity is not limited by geographic region, but its impact on water quality is greatest in more urbanized areas with higher concentrations of automobiles. Currently, only a few pollution prevention programs incorporate proper car washing practices as part of an overall message to residents on ways to reduce nonpoint source pollution. Other programs have extended this message to include charity car washes and provide these charity groups with equipment and training to alleviate the problems associated with polluted wash water entering the storm drain system.

Implementation

The development of a prevention program to reduce the impact of car wash runoff includes outreach on management practices to reduce discharges to storm drains. Some of these management practices include the following:

- Using a commercial car wash.
- Washing cars on gravel, grass, or other permeable surfaces.
- Blocking off the storm drain during charity carwash events or using a insert to catch wash water.
- Pumping soapy water from car washes into a sanitary sewer drain.
- If pumping into a drain is not feasible, pumping car wash water onto grass or landscaping to provide filtration.
- Using hoses with nozzles that automatically turn off when left unattended.
- Using only biodegradable soaps.

Storm drain stenciling programs (see the Storm Drain Stenciling fact sheet) emphasizing the connection between the storm drain system and runoff can also help reinforce the idea that car washing activities can affect local water quality.

In the Pacific Northwest, outreach programs provide materials to charity carwash organizers to prevent car wash water from entering storm drains. These "water friendly "carwash kits are provided free of charge to charity organizers, along with training and educational videos on planning an environmentally friendly carwash. Two types of equipment are available for charity organizations to borrow: a catch-basin insert with a sump pump, or a vacuum/boom device known as a Bubble Buster (Kitsap County, 1999). Both devices capture wash water runoff, allowing it to be pumped to either a sanitary sewer or a vegetated area for treatment.

For businesses, good housekeeping practices can minimize the risk of contamination from wash water discharges. The following are some general best management practices that those businesses with their own vehicle washing facilities can incorporate to control the water quality impacts of wash water discharges:

- All vehicle washing should be done in areas designed to collect and hold the wash and rinse water or effluent generated. Wash water effluent should be recycled, collected, or treated prior to discharge to the sanitary sewer system.
- Pressure cleaning and steam cleaning should be done off-site to avoid generating runoff with high pollutant concentrations. If done on-site, no pressure cleaning and steam cleaning should be done in areas designated as wellhead protection areas for public water supply.
- On-site storm drain locations should be mapped to avoid discharges to the storm drain system.
- Spills should be immediately contained and treated.

Limitations

The biggest limitation to implementing residential car wash best management practices may be the lack of knowledge regarding the impacts of polluted runoff. Many people do not associate the effects of their vehicle washing activities with local water quality and may be unaware that the discharges that enter storm drains are not treated at plants before being discharged into local waters. Surveys indicate that the average citizen does not fully understand the hydrologic connection between their yard, the street, the storm sewer, and the streams. For example, a recent Roper survey found that just 22 percent of Americans know that storm water runoff is the most common source of pollution of streams, rivers, and oceans (NEETF, 1999).

Most car washing best management practices are inexpensive and rely more on good housekeeping practices than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive for businesses. Also, for facilities that cannot recycle their wash water, the cost of pretreating wash water, through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants, can represent a cost limitation.

Effectiveness

The effectiveness of car washing management practices at reducing nonpoint source pollutant loads has yet to be measured accurately. Due to the diffuse nature of nonpoint source pollution, it is often difficult to determine the exact impact of a particular pollution prevention measure at reducing pollutant loading. While not much is known about the water quality of car wash water, it is clear that car washing is a common watershed behavior. Three recent surveys have asked residents where and how frequently they wash their cars (Table 2).

Table 2. A comparison of three surveys about car washing.

Study	Car Washing Behavior
Smith, 1996 Maryland	60% washed car more than once a month
Pellegrin, 1998 California	73% washed their own cars 73% report that wash-water drains to pavement
Hardwick, 1997 Washington	56% washed their own cars 44% used a commercial car wash 91% report that wash-water drains to pavement 56% washed car more than once a month 50% would shift if given discounts or free commercial car washes

Residents are typically not aware of the water quality consequences of car washing and do not understand the chemical content of the soaps and detergents they use. Car washing is a very difficult watershed behavior to change since it is often hard to define a better alternative. However, as with all pollution prevention measures, the reduction of pollutant loads from outdoor car washing activities are bound to have a positive effect on storm water quality.

Cost Considerations

Staffing and materials represent the largest expenditure for local governments seeking to administer a nonpoint source education program. Car wash outreach programs are relatively inexpensive to staff and often require only a limited outlay for materials (brochures, training videos, etc.), and staff time devoted specifically to car wash education can be less than 5 percent of an employee's time. For Kitsap County, Washington, the Sound Car Wash program requires roughly 10 to 15 hours a week of staff time over a 25-week period from April to September. Cost for materials and equipment replacement is estimated to be between $1,500 and $3,000 for the same 25-week period (Kitsap County, 1999). The Clean Bay Car Wash kits program in Tacoma, Washington, uses only the catch basin insert option and estimates that it spends no more than $2,000 per year and less than 2 weeks of staff time per year to handle requests for its program (Tacoma Stormwater Utility, 1999).

The purchase of wash water containment equipment is often a one-time expense, and this equipment is often used for a number of years. Two pieces of equipment used in car wash programs developed in the Pacific Northwest provide an example of the potential equipment cost. For the catch-basin insert, the approximate cost of installation is $65. In some cases, locations where charity car washes are frequently held have constructed their own catch basin inserts using plywood. For the Bubble Buster, the cost ranges from $2,000 to $2,500.

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Illegal Dumping Control

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Illegal dumping control as a management practice involves using public education to familiarize residents and businesses with how illegal dumping can affect storm water. By locating and correcting illegal dumping practices through education and enforcement measures, the many risks to public safety and water quality associated with illegal disposal actions can be prevented. For storm water managers, illegal dumping control is important to preventing contaminated runoff from entering wells and surface water, as well as averting flooding due to blockages of drainage channels for runoff.

Signs can be used to discourage dumping in sensitive areas (Source: NCDENR, 2000)

Several types of illegal dumping can occur. The first is the illegal dumping (also known as "open dumping," "fly dumping," or "midnight dumping") of litter that occurs at abandoned industrial, commercial, or residential buildings, vacant lots, and poorly lit areas such as rural roads and railway lines. This dumping primarily happens to avoid disposal fees or the time and effort required for proper disposal at landfills or recycling facilities. A second type of illegal dumping involves disposal of water that has been exposed to industrial activities and then released to the storm drainage system, introducing pollutants into storm water runoff.

Applicability

Illegal dumping can occur in both urban and rural settings and can happen in all geographic regions. The effects of illegal dumping may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff. In more urbanized areas, illegal dumping may occur due to inaccessibility of recycling or solid waste disposal centers, which are often located on the suburban-rural fringe.

Design Considerations

Illegal dumping control programs focus on community involvement and targeted enforcement to eliminate or reduce illegal dumping practices. The key to successfully using this BMP is increasing public awareness of the problem and its implications. Illegal dumping control programs use a combination of public education, citizen participation, site maintenance, and authorized enforcement measures to address illegal waste disposal. Some of the issues that need to be examined when creating a program include the following:

- The locations of persistent illegal dumping activity
- Types of waste dumped and the profile of dumpers
- Possible driving forces behind illegal dumping, such as excessive user fees, restrictive curbside trash pickup, or ineffective recycling programs

- Previous education and cleanup efforts
- Current control programs and local laws or ordinances addressing the problem
- Sources of funding and additional resources that may be required.

Effective illegal dumping control programs use practices that educate and involve the community, local industries, and elected officials in an effort to eliminate the illegal discarding of wastes. An EPA toolkit for preventing illegal dumping focuses on four programmatic areas (USEPA 1998):

1. <u>Cleanup efforts</u>

Cleanup projects will require a coordinated planning effort to ensure that adequate resources and funding are available. Once a site has been cleaned, signs, lighting, or barriers may be required to discourage future dumping. Signs should indicate the fines and penalties for illegal dumping, and a phone number for reporting incidents. Landscaping and beautification efforts might also discourage future dumping, as well as providing open space and increasing property values.

2. <u>Community Outreach and Involvement</u>

This might be the most important tool in ensuring that this best management practice is effective. The organization of special cleanup events where communities are provided with the resources to properly dispose of illegally dumped materials increases the understanding among residents of illegal dumping impacts and supplies opportunities to correctly dispose of materials which may otherwise be illegally dumped. Integration of illegal dumping prevention into community policing programs or use of programs such as Crimestoppers may also be an effective way to increase enforcement opportunities without the additional cost of hiring new staff. Producing simple messages relating the cost of illegal dumping on local taxes, and directions to proper disposal sites will aid in eliminating the problem. Having a hotline where citizens can report illegal activities and educating the public on the connection between the storm drain and water quality will decrease disposal of waste into storm drain inlets.

3. <u>Targeted Enforcement</u>

This tool involves the use of ordinances to regulate waste management and eliminate illegal dumping through methods such as fines, cost recovery penalties for cleanup, and permit requirements for waste management activities. These fines and penalties can be used to help fund the prevention program or to provide rewards to citizens who report illegal dumping activities. Other recommendations for this tool include training of staff from all municipal departments in recognizing and reporting illegal dumping incidents, and dedicating staff who have the authority to conduct surveillance and inspections and write citations for those caught illegally dumping.

4. <u>Tracking and Evaluation</u>

This tool measures the impact of prevention efforts and determines if goals are being met. Using mapping techniques and computer databases allows officials to identify areas where dumping most often occurs, record patterns of dumping occurrence (time of day, day of week, etc.), and calculate the number of citations issued to the responsible parties. This allows for better allocation of resources and more specific targeting of outreach and education efforts for offenders.

Limitations

Illegal dumping is often spurred by cost and convenience considerations, and a number of factors encourage this practice. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.

Municipalities can coordinate with state and federal agencies to help enforce illegal dumping control measures when resources such as funding and staff for enforcement activities are scarse.

Effectiveness

While the effectiveness of illegal dumping control measures at removing pollutant loads to local waters is hard to quantify, there are numbers to demonstrate the preventative effects these programs have in keeping waste from illegal dump sites and ultimately from storm water runoff. Some examples follow:

- The City/County of Spokane, Washington, Litter Control program is responsible for removing indiscriminate dumping on publicly owned properties and road right-of-ways. The program is estimated to remove 350 tons of illegally dumped material each year.
- Project HALT in Phoenix, Arizona, cleaned up a reported 15,000 tons of waste in 1996 and 1997 and issued more than 165 citations.
- The "Tire Roundup" program sponsored by the Southwest Detroit Environmental Visions community organization pays local residents to bring in illegally dumped tires. In 1995, residents were paid 25 cents per tire, and more than 8,000 tires were collected.

Illegal dumping of household and commercial waste has a variety of impacts on water quality. Hazardous chemicals generated from household, commercial, and industrial sources can contaminate ground and surface water supplies, affecting drinking water and public health as well as aquatic habitat. Reduced drainage of runoff due to blockage of streams, culverts and drainage basins can result in flooding and channel modification. Open burning associated with some illegal sites can cause forest fires that create severe erosion and cause sediment loading in streams. Economically, property values decrease as a result of illegal dumping and affect the local tax base and the ability to maintain pollution prevention programs.

Cost Considerations

The cost of illegal dumping control program activities can vary due to economic and social factors, but with creative thinking potential costs may be reduced. Possible sources of labor for dumping site cleanups can include community and youth groups, county or state corrections programs, or corporations. Equipment for cleanup may be available through either public works or transportation agencies or through donations by private companies. Training municipal staff to report incidents of illegal dumping witnessed during the performance of other duties reduces the need for full-time staff for the program.

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Landscaping and Lawn Care

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Applying too much lawn fertilizer can significantly contribute to water quality problems

This management measure seeks to control the storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Research has indicated that nutrient runoff from lawns has the potential to cause eutrophication in streams, lakes, and estuaries (CWP, 1999a, and Schueler, 1995a). Nutrient loads generated by suburban lawns as well as municipal properties can be significant, and recent research has shown that lawns produce more surface runoff than previously thought (CWP, 1999b). Pesticide runoff (see Pest Control fact sheet) can contribute pollutants that contaminate drinking water supplies and are toxic to both humans and aquatic organisms.

Landscaping, lawn care, and grounds maintenance are a big business in the United States. It has been estimated that there are 25 to 30 million acres of turf and lawn in the United States (Robert and Roberts, 1989, Lawn and Landscape Institute, 1999). If lawns were classified as a crop, they would rank as the fifth largest in the country on the basis of area, after corn, soybeans, wheat, and hay (USDA, 1992). In terms of fertilizer inputs, nutrients are applied to lawns at about the same application rates as those used for row crops (Barth, 1995a). The urban lawn is also estimated to receive an annual input of 5 to 7 pounds of pesticides per acre (Schueler, 1995b).

Not many residents understand that lawn fertilizer can cause water quality problems overall, less than one-fourth of residents rated it as a water quality concern (Syferd, 1995 and Assing, 1994), although ratings were as high as 60 percent for residents who lived adjacent to lakes (Morris and Traxler, 1996, and MCSR, 1997). Interestingly, in one Minnesota survey, only 21 percent of homeowners felt their own lawn contributed to water quality problems, while over twice as many felt that their neighbors' lawns did (MCSR, 1997). Unlike farmers, suburban and rural landowners are often ignorant of the actual nutrient needs of their lawns. According to surveys, only 10 to 20 percent of lawn owners take the trouble to take soil tests to determine whether fertilization is even needed (CWP, 1999). The majority of lawn owners are not aware of the phosphorus or nitrogen content of the fertilizer they apply (Morris and Traxler, 1996) or that mulching grass clippings into lawns can reduce or eliminate the need to fertilize. Informing residents, municipalities, and lawn care professionals on methods to reduce fertilizer and pesticide application, limit water use, and avoid land disturbance can help alleviate the potential impacts of a major contributor of nonpoint source pollution in residential communities.

Applicability

Lawn care, landscaping, and grounds maintenance are done in all parts of the country, in all types of climates, and in every type of community from rural to urban. Lawn fertilization is one of the most widespread watershed practices conducted by homeowners. In a survey of resident attitudes in the Chesapeake Bay, 89 percent of residents owned a yard, and of these, about 50 percent applied fertilizer every year (Swann, 1999). The average rate of fertilization in 10 other resident surveys was even higher, at 78 percent, although this could reflect the fact that these surveys were biased toward predominantly suburban neighborhoods, or excluded non-lawn owners. Because lawn care, landscaping, and grounds maintenance are such common practices, education programs for both residents, municipalities, and lawn care professionals on reducing the storm water impacts of these practices are an excellent way to improve local water quality.

Design Considerations

Designers of education programs that seek to change the impacts of fertilizer, pesticide, and herbicide use on receiving water quality should first consider creating training programs for those involved in the lawn care industry. Nationally, lawn care companies are used by 7 to 50 percent of consumers, depending on household income and lot size. Lawn care companies can exercise considerable authority over which practices are applied to the lawns they tend, as long as they still produce an attractive lawn. For example, 94 percent of lawn care companies reported that they had authority to change practices, and that about 60 percent of their customers were "somewhat receptive to new ideas", according to a Florida study (Israel et al., 1995). De Young (1997) also found that suburban Michigan residents expressed a high level of trust in their lawn care company.

Local governments that want to influence lawn care companies must have an active program that supports those companies that employ techniques to limit fertilizer and pesticide use to the minimum necessary to maintain a green lawn. One way to do this is through providing promotional opportunities. One example is the state of Virginia Water Quality Improvement program that includes the chance for lawn care professionals to enter into an agreement to use more environmentally friendly lawn care practices. In exchange, the lawn care company can use their participation in the program as a promotional tool (VA DCR, 1999). Providing certification for representatives from lawn care companies for attending training workshops put on by cooperative extension offices can also be an effective promotional tool.

Training for employees of lawn and garden centers is another important tool in spreading the message regarding lawn care and pollution control. Many studies indicate that product labels and store attendants are the primary and almost exclusive source of lawn care information for the average consumer who takes care of their own lawn. The Florida Yards and Neighbors program has worked with 19 stores of a large national hardware and garden chain to educate store employees and incorporate messages regarding fertilizer use and pesticide reduction (NRDC, 1999). Often the key strategy to implementing a program like this is to substitute watershed-friendly products for those that are not, and to offer training for the store attendants at the point of sale on how to use and, perhaps more importantly, how not to abuse or overuse such products.

A recent Center for Watershed Protection (CWP) survey of 50 nutrient education programs provides a number of tips to program managers on making outreach programs more effective. The results of the study showed that there were a number of important considerations for increasing the recall and implementation of pollution prevention messages. Table 1 provides some tips that appear to work the best at relaying pollution prevention messages and changing pollution-producing behaviors.

Table 1. Tips for creating more effective resident lawn care outreach programs

Tip 1: *Develop a stronger connection between the yard, the street, the storm, and the stream*.	Outreach techniques should continually stress the link between lawn care and the undesirable water quality it helps to create (e.g., algae blooms and sedimentation).
Tip 2: *Form regional media campaigns*.	Since most communities operate on small budgets, they should consider pooling their resources to develop regional media campaigns that can use the outreach techniques that are proven to reach and influence residents. In particular, regional campaigns allow communities to hire the professionals needed to create and deliver a strong message through the media. Also, the campaign approach allows a community to employ a combination of media, such as radio, television, and print, to reach a wider segment of the population. It is important to keep in mind that since no single outreach technique will be recalled by more than 30 percent of the population at large, several different outreach techniques will be needed in an effective media campaign.
Tip 3: *Use television wisely*.	Television is the most influential medium for influencing the public, but careful choices need to be made on the form of television that is used. The CWP survey found that community cable access channels are much less effective than commercial or public television channels. Program managers should consider using cable network channels targeted for specific audiences, and develop thematic shows that capture interest of the home, garden and lawn crowd (e.g., shows along the lines of "Gardening by the Yard"). Well-produced public service announcements on commercial television are also a sensible investment.

Table 1. Tips for creating more effective resident lawn care outreach programs (Continued)

Tip 4: *Keep messages simple and funny*.	Watershed education should not be preachy, complex, or depressing. Indeed, the most effective outreach techniques combine a simple and direct message with a dash of humor.
Tip 5: *Make information packets small, slick, and durable*.	Educators continually struggle about how to impart the detailed information to residents on how to really practice good lawn care behaviors, without losing their interest. One should avoid creating a ponderous and boring handbook. One solution is to create small, colorful and durable packets that contain the key essentials about lawn care behaviors, and direct contact information to get better advice. These packets can be stuck on the refrigerator, the kitchen drawer or the workbench for handy reference when the impulse for better lawn care behavior strikes.
Tip 6: *Understand the demographics of your watershed*.	Knowing the unique demographics of a watershed allows a program manager to determine what outreach techniques are likely to work for that particular area. For example, if some residents speak English as a second language, a certain percentage of outreach materials should be produced in their native language. Similarly, watershed managers should consider more direct channels to send watershed messages to reach particular groups, such as through church leaders or ethnic-specific newspapers and television channels**.**

Pollution prevention programs may also wish to incorporate a much stronger message that promotes a low- or zero-input lawn. Watershed education programs might strongly advocate no chemical fertilization, reduced turf area, and the use of native plants adapted to the ecoregion (Barth, 1995b). This message provides a balance to the pro-fertilization message that is marketed by the lawn care industry.

Program managers need to incorporate some method for evaluating the effectiveness of their programs at reaching residents. Many programs use "before and after" market surveys to provide information on the level of understanding of residents and the percentage of residents that implement good lawn care practices. These surveys provide insights on what outreach techniques work best for a community and the level of behavior change that can be expected.

Alternative landscaping techniques such as naturescaping and xeriscaping can also be used. *Xeriscaping* is considered to be a viable alternative to the high water requirements of typical landscaping. It is a form of landscaping that conserves water and protects the environment. Xeriscaping does not result in landscaping with cactus and rock gardens. Rather, cool, green landscapes can be used when they are maintained with water-efficient practices. The main benefit of xeriscaping is that it reduces water use (TAMU, 1996). Xeriscaping incorporates seven basic principles that reduce water use (NYDEP, 1997):

- *Planning and design*. Consider drainage, light, and soil conditions; desired maintenance level; which existing plants will remain; plant and color preferences; and budget.

- *Soil improvement*. Mix peat moss or compost into soil before planting to help the soil retain water. Use terraces and retaining walls to reduce water run-off from sloped yards.
- *Appropriate plant selection*. Choose low-water-using flowers, trees, shrubs, and groundcovers. Many of these plants need watering only in the first year.
- *Practical lawns.* Limit the amount of grass area. Plant groundcovers or add hard surface areas like decks, patios, or walkways. If replanting lawns, use drought-tolerant grass seed mixes.
- *Efficient irrigation*. Install drip or trickle irrigation systems, as they use water efficiently.
- *Effective use of mulches*. Use a 3-inch deep layer of mulches such as pine needles or shredded leaves or bark. This keeps soil moist, prevents erosion, and smothers weeds.
- *Appropriate maintenance*. Properly timed fertilizing, weeding, pest control, and pruning will preserve the beauty of the landscape and its water efficiency.

Naturescaping is a way of putting native plants and beneficial wildlife habitat back into your yard or community. It is also a beautiful way to conserve water and energy, reduce pollution of water and soil, and create habitat for wildlife. Native plants are the foundation of naturescaping. The plants that evolved in your region are well adapted to our climate and naturally resistant to local pests and diseases. Once established, natives can often survive on rainwater alone. Naturescaping areas can include replacing some lawn area with a wildflower meadow; hummingbird and butterfly garden, plants and trees selected for seeds, fruit, and nectar; and nesting boxes.

When creating a naturescape, it is important to include four elements: food, water, shelter, and adequate space. When creating a naturescape in your yard or community, keep in mind these steps:

- Visit "wild" places and naturescaped sites and imagine how these landscapes would fit in your yard or community.
- Educate yourself and your community. Learn about native plants and basic design and care concepts. You can attend workshops and read plant and design books.
- When you are ready to develop a site plan, choose a small viewable site. When planning, consider maintenance water, gardening, access to feeders. Know the existing conditions of the area shade/sun, wet/dry, wind patterns, drainage, existing plants and critters. Once you develop a plan and you have gotten any necessary permits, you are ready to gather your material and begin.

A local government can meet with local neighborhood and creek groups to promote community naturescaping, host naturescaping workshops, and establish naturescaping demonstration sites in neighborhoods, and can offer naturescaping assistance to many residential, business, and public projects.

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

The IPM approach can be applied to both agricultural and nonagricultural settings, such as the home, garden, and workplace. IPM takes advantage of all appropriate pest management options, including -- but not limited to -- the judicious use of pesticides. In contrast, *organic* food production applies many of the same concepts as IPM but limits the use of pesticides to those that are produced from natural sources, as opposed to synthetic chemicals.

IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions, and controls. Integrated pest management is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools. Municipalities can encourage homeowners to practice IPM and train/encourage municipal maintenance crews to use these techniques for managing public green areas. There are many methods and types of integrated pest management, including the following:

- Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
- Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
- Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
- Sprinkling the ground surface with abrasive diatomaceous earth can prevent infestations by soft-bodied insects and slugs. Slugs also can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
- In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of. (Pruning equipment should be disinfected with bleach to prevent spreading the disease organism.)
- Small mammals and birds can be excluded using fences, netting, tree trunk guards.
- Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seedhead weevils, and spiders that prey on detrimental pest species can be promoted.

Limitations

The overriding public desire for green lawns is probably the biggest impediment to limiting pollution from this source. For example, when residents were asked their opinions on more than 30 statements about lawns in a Michigan survey, the most favorable overall response was to the statement "a green, attractive lawn is an important asset in a neighborhood" (De Young, 1997). Nationally, homeowners spend about $27 billion each year to maintain their own yard or to pay someone else to do it (PLCAA, 1999). In terms of labor, a majority of homeowners spend more than an hour a week taking care of the lawn (Aveni, 1994, De Young, 1997). Convincing residents that a nice, green lawn can be achieved without using large amounts of chemicals and fertilizers is difficult when conventional lawn care techniques are often seen as more effective, less time-consuming, and more convenient.

Effectiveness

The effectiveness of pollution prevention programs designed to educate residents on lawn care and landscaping practices has not been well documented to date. However, the need for such programs is evident. Source area monitoring in Marquette, Michigan, found that nitrogen and phosphorus concentrations in residential lawn runoff were 5 to 10 times higher than from any other source area (CWP, 1999). This report confirms earlier Wisconsin research findings that residential lawns yielded the highest phosphorus concentrations of 12 urban pollutant sources examined (Bannerman et al, 1993).

A critical step in crafting an education program is to select the right outreach techniques to send the lawn care message. From the results of a number of market surveys, two outreach techniques have shown some promise in actually changing behavior -- media campaigns and intensive training. Media campaigns typically use a mix of radio, TV, direct mail, and signs to broadcast a general watershed message to a large audience. Intensive training uses workshops, consultation, and guidebooks to send a much more complex message to a smaller and more interested audience. Intensive training requires a more substantial time commitment, ranging from several hours to a few days.

From evaluations of several market surveys, it appears that media campaigns and intensive training can each produce up to a 10- to 20-percent improvement in selected watershed behaviors among their respective target populations. A combination of both outreach techniques is probably needed in most watersheds, as each complements the other. For example, media campaigns cost just a few cents per watershed resident reached, while intensive training can cost several dollars for each resident that is actually influenced. Media campaigns are generally better at increasing awareness and sending messages about negative watershed behaviors. Intensive training, on the other hand, is superior at changing individual practices in the home, lawn, and garden.

Cost Considerations

The cost of creating and maintaining a program that addresses lawn care and landscaping practices and water quality varies depending on the intensity of the effort and what outreach techniques are selected. Media campaigns often require a greater amount of money to create, but are also most likely to reach the largest proportion of the community. Intensive training campaigns may not require as large a creation cost, but often require more staff time. Production costs for materials such as flyers and brochures is often inexpensive ($0.10 to $0.50 per brochure), and soil kits and testing may be provided through a local university to reduce expense. Many cooperative extension offices have already produced materials on lawn care and landscaping techniques to protect water quality, and program managers may save money by utilizing these available resources.

An example of a program that educates residents on better lawn care practices is The Water-Wise Gardener Program of the Prince William County, Virginia, Cooperative Extension service. Through the changes in behavior of more than 700 participants, an estimated aggregate reduction in fertilizer application of 20 tons has been realized in the county in 5 years. The program operates on an average annual budget of approximately $30,000 and requires the yearly time of 1.5 staff persons. Expense is deferred by the use of master gardener volunteers, who act as consultants for volunteer lawns where lawn care practices have been implemented. The program has recently been developed into a regional model that has been applied in several other Virginia counties.

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Pest Control

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

The use of pesticides, such as those pictured here, should be limited to avoid runoff contamination

This management measure involves limiting the impact of pesticides on water quality by educating residents and businesses on alternatives to pesticide use and proper storage and on application techniques. The presence of pesticides in storm water runoff has a direct impact on the health of aquatic organisms and can present a threat to humans through contamination of drinking water supplies. The pesticides of greatest concern are insecticides, such as diazinon and chloropyrifos (CWP, 1999 and Schueler, 1995), which even at very low levels can be harmful to aquatic life. A recent study of urban streams by the U.S. Geological Survey found that some of the more commonly used household and garden insecticides occurred at higher frequencies and concentrations in urban streams than in agricultural streams (USGS, 1999). The study also found that these insecticide concentrations were frequently in excess of USEPA guidelines for protection of aquatic life.

The major source of pesticides to urban streams is home application of products designed to kill insects and weeds in the lawn and garden. It has been estimated that an average acre of a well-maintained urban lawn receives an annual input of 5 to 7 pounds of pesticides (Schueler, 1995). Pesticide pollution prevention programs try to limit adverse impacts of insecticides and herbicides by providing information on alternative pest control techniques other than chemicals or explaining how to determine the correct dosages needed to manage pests. Lawn care and landscaping management programs often include pesticide use management as part of their outreach message.

Applicability

EPA estimates that nearly 70 million pounds of active pesticide ingredients are applied to urban lawns each year. Table 1 compares surveys on residential pesticide use in eleven different areas of the country, broken down by insecticides and herbicides use. It appears that pesticide application rates vary greatly, ranging from a low of 17 percent to a high of 87 percent, but climate is an important factor in determining insecticide and herbicide use.

Table 1. A comparison of eleven surveys of residential insecticide and weedkiller use

Study	Number of Respondents	% Using Insecticides	% Using Herbicides
Chesapeake Bay Swann, 1999	656	21%	–
Maryland, Kroll and Murphy,1994	403	42%	32%
Virginia, Aveni, 1998	100	66%	–
Maryland, Smith, 1994	100	23%	n/a
Minnesota, Morris and Traxler, 1997	981	–	75%
Michigan, De Young, 1997	432	40%	59%
Minnesota, Dindorf, 1992	136	–	76%
Wisconsin, Kroupa, 1995	204	17%	24% **
Florida, Knox et al, 1995	659	83%	–
Texas, NSR, 1998	350	87%	–
California, Scanlin and Cooper, 1997	600	50%	–

Notes: (**) note difference in self-reported herbicide use and those that use a weed and feed product (herbicide combined with fertilizer)

Insecticides appear to be applied more widely in warm weather climates where insect control is a year-round problem (such as Texas, California, and Florida). Anywhere from 50 to 90 percent of residents reported that they had applied insecticides in the last year in warm-weather areas. This can be compared to 20 to 50 percent levels of insecticide use reported in colder regions, where hard winters can help keep insects in check. By contrast, herbicide application rates tend to be higher in cold weather climates to kill the weeds that arrive with the onset of spring (60 to 75 percent in the Michigan, Wisconsin, and Minnesota surveys).

Design Considerations

The use of integrated pest management (IPM) is a popular way for program managers to educate residents and businesses on alternatives to chemical pesticides. IPM reflects a holistic approach to pest control that examines the interrelationship between soil, water, air, nutrients, insects, diseases, landscape design, weeds, animals, weather, and cultural practices to select an appropriate pest management plan. The goal of an IPM program is not to eliminate pests but to manage them to an acceptable level while avoiding disruptions to the environment. An IPM program incorporates preventative practices in combination with nonchemical and chemical pest controls to minimize the use of pesticides and promote natural control of pest species. Three different nonchemical pest control practices biological (good bugs that eat pests), cultural (handpicking of pests, removal of diseased plants, etc.), and mechanical (zappers, paper collars, etc) are used to limit the need for chemicals. In those instances when pesticides are required, programs seek to have users try less toxic products such as insecticidal soaps. The development of higher tolerance levels among residents for certain weed species is a central concept of IPM programs for reducing herbicide use.

Education on the proper use of pesticides is often included in many lawn care and landscaping management programs. Most often this is in the form of informational brochures or fact sheets on pesticide use around the home or garden. These information packets include tips on identifying pest problems and selecting treatment approaches that reduce environmental impacts; less-toxic pest control products if chemical control is necessary; and the proper mixing, application rates, and cleanup procedures for pesticide use. Program managers can consult cooperative extension programs and university agricultural programs for more information regarding pest control techniques that are more water quality friendly.

Limitations

The public perception that no alternative to pesticide use exists is probably the greatest limitation that program managers will face. Surveys tell us that the public has a reasonably good understanding about the potential environmental dangers of pesticides. Several surveys indicate that residents do understand environmental concerns about pesticides, and consistently rank them as the leading cause of pollution in the neighborhood (Elgin DDB, 1996). Even so, pesticide use still remains high in many urban areas (see Table 1). The time required for homeowners to learn more about alternative pest control techniques may also limit program effectiveness. Many residents prefer the ease of spraying a chemical on their lawns to other pest control techniques they perceive as more time intensive and less reliable. Managers should recognize that IPM programs have their own limitations, including questions about the effectiveness of alternative pest control techniques.

Effectiveness

A national study of the effectiveness of alternative pest control programs at reducing pesticide use and protecting water quality has not yet been performed. Cooperative extension and university agriculture programs across the country have performed studies of the ability of distinct alternative pest control techniques at limiting pesticide use, but a synthesis of these individual studies into a national report has not been performed. However, the need for pesticide control programs is evident from recent studies on the presence of insecticides in storm water. Results of recent sampling of urban streams caused the USGS to conclude that the presence of insecticides in urban streams may be a significant obstacle to restoring urban streams. (USGS, 1999). Table 2 examines eight studies on storm water runoff and insecticide concentrations and provides an example of how insecticides persist even after their use is discontinued.

Additional research done in the San Francisco Bay Region regarding diazinon use further illustrates the need for pest control programs. Results of the study show that harmful diazinon levels can be produced in urban streams from use at only a handful of individual homes in a given watershed (CWP, 1999). Due to the solubility of diazinon, current storm water and wastewater treatment technologies cannot significantly reduce diazinon levels. The best tool for controlling diazinon in urban watersheds is through source control by educating residents and businesses on pesticide alternatives and safe application.

An example of successful use of IPM is the Grounds Maintenance Program for the City of Eugene, Oregon. This program was started in the early 1980's and includes all the city public parks and recreation areas. The city uses a variety of IPM methods, including water blasting to remove aphids, insecticidal soaps, and limited use of pesticides. The city has also adopted higher tolerance levels for certain weed and pest species that reduces the need to apply pesticides and herbicides. Since the program's inception, pesticide usage by the City of Eugene has dropped bay more than 75 percent (Lehner et. al., 1999). Although no exact cost savings have been calculated from the use of the IPM program, the city turf and grounds supervisor believes the program saves money and has little citizen opposition.

Table 2: Banned or restricted insecticides found in storm water runoff concentrations in µg/l (ppb) (Source: Schueler, 1995)

Study	Chlordane	Lindane	Dieldrin	Other
Baltimore Kroll/Murphy	0.52	0.18	2.44	–
Rhode Island Cohen	Detected	NA	NA	NA
Atlanta Hippe	NA	0.01 (0.048)	NA	–
Atlanta Thomas	Detected	NX	NX	heptachlor
Milwaukee Bannerman	Detected	Detected	Detected	DDT, DDE
Washington MWCOG	0.2	0.2	0.2	Heptachlor
Northern Virginia Dewberry and Davis	ND	Trace	ND	Endrin
Toronto D'Andrea	NA	0.5 to 2	0.1 to 2	–
Toronto D'Andrea	NA	0.5 to 2	0.1 to 2	–
ND=Not Detected, NA=Not Analyzed, NX= Detection reported only if they exceeded water quality standards.				

Cost Considerations

The cost of educating residents on proper pesticide use varies greatly depending on the intensity of the effort. Some cities have begun partnerships that include training of retail employees on IPM techniques, similar to lawn care and landscaping programs. In addition, promotional materials and displays on safer pesticide alternatives are set up. The cost of staff time for training and production of materials must be included in any cost estimate. Since there are currently a number of good fact sheets on IPM and pesticide use available through cooperative extension programs, managers should consider using this source instead of creating a new one. Another way to save cost would be to utilize master gardener volunteers to help with training, for both residents and store employees.

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Parking Lot and Street Cleaning

Pollution Prevention/Good Housekeeping for Municipal Operations

Description


A street sweeper cleans up pollutants and sediments on the street to reduce the amount of pollutants entering receiving waters

This management measure involves employing pavement cleaning practices such as street sweeping on a regular basis to minimize pollutant export to receiving waters. These cleaning practices are designed to remove from road and parking lot surfaces sediment debris and other pollutants that are a potential source of pollution impacting urban waterways (Bannerman, 1999). Although performance monitoring for the Nationwide Urban Runoff Program (NURP) indicted that street sweeping was not very effective in reducing pollutant loads (USEPA, 1983), recent improvements in street sweeper technology have enhanced the ability of present day machines to pick up the fine grained sediment particles that carry a substantial portion of the storm water pollutant load. Many of today's sweepers can now significantly reduce the amount of street dirt entering streams and rivers, some by significant amounts (Runoff Report, 1998). A debate as to whether this ability to pick up finer particles will improve the overall pollutant removal effectiveness of street sweepers is ongoing, and further research is required to establish the optimal sweeping frequency for pollutant removal and what streets are most appropriate for a sweeping program.

Applicability

Street sweeping is practiced in most urban areas, often as an aesthetic practice to remove sediment buildup and large debris from curb gutters. In colder climates, street sweeping is used during the spring snowmelt to reduce pollutant loads from road salt and to reduce sand export to receiving waters. Seventy percent of cold climate storm water experts recommend street sweeping during the spring snowmelt as a pollution prevention measure (CWP, 1997). The frequency and intensity of rainfall for a region are also key variables in determining how streets need to be swept to obtain a desired removal efficiency. Other factors that affect a street sweeper's ability to reduce nonpoint pollution include the condition of the street, its geographical location, the operator's skill, the presence of parked cars, and the amount of impervious area devoted to rooftop.

Design Considerations

One factor considered most essential to the success of street sweeping as a pollutant removal practice is use of the most sophisticated sweepers available. Innovations in sweeper technology have improved the performance of these machines at removing finer sediment particles, especially for machines that use vacuum-assisted dry sweeping to remove particulate matter. By using the most sophisticated sweepers in areas with the highest pollutant loads, greater reductions in sediment and accompanied pollutants can be realized.

Another important aspect of street sweeping programs is the ability to regulate parking. The ability to impose parking regulations in densely populated areas and on heavily traveled roads is essential.

The frequency and location of street sweeping is another consideration for any program. How often and what roads to sweep are determined by the program budget and the level of pollutant removal the program wishes to achieve. Computer modeling of pollutant removal in the Pacific Northwest suggests that the optimum sweeping frequency appears to be once every week or two (CWP, 1999). More frequent sweeping operations yielded only a small increment in additional removal. The model also suggests that somewhat higher removal could be obtained on residential streets as opposed to more heavily traveled arterial roads.

Sweeping of parking lots is also employed as a nonstructural management practice for industrial sites. This sweeping involves using brooms to remove small quantities of dry chemicals and solids from areas that are exposed to rainfall or storm water runoff. While the effectiveness of this practice at pollutant removal is unknown, the sweeping and proper disposal of materials is a reasonably inexpensive method of pollution prevention that requires no special training or equipment.

Limitations

For street sweeping, the high cost of current sweeper technologies is a large limitation to using this management practice. With costs approaching $200,000 for some of the newer sweeper technologies, storm water managers with limited budgets must consider the high equipment cost together with the uncertainty about pollutant removal efficiency to decide whether a sweeping program is an attractive management option. The potential inability to restrict parking in urban areas may present another limitation. Other possible limitations include the need for sweeper operator training, the inability of current sweeper technology to remove oil and grease, and the lack of solid evidence regarding the expected levels of pollutant removal. Proper disposal of swept materials might also be a limitation.

Maintenance Considerations

Street cleaning programs require a significant investment of capital and a yearly operation and maintenance budget. Sweepers have a useful life of about four years, and proper maintenance can greatly improve sweeping efficiency. Arrangements for disposal of the swept material collected must also be made, as well as accurate tracking of the streets swept and the frequency of sweeping. The operation and maintenance costs for two types of sweepers are included in Table 1.

Effectiveness

Street sweeping programs had largely fallen out of favor as a pollutant removal practice following the 1983 NURP report, but improvements in sweeper technology have caused a recent reevaluation of their effectiveness. New studies show that conventional mechanical broom and vacuum-assisted wet sweepers reduce nonpoint pollution by 5 to 30 percent and nutrient content by 0 to 15 percent. However, newer dry vacuum sweepers can reduce nonpoint pollution by 35 to 80 percent and nutrients by 15 to 40 percent for those areas that can be swept (Runoff Report, 1998).

While actual reductions in storm water pollutants have not yet been established, information on the reductions in finer sediment particles that carry a significant portion of the storm water pollutant load is available. Recent estimates are that the new vacuum assisted dry sweeper might achieve a 50–88 percent overall reduction in the annual sediment loading for a residential street, depending on sweeping frequency (Bannerman, 1999).

A benefit of high-efficiency street sweeping is that by capturing pollutants before they are made soluble by rainwater, the need for structural storm water control measures might be reduced. Structural controls often require costly added measures, such as adding filters to remove some of these pollutants and requiring regular manpower to change-out filters. Street sweepers that can show a significant level of sediment removal efficiency may prove to be more cost-effective than certain structural controls, especially in more urbanized areas with greater areas of pavement.

Cost Considerations

The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.

If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Table 1 gives sweeper cost data for two types of sweepers: mechanical and vacuum-assisted. The table shows that while the purchase price of vacuum-assisted sweepers is significantly higher, the operation and maintenance costs are lower.

Table 1. Estimated costs for two types of street sweepers

Sweeper Type	**Life (Years)**	**Purchase Price ($)**	**O&M Cost ($/curb mile)**	**Sources**
Mechanical	5	75,000	30	Finley, 1996 SWRPC, 1991
Vacuum-assisted	8	150,000	15	Finley, 1996 Satterfield, 1991

Cost data for two cities in Michigan provide some guidance on the overall cost of a street cleaning program. Table 2 contains a review of the labor, equipment, and material costs for street cleaning for the year 1995 (Ferguson et al., 1997). The average cost for street cleaning was $68/curb mile and approximately 11 curb miles/day were swept.

Table 2. The cost of street cleaning for two cities in Michigan

City	Labor	Equipment	Material and Services	Total
Livonia	$23,840	$85,630	$5,210	$114,680
Plymouth Township	$18,050	$14,550	$280	$32,880

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Roadway and Bridge Maintenance

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Pollutants generated from road and bridge maintenance can be minimized with good housekeeping practices (Source: VDOT, 2000)

This practice involves pollution prevention techniques that reduce or eliminate pollutant loadings from existing road surfaces as part of an operation and maintenance program. Substantial amounts of sediment and pollutants are generated during daily roadway and bridge use and scheduled repair operations, and these pollutant loadings can threaten local water quality by contributing heavy metals, hydrocarbons, sediment, and debris to storm water runoff. Table 1 shows some of the constituents that can be present in highway runoff and their primary sources.

As Table 1 demonstrates, numerous pathways for pollutant deposition on roadways and bridges influence the water quality of storm water runoff. Routine performance of general maintenance activities such as sweeping, vegetation maintenance, and cleaning of runoff control structures can help alleviate the impacts of these pollutants. Modifications in roadway resurfacing practices and application techniques for salt and other deicers can also help reduce pollutant loads to storm water runoff and protect the quality of receiving waters.

Table 1. Highway runoff constituents and their primary sources (Source: USEPA, 1993)

Constituent	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Tire wear, auto exhaust
Zinc	Tire wear, motor oil, grease
Iron	Auto body rust, steel highway structures, moving engine parts
Copper	Metal plating, brake lining wear, moving engine parts, bearing and bushing wear, fungicides and insecticides
Cadmium	Tire Wear, insecticides

Table 1. Highway runoff constituents and their primary sources
(Source: USEPA, 1993) (Continued)

Chromium	Metal plating, moving engine parts, brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

Applicability

Roadway systems are a large part of the infrastructure of urban areas across the country, and require regular repairs and maintenance due to traffic use and climatic conditions. The level of pollutants found in road and bridge runoff is variable and is determined by a number of factors in addition to traffic volume and climate. Other factors affecting pollutant levels include surrounding land use, the design of the bridge or roadway, the presence of roadside vegetation, the use of insecticides, and the frequency of accidents and spills that can introduce hazardous chemicals. In colder climates, the amount of deicer applied to melt ice and snow can also influence the level of certain pollutants in road runoff and its impacts on local water quality.

Design Considerations

Road and bridge maintenance programs have a number of options for reducing the level of pollutants generated during the maintenance of existing road surfaces. Changes in the methods used for maintaining road surfaces, removing debris and sediment from roadways, and cleaning of runoff control structures can help improve the overall quality of storm water discharges from roads and bridges.

Proper planning for road and bridge resurfacing operations is a simple but effective method to control pollution. Many techniques can be implemented to control the impacts of this maintenance operation. First, paving operations should be performed using concrete, asphalt, or other sealers only in dry weather situations to prevent contamination of runoff. Second, proper staging techniques should be used to reduce the spillage of paving materials during the repair of potholes and worn pavement. These techniques can include covering storm drain inlets and manholes during paving operations; using erosion and sediment control measures to decrease runoff from repair sites; and utilizing pollution prevention materials such as drip pans and absorbent material for all paving machines to limit leaks and spills of paving materials and fluids.

Finally, resurfacing operations could employ porous asphalt for pothole repair and for shoulder areas to reduce the level of storm water runoff from road systems. For more information on permeable road surface materials, see the Porous Pavement fact sheet.

Good cleaning practices can help diminish impacts to storm water runoff. Sweeping and vacuuming of heavily traveled roadways to remove sediment and debris can reduce the amount of pollutants in runoff. Street sweeping as a pollution source control is discussed more extensively in the Parking Lot and Street Cleaning fact sheet. Regular cleaning of runoff control structures such as catch basins can help reduce sediment loads in runoff that will end up in local waterways (see Catch Basins fact sheet).

Proper application of road salt or other deicers also reduces storm water pollution. By routinely calibrating spreaders, a program manager can prevent over-application of deicing materials. In addition to reducing the effects of these materials on the aquatic environment, cost savings may be realized due to reductions in the purchase of deicing materials. Training for transportation employees in proper deicer application techniques, the timing of deicer application, and what type of deicer to apply will also determine the impacts on water quality and aquatic habitat.

Maintenance practices for roadside vegetation also determine the storm water quality of road runoff. Restrictions on the use of herbicides and pesticides on roadside vegetation, and training to ensure that employees understand the proper handling and application of pesticides and other chemicals, can help prevent contamination of runoff. Selection of roadside vegetation with higher salt tolerances will also help to maintain vegetated swales and biofilters that filter out runoff. For more information on vegetated storm water practices, see the Grassed Filter Strips fact sheet.

Bridge runoff may require additional maintenance practices to eliminate storm water runoff impacts. In addition to some of the roadway practices listed above improved, practices in bridge siting and design can help reduce water quality impacts. One technique is to avoid using bridge scupper drains for any new bridges and to routinely clean existing ones to prevent sediment and debris buildup. Scupper drains can cause direct discharges to surface waters and have been found to carry relatively high concentrations of pollutants (CDM, 1993). Program managers should consider endorsing retrofits of scupper drains with catch basins or redirecting water from these drains to vegetated areas to provide treatment. Other techniques such as using suspended tarps, booms, and vacuums to capture pollutants (e.g., paint, solvents, rust, and paint scrapings) generated during bridge maintenance will also help reduce impacts to receiving waters. In addition, using deicers such as glycol, urea, or calcium magnesium acetate (CMA) reduces the corrosion of metal bridge supports that can occur when salt is used.

Limitations

Generally, limitations to instituting pollution prevention practices for road and bridge maintenance involve the cost for additional equipment and training. Since maintenance of roadways and bridges is already required in all communities, staffing is usually in place and alteration of current practices should not require additional staffing or administrative labor.

Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters. The practice of controlling paved areas to limit impervious surface might also be restricted by community regulations of required widths for roadways and shoulders.

Effectiveness

Limited data are available on the actual effectiveness of road and bridge maintenance practices at removing pollutants from storm water runoff. Table 2 examines the effectiveness and cost of some of the operation and maintenance practices recommended for storm water pollution control.

Table 2. Road and bridge maintenance management practices: cost and effectiveness (Source: USEPA, 1993)

	Effectiveness (% Removal)[a]		**Cost**
Maintaining Roadside Vegetation	Sediment Control: 90% average P and N: 40% average COD, Lead, and Zinc: 50% average TSS: 60% average		Natural succession allowed to occur Average: $100/acre/year Range: $50-$200/acre/year
Street Sweeping	Smooth Street Frequent Cleaning: TSS: 20% COD: 5% Lead: 25%	Smooth Street Infrequent Cleaning: TSS: N/A COD: N/A Lead: 5%	Average: $20/curb mile Range: $10–$30/curb mile
Litter Control	N/A		All are accepted as economical practices to control or prevent storm water impacts.
General Maintenance	N/A		
Minimizing Deicer Application	N/A		

[a]P=phosphorus; N=nitrogen; TSS=total suspended solids; COD=chemical oxygen demand

Although data may be limited on cost and effectiveness, preventative maintenance and strategic planning are time-proven and cost-effective methods to limit contamination of storm water runoff. It can be assumed that the management practices recommended will have a positive affect on storm water quality by working to reduce pollutant loads and the quantity of runoff. Protecting and restoring roadside vegetation, removal of debris and sediment from roads and bridges, and directing runoff to vegetated areas are all effective ways to treat storm water runoff. Other practices, such as minimizing deicer application, litter control, and proper handling of fertilizers, pesticides, and other toxic materials, work to control some of the pathways of storm water pollution. Employing good road and bridge maintenance practices is an efficient and low-cost means of eliminating some of the impacts of pollutants associated with road systems on local streams and waterways.

Cost Considerations

The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices. Cost data for some of the new practices that have been recommended are included in Table 2.

Costs may vary greatly in the type of deicer selected for application. Table 3 includes a comparison of four different deicers and the cost for application. It should be noted that CMA has a higher cost than the other deicers, but that reductions in corrosion to infrastructure, damage to roadside vegetation, and amount of material used may offset the higher cost.

Table 3. The estimated cost of four deicer types (Source: Caraco and Claytor, 1997)

Deicer Type	Material Cost Per Ton	Cost Per Lane Mile Per Season
Sodium Chloride	\$20–\$40	\$6,371–\$6,909
Calcium Chloride	\$200	\$6,977–\$7,529
Calcium Magnesium Acetate (CMA)	\$650–\$675	\$12,958–\$16,319
CG-90 Surface Saver	\$185	\$5,931–\$6,148

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Septic System Controls

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Septic system source control refers to the use of outreach programs to educate homeowners about the proper operation and maintenance of their septic systems to reduce the likelihood of failure. Septic systems are designed to treat wastewater by separating solids from liquids and then draining the liquid into the ground. Sewage flows into the tank where settling and bacterial decomposition of larger particles takes place, while treated liquid filters into the soil. When system failures occur, untreated wastewater and sewage can be introduced into ground water or nearby streams and water bodies.


Workers test a drain field (Source: Texas A&M University, 1996)

Pollution prevention practices are designed to restrict pollutant and nutrient loads from improperly functioning septic systems from entering local water sources. These loadings occur for a number of reasons, including improper siting, inadequate installation, or system operation failures (see Failing Septic Systems fact sheet). As many as 75 percent of all system failures have been attributed to hydraulic overloading (Jarrett et al., 1985). Failures may also occur due to lapses in the regular inspection and maintenance that are required to ensure proper operation during the design life of the septic system. Homeowners may be unaware of the age of their system and whether preemptive planning is necessary before the system fails.

Applicability

Outreach regarding septic systems controls is applicable for large lot development in rural areas that are not served by sewer. When septic systems are used for wastewater treatment, there is a need for educational outreach and training to avoid system failures for owners of both new and existing systems. Septic system maintenance education is extremely important in coastal areas for shoreline development near shellfish beds and spawning areas, where septic effluent discharges can influence water quality and lead to bed closures and algal blooms. There is also a significant need for educational outreach regarding septic system maintenance near lake shoreline developments, where nitrogen inputs can lead to lake eutrophication.

Implementation

The most effective way to control on-site wastewater problems is through a comprehensive management program. An onsite wastewater management program can reduce water quality degradation and save local governments and homeowners time and money, as well as better tracking of the performance of routine maintenance practices. This comprehensive plan is administered by one agency that has ultimate responsibility for all aspects of wastewater management, including on-site disposal systems. (see Failing Septic Systems fact sheet).

Public outreach and training are vital elements in the control of septic system failure. Many of the problems associated with improper septic system functioning may be attributed to a lack of homeowner knowledge of operation and maintenance of the system. Educational materials for homeowners and training courses for installers and inspectors can reduce the incidence of failure. Education is most effective when used in concert with other source reduction practices, such as phosphate bans and use of low-volume plumbing fixtures. Simple messages that can be conveyed to homeowners to reduce system failures and ensure proper functioning include

- Do not wait until septic system shows sign of failure. Inspect the system annually and have it pumped-out at least once every 3 years.
- Keep records of pumping and maintenance and a map of the location of your system and drainfield.
- Practice water conservation indoors and divert roof drains and surface water away from the system.
- Use caution in disposing materials down the drain. Household chemicals can kill the bacteria that make the system work and nondegradable materials (cigarette butts, etc.) can clog the system.
- Keep heavy equipment and vehicles off your system and drainfield.
- Don't cover your drainfield with impermeable surfaces that can block evaporation and the air needed for effluent treatment.

In addition to the general suggestions above, there are other management measures which can be implemented to help maintain a properly operating system. These measures include the following:

Chemical Additive Restrictions

Organic solvents are often advertised for use as septic system cleaners. Little evidence shows that such cleaners perform any useful functions, and they might instead exterminate the microbes necessary for waste treatment, resulting in increased discharge of pollutants. In addition, the chemicals themselves often contain constituents that are listed with U.S. EPA as priority pollutants. Restrictions on the use of these additives can prevent improper system operation and ground water contamination (USEPA, 1993).

Phosphorus Detergent Restrictions

Conventional septic systems are usually very effective at removing phosphorus (see the Failing Septic Systems fact sheet). However, certain soil conditions combined with proximity to sensitive surface waters can result in phosphorus pollutant loading. If such conditions are sufficiently prevalent within areas of concern, restrictions or bans on the use of detergents containing phosphate can be implemented. Eliminating phosphates from detergent can reduce phosphorus loads to septic systems by 40 to 50 percent (USEPA, 1993). As of October 1993, 17 states had enacted phosphate detergent restrictions or bans (Osmond et al, 1995).

Elimination of Garbage Disposals for Households Served by Septic System

Garbage disposals contribute to the loading of suspended solids, nutrients, and biological oxygen demand (BOD) to septic systems, as well as increasing the buildup of solids in septic tanks. Garbage disposals can double the amount of solids added to a septic tank, creating the need for more frequent pumpouts.

Proper Septic System Maintenance

Depending on soil conditions and other factors, septic systems have a failure rate of 5 to 35 percent. When they fail, septic systems can discharge untreated or partially treated wastewater into groundwater. As a result, it is important to ensure that septic systems are maintained and operating properly. This can be accomplished by homeowners or trained inspectors through regular inspections of onsite systems. During inspections, the holding or septic tank should be checked to determine whether or not pumping is necessary. Additionally, the inspection port should be opened and the baffles checked to ensure that they have not been damaged since the last inspection. The absorption field should also be checked for flooding or sogginess, which are indicators of a clogged system or excessive water use. Finally, the entire area should be checked for odors or damp or soggy areas, which are indicative of a leak in the system.

The holding tank should be pumped regularly, with the frequency depending on the capacity of the tank, the flow of wastewater, and the volume of solids in the tank. First, a tank's capacity might become too small if new high-water-use technologies such as a hot tub or whirlpool are installed, or if more people move into the house than when the system was originally installed. Second, when more people move into a house, the wastewater flow will increase, requiring more frequent pumping. Finally, if the house has a garbage disposal or if the occupation of someone in the household results in their having excessively soiled clothing, the volume of solids entering the tank might be greater than usual and require more frequent pumping. These factors should be accounted for when determining how frequently to pump a septic tank.

Table 2 lists estimates of how frequently septic tanks should be pumped on average, based on the size of the tank and household size (NSFC). These values were calculated assuming there was no garbage disposal, which can increase solids by up to 50 percent. Individuals can determine specifically when the holding tank should be pumped by occasionally checking the depth of solids and the level of scum built up on top of the water in the tank. As this can be an unpleasant chore, it is best to have the tank routinely pumped by a certified contractor approximately every 3 years.

Limitations

As with all pollution prevention measures, public ignorance about the suggested practices may be the biggest limitation to septic system source control. Many residents appear to be either unaware of or unwilling to implement the necessary steps to ensure the proper operation and maintenance of their septic systems. A recent survey of residents in the Chesapeake Bay region found that 50 percent of septic owners had not had their systems inspected within the last 3 years and that 46 percent had not had their system cleaned within the same time frame (Swann, 1999). Twelve percent of residents did not even know where their septic system was located. This finding indicates that residents are not receiving the necessary information on septic system care to prevent or reduce the incidence of failure.

Table 2. Estimated septic tank pumping frequencies in years

Tank Size (gallons)	Household Size (number of people)					
	1	2	3	4	5	6
500	5.8	2.6	1.3	1.0	0.7	0.4
750	9.1	4.2	2.6	1.8	1.3	1.0
900	11.0	5.2	3.3	2.3	1.7	1.3
1,000	12.4	5.9	3.7	2.6	2.0	1.3
1,250	15.6	7.5	4.8	3.4	2.6	2.0
1,500	18.9	9.1	5.9	4.2	3.3	2.6
1,750	22.1	10.7	6.9	5.0	3.9	3.1
2,000	25.4	12.4	8.0	5.9	4.5	3.7
2,250	28.6	14.0	9.1	6.7	5.2	4.2
2,500	31.9	15.6	10.2	7.5	5.9	4.8

Effectiveness

Failing septic systems have been linked to water quality problems in streams, lakes, shellfish beds, and coastal areas. Improvements in system operation and maintenance should be a strong element in watershed plans for those areas where septic systems are used for wastewater treatment. Public education and outreach regarding septic system operation and maintenance can be assumed to produce some positive effect on water quality, but studies on resident behaviors regarding septic pollution prevention practices are limited. Instead, effectiveness of septic source controls is most often measured in the number of informational packets mailed out or the number of attendees for training workshops.

While this may help to define the demand for information, it gives no indication of whether the operation and maintenance practices presented are implemented. To better determine whether pollution prevention outreach is being effective, residential surveys should be part of any program seeking to educate residents on septic systems and their influence on water quality.

Cost Considerations

The cost of septic system pollution prevention programs can vary greatly, depending on factors such as staff time, outreach components, and the extent of septic use within a region. Table 3 provides some examples of programs from various parts of the country and the expenditures for septic outreach.

Once a program is well established, the cost of creating educational materials and training programs decreases and funding can be redistributed to those outreach techniques that have proven to be the most successful. Programs should be sure to secure some funding for media outreach (especially television), as this often ranks as the most popular information source in surveys of resident preferences.

Table 3. Some examples of cost and staff time for septic outreach programs

Program	**Expenditure**	**Staff time (Full time equivalent)**	**Components**
City of Olympia, Washington	$40,000	0.5	• Flyers/brochures • Training workshops • System monitoring
Thurston County, Washington	$35,000	0.5	• Flyer/brochures • Discount coupons for septic pumping • Training workshops
Minnesota Cooperative Extension	$18,000	0.25	• Publications/videos • Flyers/brochures • Training Workshops/community Visits • Septic owners guide distributed with new permits • Satellite conferences for policy makers • Train the trainers program

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Storm Drain System Cleaning

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Storm drain systems need to be cleaned regularly. Routine cleaning reduces the amount of pollutants, trash, and debris both in the storm drain system and in receiving waters. Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion (Livingston et al., 1997). Benefits of cleaning include increased dissolved oxygen, reduced levels of bacteria, and support of instream habitat. Areas with relatively flat grades or low flows should be given special attention because they rarely achieve high enough flows to flush themselves (Ferguson et al., 1997).

Municipalities can hire professional plumbing services to remove trapped sediment and debris from storm drains with periodical flushing (Source: Drain Patrol, no date)

Applicability

This measure is applicable to all storm drain systems. The same principles can be applied to material and waste handling areas, paved and vegetated areas, waterways, and new development projects (Ferguson et al., 1997).

Limitations

While cleaning is necessary for all storm drain systems, there are limitations (adapted from Ferguson et al., 1997) as follows:

- Cleaning the storm drain by flushing is more successful for pipes smaller than 36 inches in diameter.
- A water source is necessary for cleaning. The wastewater must be collected and treated once flushed through the system.
- Depending on the condition of the wastewater, it may or may not be disposed to sanitary sewer systems.
- The efficiency of storm system flushing decreases when the length of sewer line being cleaned exceeds 700 feet.

Maintenance Considerations

Ferguson et al. (1997) report removal of 55 to 65 percent for nonorganic materials and grits and 65 to 75 percent for organics.

Cost Considerations

The cost of a vactor truck can range from $175,000 to $200,000, and labor rates range from $125 to $175 per hour (Ferguson et al., 1997). Ferguson et al. (1997) also cited costs of $1.00 to $2.00 per foot for storm drain system cleaning.

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Alternative Discharge Options for Chlorinated Water

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Chlorinated water discharged to surface waters has an adverse impact on local water quality. Swimming pools are a major source of chlorinated water discharged into sanitary and storm sewer systems. An average swimming pool holds 19,000 gallons of chlorinated water. Pools have high concentrations of chlorine, which is toxic to wildlife and fish.

Chlorinated water from swimming pools should not discharged to the storm sewer system or directly into a waterbody (Source: The Pool Guy, 2001)

Applicability

Many pool owners who live in cooler climates drain their swimming pools to reduce maintenance and potential damage from freezing during harsh winters. These individuals should not discharge pool water to the storm sewer system or directly into a waterbody and should investigate alternative discharge options.

Siting and Design Considerations

The Oregon Department of Environmental Quality suggests that

- Pool owners obtain permission from local sanitary sewer operators or municipal treatment plant operators and discharge to the sanitary sewer system.
- Discharge the chlorinated water to land, where it will not drain to local surface waters.
- Dechlorinate the water before draining the pool.

Montgomery County, Maryland's, Department of Environmental Protection (1997) provides the following guidelines to pool owners and operators:

- Community pools must discharge to the sanitary sewer using a surge tank.
- Residential pools must discharge backwash water to the sanitary sewer.
- If the only option for draining pool water is to discharge directly into the environment, water quality must comply with the applicable water quality criteria.
- Pool water must sit for at least 2 days after the addition of chlorine or bromine or until chlorine or bromine levels are below 0.1 mg/l.
- The pH of discharge water must be between 6.5 and 8.5 before it is discharged.
- Algicides such as copper or silver can interrupt normal algal and plant growth and should not be used.

- Total suspended solids must be below 60 mg/l—suspended particles should be allowed to settle out and the water should not appear murky. Settled material should not be discharged with pool water.
- Discharges to the environment should be directed over a land surface so that some level of filtration by soil particles can occur. The above water quality requirements also apply to land-applied water.

Limitations

Enforcement of safe discharge of chlorinated water may be difficult to achieve.

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Materials management

Alternative Products

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Examples of alternative products include rechargeable batteries, baking soda, olive oil, vegetable oil, a lemon, a toothbrush, and a rag

Using alternatives to toxic substances drastically reduces their presence in storm water and receiving waters. The most common toxic substances found in the home are cleaners, automotive products, and pesticides. Fertilizers, paints, and fuels are among other common hazardous substances frequently found in ground water because of improper disposal (WEF and ASCE, 1998).

Applicability

The promotion of safer alternative products should be coupled with other programs designed to reduce the presence of hazardous or toxic materials in homes and storm water runoff. Examples of such programs are hazardous materials collection, good housekeeping or material management practices, oil and automotive waste recycling, and spill response and prevention (WEF and ASCE, 1998).

Examples of commonly used products and safer alternatives are as follows (adapted from Washington State Department of Ecology):

- *Aerosols*. Pump-type or non-aerosol products should be used.
- *Art supplies*. One should purchase water-based paints or inks. They should not contain lead or other toxic materials.
- *Batteries*. Rechargeable batteries are a cost-effective alternative to disposable batteries.
- *Chemical fertilizers*. Composting yard clippings and food scraps is an option. Manure (in measured amounts) is another alternative to chemical fertilizers.
- *Gasoline*. Not driving at all is the best way to reduce gasoline use. Purchasing a super-efficient or electric vehicle is the next best alternative. Carpooling, walking, bicycling, and public transportation are other viable options.
- *Household cleaners and detergents.* Baking soda is an excellent cleanser with mild abrasive power that can be used in lieu of heavy-duty cleansers. A mixture of 1 quart water and 2 tablespoons of vinegar can be used as a window cleaner. Three parts olive oil mixed with one part white vinegar can be used for a wood cleanser. Borax and lemon juice make an excellent toilet cleaner. Many other non- or less-toxic alternatives to harsh cleansers exist. A listing of these alternatives can be found at www.healthdept.co.pierce.wa.us/sourceprotection/alter.html.

- *Motor Oil*. Re-refined motor oil should be used. Doing so will spur the market for recycled motor oil and decrease reliance on new oil supplies.
- *Pesticides*. Keeping homes and gardens free from food and breeding areas for insect pests prevents the need for pesticides. Onion, garlic, and marigold plants help keep garden pests at bay.

Implementation

One of the best ways to encourage homeowners to switch to alternatives to potentially harmful products is to educate them (see Proper Disposal of Household Hazardous Wastes fact sheet). Municipalities can compile a list of alternative products and post it on their web site, publish it in a newsletter, include it as an insert in a utility bill, or produce magnets or other household products with a select list of nonhazardous alternatives. Municipalities might choose to include commercially available products that have been shown to be "green" alternatives to harsh chemicals.

Limitations

In some cases, alternative products may not be readily available. In addition, cost can be a limiting factor. For example, until recently, environmentally friendly de-icing materials for roads were significantly more expensive than traditional salt (Babcock 1998). Effectiveness of alternatives may be an issue.

The biggest impediment to instituting widespread use of alternative products is public awareness. Municipal staff must convince people to change old habits or to try new products.

Effectiveness

The use of alternative products prevents their hazardous waste counterparts from being disposed of improperly and contaminating storm water.

Cost Considerations

The majority of the cost for this BMP is composed of staff hours. An alternative products campaign should be instituted in conjunction with other public awareness programs; therefore, municipalities should not experience significant cost increases.

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Hazardous Materials Storage

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Failure to properly store hazardous materials dramatically increases the probability that they will end up in local waterways. Many people have hazardous chemicals stored throughout their homes, especially in garages and storage sheds. Practices such as covering hazardous materials or even storing them properly, can have dramatic impacts.

Signs on hazardous material storage containers indicate the dangers associated with each substance

Applicability

Hazardous material storage is relevant to both urban and rural settings and all geographic regions. The effects of hazardous material leakage may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff.

Siting and Design Considerations

EPA (1992) has outlined some management considerations for hazardous materials. They are as follows:

- Ensuring sufficient aisle space to provide access for inspections and to improve the ease of material transport.
- Storing materials well away from high-traffic areas to reduce the likelihood of accidents that might cause spills or damage to drums, bags, or containers.
- Stacking containers in accordance with the manufacturers' directions to avoid damaging the container or the product itself.
- Storing containers on pallets or equivalent structures. This facilitates inspection for leaks and prevents the containers from coming into contact with wet floors, which can cause corrosion. This consideration also reduces the incidence of damage by pests (insects, rodents, etc.).
- Delegating the responsibility for management of hazardous materials to personnel trained and experienced in hazardous substance management.

Covering hazardous materials and areas where such materials are handled reduces potential contact with storm water and wind. Storage areas, outdoor material deposits, loading and unloading areas, and raw materials should all be covered or enclosed. Priority should be given to locations of the most hazardous substances (USEPA 1992).

Residents waiting to dispose of their household hazardous waste should store it properly until their hazardous waste collection day (Kopel,1998). One storage technique requires a plastic container with a lid (e.g., a 5-gallon bucket). The container should be filled halfway with (unused) kitty litter. The hazardous substance in its own original container should be put into the kitty litter-filled plastic bucket. The bucket lid should be fastened, and the contained marked clearly, kept far away from children, and anyone else who might ingest it. Corrosion will be reduced if the container is stored on a shelf, rather than on a concrete or dirt floor.

Limitations

The lifespan of the cover or structure must be taken into account, depending on the hazardous nature of the stored materials. Tarpaulins and plastic sheets may not last in certain types of climatic conditions. If a roof or other structure is required, the lifespan will increase. Any storage facility must meet local fire and building codes (Ferguson, et al. 1997).

Maintenance Considerations

Maintenance of hazardous material storage areas consists mostly of inspection and employee training (Ferguson, et al. 1997). Storage spaces and containers should be routinely inspected for leaks, signs of cracks or deterioration, or any other signs of release.

Effectiveness

Improved storage of hazardous materials is effective at reducing contamination of storm water runoff and receiving waters if proper storage and maintenance techniques are used.

Cost Considerations

Estimates of costs for storing and covering materials vary depending on the substance and type of operation. Ferguson et al. (1997) estimated the costs of a pre-fabricated building at \$6 to \$11 per ft^2, and the cost of a 6-inch thick concrete slab at \$3.50 to \$5.00 per ft^2. All hazardous materials should be protected from exposure to storm water regardless of the expense. To offset the cost of covering or enclosing hazardous materials, consider changing procurement, inventory, and disposal practices to minimize the amount of materials stored onsite.

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Road Salt Application and Storage

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

The application and storage of deicing materials, most commonly salts such as sodium chloride, can lead to water quality problems for surrounding areas (Koppelman et al., 1984). Salts, gravel, sand, and other materials are applied to highways and roads to reduce the amount of ice during winter storm events. Salts lower the melting point of ice, allowing roadways to stay free of ice buildup during cold winters. Sand and gravel increase traction on the road, making travel safer.

During storage, road salt should be covered to prevent salt from lumping together or being lost with storm water runoff

Applicability

This practice is applicable to areas that receive snowfall in winter months and require deicing materials. Municipalities in these areas must ensure proper storage and application for equipment and materials.

Siting and Design Considerations

Many of the problems associated with contamination of local waterways stem from the improper storage of deicing materials (Koppelman et al., 1984). Salts are very soluble when they come into contact with storm water. They can migrate into ground water used for public water supplies and also contaminate surface waters.

More information about road deicing materials can be found at the American Association of State Highway and Transportation Officials web page at *www.transportation.org/aashto/home.nsf/FrontPage*.

Limitations

Road salt is the least expensive material for deicing operations; however, once the full social costs are taken into account, alternative products and better management and application of salts become increasingly attractive options.

Maintenance Considerations

Covering stored road salts may be costly; however, the benefits are greater than the perceived costs. Storing road salts correctly prevents the salt from lumping together, which makes it easier to load and apply. In addition, covering salt storage piles reduces salt loss from storm water runoff and potential contamination to streams, aquifers, and estuarine areas. Salt storage piles should be located outside the 100-year floodplain for further protection against surface water contamination.

During road salt application, certain best management practices can produce significant environmental benefits. The amount of road salt applied should be regulated to prevent oversalting of motorways and increasing runoff concentrations. The amount of salt applied should be varied to reflect site-specific characteristics, such as road width and design, traffic concentration, and proximity to surface waters. Calibration devices for spreaders in trucks aid maintenance workers in the proper application of road salts. Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

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Spill Response and Prevention

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

A person works to prevent a spill from entering a storm sewer (DAWG, 2000)

Spill response and prevention plans should clearly state measures to stop the source of a spill, contain the spill, clean up the spill, dispose of contaminated materials, and train personnel to prevent and control future spills.

Applicability

Spill prevention and control plans are applicable to construction sites where hazardous wastes are stored or used. Hazardous wastes include pesticides, paints, cleaners, petroleum products, fertilizers, and solvents.

Siting and Design Considerations

Identify potential spill or source areas, such as loading and unloading, storage, and processing areas, places where dust or particulate matter is generated, and areas designated for waste disposal. Also, spill potential should be evaluated for stationary facilities, including manufacturing areas, warehouses, service stations, parking lots, and access roads.

Material handling procedures and storage requirements should be defined and actions taken to reduce spill potential and impacts on storm water quality. This can be achieved by

- Recycling, reclaiming, or reusing process materials, thereby reducing the amount of process materials that are brought into the facility
- Installing leak detection devices, overflow controls, and diversion berms
- Disconnecting any drains from processing areas that lead to the storm sewer
- Performing preventative maintenance on storm tanks, valves, pumps, pipes, and other equipment
- Using material transfer procedures or filling procedures for tanks and other equipment that minimize spills
- Substituting less- or non-toxic materials for toxic materials.

Provide documentation of spill response equipment and procedures to be used, ensuring that procedures are clear and concise. Give step-by-step instructions for the response to spills at a particular facility. This spill response plan can be presented as a procedural handbook or a sign.

The spill response plan should

- Identify individuals responsible for implementing the plan
- Define safety measures to be taken with each kind of waste
- Specify how to notify appropriate authorities, such as police and fire departments, hospitals, or publicly-owned treatment works for assistance
- State procedures for containing, diverting, isolating, and cleaning up the spill
- Describe spill response equipment to be used, including safety and cleanup equipment.

Education is essential for reducing spills. By informing people of actions they can take to reduce spill potential, spills will be reduced and/or prevented. Some municipalities have set up 1-800 numbers for citizens to call in the event of spills. This is helpful for ensuring that spills are cleaned up in a safe, proper, and timely manner.

Limitations

A spill prevention and control plan must be well planned and clearly defined so that the likelihood of accidental spills can be reduced and any spills that do occur can be dealt with quickly and effectively. Training might be necessary to ensure that all workers are knowledgeable enough to follow procedures. Equipment and materials for cleanup must be readily accessible and clearly marked for workers to be able to follow procedures.

Maintenance Considerations

Update the spill prevention and control plan to accommodate any changes in the site or procedures. Regularly inspect areas where spills might occur to ensure that procedures are posted and cleanup equipment is readily available.

Effectiveness

A spill prevention and control plan can be highly effective at reducing the risk of surface and ground water contamination. However, the plan's effectiveness is enhanced by worker training, availability of materials and equipment for cleanup, and extra time spent by management to ensure that procedures are followed.

Cost Considerations

Spill prevention and control plans are inexpensive to implement. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs.

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Used Oil Recycling

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Used motor oil is a hazardous waste because it contains heavy metals picked up from the engine during use. Fortunately, it is recyclable because it becomes dirty from use, rather than actually wearing out. However, as motor oil is toxic to humans, wildlife, and plants, it should be disposed of at a local recycling or disposal facility. Before disposal, used motor oil should be stored in a plastic or metal container with a secure lid, rather than dumped in a landfill or down the drain. Containers that previously stored household chemicals, such as bleach, gasoline, paint, or solvents should not be used. Used motor oil should also never be mixed with other substances such as antifreeze, pesticides, or paint stripper.

Used oil can be disposed of at a waste collection facility, where it will be collected and later sent to a recycling facility

Used motor oil is recycled in a number of different ways. It can be *reprocessed* into fuel for heating and cooling homes. Reprocessing is the most common method of recycling used oil in the United States. Approximately 750 million gallons of used oil are reprocessed every year and marketed to asphalt plants, steel mills, boilers, pulp and paper mills, cement/lime kilns, and a number of other places. Motor oil can also be burned in furnaces for heat or in power plants to generate electricity for homes, businesses, or schools. It can also be blended for marine fuels, mixed with asphalts for paving, or be used in industrial burners. Used motor oil can also be used in specially designed municipal garages, space heaters, and automotive bays. Finally, used motor oil can be re-refined into lubricating oils that meet the same standards as virgin/new oil. All of these methods of recycling help to conserve valuable energy resources.

When establishing oil recycling programs, municipalities should provide the public with the proper informational resources. Programs should encourage the public to contact local service stations, municipal governments, the county government office, or the local environmental or health departments, if they are unsure where to safely dispose of their oil. The public can also call 1-800-RECYCLE or contact Earth's 911 at *www.1800cleanup.org/* for more information. Finally, state government contacts, who might be able to provide information about oil recycling, can be obtained by the public at *www.noraoil.com/Contact/contact.html*.

Municipalities also need to address oil filter recycling in their recycling programs. Programs should encourage the public to check with local collection facilities to determine whether oil filters are recycled locally. The Filter Manufacturers Council, which was established in 1971 to monitor regulatory and technological developments that affect the oil industry, can also be used as a resource for the public. The Council operates a hotline (1-800-99-FILTER) and a web site (*www.filtercouncil.org/*) to provide information about state regulations and companies that transport, recycle, and process used oil filters. If oil filters are not recycled locally, empty filters should be wrapped in newspaper and disposed of with regular household waste. Oil filters must always be drained of oil, whether recycling or disposing of the filter. The public should also check with trash collectors to determine if their state permits disposal of oil filters in landfills.

Applicability

Motorists that have their oil changed can be classified as a do-it-yourselfer or a do-it-for-me. Do-it-yourselfers change their own oil because they want to save money, they enjoy it, or they take pride in the quality of their own workmanship. According to a recent survey, more than 30 percent of motorists change their own oil. Between 43 and 62 million gallons of used oil were collected and recycled by do-it-yourselfers in 1997 (API, 2000). Therefore, it is important that do-it-yourselfers recycle their used oil. Do-it-for-mes have their oil changed at places such as service stations or quick lubes; they should be sure to check if their mechanic recycles motor oil.

To make recycling motor oil more convenient for the do-it-yourselfers, oil recycling programs should be located throughout all communities. Although oil recycling programs are appropriate in any community, urban areas are in particular need of programs, as more motor oil is used in these areas to maintain a larger number of vehicles. Therefore, oil recycling programs should more heavily target urban areas and provide a greater number of facilities for recycling oil in these areas.

Implementation

Oil recycling programs can be implemented easily throughout the country. Two types of programs currently in use are drop-off locations and curbside collection. Drop-off locations include service stations, recycling centers, auto parts retail stores, quick lubes, and landfills. These locations are effective because they are familiar, convenient, permanent, and well located. Additionally, sites that are permanent allow for effective publicity for recycling programs. Curbside collection programs allow consumers to put their oil out on the curb for collection, as they already do with their other recycling and trash. While this program is more convenient for the user, it requires a hauler to come and collect the oil. Oil recycling programs that use drop-off locations for collection are implemented by local governments, state governments, service stations, quick lubes, auto parts retailers, oil processors, or any combination of the above. Curbside collection programs are implemented by municipal or private waste haulers, municipal or private recycling haulers, or a combination of any of the above.

Local Recycling Programs. Many states, cities, and communities have developed their own recycling programs. For example, the California Integrated Waste Management Board sponsors a used oil recycling program that develops and promotes alternatives to illegal oil disposal. This is accomplished through a statewide network of collection opportunities and outreach efforts that publicize and encourage used oil recycling.

The program provides useful information for the public, including collection locations, certification information, proposed regulations, used oil facts, and a number of other resources. More information about this program can be found at www.ciwmb.ca.gov/usedoil/Default.htm. Other cities with used oil programs are King County, Washington; Kansas City, Missouri; Clark County, Ohio; and New Carollton, Maryland. All of these programs can be used as models for other communities to develop their own programs.

National Recycling Programs. In 1991, the American Petroleum Institute (API) established a used oil collection and recycling program. This program works to educate the public about collecting and recycling used oil, making oil collection more convenient, and ensuring that this valuable resource is handled appropriately. Information about API's Used Motor Oil Program is available at www.recycleoil.org. API has also developed model legislation, based on Florida's program, to encourage collection and recycling of used oil. Florida's legislation specifically requires states to create a special fund to help cities and towns establish used oil collection facilities. Additionally, it emphasizes the importance of educating the public about oil recycling. Guidance for developing collection programs, in the form of API's model legislation as well as guidebooks and publications, can be found at www.recycleoil.org/legislative.htm.

Benefits

Recycling used motor oil is beneficial to the environment, the public health, and the economy. If oil is improperly disposed of in landfills, ditches, or waterways or dumped on the ground or down storm sewers, it can migrate into surface and ground water. It takes only one gallon of oil to contaminate one million gallons of drinking water (USEPA, 2000). This same oil can also seriously harm aquatic plants and animals. Submerged vegetation is especially affected by oil because the oil blocks sunlight from entering the water and hinders photosynthesis. As motor oil causes 40 percent of the pollution in America's waterways (Mississippi DEQ), water pollution could dramatically decrease if that same oil was recycled.

It is also beneficial to recycle motor oil because one gallon of re-refined oil produces 2.5 quarts of lubricating oil, while 42 gallons of crude oil are necessary to produce this same amount. It also takes three times as much energy used to refine crude oil to lubricating oil than it does to re-refine used motor oil. If the 180 million gallons of recoverable motor oil that are thrown away each year were recycled, this would produce enough energy to power 360,000 homes annually. Finally, if the 1.3 billion gallons of oil wasted each year by the United States were re-refined, it would save 1.3 million barrels of oil a day (Mississippi DEQ).

Recycling used motor oil is also beneficial in protecting public health. As oil circulates through a car's engine, it collects rust, dirt, metal particles, and a variety of contaminants. Engine heat can also break down oil additives, producing acids and a number of other substances. Exhaust gases and antifreeze can also leak into oil when the engine is in use. When any of these substances mix with oil, the toxicity of oil is greatly increased. Then, if oil is disposed of improperly and enters the water or air, public health can be seriously threatened.

Recycling used motor oil is also beneficial to the economy. Oil is a valuable resource that can be re-refined and reused in combustion engines. As oil is a non-renewable resource, it will become increasingly more difficult to find new reserves in the future. Therefore, recycling will provide time to develop alternative fuels and lessen dependence on foreign oil suppliers.

Limitations

One limitation to recycling oil is the possibility of contamination during collection. If oil is mixed with other substances or if storage containers have residues of other substances, this can contaminate oil and make it a hazardous waste. In these cases, collection facilities are responsible for disposing of this hazardous waste and abiding by appropriate rules. Another limitation is educating the public. While oil recycling programs can be effective, it is often difficult to effectively educate the public and convince them of the importance of recycling oil. This limitation can be addressed if municipalities include recycling information in utility bill inserts, newspaper ads, and mailings. A last limitation is that some might find it inconvenient to take their oil to a recycling facility. People may not have time to drive their oil to a facility or the facility may be difficult to find. When this happens, people are more likely to dispose of their oil improperly.

Effectiveness

According to a 1998 survey, 30 percent of motorists change their oil themselves. Of those people, 12 to 15 percent report that they improperly dispose of their oil. While most people claim that they put the oil in the trash, 3 to 5 percent say that they dispose of their oil in a storm drain system. Based on this survey, more than half of do-it-yourselfers improperly dispose of used motor oil. A 1994 survey reports that of the 28 percent who are do-it yourselfers, 17 percent report improper disposal. These statistics can be improved through better advertisement of recycling facilities and by making recycling more convenient for the public.

Costs

Costs for used motor oil recycling programs vary depending on whether a community has already established similar types of recycling programs. Major costs associated with oil recycling programs include advertisement costs and oil collection costs. While service stations and collection facilities often allow the public to drop off their oil free of charge, these facilities must pay a recovery service to collect and dispose of their accumulated oil. One such recovery service, US Filter, charges an annual fee of $179 for unlimited waste oil removal, or a $79 fee for one-time oil removal, from service stations, small garage owners, and other types of collection facilities. Costs for programs also vary, depending on whether oil is collected by curbside pickup or at drop-off facilities. As fees will vary, check with a local recovery service for more specific information about oil collection fees.

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Materials Management

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Responsibly managing common chemicals, such as fertilizers, solvents, paints, cleaners, and automotive products, can significantly reduce polluted runoff (WEF and ASCE, 1998). Such products must be handled properly in all stages of their useful lives. Materials management entails the selection of the individual product, the correct use and storage of the product, and the responsible disposal of associated waste(s).

Applicability

In many cases, industries can implement simple housekeeping practices in order to manage materials more effectively. Proper management reduces the likelihood of accidental spills or releases of hazardous materials during storm events. In addition, health and safety conditions at the facility will improve.

Some simple practices for managing materials are improving maintenance of industrial machinery, establishing material storage and inventory controls, improving routine cleaning and inspection of facilities where materials are stored or processed, maintaining organized workplaces, and educating employees about the benefits of the above practices (USEPA, 1992).

Maintenance Considerations

Maintenance associated with materials management should be designed to minimize the amounts of materials used and the wastes generated by industrial processes. Procedures for operation and maintenance can easily be integrated into an industry's management plan. Simple processes, such as routine cleaning of work spaces, proper collection and disposal of wastes, maintenance of machinery, regular inspections of equipment and facilities, and training employees to respond to spills or leaks, have significant effects on reducing storm water runoff.

Another consideration is regular material inventories. Such inventories reduce the occurrence of overstocking hazardous materials, increase knowledge about what hazardous materials are present and how they are stored, and provide documentation of proper handling of hazardous materials. An inventory of hazardous materials present at a particular site consists of three major steps (USEPA, 1992):

- Identify all hazardous and nonhazardous substances present in a facility. This can be accomplished by reviewing all purchase orders for the facility and walking through the facility itself. Compile a list of all chemicals present in a facility and obtain a Material Safety Data Sheet (MSDS) for each one.

- Label all containers with the name of the chemical, unit number, expiration date, handling instructions, and health or environmental hazards. Much of this information will be found on the MSDS. Often, insufficient labeling leads to improper handling or disposal of hazardous substances.

- Make special note on the inventory of hazardous chemicals that require special handling, storage, or disposal.

Cost Considerations

The major costs of these BMPs can be attributed to additional labor. Depending on the extent of the program, varying amounts of staff hours will be required for the necessary education of municipal employees, local businesses, and the public. In addition, posters and bulletin boards that encourage the proper management of materials should be displayed throughout the facility.

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Municipal Facilities Management

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Municipalities own and operate numerous facilities, including maintenance yards, parks, office buildings, schools, and other city-owned properties. The objective of managing stormwater at municipal facilities is to prevent pollutants released during city activities from entering storm drain systems or receiving waters. Activities associated with municipal facilities that are a potential threat to water quality include, but are not limited to, Automobile Maintenance, Residential Car Washing, Hazardous Materials Storage, Materials Management, sign painting, Pest Control, Parking Lot and Street Cleaning, and waste storage and disposal. To effectively prevent or reduce stormwater pollution, a municipality should inventory its facilities and associated activities to assess potential impacts on stormwater quality and revise activities or implement new measures as needed. These activities and control measures should be described in a stormwater pollution prevention plan (SWPPP) or a similar document that describes management actions that will be taken to reduce pollution from the site or activity. Training on stormwater best management practices (BMPs) and principles should be provided to all municipal facilities maintenance staff, and they should have clear guidance on how to use appropriate stormwater practices during typical maintenance operations and facility management activities.

Applicability

The Phase II rule specifies that municipalities develop a program to prevent and reduce pollutant runoff from municipal operations, using training and controls for reducing or eliminating the discharge of pollutants from municipal parking lots, maintenance and storage yards, fleet maintenance shops, salt/sand storage locations, snow disposal areas, and waste transfer stations. The rule also includes development of procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris). Other municipal facilities that should be evaluated for pollution potential and BMP implementation include those where chemicals are stored, those with outdoor trash storage areas, and areas where potentially hazardous materials are stored or disposed of (e.g., animal shelters, hospitals, clinics).

Some municipalities are required to have coverage under an industrial stormwater permit for municipal facilities they own and manage. If a municipal facility, such as a landfill or transportation facility, has activities included in one of the 11 categories of industrial activity described in 40 CFR 122.26(b)(14)(i)-(xi), the operator must obtain coverage under an NPDES industrial stormwater permit, unless they are conditionally excluded. For those areas where EPA is the permitting authority (in some states, on Indian Country lands, and at some federal facilities), the Multi-Sector General Permit (MSGP) provides facility-specific requirements for many types of industrial facilities in one permit. Most states, however, are authorized to implement the NPDES stormwater program (click here for a list of authorized states) and have their own industrial stormwater permits.

Implementation

Each facility will have different activities and pollutants of concern. Facility managers should consider the housekeeping and pollution prevention BMPs outlined in the Menu of BMPs and develop a SWPPP that outlines how the BMPs will be implemented. If the facility is covered by an industrial stormwater permit, the development and implementation of a SWPPP is one of the permit requirements.

SWPPP development includes a step-by-step process to ensure that pollutants do not enter the storm drain system or receiving waters. BMPs include scheduling activities to reduce the potential for offsite migration of pollutants, such as not scheduling activities immediately before or during rainstorms; prohibiting certain practices, such as the outside storage and use of chemicals; requiring specific maintenance procedures; and other management practices to prevent or reduce pollution. A set of worksheets and a model plan are available in EPA's (1992) Stormwater Management for Industrial Facilities: Development Pollution Prevention Plans and Best Management Practices Summary Document to assist municipal operators. This document describes the five major phases of developing a pollution prevention plan: (1) planning and organization, (2) assessment, (3) BMP selection and plan design, (4) implementation, and (5) evaluation and site inspection.

Planning and Organization: An individual should be designated who will be responsible for developing and implementing the municipal facility SWPPP and other existing environmental facility plans, such as plans governing pesticide use or hazardous materials storage, to ensure consistency and overlap. The municipality should build on relevant portions of other environmental plans as appropriate, although it is important that the SWPPP be a comprehensive, stand-alone document.

Assessment: Municipal facilities that have been identified as having potential to contribute pollutants to the storm drain system should be inspected to identify possible pollution sources and BMP implementation opportunities. It is helpful to create a map of the facility site that identifies pollutant sources, storm drains, drainage ditches, BMPs requiring periodic maintenance, and areas suitable for new BMP implementation or retrofit. The municipality should also conduct an inventory of potentially polluting materials, evaluate past spills and leaks, identify and eliminate sources of nonstormwater discharges and illicit connections, collect and evaluate any existing stormwater quality data, and summarize the findings of the assessment.

Identify BMPs: BMPs should be selected with special consideration given to areas where materials are handled or stored, outdoor processing areas, loading and unloading areas, and onsite waste management and disposal areas. At a minimum, the plan should address appropriate good housekeeping, preventive maintenance, spill prevention and response, erosion and sediment control, and structural stormwater management controls. Employee training, visual inspections, recordkeeping, and reporting should be addressed and included in the SWPPP as well. Additional activity- or site-specific BMPs might also be appropriate.

Implementation: The selected stormwater BMPs should be implemented according to a schedule that reflects the priority level and funding/labor constraints. Also, all municipal employees should receive training to understand and carry out the goals of the SWPPP.

Evaluation: Periodic site evaluations should be conducted and records should be kept of BMP implementation, illicit discharge or spill incidents, employee training, inspections, and monitoring, if any is being conducted. The plan should be revised if parts are shown to be ineffective or if activities or conditions at the facility change.

Limitations

Developing and implementing an effective SWPPP at a municipal facility requires time and commitment, not only from managers, but also from staff and laborers. After development of the SWPPP, facilities should be self-inspected annually, with regular inspections conducted more often to detect leaks, spills, or other pollution issues as soon as possible. Also, without the proper training, municipal employees can be unable or unwilling to implement and maintain the BMPs included in the SWPPP.

Case Studies

The following are examples of municipalities that have successfully implemented municipal facility BMPs. Links are provided for more information.

- The City of Gresham, Oregon, conducted an internal audit of a local maintenance yard where materials such as paint, gasoline, oil, grease, pesticides, and herbicides are stored to identify problems and recommend changes that would improve stormwater quality (see Municipal Stormwater Toolbox for Maintenance Practices). Municipal staff studied stormwater drainage on the site, inventoried equipment and materials, determined the potential for polluting stormwater, inspected the outfalls to a local creek, and interviewed facility operators to learn about existing practices. By participating in the audit, all the facility operators were educated about stormwater drainage and quality and are now actively involved in implementing solutions (Oregon Association of Clean Water Agencies, 1998).

- The City of Santa Monica, California, has implemented numerous practices to control dry and wet weather discharges from municipal areas and activities and has conducted urban runoff training for city employees (USEPA, 2004).

Cost Considerations

The costs of formalizing stormwater management at municipal facilities will vary by facility and by municipality. The majority of the costs are associated with the staff time necessary to develop a SWPPP, train staff, and inspect the facilities to ensure that selected BMPs are applicable and effective.

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Municipal Employee Training and Education

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Municipal employee training programs should be designed to teach staff about potential sources of stormwater contamination and ways to minimize the water quality impact of municipal activities, such as park and open space maintenance, fleet and building maintenance, construction and land disturbances, and storm drain system maintenance. Training programs should include a general stormwater awareness message, pollution prevention/good housekeeping measures, Spill Response and Prevention, and information about the operation and maintenance of structural best management practices (BMPs). Training programs also should include information on stormwater pollution prevention plans (SWPPPs) for municipal facilities and BMPs recommended for use in the field to prevent contaminated discharges. Finally, municipal field staff should be trained to recognize, track, and report illicit discharges.

Applicability

Municipal employees who are directly involved in potentially polluting activities should receive both general stormwater and targeted BMP training tailored to their activities. This will increase the likelihood that receiving waters and the storm drain system will be protected from inadvertent discharges and spills. It is important to train all municipal staff, however, regardless of field responsibilities, about general stormwater awareness and the detection of illicit discharges. Very often, municipal staff are residents as well, and improving the awareness of municipal employees may reduce residential impacts and increase reporting of illicit discharges, dumping, and spills. Also, because municipalities expect residents and business owners to practice pollution prevention and good housekeeping, municipal employees should set an example for the rest of the community to follow.

Siting and Design Considerations

Municipal employees can be educated about stormwater issues in a number of ways: in-house training programs, on-the-job reinforcement, general awareness and educational materials, and workshops or conferences.

Most municipalities have established training programs for field maintenance staff to address safety, materials handling, waste disposal, or other issues. Typically, in-house training formats include formal, classroom style programs that are usually held on an annual basis, and more frequent, informal "tailgate" meetings. Tailgate meetings are usually held weekly to update staff on current issues and tasks, but they often incorporate short training sessions as well. More comprehensive training is usually conducted when new employees are hired or existing employees are looking to be promoted. Basic stormwater information and details about pollution prevention and BMPs can be incorporated into these existing formats. Whenever possible, additional in-field training should be provided to demonstrate proper implementation of operation and maintenance of BMPs and housekeeping measures at municipal facilities. Videos are also useful tools that may be used during training. For example, the North Central Texas Council of Governments developed a video entitled Preventing Stormwater Pollution: What We Can Do" along with an accompanying Stormwater Pollution Prevention Training Module Series, as tools to assist local governments and state agencies in training their employees on stormwater pollution (North Central Texas Council of Governments, no date). In addition, the City of Memphis has developed training for private industrial facility operators that can be modified to apply to municipal facility maintenance staff and managers (City of Memphis, 2004).

After training, it is helpful for managers to periodically check employees' work practices to ensure BMPs are implemented properly. Periodic unscheduled inspections of facilities and maintenance activities will allow managers to gauge what has been learned. Posting reminders, such as markers above drains prohibiting discharges of vehicle fluids and wastes, or signs above faucets reminding employees not to use water to clean up spills will remind employees of proper procedures. Stickers that list important information and contact numbers for reporting illicit discharges, dumping, or spills can be adhered to all municipal vehicles. Stenciling or marking all storm drains at municipal facilities will prompt employees to be conscious of discharges. Facility SWPPPs and BMP guidance documents should be available to all employees as a reference to use after training.

All municipal staff can benefit from general stormwater information. Some municipalities provide general stormwater awareness information in new employee training. Paycheck inserts or email notices with information about household practices to reduce stormwater impacts or ways to recognize an illicit discharge can increase overall awareness. Stormwater posters or displays in common areas of municipal buildings educate both employees and members of the community. The Alameda Countywide Clean Water Program has developed a number of pollution prevention brochures that could be modified for municipal use (Alameda Countywide Clean Water Program, 2005), and EPA has developed posters, fact sheets, guidebooks and other tools that could be used as well (U.S. Environmental Protection Agency, 2005a). The City of Los Angeles has developed an online handbook to educate city staff about stormwater issues (City of Los Angeles Stormwater Program, no date). Many additional training resources can be found at the North Central Texas Council of Governments Pollution Prevention Training Resources Compilation website (North Central Texas Council of Governments, 2003).

Workshops and conferences about pollution prevention and stormwater management BMPs are offered by numerous federal and state agencies and professional and nonprofit organizations. For example, EPA sponsors workshops and conferences on a variety of stormwater topics, and many states provide stormwater trainings as well (U.S. Environmental Protection Agency, 2005b). These courses are useful if the municipality owns and manages a landfill, or other facility, that requires coverage under an industrial stormwater permit. Employees can learn how to comply with the latest stormwater management regulations, how to develop required stormwater pollution prevention plans, which BMPs to use at a particular facility or site, and methods for collecting and handling samples. By attending these outside events, municipal staff can keep up-to-date on current BMPs and stormwater management approaches while networking with other municipal employees and representatives from industry and regulatory agencies.

Limitations

Comprehensive stormwater training can be hampered by limited staff time, funding constraints, or lack of commitment from management. To combat these problems, stormwater training can be incorporated into existing training programs. Also, training materials and BMP guidance documents are available free of charge on the Internet. For example, Caltrans provides training materials for BMPs to be used during highway construction (California Department of Transportation, 2003).

Cost Considerations

Costs for implementing an in-house employee training program are related to labor and associated overhead costs. Trainers can reduce direct costs by using free educational materials or training tools that are already developed.

General education materials can also be reproduced inexpensively by using existing resources and tools.

Workshops or conferences presented by outside organizations, agencies, or groups can vary in cost. Often these workshops are free or provided for a nominal fee. Many private companies and groups also provide training. For example, the Environmental Resource Center offers a one-day seminar on how to manage industrial stormwater discharges for $499 per person (Environmental Resource Center, no date).

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Municipal Landscaping

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Lawn and garden activities can contaminate stormwater with pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff, and enhance a property's aesthetics. Environmentally friendly landscape management protects the environment through careful planning and design, routine soil analysis, appropriate plant selection, use of practical turf areas and mulches, efficient water use, and appropriate maintenance.

A typical composting bin (Source: Alameda County Waste Management Authority, 2001)

Other activities that benefit water resources include maintaining healthy plants and lawns, and composting lawn wastes. Healthy plants better resist diseases and insects. Therefore, they require fewer pest control measures. To promote healthy plants, it is often beneficial to till composted material into the soil. Recycling of garden wastes by composting is also effective at reducing waste, although compost bins and piles should not be located next to waterways or storm drains because leachate from compost materials can cause contamination.

There are several benefits to environmentally friendly landscape design. First, proper site planning can reduce maintenance requirements by selecting native species and locating plants in areas where conditions are optimal for growth requirements. Soil analysis can prevent overapplication of fertilizers by eliminating uncertainty regarding existing soil fertility. Careful selection of turf can minimize watering and fertilizer requirements by choosing grasses that thrive in a particular climate. Minimizing turf area by replacing it with ground cover, shrubs, and trees reduces mowing requirements, which subsequently reduces air, water, and noise pollution. Efficient watering practices reduce pollutant transport and erosion from runoff of wasted water. Mulches stabilize exposed soils, prevent growth of nuisance vegetation, and improve soil fertility through the slow release of nutrients from decomposition. Finally, the reduction or judicious application of pesticides and fertilizers reduces the probability of contamination, while ensuring that the maintenance requirements of vegetation are being met.

It is important for municipalities to set a good example for residents. To encourage the use of less-toxic alternatives by municipal crews, King County, Washington, and the City of Seattle voluntarily phased out the use of dozens of pesticides (Johnson, 1999). The decision followed criticism that while the municipalities were urging residents to stop using weed killer and pesticides in yards to help endangered Chinook salmon, they were allowing municipal crews to apply herbicides in municipal parks and along roadsides. Based on a study by the City of Seattle, the municipalities phased-out the use of all hazardous Tier 1 chemicals. Major health and safety concerns from pest outbreaks are excepted from the phase-out. Environmental groups support the phase-out and hope to see zero pesticide use in the future. Groups representing agriculture, landscaping, and timber interests oppose the plan. They warn that overwhelming weed, mosquito, and rat problems will result. More information can be found at the Seattle Pesticide Reduction website.

Applicability

Municipalities can use environmentally friendly lawn and garden practices on their properties, and they can encourage residents to use the same practices in their yards. Such practices include landscape planning, integrated pest management, planting indigenous species, soil testing, and the reduction, elimination or judicial use of fertilizers and pesticides. Planting drought-resistant plants and using Water Conservation Practices for Homeowners can be especially useful in areas of low rainfall. Areas of high rainfall experience more erosion, so protecting exposed soils with vegetation and mulches is of particular importance in these areas.

Siting and Design Considerations

The following guidelines describe ways in which municipalities can promote environmentally friendly landscaping techniques:

General Programs. An effective public education campaign can help landowners understand the value of good yard practices. The Florida Yardstick, part of the Florida Yards and Neighborhoods Program (University of Florida Cooperative Extension Service, no date), helps landowners evaluate their yard. A 19 x 37 inch poster of a yardstick indicates credits homeowners have earned for recycling, fertilizing, selecting indigenous plants, and so on. The credits represent inches, the best yards adding up to 36. Landowners meeting the 36 inch goal are rewarded with a certificate. More information can be found at the Florida Yardstick website.

Planning and Design. It is important that property owners develop a landscape plan that recognizes the property's natural conditions. For example, a landscape plan should recognize regional and climatic conditions. It should consider the site's topography and existing vegetation, and group plants together according to their water needs. The site's intended use should be considered. A thoughtful landscape plan will promote natural vegetation growth and minimize water loss and contamination. Residents and municipal crews can partner with local nurseries and irrigation and lawn services to determine appropriate landscape designs for a specific site.

Soil Analysis and Improvements. Residents and municipal crews should be encouraged to test soils every 3 to 4 years to determine the amount of nutrients necessary to maintain a healthy lawn. Municipalities can encourage home and garden centers to market and sell soil test kits so that property owners can perform such tests on their own. A local extension service can also perform soil analyses, and their representatives can then provide suggestions for improving a site's ability to retain water and to support specific vegetation.

Appropriate Plant Selection. Encourage property owners and municipal crews to choose local or regional plants when developing an environmentally friendly landscape. Indigenous plant species are generally more water efficient and disease resistant. Furthermore, exotic plants can potentially invade local waterways. Local nurseries can assist in choosing appropriate regional plant species.

Practical Turf Areas. Property owners and municipal crews should be encouraged to plant non-turf areas where possible, because lawns require more water and maintenance than wildflowers, shrubs, and trees. If turf is used, it is important to select a type of grass that can withstand drought and that becomes dormant in hot, dry seasons. Local nurseries can assist property owners and municipal crews with selecting grass types. In addition, when maintaining lawns, the grass should not be cut shorter than 3 to 4 inches in height. Mulched clippings should be left on the lawn as a natural fertilizer.

Efficient Irrigation. Much of the water that is applied to lawns and gardens is not absorbed by the vegetation. When water is applied too quickly, it is lost as runoff along with the top layers of soil. To prevent this, it is important to encourage the use of low-volume watering approaches such as drip-type or sprinkler systems. In addition, encourage property owners and municipal crews to water plants only when needed to enhance plant root growth and avoid runoff problems.

Use of Mulches. Mulches help retain water, reduce weed growth, prevent erosion, and improve the soil for plant growth. Mulches usually contain wood bark chips, wood grindings, pine straws, nut shells, small gravel, or shredded landscape clippings. Property owners should be encouraged to use mulches and should be informed of the benefits of these materials. Additionally, municipalities can start a program to collect plant materials from municipal maintenance activities as well as yard waste from property owners. These materials can be converted to mulch and used at municipal properties or redistributed to property owners.

Fertilizers. Property owners and municipal crews should be discouraged from using fertilizers, or if they are used, from over-applying them. Municipalities can recommend less-toxic alternatives to commercial fertilizers, such as composted organic material.

Municipalities can also recommend practices to reduce the amount of fertilizer entering runoff. For example, slow-release organic fertilizers are less likely to enter stormwater. Application techniques, such as tilling fertilizers into moist soil to move the chemicals directly into the root zone, reduce the likelihood that the chemicals will be mobilized in stormwater. Timing is also important: Warm season grasses should be fertilized in the summer, in frequent and small doses, while cool season grasses should be fertilized in the fall. Also, fertilizer should not be applied on a windy day or immediately before a heavy rain. Municipalities can recommend that property owners apply fertilizer at rates at or below those recommended on the packaging or should apply fertilizer based on the needs of the soil (as determined by a soil test). Safe disposal of excess fertilizer and containers should be encouraged. (see Proper Disposal of Household Hazardous Wastes fact sheet.)

Pesticides. Like fertilizers, pesticides should be used on lawns and gardens only when necessary. Pesticide use can be avoided by selecting hearty plants that are native to the area and by keeping them healthy. It is important to identify any potential pests to determine if they are truly harmful to the plant. The pests should always be removed by hand when possible; chemical pest control should be used only when other approaches fail. If it is necessary to use chemical pesticides, the least toxic pesticide that targets the specific pest in question should be chosen (i.e., boric acid, garlic, insects, etc). If a pesticide is labeled with the word "caution," it is less toxic than one labeled "warning," which is, in turn, less toxic than one that is labeled "danger/poison."

It is important to follow the label directions on the pesticide. Property owners and municipal crews must wear the appropriate protective equipment listed on the label when working with organophosphate insecticides or concentrated sprays or dusts. Read and follow all safety precautions listed on pesticide labels and wash hands and face before smoking or eating. Tools or equipment that were used to apply or incorporate pesticides should always be rinsed in a bucket and the rinse water applied as if it were full-strength pesticide. Any unused pesticide can be saved and disposed of at a household hazardous waste collection location. (see Proper Disposal of Household Hazardous Wastes fact sheet.)

Ordinances. Municipalities can use ordinances as a means of controlling or preventing pesticide usage in the future. For example, the city of Arcata, California, created an ordinance that officially eliminated the use of pesticides on all city properties (Californians for Alternatives to Toxics, 2000). This ordinance followed a 14-year moratorium on pesticides in which the city council and a citizen's task force researched less-toxic alternatives to pesticide use. Municipal workers adapted to the moratorium by devising innovative pest control methods, such as covering the infield dirt in the baseball stadium with tarps between games to prevent weed growth. Other methods that Arcata crews used to prevent weeds included planting local plant species adapted to the city's climate; timely mowing, irrigating, weeding, and thatching lawns; and performing regular street maintenance such as sweeping and crack sealing. The ordinance also mandates the creation of a pest control management plan that will be linked to the city's stormwater discharge program and includes a public education component. The text of the ordinance can be found at the Californians for Alternatives to Toxics website.

Limitations

There are virtually no limitations associated with implementing environmentally friendly lawn and garden practices. Some practices are more applicable in certain climates (for example, there is little need for irrigation practices in areas of very high rainfall), but in general, all practices are low cost and relatively easy to implement. With guidance from a local environmental agency, extension service, or nursery, proper decisions can be made regarding which practices are best for the site in question.

Effectiveness

Using proper landscaping techniques can effectively increase the value of a property while benefiting the environment. Attractive, water-efficient, low maintenance landscapes can increase property values between 7 and 14 percent (USEPA, 1993). These practices also benefit the environment by reducing water use; decreasing energy use (because less water pumping and treatment is required); minimizing runoff of storm and irrigation water that transports soils, fertilizers, and pesticides; and creating additional habitat for plants and wildlife.

Cost Considerations

Proper landscape activities are very cost effective. Promoting the growth of healthy plants that require less fertilizer and pesticide applications minimizes labor and maintenance costs of lawn and garden care. Using water, pesticides, and fertilizers only when necessary and replacing store-bought fertilizers with compost material can increase the savings for a property owner as well as benefit the environment.

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Municipal Vehicle Fueling

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Fueling fleets of municipal vehicles can generate spills and leaks of fuel (gasoline and diesel fuel) and heavy metals - disproportionately toxic compounds that if washed into the storm drain system by stormwater runoff can seriously impair the water quality of nearby waterbodies. To prevent such discharges, municipal officials can employ a variety of BMPs. They frequently have municipal vehicles refueled at offsite facilities, and then only in designated areas. They store fuel in enclosed, covered tanks. They implement spill controls and train employees and subcontractors in proper fueling procedures (CASQA, 2003a).

This fueling island is roofed and absorbent materials are provided in case of spills. However, the used absorbent hasn't been swept up and disposed of properly.

Applicability

Municipal activities require the use of a variety of vehicles and equipment, such as transit buses, fire trucks, police cruisers, school buses, and public works and maintenance vehicles. These vehicles may refuel at facilities located at numerous municipal facilities. The BMPs suggested in this fact sheet apply to fueling operations regardless of location.

Siting & Design Considerations

Designated fueling areas should be designed to prevent stormwater runoff and spills. The California Stormwater Quality Association recommends that fuel-dispensing areas be paved with cement, concrete, or an equivalent impervious surface, with a two to four percent slope to prevent ponding, and separated from the rest of the site by a grade break or berm that prevents run-on of stormwater.

Fuel dispensing areas should be covered, and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area. The cover should not drain onto the fuel dispensing area. Use a perimeter drain or slope the pavement inward so that runoff drains to a blind sump. It might be necessary to install and maintain an oil control device in catch basins that might receive runoff from the fueling area.

For facilities where equipment is being fueled with a mobile fuel truck, consider establishing a designated fueling area. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain (CASQA, 2003b).

A form of secondary containment should be used when transferring fuel from the tank truck to the fuel tank. Storm drains in the vicinity should also be covered. Install vapor recovery nozzles to help control drips as well as reduce air pollution (CASQA, 2003b).

All facilities with fueling areas should have a spill prevention plan and necessary spill kits located nearby. A spill prevention plan specifies material handling procedures and storage requirements, and identifies spill cleanup procedures for areas and processes in which spills may potentially occur. The plan standardizes operating procedures and employee training in an effort to minimize accidental pollutant releases that could contaminate stormwater.

Limitations

Old, outdated equipment and facilities can limit the implementation of appropriate vehicle fueling BMPs. Many municipal fueling areas are uncovered, poorly located or drained, or use equipment prone to leaking or spills. It can be costly to retrofit existing facilities or build new fueling islands that provide a greater degree of stormwater protection. Retraining staff and regularly inspecting facilities also requires staff time.

Maintenance Considerations

Fuel-dispensing areas should be inspected regularly. Inspectors should:

- Check for external corrosion and structural failure in aboveground tanks.
- Check for spills and overfills due to operator error.
- Check for failure of any piping systems.
- Check for leaks or spills during pumping of liquids or gases from a truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installations for loose fittings, poor welds, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, tank walls, and piping systems. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Above-ground tanks should be tested periodically for integrity by a qualified professional.

Dry cleanup methods should be employed when cleaning up fuel-dispensing areas. Such methods include sweeping to remove litter and debris and using rags and adsorbents for leaks and spills. Water should not be used to wash these areas. During routine cleaning, use a damp cloth on the pumps and a damp mop on the pavement, rather than spraying with a hose (Sacramento Stormwater Management Program, 1992). Fuel dispensing nozzles should be fitted with "hold-open latches" (automatic shutoff) except where prohibited by local fire departments. Signs can be posted at the fuel dispenser or island warning vehicle owners/operators against "topping off" vehicle fuel tanks.

Written procedures should be provided to employees who will be using fueling systems that describe these BMPs.

Effectiveness

It is difficult to quantify the effectiveness of vehicle fueling BMPs. However, experience has shown that implementing such BMPs will reduce the likelihood of spills reaching receiving waters. Furthermore, a related study on stormwater runoff from an auto recycling facility found that stormwater management practices and pollution prevention techniques can decrease the concentration of pollutants in stormwater runoff (Swamikannu 1994). Like municipal fueling facilities, auto recycling facilities typically contain higher concentrations of oil, phenols, BOD, metals, and other pollutants compared to other sources. Through the use of structural and non-structural pollution prevention BMPs, the 10-year study of a 17-acre auto-recycling facility in Los Angeles was able to show substantial reductions in the concentrations of metals, oil, and grease. The full study (Auto Recycler and Dismantler Facilities: Environmental Analysis fo the Industry with a Focus on Stormwater Pollution) is currently available (as of 4/10/06). For summary information of the study, see Article 140 in the Practice of Watershed Protection.

Cost Considerations

To avoid future maintenance costs, new and substantially remodeled facilities should implement high-quality design techniques during the initial installation. Retrofitting existing fueling areas with BMPs to help minimize stormwater exposure or spills can be expensive. Staff time for training new-hires, along with staff time for periodic re-training of other employees, will also need to be considered. Spill kits should be purchased and made available at each fueling area and on each mobile fueling truck. Spill kits capable of cleaning-up five to six gallons of spilled liquid, and that include socks, pads, gloves, one or more disposal bags, and a watertight container, range in cost from $24 to $74. A 16- to 20-gallon spill kits cost $85 to $149.

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Municipal Vehicle and Equipment Maintenance

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

This small auto repair shop performs work outdoors without a roof and without berms or other containment for spills, which increases the threat of stormwater pollution.

Common activities at municipal maintenance shops include parts cleaning, vehicle fluid replacement, and equipment replacement and repair. Automotive maintenance facilities are considered to be stormwater "hot spots." Hotspots are areas that generate significant loads of hydrocarbons, trace metals, and other pollutants that can affect the quality of stormwater. Some of the wastes generated at automobile maintenance facilities include:

- Solvents (degreasers, paint thinners, etc.)
- Antifreeze
- Brake fluid and brake pad dust
- Battery acid
- Motor oil
- Fuel (gasoline, diesel, kerosene)
- Lubricating grease

Fluid spills and improper disposal of materials result in pollutants, heavy metals, and toxic materials entering ground and surface water supplies, which can create public health and environmental risks. Municipal facilities that properly store automotive fluids and thoroughly clean up spills can help reduce the effects of automotive maintenance practices on stormwater runoff and, consequently, local water supplies.

Applicability

Municipal activities require the use of various vehicles and equipment, such as public works operation and maintenance vehicles, police cars, fire trucks, and school and public transit buses. Maintenance facilities may be located at several municipal facilities. An estimated 180 million gallons of used oil is improperly disposed of annually (Alameda CCWP, 1992), and just a single quart of motor oil can pollute 250,000 gallons of drinking water. For this reason, automotive maintenance facilities' discharges to storm and sanitary sewer systems are highly regulated. For more information on educating the public and commercial businesses about vehicle maintenance, see the Stormwater Outreach for Commercial Businesses fact sheet.

Siting and Design Considerations

The most effective way to minimize wastes generated by automotive maintenance activities is to prevent their production in the first place. Pollution prevention programs trying to reduce polluted liquid discharges from automotive maintenance facilities to storm drains should stress "dry shop" techniques. Among suggestions for creating a dry operation:

- All maintenance activities should be performed inside or under cover.
- Spills should be cleaned up immediately, without water whenever possible and clean up materials disposed of properly.
- Floor drains should be sealed.
- A solvent service can be hired to supply parts and cleaning materials and to collect spent solvent.

Facilities that discharge to the sanitary sewer system may be required to treat their wastewater prior to its release from the site. Some municipalities require the use of structural treatment devices to pretreat wastes before they are discharged to sewage treatment plants. These devices prevent oils and grease from entering the sewer system, often by separating the oil and solids from the water through settling or filtration.

Other methods can also help prevent or reduce pollutant discharges from vehicle maintenance facilities. The following suggestions can reduce vehicle maintenance and repair impacts. Many of these practices apply both to business owners and to residents who maintain their own vehicles. These practices also apply to the maintenance of school buses, public works, fire, police, parks, and other types of municipal fleets. The following list is not comprehensive. Many other suggestions for reducing impacts are available to those responsible for managing stormwater from maintenance facilities.

Waste Reduction

- Keep the number of solvents used to a minimum. It makes recycling easier and it reduces hazardous waste management cost.
- Do all liquid cleaning at a centralized station to ensure that solvents and residues stay in one area.
- Locate drip pans and draining boards to direct solvents back into a solvent sink or holding tank for reuse.

Use of Safer Alternatives

- Use non-hazardous cleaners when possible.
- Replace chlorinated organic solvents with nonchlorinated ones like kerosene or mineral spirits.
- Purchase recycled products, such as engines, oil, transmission fluid, antifreeze, and hydraulic fluid, to help support the recycled products market.

Spill Containment and Cleanup

- Install berms or other measures to contain spills and prevent work surface runoff from entering storm drains.
- Use as little water as possible to clean spills, leaks, and drips.
- Follow the spill prevention plan.

Good Housekeeping

- Reinforce employee training and public outreach to reinforce proper disposal practices.
- Conduct maintenance work such as fluid changes indoors.
- Update facility schematics to accurately reflect all plumbing connections.
- Closely monitor parked vehicles for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling.
- Promptly transfer used fluids to recycling drums or hazardous waste containers.
- Dispose of liquid waste properly.
- In the event of a spill, cover drains with drain mats.
- Store cracked batteries in leakproof secondary containers.

Parts Cleaning

- Use detergent-based or water-based cleaning systems instead of organic solvent degreasers.
- Steam clean or pressure wash parts instead of using solvents. Water discharged into the sanitary sewer may require treatment prior to release. You should check with the sewer authority to determine if treatment is required. The wastewater generated from steam cleaning can be discharged to the on-site oil/water separator, but remember that such separators must be periodically maintained to ensure their effectiveness.

Limitations

There are a number of limitations to implementing recommendations for automotive maintenance facilities. Space and time constraints may rule out indoor work. Containing spills from vehicles brought on-site after working hours may be impossible. Education for employees on proper disposal of wastes must continually be updated. Installing structural BMPs for pretreatment of wastewater discharges can be expensive. Recycled materials and fluids may cost more than non-recycled materials. Some facilities can be limited by a lack of recycled materials providers. Other facilities can be limited by the absence of business that provide hazardous waste removal, structural BMP maintenance, solvent recycling, or other services.

Maintenance Considerations

Outdoor areas, especially parking areas for vehicles awaiting repair, should be inspected regularly for drips, spills and improperly stored materials (unlabeled containers, auto parts that might contain grease or fluids, etc.). Good housekeeping is an important step in reducing stormwater pollution in these hotspot settings.

The proper functioning of structural BMPs is an important maintenance consideration for facilities responsible for pretreating their wastewater prior to discharging.. To maintain their effectiveness, the devices require routine cleanout of oil and grease, usually at least once a month. During periods of heavy rainfall, cleanout is required more often to ensure that pollutants are not washed through the trap. Sediment removal is also required on a regular basis to keep the device working efficiently.

Effectiveness

It's difficult to quantify the effectiveness of automotive maintenance best management practices at removing pollutants. However, there are studies that demonstrate that pollution prevention practices can reduce the impacts of automotive fluids. A 1994 study of auto recycling facilities found that best management practices can reduce stormwater toxicity and pollutant loads. Through the use of structural and nonstructural BMPs, the study facility was able to reduce concentrations of lead, oil, and grease to levels approaching USEPA benchmarks (CWP, 1995).

Palo Alto, California, has instituted a program that has had great success in controlling contaminated flows from vehicle maintenance facilities. The Clean Bay Business Program offers local business the opportunity to be officially recognized as an environmentally responsible retailer. In exchange for allowing inspectors to visit once a year, and for agreeing to implement recommended management practices, participating businesses earn the designation of a Clean Bay Business. In doing so, they gain promotional opportunities like twice annual listings in full-page newspaper ads, decals for shop windows, and other Clean Bay Business materials. Other promotions, like prize drawings and discount coupon giveaways, help generate additional business for participants. The number of businesses that have received the Clean Bay Business designation has risen steadily since the program's inception. In 1992, when the program began, only four percent of businesses used all the recommended management practices. By 1998, that number had risen to 94 percent (NRDC, 1999).

The program's success in altering the behaviors of participating business resulted in the following:

- The elimination of 78 direct discharges to storm drains by ceasing or modifying the practices used in parking lot cleaning, vehicle washing, wet sanding, and other activities.
- A 90 percent drop in violations of storm drain protection requirements from 1992 through 1995.

- The number of shops conducting outdoor removal of vehicle fluids without secondary containment fell from 43 to 4.

Cost Considerations

The initial cost for Palo Alto's program was approximately $300. Each subsequent year costs $150. The cost includes inspector's visits and follow-up work, outreach materials, mailing lists, and database management. The program has been expanded to include auto parts stores and outreach to local high schools and adult education repair classes.

References

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Municipal Vehicle and Equipment Washing

Pollution Prevention/Good Housekeeping for Municipal Operations

Description

Municipal vehicle washing can generate dry weather runoff contaminated with detergents, oils, grease, and heavy metals. Vehicle washing BMPs can eliminate contaminated wash water discharges to the sanitary sewer system. Such BMPs include installing wash racks that discharge wash water to the sanitary sewer, and contracting the services of commercial car washes, which are permitted to discharge wash water to the sanitary sewer system. Finally, employees and subcontractors should be trained in the municipality's vehicle washing procedures to avoid illicit discharges.

Applicability

Municipalities typically operate a fleet of vehicles, including public works trucks, fire trucks, ambulances, police cars, school buses, and other types of vehicles. Municipalities with a large fleet of vehicles might consider building municipal-operated vehicle washing facilities. Municipalities with small fleets might consider contracting with a commercial car wash. Municipalities that own and operate concrete trucks should look at the Concrete Washout fact sheet for proper washing procedures. For information on how to educate the public about reducing pollution while washing personal vehicles, see the Residential Car Washing and Stormwater Outreach for Commercial Businesses fact sheets.

Siting & Design Considerations

Wash Racks

When installing a wash rack at a municipal facility, several design features should be considered. A designated wash area should be paved and bermed or sloped to contain and direct wash water to a sump connected to the sanitary sewer or to a holding tank, process treatment system, or enclosed recycling system. Note that you must seek the permission of the sewer authority before discharging wastewater to the sanitary sewer, and that special treatment requirements may be placed on such discharges. Alternately, the wash rack could be designed to recycle wash water, thereby eliminating the pretreatment costs of discharging to the sanitary sewer.

The following good housekeeping practices can minimize the risk of contamination from vehicle wash water discharges at municipal facilities (adapted from CASQA, 2003):

- Wash all vehicles in areas designed to collect and hold wash water before its discharge to the sanitary sewer system. Normally, wastewater treatment regulations require wash water to be pretreated prior to its discharge to the treatment plant. Contact your sewer authority to ensure that all requirements are met before designing, building, and operating the wash rack.

- Avoid detergents whenever possible. If detergents are necessary, a phosphate-free, non-toxic, biodegradable soap is recommended. Detergents should be avoided if an oil/water separator is used for pretreatment prior to discharge to the sanitary sewer.
- Municipal facilities that store vehicles should stencil their storm drains to remind employees to wash vehicles within the designated wash area. Signage can also be posted with this message.
- Mount spill kits with absorbent containment materials and instructions near wash racks. Immediately contain and treat all spills.

Commercial Car Washes

Municipalities can negotiate with commercial car washes and steam cleaning businesses to handle their fleet vehicle washing. This option eliminates the cost of building and the liability of operating a wash facility. This option may be limited to smaller sized vehicles, however, since many car washes do not have bays large enough to handle buses, fire trucks, ambulances, and other large vehicles.

Other BMPs

If a vehicle must be washed outside of a facility plumbed to the sanitary sewer, take precautions to avoid wash water discharges to the storm drain system. For small jobs, berm the area surrounding the vehicle and use a wet/dry vacuum to capture the wash water for discharge to the sanitary sewer. For larger jobs, use a combination of berms and a vacuum truck, such as those used to clean storm and sanitary sewer systems, to capture and safely dispose of wash water. If detergents are used, clean the pavement to prevent this material from being carried to the storm drain during the next rainstorm.

Maintenance Considerations

A wash rack's paved surfaces and sump should be inspected and cleaned periodically to remove buildups of particulate matter or other pollutants. Plumbing, recycling, and pretreatment systems also require periodic inspection and maintenance. The area surrounding the wash rack should be visually inspected for leaks, overspray, or other signs of ineffective containment due to faulty design or physical damage to berms. Any defects should be corrected.

Limitations

Building a new wash rack can be expensive. Also, for facilities that cannot recycle their wash water, the cost of pretreating wash water prior to discharge to the sanitary sewer can represent a cost limitation. If the appropriate facilities are available, vehicle washing BMPs are relatively inexpensive housekeeping measures.

Effectiveness

Studies have yet to demonstrate the effectiveness of car washing management practices at reducing stormwater pollutant loads.

Cost Considerations

Municipal wash racks plumbed to the sanitary sewer can be expensive to build. They need to be pursued as a capital improvement project or through other measures based on your local policies for such projects. Costs for contracting with commercial car washes can vary depending on the size of the fleet. Rates are subject to negotiation, but they would constitute an annual operating cost that could be included as part of the municipal budget. Other measures to control discharge of incidental washing to the storm drain system (berms, wet/dry vacuums, etc.) are relatively inexpensive.

References

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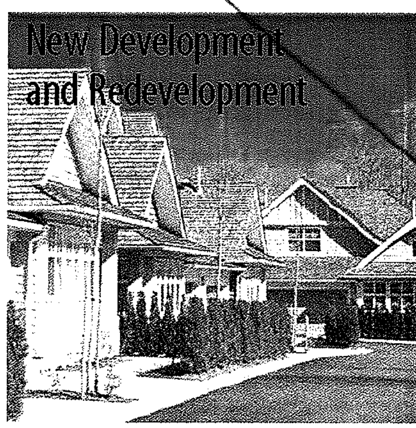
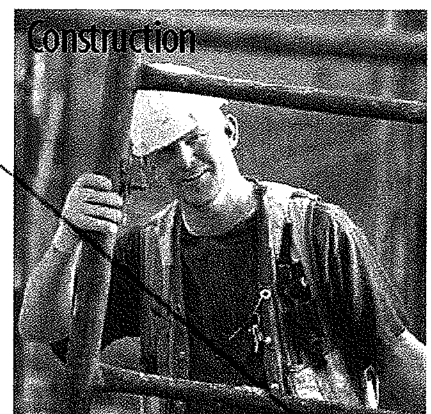
California Stormwater Quality Association

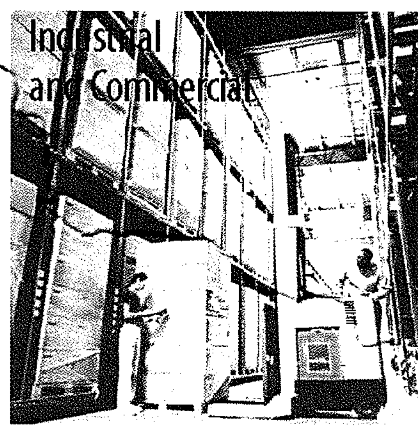
Stormwater Best Management Practice

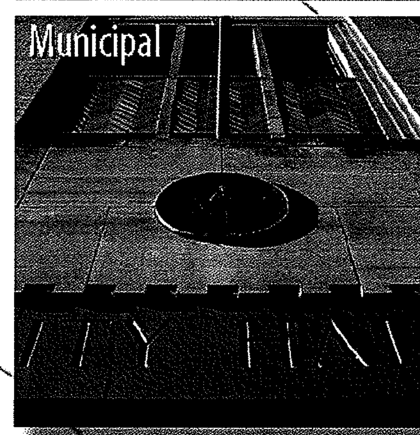
Handbook

M u n i c i p a l









Section 3
Source Control BMPs

3.1 Introduction

This section provides a description of specific source control Best Management Practices (BMPs) for activities related to municipal operations. As noted in Sections 1 and 2, municipal fixed facilities conduct activities that have the potential to generate pollutants. The source control BMPs in this section address these activities (see Table 3-1).

In addition, municipalities conduct various field programs where activities may occur and create pollutants. BMPs for these field programs and associated activities are listed in Table 3-2.

Table 3-1 Municipal Fixed Facility BMPs

Non-Stormwater Management	
SC-10	Non-Stormwater Discharges
SC-11	Spill Prevention, Control and Cleanup
Vehicle and Equipment Management	
SC-20	Vehicle and Equipment Fueling
SC-21	Vehicle and Equipment Cleaning
SC-22	Vehicle and Equipment Repair
Material and Waste Management	
SC-30	Outdoor Loading/Unloading
SC-31	Outdoor Container Storage
SC-32	Outdoor Equipment Maintenance
SC-33	Outdoor Storage of Raw Materials
SC-34	Waste Handling and Disposal
Building and Grounds Management	
SC-41	Building and Grounds Maintenance
SC-43	Parking/Storage Area Maintenance
Over Water Activities	
SC-50	Over Water Activities
General Stormwater Management	
SC-60	Housekeeping Practices
SC-61	Safer Alternative Products

Table 3-2 Municipal Field Program BMPs

SC-70	Road and Street Maintenance
SC-71	Plaza and Sidewalk Cleaning
SC-72	Fountains & Pools Maintenance
SC-73	Landscape Maintenance
SC-74	Drainage System Maintenance
SC-75	Waste Handling and Disposal
SC-76	Water and Sewer Utility Maintenance

3.2 Fact Sheet Format

Each BMP fact sheet is a short document that gives all the information about a particular BMP. Typically, each fact sheet contains the information outlined in Figure 3-1. Completed fact sheets for each of the activities listed in Tables 3-1 and 3-2 are provided in Section 3.3.

The fact sheets also contain side bar presentations with information on BMP objectives and targeted constituents.

The information provided in each fact sheet is extensive and may not be applicable to all municipal operations. The readers may find it helpful to modify and simplify the BMP fact sheets to better reflect their existing operations.

SC-xx Example Fact Sheet

Description of the BMP

Approach

- Pollution Prevention
- Suggested Protocols
- Training
- Spill Response and Prevention
- Other Considerations

Requirements

- Costs
- Maintenance

Supplemental Information

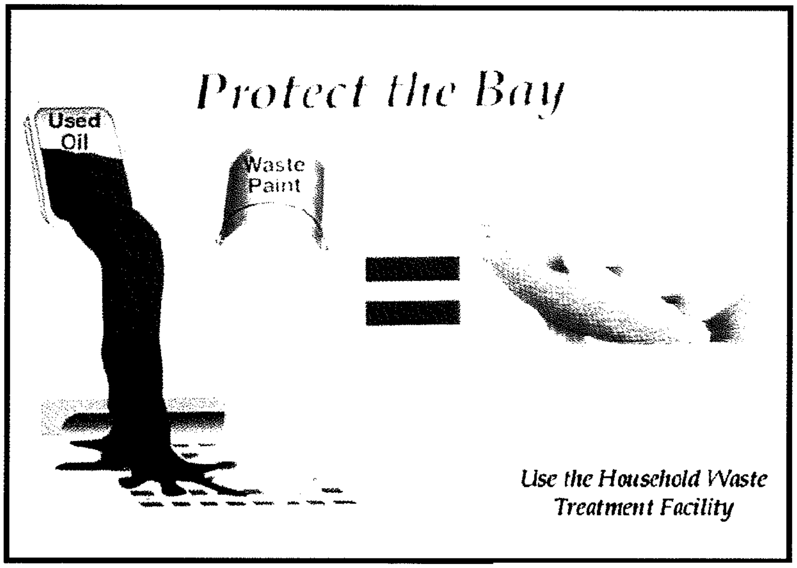
- Further Details on the BMP
- Examples

References and Resources

Figure 3-1
Example Fact Sheet

3.3 BMP Fact Sheets

BMP fact sheets for fixed facilities activities and field programs follow. The BMP fact sheets are individually page numbered and are suitable for photocopying and inclusions in stormwater quality management plans. Fresh copies of the fact sheets can be individually downloaded from the California Stormwater BMP Handbook website at http://www.cabmphandbooks.com



Graphic by: Margie Winter

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

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

Description

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

Approach

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

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

Suggested Protocols

Fixed Facility

General

- Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Landscaping and beautification efforts of hot spots might also discourage future dumping, as well as provide open space and increase property values.
- Lighting or barriers may also be needed to discourage future dumping.

Illicit Connections

- Locate discharges from the fixed facility drainage system to the municipal storm drain system through review of "as-built" piping schematics.
- Use techniques such as smoke testing, dye testing and television camera inspection (as noted below) to verify physical connections.
- Isolate problem areas and plug illicit discharge points.

Visual Inspection and Inventory

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

Review Infield Piping

- Review the "as-built" piping schematic as a way to determine if there are any connections to the stormwater collection system.
- Inspect the path of floor drains in older buildings.

Smoke Testing

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

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

  Dye Testing

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

TV Inspection of Storm Sewer

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

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Clean up spills on paved surfaces with as little water as possible. Use a rag for small spills, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Sweep up the material and dispose of properly.
- Use adsorbent materials on small spills rather than hosing down the spill. Remove the adsorbent materials promptly and dispose of properly.
- For larger spills, a private spill cleanup company or Hazmat team may be necessary.
- See fact sheet SC-11 Spill Prevention, Control, and Clean Up.

Field Program

General

- Develop clear protocols and lines of communication for effectively prohibiting non-stormwater discharges, especially ones that involve more than one jurisdiction and those that are not classified as hazardous, which are often not responded to as effectively as they need to be.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- See SC-74 Stormwater Drainage System Maintenance for additional information.

Field Inspection

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- During routine field program maintenance field staff should look for evidence of illegal discharges or illicit connection:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections and notify appropriate investigating agency.
- If trained, conduct field investigation of non-stormwater discharges to determine whether they pose a threat to water quality.

Recommended Complaint Investigation Equipment

- Field Screening Analysis
  - pH paper or meter
  - Commercial stormwater pollutant screening kit that can detect for reactive phosphorus, nitrate nitrogen, ammonium nitrogen, specific conductance, and turbidity
  - Sample jars
  - Sample collection pole
  - A tool to remove access hole covers
- Laboratory Analysis
  - Sample cooler
  - Ice
  - Sample jars and labels
  - Chain of custody forms.
- Documentation
  - Camera
  - Notebook
  - Pens
  - Notice of Violation forms

- Educational materials

Reporting

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

Enforcement

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

Training

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

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

Spill Response and Prevention
- See SC-11 Spill Prevention Control and Clean Up

Other Considerations
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The cost of fees for dumping at a proper waste disposal facility are often more than the fine for an illegal dumping offense, thereby discouraging people from complying with the law. The absence of routine or affordable pickup service for trash and recyclables in some communities also encourages illegal dumping. A lack of understanding regarding applicable laws or the inadequacy of existing laws may also contribute to the problem.
- Municipal codes should include sections prohibiting the discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.
- Many facilities do not have accurate, up-to-date schematic drawings.
- Can be difficult to locate illicit connections especially if there is groundwater infiltration.

Requirements
Costs
- Eliminating illicit connections can be expensive especially if structural modifications are required such re-plumbing cross connections under an existing slab.
- Minor cost to train field crews regarding the identification of non-stormwater discharges. The primary cost is for a fully integrated program to identify and eliminate illicit connections and illegal dumping. However, by combining with other municipal programs (i.e. pretreatment program) cost may be lowered.
- Municipal cost for containment and disposal may be borne by the discharger.

Maintenance
Not applicable

Supplemental Information

Further Detail of the BMP

What constitutes a "non-stormwater" discharge?

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

Permit Requirements

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

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

Illegal Dumping

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

Outreach

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

- Train municipal staff from all departments (public works, utilities, street cleaning, parks and recreation, industrial waste inspection, hazardous waste inspection, sewer maintenance) to recognize and report the incidents.
- Deputize municipal staff who may come into contact with illegal dumping with the authority to write illegal dumping tickets for offenders caught in the act (see below).
- Educate the public. As many as 3 out of 4 people do not understand that in most communities the storm drain does not go to the wastewater treatment plant. Unfortunately, with the heavy emphasis in recent years on public education about solid waste management, including recycling and household hazardous waste, the sewer system (both storm and sanitary) has been the likely recipient of cross-media transfers of waste.
- Provide the public with a mechanism for reporting incidents such as a hot line and/or door hanger (see below).
- Help areas where incidents occur more frequently set up environmental watch programs (like crime watch programs).
- Train volunteers to notice and report the presence and suspected source of an observed pollutant to the appropriate public agency.

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  - Footing drains;
  - Air conditioning condensation;
  - Flows from riparian habitats and wetlands;
  - Water line and hydrant flushing ;
  - Landscape irrigation;
  - Planned and unplanned discharges from potable water sources;
  - Irrigation water;
  - Individual residential car washing; and
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Municipal facilities subject to industrial general permit requirements must include a certification that the stormwater collection system has been tested or evaluated for the presence of non-stormwater discharges. The state's General Industrial Stormwater Permit requires that non-stormwater discharges be eliminated prior to implementation of the facility's SWPPP.

Storm Drain Stenciling

- Stencil storm drain inlets with a message to prohibit illegal dumpings, especially in areas with waste handling facilities.
- Encourage public reporting of improper waste disposal by a HOTLINE number stenciled onto the storm drain inlet.
- See Supplemental Information section of this fact sheet for further detail on stenciling program approach.

Oil Recycling

- Contract collection and hauling of used oil to a private licensed used oil hauler/recycler.
- Comply with all applicable state and federal regulations regarding storage, handling, and transport of petroleum products.
- Create procedures for collection such as; collection locations and schedule, acceptable containers, and maximum amounts accepted.
- The California Integrated Waste Management Board has a Recycling Hotline, (800) 553-2962, that provides information and recycling locations for used oil.

Household Hazardous Waste

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

Training

- Train municipal employees and contractors in proper and consistent methods for waste disposal.
- Train municipal employees to recognize and report illegal dumping.
- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention

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

Other Considerations

- Federal Regulations (RCRA, SARA, CERCLA) and state regulations exist regarding the disposal of hazardous waste.
- Municipalities are required to have a used oil recycling element and a HHW element within their integrated waste management plan.
- Significant liability issues are involved with the collection, handling, and disposal of HHW.

Examples

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

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

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

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

References and Resources

http://www.stormwatercenter.net/

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

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

Orange County Stormwater Program, http://www.ocwatersheds.com/stormwater/swp_introduction.asp

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

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp-w2k.com/pdf%20documents/PS_ICID.PDF

Objectives

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

Targeted Constituents

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

Description

Spills and leaks, if not properly controlled, can adversely impact the storm drain system and receiving waters. Due to the type of work or the materials involved, many activities that occur either at a municipal facility or as a part of municipal field programs have the potential for accidental spills and leaks. Proper spill response planning and preparation can enable municipal employees to effectively respond to problems when they occur and minimize the discharge of pollutants to the environment.

Approach

- An effective spill response and control plan should include:
  - Spill/leak prevention measures;
  - Spill response procedures;
  - Spill cleanup procedures;
  - Reporting; and
  - Training
- A well thought out and implemented plan can prevent pollutants from entering the storm drainage system and can be used as a tool for training personnel to prevent and control future spills as well.

Pollution Prevention

- Develop and implement a Spill Prevention Control and Response Plan. The plan should include:

- A description of the facility, the address, activities and materials involved
- Identification of key spill response personnel
- Identification of the potential spill areas or operations prone to spills/leaks
- Identification of which areas should be or are bermed to contain spills/leaks
- Facility map identifying the key locations of areas, activities, materials, structural BMPs, etc.
- Material handling procedures
- Spill response procedures including:
  - Assessment of the site and potential impacts
  - Containment of the material
  - Notification of the proper personnel and evacuation procedures
  - Clean up of the site
  - Disposal of the waste material and
  - Proper record keeping

- Product substitution – use less toxic materials (i.e. use water based paints instead of oil based paints)
- Recycle, reclaim, or reuse materials whenever possible. This will reduce the amount of materials that are brought into the facility or into the field.

Suggested Protocols

Spill/Leak Prevention Measures

- If possible, move material handling indoors, under cover, or away from storm drains or sensitive water bodies.
- Properly label all containers so that the contents are easily identifiable.
- Berm storage areas so that if a spill or leak occurs, the material is contained.
- Cover outside storage areas either with a permanent structure or with a seasonal one such as a tarp so that rain can not come into contact with the materials.
- Check containers (and any containment sumps) often for leaks and spills. Replace containers that are leaking, corroded, or otherwise deteriorating with containers in good condition. Collect all spilled liquids 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 be washed into the storm drainage system, surface waters, or groundwater.

- 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. Any collected liquids or soiled absorbent materials should be reused/recycled or properly disposed of.

- For field programs, only transport the minimum amount of material needed for the daily activities and transfer materials between containers at a municipal yard where leaks and spill are easier to control.

- If paved, sweep and clean storage areas monthly, do not use water to hose down the area unless all of 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 any storage areas if the materials stored are oil, gas, or other materials that separate from and float on water. This will allow for easier cleanup if a spill occurs.

- If necessary, protect catch basins while conducting field activities so that if a spill occurs, the material will be contained.

Training

- Educate employees about spill prevention, spill response and cleanup on a routine basis.

- Well-trained employees can reduce human errors that lead to accidental releases or spills:

  - The employees should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

  - Employees should be familiar with the Spill Prevention Control and Countermeasure Plan if one is available.

- Training of staff from all municipal departments should focus on recognizing and reporting potential or current spills/leaks and who they should contact.

- Employees responsible for aboveground storage tanks and liquid transfers for large bulk containers should be thoroughly familiar with the Spill Prevention Control and Countermeasure Plan and the plan should be readily available.

Spill Response and Prevention

- Identify key spill response personnel and train employees on who they are.

- Store and maintain appropriate spill cleanup materials in a clearly marked location near storage areas; and train employees to ensure familiarity with the site's spill control plan and/or proper spill cleanup procedures.

- Locate spill cleanup materials, such as absorbents, where they will be readily accessible (e.g. near storage and maintenance areas, on field trucks).

- Follow the Spill Prevention Control and Countermeasure Plan if one is available.

- If a spill occurs, notify the key spill response personnel immediately. If the material is unknown or hazardous, the local fire department may also need to be contacted.

- If safe to do so, attempt to contain the material and block the nearby storm drains so that the area impacted is minimized. If the material is unknown or hazardous wait for properly trained personnel to contain the materials.

- Perform an assessment of the area where the spill occurred and the downstream area that it could impact. Relay this information to the key spill response and clean up personnel.

Spill Cleanup Procedures

- Small non-hazardous spills
  - Use a rag, damp cloth or absorbent materials for general clean up of liquids
  - Use brooms or shovels for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly

- Large non-hazardous spills
  - Use absorbent materials for general clean up of liquids
  - Use brooms, shovels or street sweepers for the general clean up of dry materials
  - If water is used, it must be collected and properly disposed of. The wash water can not be allowed to enter the storm drain.
  - Dispose of any waste materials properly
  - Clean or dispose of any equipment used to clean up the spill properly

- For hazardous or very large spills, a private cleanup company or Hazmat team may need to be contacted to assess the situation and conduct the cleanup and disposal of the materials.

- Chemical cleanups of material can be achieved with the use of absorbents, gels, and foams. Remove the adsorbent materials promptly and dispose of according to regulations.

- If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to a certified laundry (rags) or disposed of as hazardous waste.

Reporting

- Report any spills immediately to the identified key municipal spill response personnel.

- Report spills in accordance with applicable reporting laws. Spills that pose an immediate threat to human health or the environment must be reported immediately to the Office of Emergency Service (OES)

- Spills that pose an immediate threat to human health or the environment may also need to be reported within 24 hours to the Regional Water Quality Control Board.

- Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hour)

- After the spill has been contained and cleaned up, a detailed report about the incident should be generated and kept on file (see the section on Reporting below). The incident may also be used in briefing staff about proper procedures

Other Considerations

- State regulations exist for facilities with a storage capacity of 10,000 gallons or more of petroleum to prepare a Spill Prevention Control and Countermeasure Plan (SPCC) Plan (Health & Safety Code Chapter 6.67).

- State regulations also exist for storage of hazardous materials (Health & Safety Code Chapter 6.95), including the preparation of area and business plans for emergency response to the releases or threatened releases.

- Consider requiring smaller secondary containment areas (less than 200 sq. ft.) to be connected to the sanitary sewer, if permitted to do so, prohibiting any hard connections to the storm drain.

Requirements

Costs

- Will vary depending on the size of the facility and the necessary controls.

- Prevention of leaks and spills is inexpensive. Treatment and/or disposal of wastes, contaminated soil and water is very expensive

Maintenance

- This BMP has no major administrative or staffing requirements. However, extra time is needed to properly handle and dispose of spills, which results in increased labor costs

Supplemental Information

Further Detail of the BMP

Reporting

Record keeping and internal reporting represent good operating practices because they can increase the efficiency of the response and containment of a spill. A good record keeping system helps the municipality minimize incident recurrence, correctly respond with appropriate containment and cleanup activities, and comply with legal requirements.

A record keeping and reporting system should be set up for documenting spills, leaks, and other discharges, including discharges of hazardous substances in reportable quantities. Incident records describe the quality and quantity of non-stormwater discharges to the storm drain.

These records should contain the following information:

- Date and time of the incident
- Weather conditions
- Duration of the spill/leak/discharge
- Cause of the spill/leak/discharge
- Response procedures implemented
- Persons notified
- Environmental problems associated with the spill/leak/discharge

Separate record keeping systems should be established to document housekeeping and preventive maintenance inspections, and training activities. All housekeeping and preventive maintenance inspections should be documented. Inspection documentation should contain the following information:

- The date and time the inspection was performed
- Name of the inspector
- Items inspected
- Problems noted
- Corrective action required
- Date corrective action was taken

Other means to document and record inspection results are field notes, timed and dated photographs, videotapes, and drawings and maps.

Examples

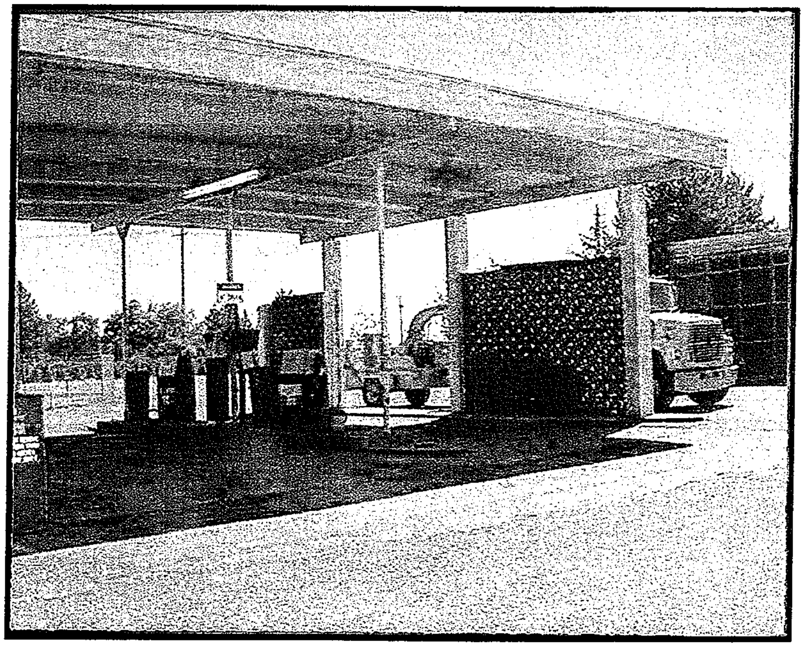
The City of Palo Alto includes spill prevention and control as a major element of its highly effective program for municipal vehicle maintenance shops.

References and Resources

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

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf



Objectives
- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

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

Description
Spills and leaks that occur during vehicle and equipment fueling can contribute hydrocarbons, oil and grease, as well as heavy metals to stormwater runoff. Implementing the following management practices can help prevent fuel spills and leaks.

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

Pollution Prevention
- Use properly maintained offsite fueling stations whenever possible. These businesses are better equipped to handle fuel and spills properly.
- Educate employees about pollution prevention measures and goals
- Focus pollution prevention activities on containment of spills and leaks, most of which may occur during liquid transfers.

Suggested Protocols
General

- "Spot clean" leaks and drips routinely. Leaks are not cleaned up until the absorbent is picked up and disposed of properly.

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- Label drains within the facility boundary, by paint/stencil (or equivalent), to indicate whether they flow to an oil/water separator, directly to the sewer, or to a storm drain. Labels are not necessary for plumbing fixtures directly connected to the sanitary sewer but may be useful to help eliminate confusion about where the drain leads.

- Post signs to remind employees not to top off the fuel tank when filling and signs that ban employees from changing engine oil or other fluids at that location.

- Report leaking vehicles to fleet maintenance.

- Install inlet catch basin equipped with a small sedimentation basin or grit chamber to remove large particles from stormwater in highly impervious areas. Proper maintenance of these devices is necessary.

- Accumulated non-contaminated stormwater (e.g., in a secondary containment) should be released prior to next storm.

- Ensure the following safeguards are in place:

  - Overflow protection devices on tank systems to warn the operator to automatically shutdown transfer pumps when the tank reaches full capacity.

  - Protective guards around tanks and piping to prevent vehicle or forklift damage.

  - Clearly tagging or labeling all valves to reduce human error.

  - Automatic shut off for severed fuel hoses.

Fuel Dispensing Areas

- Maintain clean fuel-dispensing areas using dry cleanup methods such as sweeping for removal of litter and debris, or use of 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" (automatic shutoffs) except where prohibited by local fire departments.

- Post signs at the fuel dispenser or fuel island warning vehicle owners/operators against "topping off" of vehicle fuel tanks.

- Design fueling area to prevent stormwater runoff and spills.

- Cover fueling area with an overhanging roof structure or canopy so that precipitation cannot come in contact with the fueling area and if possible use a perimeter drain or slope pavement inward with drainage to a blind sump (must be properly maintained and water properly disposed of); pave area with concrete rather than asphalt.

- Apply a suitable sealant that protects the asphalt from spilled fuels in areas where covering is infeasible and the fuel island is surrounded by pavement.
- Install vapor recovery nozzles to help control drips as well as air pollution.
- Use secondary containment when transferring fuel from the tank truck to the fuel tank.
- Cover storm drains in the vicinity during transfer.

Outdoor Waste Receptacle Area

- Spot clean leaks and drips routinely to prevent runoff of spillage.
- Minimize the possibility of stormwater pollution from outside waste receptacles by using an effective combination of the following:
  - use only watertight waste receptacle(s) and keep the lid(s) closed, or
  - grade and pave the waste receptacle area to prevent runon of stormwater, or
  - install a roof over the waste receptacle area, or
  - install a low containment berm around the waste receptacle area, or
  - use and maintain drip pans under waste receptacles. Containment areas and drip pans must be properly maintained and collected water disposed of properly (e.g., to sanitary sewer). Several drip pans should be stored in a covered location near outdoor waste receptacle area so that they are always available, yet protected from precipitation when not in use.
- Post "no littering" signs.

Air/Water Supply Area

- Minimize the possibility of stormwater pollution from air/water supply areas by implementing an effective combination of the following:
  - spot clean leaks and drips routinely to prevent runoff of spillage, or
  - grade and pave the air/water supply area to prevent runon of stormwater, or
  - install a roof over the air/water supply area, or
  - install a low containment berm around the air/water supply area. Maintain containment areas and dispose of contaminated water properly (e.g., to sanitary sewer).

Inspection

- Aboveground Tank Leak and Spill Control:
  - Check for external corrosion and structural failure.

- Check for spills and overfills due to operator error.
- Check for failure of piping system.
- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.
- Visually inspect new tank or container installation for loose fittings, poor welding, and improper or poorly fitted gaskets.
- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.
- Periodically, integrity testing should be conducted by a qualified professional.

■ Inspect and clean, if necessary, storm drain inlets and catch basins within the facility boundary before October 1 each year.

Training

■ Train all employees upon hiring and annually thereafter on proper methods for handling and disposing of waste. Make sure that all employees understand stormwater discharge prohibitions, wastewater discharge requirements, and these best management practices.

■ Train employees on proper fueling and cleanup procedures.

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

■ Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.

Spill Response and Prevention

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

■ Place stockpiles of spill cleanup materials where they are readily accessible.

■ Use adsorbent materials on small spills and general cleaning rather than hosing down the area. Remove the adsorbent materials promptly and dispose properly.

■ Store portable absorbent booms (long flexible shafts or barriers made of absorbent material) in unbermed fueling areas.

■ Report spills promptly.

■ Install an oil/water separator and connect to the sanitary sewer (if allowed), if a dead-end sump is not used to collect spills.

Other Considerations

■ Carry out all federal and state requirements regarding underground storage tanks, or install above ground tanks.

Requirements

Costs

- The retrofitting of existing fueling areas to minimize stormwater exposure or spill runoff can be expensive. Good design must occur during the initial installation.

- Extruded curb along the "upstream" side of the fueling area to prevent stormwater runon is of modest cost.

Maintenance

- Clean oil/water separators at appropriate intervals.

- Keep ample supplies of spill cleanup materials onsite.

- Inspect fueling areas, storage tanks, catch basin inserts, containment areas, and drip pans on a regular schedule.

Supplemental Information

Design Considerations

Designing New Installations

The elements listed below should be included in the design and construction of new or substantially remodeled facilities.

Fuel Dispensing Areas

- Fuel dispensing areas must be paved with Portland cement concrete (or, equivalent smooth impervious surface), with a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents runon of stormwater to the extent practicable. The fuel dispensing area is defined as extending 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.

- The fuel dispensing area must be covered, and the cover's minimum dimensions must be equal to or greater than the area within the grade break or the fuel dispensing area, as defined above. The cover must not drain onto the fuel dispensing area.

- If necessary install and maintain an oil control device in the appropriate catch basin(s) to treat runoff from the fueling area.

Outdoor Waste Receptacle Area

- Grade and pave the outdoor waste receptacle area to prevent runon of stormwater to the extent practicable.

Air/Water Supply Area

- Grade and pave the air/water supply area to prevent runon of stormwater to the extent practicable.

Designated Fueling Area

- If your facility has large numbers of mobile equipment working throughout the site and you currently fuel them with a mobile fuel truck, consider establishing a designated fueling area. With the exception of tracked equipment such as bulldozers and perhaps small forklifts, most vehicles should be able to travel to a designated area with little lost time. Place temporary "caps" over nearby catch basins or manhole covers so that if a spill occurs it is prevented from entering the storm drain.

Examples

The Spill Prevention Control and Countermeasure (SPCC) Plan, which is required by law for some facilities, is an effective program to reduce the number of accidental spills and minimize contamination of stormwater runoff.

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

References and Resources

Best Management Practice Guide for Retail Gasoline Outlets, California Stormwater Quality Task Force. 1997.

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

Orange County Stormwater Program http://www.ocwatersheds.com/StormWater/swp_introduction.asp

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

Photo Credit Geoff Brosseau

Objectives

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

Targeted Constituents

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

Description

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

Approach

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

Pollution Prevention

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

- Good housekeeping practices can minimize the risk of contamination from wash water discharges.

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Suggested Protocols

General

- Use biodegradable, phosphate-free detergents for washing vehicles as appropriate.
- Mark the area clearly as a wash area.
- Post signs stating that only washing is allowed in wash area and that discharges to the storm drain are prohibited.
- Provide a trash container in wash area.
- Map on-site storm drain locations to avoid discharges to the storm drain system.
- Emphasize the connection between the storm drain system and runoff and help reinforce that car washing activities can have an affect on local water quality. This can be accomplished through storm drain stenciling programs.

Vehicle and Equipment Cleaning

- Design wash areas to properly collect and dispose of wash water when engine cleaning is conducted and when chemical additives, solvents, or degreasers are used. This may include installation of sumps or drain lines to collect wash water or construction of a berm around the designated area and grading of the area to collect wash water as well as prevent stormwater run-on.
- Consider washing vehicles and equipment inside the building if washing/cleaning must occur on-site. This will help to control the targeted constituents by directing them to the sanitary sewer.
- If washing must occur on-site and outdoor:
  - Use designated paved wash areas. Designated wash areas must be well marked with signs indicating where and how washing must be done. This area must be covered or bermed to collect the wash water and graded to direct the wash water to a treatment or disposal facility.
  - Oil changes and other engine maintenance cannot be conducted in the designated washing area. Perform these activities in a place designated for such activities.
  - Cover the wash area when not in use to prevent contact with rain water.
- Use hoses with nozzles that automatically turn off when left unattended.
- Perform pressure cleaning and steam cleaning off-site to avoid generating runoff with high pollutant concentrations. If done on-site, no pressure cleaning and steam cleaning should be done in areas designated as wellhead protection areas for public water supply.

Disposal

- Consider filtering and recycling wash water.

- Discharge equipment wash water to the sanitary sewer, a holding tank, or a process treatment system, regardless of the washing method used.

- Discharge vehicle wash water to (1) the sanitary sewer, a holding tank, or process treatment system or (2) an enclosed recycling system.

- Discharge wash water to sanitary sewer only after contacting the local sewer authority to find out if pretreatment is required.

Training

- Train employees on proper cleaning and wash water disposal procedures and conduct "refresher" courses on a regular basis.

- Train staff on proper maintenance measures for the wash area.

- Train employees and contractors on proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

Spill Response and Prevention

- Refer to SC-11, Spill Prevention, Control and Cleanup.

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

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

- Clean up spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations (Limitations and Regulations)

- Some municipalities may require pretreatment and monitoring of wash water discharges to the sanitary sewer.

- Steam cleaning can generate significant pollutant concentrations requiring that careful consideration be given to the environmental impacts and compliance issues related to steam cleaning.

- Most car washing best management practices are inexpensive, and rely more on good housekeeping practices (where vehicles are washed, planning for the collection of wash water) than on expensive technology. However, the construction of a specialized area for vehicle washing can be expensive for municipal facilities. Also, for facilities that cannot recycle their wash water the cost of pre-treating wash water through either structural practices or planning for collection and hauling of contaminated water to sewage treatment plants can represent a cost limitation.

Requirements

Costs

- Capital costs vary depending on measures implemented

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

- O&M costs increase with increasing capital investment.

Maintenance

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

Supplemental Information

Design Considerations

Designated Cleaning Areas

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

Examples

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

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

References and Resources

http://www.stormwatercenter.net/

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

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

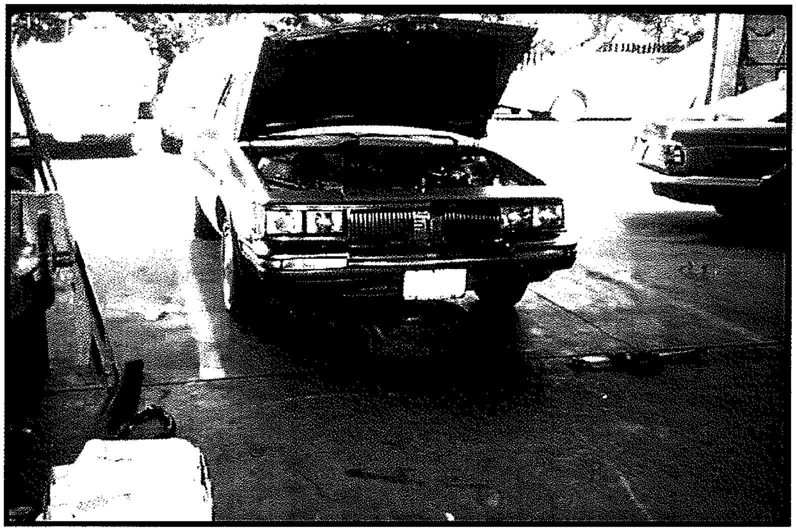

Photo Credit: Geoff Brosseau

Objectives

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

Targeted Constituents

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

Description

Vehicle or equipment maintenance and repair is potentially a significant source of stormwater pollution, due to the use of materials and wastes created that are harmful to humans and the environment. Engine repair and service (e.g. parts cleaning), replacement of fluids (e.g. oil change), and outdoor equipment storage and parking (dripping engines) can impact water quality if stormwater runoff from areas with these activities occurring on them becomes polluted by a variety of contaminants. Implementation of the following activities will prevent or reduce the discharge of pollutants to stormwater from vehicle and equipment maintenance and repair activities.

Approach

Pollution Prevention

- Keep accurate maintenance logs to evaluate materials use.
- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Minimize use of solvents. Clean parts without using solvents whenever possible.
- Keep an accurate, up-to-date inventory of materials.
- Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible.

Suggested Protocols

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General

- Move maintenance and repair activities indoors whenever feasible.
- Store idle equipment containing fluids under cover.
- Use a vehicle maintenance area designed to prevent stormwater pollution - minimize contact of stormwater with outside operations through berming and appropriate drainage routing.
- Avoid hosing down your work areas. If work areas are washed, collect and direct wash water to sanitary sewer.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Post signs at sinks to remind employees, not to pour hazardous wastes down drains.
- Clean yard storm drain inlets(s) regularly.
- Do not pour materials down drains or hose down work areas; use dry sweeping.
- Cover the work area so as to limit exposure to the rain
- Place curbs around the immediate boundaries of the process equipment.
- Build a shed or temporary roof over areas where you park cars awaiting repair or salvage, especially if you handle wrecked vehicles. Build a roof over vehicles you keep for parts.

Material and Waste Handling

- Store materials and wastes under cover whenever possible.
- Designate a special area to drain and replace motor oil, coolant, and other fluids. This area should not have any connections to the storm drain or the sanitary sewer and should allow for easy clean up of drips and spills.
- Drain all fluids from wrecked vehicles immediately. Ensure that the drain pan or drip pan is large enough to contain drained fluids (e.g. larger pans are needed to contain antifreeze, which may gush from some vehicles).
- Do not pour liquid waste to floor drains, sinks, outdoor storm drain inlets, or other storm drains or sewer connections.
- Do not dispose of used or leftover cleaning solutions, solvents, and automotive fluids and oil in the sanitary sewer.
- Dispose of all waste materials according to applicable laws and regulations.
- Collect leaking or dripping fluids in drip pans or containers. Fluids are easier to recycle if kept separate.

- Promptly transfer used fluids to the proper waste or recycling drums and store in an appropriately designed area that can contain spills. Don't leave drip pans or other open containers lying around.
- Do not dispose of oil filters in trash cans or dumpsters, which may leak oil and contaminate stormwater. Place the oil filter in a funnel over a waste oil recycling drum to drain excess oil before disposal. Most municipalities prohibit or discourage disposal of these items in solid waste facilities. Oil filters can also be recycled. Ask your oil supplier or recycler about recycling oil filters.
- Store cracked and/or dead batteries in a non-leaking covered secondary container and dispose of properly at recycling or household hazardous waste facilities..

Maintenance and Repair Activities

- Provide a designated area for vehicle maintenance.
- Keep equipment clean, don't allow excessive build-up of oil and grease.
- If temporary work is being conducted outside: Use a tarp, ground cloth, or drip pans beneath the vehicle or equipment to capture all spills and drips., The collected drips and spills must be disposed, reused, or recycled properly.
- If possible, perform all vehicle fluid removal or changing inside or under cover to prevent the runon of stormwater and the runoff of spills:
    - Keep a drip pan under the vehicle while you unclip hoses, unscrew filters, or remove other parts. Use a drip pan under any vehicle that might leak while you work on it to keep splatters or drips off the shop floor.
    - Promptly transfer used fluids to the proper waste or recycling drums. Don't leave drip pans or other open containers lying around.
    - Keep drip pans or containers under vehicles or equipment that might drip during repairs.
    - Do not change motor oil or perform equipment maintenance in non-appropriate areas.
- If equipment (e.g., radiators, axles) is to be stored outdoors, oil and other fluids should be drained first. This is also applicable to vehicles being stored and not used on a regular basis.
- Monitor parked vehicles closely for leaks and place pans under any leaks to collect the fluids for proper disposal or recycling.

Parts Cleaning

- Clean vehicle parts without using liquid cleaners wherever possible to reduce waste.
- Do all liquid cleaning at a centralized station so the solvents and residues stay in one area.

- Discharge wastewater generated from steam cleaning and pressure washing to an appropriate treatment control that is connected to a blind sump. Non-caustic detergents should be used instead of caustic cleaning agents, detergent-based or water-based cleaning systems in place of organic solvent degreasers, and non-chlorinated solvent in place of chlorinated organic solvents for parts cleaning. Refer to SC-21 for more information on steam cleaning.

- Locate drip pans, drain boards, and drying racks to direct drips back into a solvent sink or fluid holding tank for reuse.

Inspection

- Regularly inspect vehicles and equipment for leaks, and repair immediately.

- Make sure incoming vehicles are checked for leaking oil and fluids. Apply controls accordingly.

Training

- Train employees and contractors in the proper handling and disposal of engine fluids and waste materials.

- Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures (You can use reusable cloth rags to clean up small drips and spills instead of disposables; these can be washed by a permitted industrial laundry. Do not clean them at home or at a coin-operated laundry business). The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

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

Spill Response and Prevention

- Refer to SC-11 Spill Prevention, Control & Cleanup for more information.

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

- Place adequate stockpiles of spill cleanup materials where they are readily accessible.

- Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills. Use the following three-step method for cleaning floors:

  - Clean spills with rags or other absorbent materials

  - Sweep floor using dry absorbent material

  - Mop the floor. Mop water may be discharged to the sanitary sewer via a toilet or sink.

- Remove absorbent materials used for cleaning small spills promptly and properly.

- Do not saturate rags or absorbent material to eliminate need for disposal of spilled material as hazardous waste.

Other Considerations

- Space and time limitations may preclude all work being conducted indoors.
- It may not be possible to contain and clean up spills from vehicles/equipment brought onsite after working hours.
- Drain pans (usually 1 ft. x 1 ft.) are generally too small to contain antifreeze, so drip pans (3 ft. x 3 ft.) may have to be purchased or fabricated.
- Identification of engine leaks may require some use of solvents, which may require disposal as hazardous waste.
- Installation of structural treatment practices for pretreatment controls of wastewater discharges can be expensive.
- Prices for recycled materials and fluids may be higher than those of non-recycled materials.
- Some facilities can be limited by a lack of providers of recycled materials, and by the absence of businesses to provide services such as hazardous waste removal, structural treatment practice maintenance or solvent equipment and solvent recycling.

Requirements

Costs

- Should be low, but will vary depending on the size of the facility.

Maintenance

- Sweep the maintenance area weekly, if it is paved, to collect loose particles, and wipe up spills with rags and other absorbent material immediately, do not hose down the area to a storm drain.

Supplemental Information

Further Detail of the BMP

Recycling

Separating wastes allows for easier recycling and may reduce treatment costs. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents (e.g., 1,1,1-trichloroethane) separate from non-chlorinated solvents (e.g., kerosene and mineral spirits).

Many products made of recycled (i.e., refined or purified) materials are available. Engine oil, transmission fluid, antifreeze, and hydraulic fluid are available in recycled form. Buying recycled products supports the market for recycled materials.

- Recycling is always preferable to disposal of unwanted materials.
- Separate wastes for easier recycling. Keep hazardous and non-hazardous wastes separate, do not mix used oil and solvents, and keep chlorinated solvents separate from non-chlorinated solvents.
- Label and track the recycling of waste material (e.g. used oil, spent solvents, batteries).

- Purchase recycled products to support the market for recycled materials.

Safer Alternatives

If possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous material:

- Use non-caustic detergents instead of caustic cleaning for parts cleaning.
- Use detergent-based or water-based cleaning systems in place of organic solvent degreasers. Wash water may require treatment before it can be discharged to the sewer.
- Replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check list of active ingredients to see whether it contains chlorinated solvents.
- Choose cleaning agents that can be recycled.
- Refer to SC-61 Safer Alternative Products fact sheet for more information.

References and Resources

DTSC Doc. No. 619a Switching to Water Based Cleaners

DTSC Doc. No. 621 http://www.stormwatercenter.net/

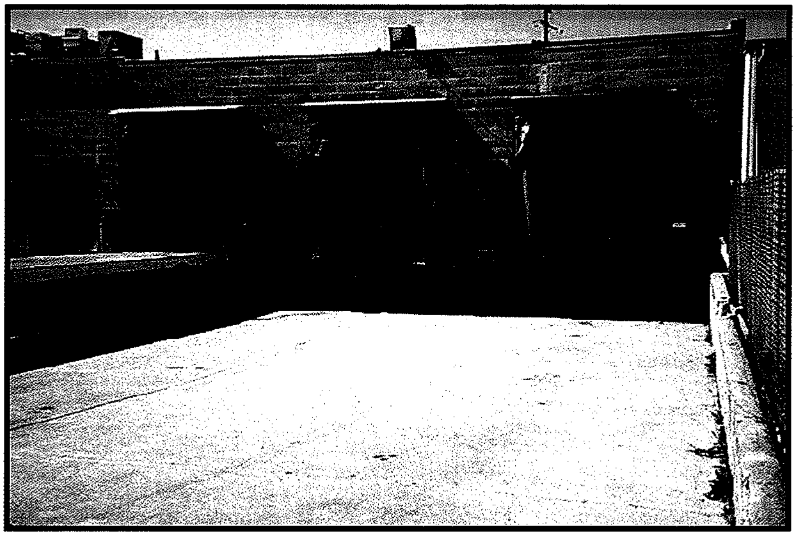
King County - ftp://dnr.metrokc.gov/wlr/dss/spcm/Chapter%203.PDF

Model Urban Runoff Program: A How-To-Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Outdoor Loading/Unloading SC-30



Objectives

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

Targeted Constituents

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

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Description

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

Approach

Pollution Prevention

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

Suggested Protocols

Loading and Unloading – General Guidelines

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

Inspection

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

Training

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

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

Spill Response and Prevention

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

Other Considerations

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

Requirements

Costs

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

Maintenance

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

Supplemental Information

Further Detail of the BMP

Special Circumstances for Indoor Loading/Unloading of Materials

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

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

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

- For transfer from rail cars to storage tanks that must occur outside, use the following procedures:

  - Drip pans should be placed at locations where spillage may occur, such as hose connections, hose reels, and filler nozzles, Use drip pans when making and breaking connections.

  - Drip pan systems should be installed between the rails to collect spillage from tank cars.

References and Resources

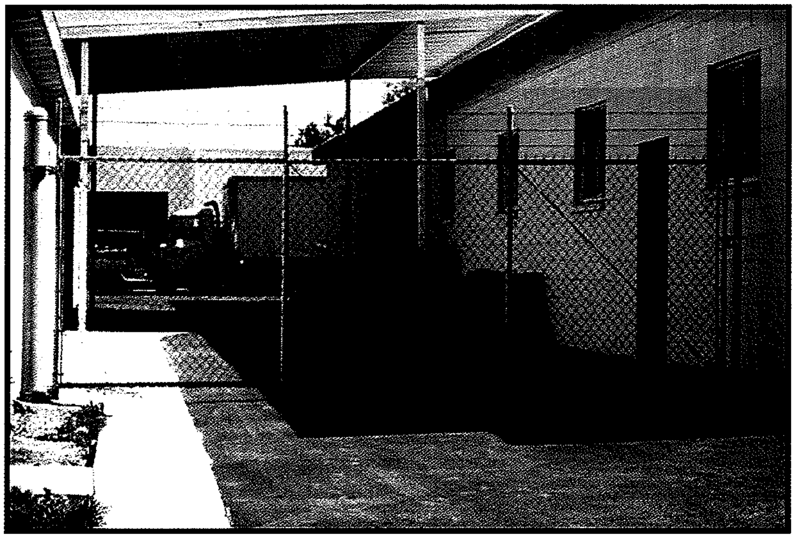
http://www.stormwatercenter.net/

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

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Outdoor Container Storage SC-31



Objectives

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

Targeted Constituents

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

Description

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

Approach

Pollution Prevention

- Educate employees about pollution prevention measures and goals

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

- Try to keep chemicals in their original containers, and keep them well labeled.

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Suggested Protocols

General

- Develop an operations plan that describes procedures for loading and/or unloading. Refer to SC-30 Outdoor Loading/Unloading for more detailed BMP information pertaining to loading and unloading of liquids.
- Protect materials from rainfall, runon, runoff, and wind dispersal:
  - Cover the storage area with a roof.
  - Minimize stormwater runon by enclosing the area or building a berm around it.
  - Use a "doghouse" structure for storage of liquid containers.
  - Use covered dumpsters for waste product containers.
- Employ safeguards against accidental releases:
  - Provide overflow protection devices to warn operator or automatic shut down transfer pumps.
  - Provide protection guards (bollards) around tanks and piping to prevent vehicle or forklift damage, and
  - Provide clear tagging or labeling, and restricting access to valves to reduce human error.
- Berm or surround tank or container with secondary containment system using dikes, liners, vaults, or double walled tanks.
- Contact the appropriate regulatory agency regarding environmental compliance for facilities with "spill ponds" designed to intercept, treat, and/or divert spills.
- Have registered and specifically trained professional engineers can identify and correct potential problems such as loose fittings, poor welding, and improper or poorly fitted gaskets for newly installed tank systems.

Storage Areas

- Provide storage tank piping located below product level with a shut-off valve at the tank; ideally this valve should be an automatic shear valve with the shut-off located inside the tank.
- Provide barriers such as posts or guard rails, where tanks are exposed, to prevent collision damage with vehicles.
- Provide secure storage to prevent vandalism.
- Place tight-fitting lids on all containers.
- Enclose or cover the containers where they are stored.

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

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

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

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

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

Container Management

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

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

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

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

Storage of Hazardous Materials

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

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

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

Inspection

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

- Conduct routine inspections and check for external corrosion of material containers. Also check for structural failure, spills and overfills due to operator error, failure of piping system.

- Check for leaks or spills during pumping of liquids or gases from truck or rail car to a storage facility or vice versa.

- Visually inspect new tank or container installations for loose fittings, poor welding, and improper or poorly fitted gaskets.

- Inspect tank foundations, connections, coatings, and tank walls and piping system. Look for corrosion, leaks, cracks, scratches, and other physical damage that may weaken the tank or container system.

- Replace containers that are leaking, corroded, or otherwise deteriorating with ones in good condition. If the liquid chemicals are corrosive, containers made of compatible materials must be used instead of metal drums.

- Label new or secondary containers with the product name and hazards.

Training

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

- Train employees in proper storage measures.

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

Spill Response and Prevention

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

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

- Collect all spilled liquids and properly dispose of them.

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

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

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

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

Other Considerations

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

Requirements

Costs

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

Maintenance

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

Supplemental Information

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

Further Detail of the BMP

Dikes

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

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

Curbing

Curbing is a barrier that surrounds an area of concern. Curbing is similar to containment diking in the way that it prevents spills and leaks from being released into the environment. The curbing is usually small scaled and does not contain large spills like diking. Curbing is common at many facilities in small areas where handling and 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 runon control,
  - Inexpensive,
  - Ease of installment,
  - Provides option to recycle materials spilled in curb areas, and
  - Common industry practice.

Examples

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

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000 http://www.nalms.org/bclss/storage.html

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

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Outdoor Equipment Maintenance SC-32

Objectives

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

Targeted Constituents

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

Description

Outside process equipment operations and maintenance can contaminate stormwater runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operations that can lead to contamination of stormwater runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

Approach

Pollution Prevention

- Perform the activity during dry periods.
- Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.

Suggested Protocols

- Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
- Cover the work area with a permanent roof.
- Minimize contact of stormwater with outside process equipment operations through berming and drainage routing (runon prevention). If allowed, connect process equipment area to public sewer.
- Dry clean the work area regularly.

Training

- Train employees to perform the activity during dry periods only and to use less or non-toxic materials.
- Train employee and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

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SC-32 Outdoor Equipment Maintenance

Spill Response and Prevention

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

Other Considerations

- Space limitations may preclude enclosing some equipment.
- Storage sheds often must meet building and fire code requirements.

Requirements

Costs

- Costs vary depending on the complexity of the operation and the amount of control necessary for stormwater pollution control.
- Providing cover may be expensive.

Maintenance

- Conduct routine preventive maintenance, including checking process equipment for leaks.
- Clean the storm drain system regularly.

Supplemental Information

Further Detail of the BMP

Hydraulic/Treatment Modifications

In some cases it may be necessary to capture and treat polluted stormwater. If the municipality does not have its own process wastewater treatment system, consider discharging to the public sewer system. Use of the public sewer might be allowed under the following conditions:

- If the activity area is very small (less than a few hundred square feet), the local sewer authority may be willing to allow the area to remain uncovered with the drain connected to the public sewer.
- It may be possible under unusual circumstances to connect a much larger area to the public sewer, as long as the rate of stormwater discharges does not exceed the capacity of the wastewater treatment plant. The stormwater could be stored during the storm and then transferred to the public sewer when the normal flow is low, such as at night.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Stormwater Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

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

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Stormwater Managers Resource Center http://www.stormwatercenter.net/

Outdoor Storage of Raw Materials SC-33

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

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

Description

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

Approach

Pollution Prevention

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

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Suggested Protocols

General

- Store all materials inside. If this is not feasible, then all outside storage areas should be covered with a roof, and bermed, or enclosed to prevent stormwater contact. At the very minimum, a temporary waterproof covering made of polyethylene, polypropylene or hypalon should be used over all materials stored outside.
- Cover and contain the stockpiles of raw materials to prevent stormwater from running into the covered piles. The covers must be in place at all times when work with the stockpiles is not occurring. (applicable to small stockpiles only).
- If the stockpiles are so large that they cannot feasibly be covered and contained, implement erosion control practices at the perimeter of your site and at any catch basins to prevent erosion of the stockpiled material off site,
- Keep liquids in a designated area on a paved impervious surface within a secondary containment.
- Keep outdoor storage containers in good condition.
- Keep storage areas clean and dry.
- Design paved areas to be sloped in a manner that minimizes the pooling of water on the site, particularly with materials that may leach pollutants into stormwater and/or groundwater, such as compost, logs, and wood chips. A minimum slope of 1.5 percent is recommended.
- Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use.
- Cover wood products treated with chromated copper arsenate, ammonical copper zinc arsenate, creosote, or pentachlorophenol with tarps or store indoors.

Raw Material Containment

- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items in secondary containers if applicable.
- Prevent the run-on of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas, by placing a curb along the perimeter of the area. The area inside the curb should slope to a drain. Liquids should be drained to the sanitary sewer if allowed. The drain must have a positive control such as a lock, valve, or plug to prevent release of contaminated liquids.
- Tanks should be bermed or surrounded by a secondary containment system.
- Release accumulated stormwater in petroleum storage areas prior to the next storm. At a minimum, water should pass through an oil/water separator and, if allowed, discharged to a sanitary sewer.

Inspection

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

Training

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

Spill Response and Prevention

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

Other Considerations

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

SC-33 Outdoor Storage of Raw Materials

Requirements

Costs

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

Maintenance

- Accurate and up-to-date inventories should be kept of all stored materials.

- Berms and curbs may require periodic repair and patching.

- Parking lots or other surfaces near bulk materials storage areas should be swept periodically to remove debris blown or washed from storage area.

- Sweep paved storage areas regularly for collection and disposal of loose solid materials, do not hose down the area to a storm drain or conveyance ditch.

- Keep outdoor storage areas in good condition (e.g. repair roofs, floors, etc. to limit releases to runoff).

Supplemental Information

Further Detail of the BMP

Raw Material Containment

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

- Curbing should be placed along the perimeter of the area to prevent the runon of uncontaminated stormwater from adjacent areas as well as runoff of stormwater from the stockpile areas.

- The storm drainage system should be designed to minimize the use of catch basins in the interior of the area as they tend to rapidly fill with manufacturing material.

- The area should be sloped to drain stormwater to the perimeter where it can be collected or to internal drainage alleyways where material is not stockpiled.

- If the raw material, by-product, or product is a liquid, more information for outside storage of liquids can be found under SC-31, Outdoor Container Storage.

Examples

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

References and Resources

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

Model Urban Runoff Program: A How-To-Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Waste Handling & Disposal SC-34

Objectives

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

Targeted Constituents

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

Description

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

Approach

Pollution Prevention

- Reduction in the amount of waste generated can be accomplished using the following source controls such as:
  - Production planning and sequencing
  - Process or equipment modification
  - Raw material substitution or elimination
  - Loss prevention and housekeeping
  - Waste segregation and separation
  - Close loop recycling
- Establish a material tracking system to increase awareness about material usage. This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
- Recycle materials whenever possible.

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Suggested Protocols

General

- Cover storage containers with leak proof lids or some other means. If waste is not in containers, cover all waste piles (plastic tarps are acceptable coverage) and prevent stormwater runon and runoff with a berm. The waste containers or piles must be covered except when in use.
- Use drip pans or absorbent materials whenever grease containers are emptied by vacuum trucks or other means. Grease cannot be left on the ground. Collected grease must be properly disposed of as garbage.
- Check storage containers weekly for leaks and to ensure that lids are on tightly. Replace any that are leaking, corroded, or otherwise deteriorating.
- Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
- Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
- Transfer waste from damaged containers into safe containers.
- Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist. Vacuum transfer systems can minimize waste loss.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide a sufficient number of litter receptacles for the facility.
- Clean out and cover litter receptacles frequently to prevent spillage.

Waste Collection

- Keep waste collection areas clean.
- Inspect solid waste containers for structural damage or leaks regularly. Repair or replace damaged containers as necessary.
- Secure solid waste containers; containers must be closed tightly when not in use.
- Place waste containers under cover if possible.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be

disposed of in solid waste containers (see chemical/ hazardous waste collection section below).

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

Good Housekeeping

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

Chemical/Hazardous Wastes

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

Runon/Runoff Prevention

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

Inspection

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

- Check waste management areas for leaking containers or spills.

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

Training
- Train staff pollution prevention measures and proper disposal methods.

- Train employees and contractors proper spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

- Train employees and subcontractors in proper hazardous waste management.

Spill Response and Prevention
- Refer to SC-11, Spill Prevention, Control & Cleanup.

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

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

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

- Vehicles transporting waste should have spill prevention equipment that can prevent spills during transport. The spill prevention equipment includes:

  - Vehicles equipped with baffles for liquid waste

  - Trucks with sealed gates and spill guards for solid waste

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

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

Maintenance
- None except for maintaining equipment for material tracking program.

Supplemental Information

Further Detail of the BMP

Land Treatment System

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

References and Resources

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

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Associations (BASMAA). On-line: http://www.basmaa.org

Objectives

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

Targeted Constituents

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

Description

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

Approach

Pollution Prevention

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

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Suggested Protocols

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a waste water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.
- If soaps or detergents are not used, and the surrounding area is paved, wash water runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in he catch basin to trap the particles in wash water runoff.
- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement. Ensure that this practice does not kill grass.

Landscaping Activities

- Do not apply any chemicals (insecticide, herbicide, or fertilizer) directly to surface waters, unless the application is approved and permitted by the state.
- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.
- Use mulch or other erosion control measures on exposed soils.
- Check irrigation schedules so pesticides will not be washed away and to minimize non-stormwater discharge.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.
- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.
- Clean paint brushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

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

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

Mowing, Trimming, and Planting

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

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

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

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

- Use hand or mechanical weeding where practical.

Fertilizer and Pesticide Management

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

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

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

- Do not use pesticides if rain is expected.

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

- Use the minimum amount needed for the job.

- Calibrate fertilizer distributors to avoid excessive application.

- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.

- Apply pesticides only when wind speeds are low.
- Work fertilizers into the soil rather than dumping or broadcasting them onto the surface.
- Irrigate slowly to prevent runoff and then only as much as is needed.
- Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Inspection

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

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the nature of the staff.

Spill Response and Prevention

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

Other Considerations

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

Requirements

Costs

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

Maintenance

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

Supplemental Information

Further Detail of the BMP

Fire Sprinkler Line Flushing

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

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

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

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Mobile Cleaners Pilot Program: Final Report. 1997. Bay Area Stormwater Management Agencies Association (BASSMA) http://www.basmaa.org/

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

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Parking/Storage Area Maintenance SC-43

Objectives

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

Targeted Constituents

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

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The following protocols are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook).
- Keep accurate maintenance logs to evaluate BMP implementation.

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.

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- Arrange rooftop drains to prevent drainage directly onto paved surfaces.

- Design lot to include semi-permeable hardscape.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.

- Provide an adequate number of litter receptacles.

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

- Provide trash receptacles in parking lots to discourage litter.

- Routinely sweep, shovel and dispose of litter in the trash.

Surface cleaning

- Use dry cleaning methods (e.g. sweeping or vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system.

- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.

- Sweep all parking lots at least once before the onset of the wet season.

- If water is used follow the procedures below:

  - Block the storm drain or contain runoff.

  - Wash water should be collected and pumped to the sanitary sewer or discharged to a pervious surface, do not allow wash water to enter storm drains.

  - Dispose of parking lot sweeping debris and dirt at a landfill.

- When cleaning heavy oily deposits:

  - Use absorbent materials on oily spots prior to sweeping or washing.

  - Dispose of used absorbents appropriately.

Surface Repair

- Pre-heat, transfer or load hot bituminous material away from storm drain inlets.

- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff.

- Cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc., where applicable. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.

- Use only as much water as necessary for dust control, to avoid runoff.
- 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.

Inspection

- Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

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

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

Requirements

Costs

Cleaning/sweeping costs can be quite large, construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities on a regular basis to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination form contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Use only as much water as necessary for dust control, to avoid runoff.

References and Resources

http://www.stormwatercenter.net/

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality control Board. July 1998 (Revised February 2002 by the California Coastal Commission).

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

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

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP)
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Objectives

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

Targeted Constituents

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

Description

Over-water activities occur at boat and ship repair yards, marinas, and yacht clubs. The discharge of pollutants to receiving waters during these activities can be prevented or reduced by minimizing over-water maintenance, keeping wastes out of the water, cleaning up spills and wastes immediately, and educating tenants and employees.

Approach

Pollution Prevention

- Switch to non-toxic chemicals for maintenance when possible.
- Choose cleaning agents that can be recycled.
- Minimize use of solvents. Clean parts without using solvents whenever possible.
- Recycle used motor oil, diesel oil, and other vehicle fluids and parts whenever possible

Suggested Protocols

General

- Perform paint and solvent mixing, fuel mixing, and similar handling of liquids on-shore, to avoid spillage directly in surface water bodies.
- Post signs to indicate proper use and disposal of residual paints, rags, used oil, and other engine fluids.

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- Sweep dry docks before flooding.

On Board Maintenance

- Move maintenance and repair activities on-shore if possible. This action reduces some of the potential for direct pollution on water bodies.
- Used antifreeze should be stored in a separate, labeled drum and recycled.
- Fuel tank vents should have valves to prevent fuel overflows or spills.
- Boats with inboard engines should have oil absorption pads in bilge areas that should be changed when no longer useful or at least once a year.
- Careful consideration must be given to fueling boat engines, recycling used oil, and discarding worn motor parts into proper receptacles to prevent spills.
- Keeping boat motors well-tuned prevents fuel and lubricant leaks and improves fuel efficiency.

Cleaning, Chipping, and Painting

- Shelter any blasting and spray painting activities by hanging wind blocking tarps to prevent sand blasting dust and overspray from escaping.
- Use secondary containment on paint cans.
- Limit over-water hull surface maintenance to sanding and minor painting.
- Major hull resurfacing should occur on land.
- Use ground cloths when painting boats on land.
- Paint mixing should not occur on the dock
- Vacuuming up loose paint chips and paint dust can help to 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 containment that is not exposed to rain.
- Use phosphate-free and biodegradable detergents for hull washing.
- Select nontoxic cleaning products that do not harm humans or aquatic life

Disposal of Bilge Water, Ballast Water, and Wastewater

- Collect bilge and ballast water that has an oily sheen on the surface for proper disposal rather than dumping in water or on land.
- Collect and properly dispose of wash water from washing painted boat hulls. Consider taking the boat to a local boat yard that is equipped to collect and treat wash water.

- Pump bilge water discharged at sea through an oil/water separator first and store the oil for discharge into storage tanks on shore for treatment.
- Pump bilge water into storage tanks on shore for analysis, treatment and proper disposal.
- Properly dispose of domestic wastewater and ballast water. DO NOT ALLOW discharge of treated or untreated sewage from vessels to harbors.
- Fecal matter and other solid waste should be contained in a U.S. Coast Guard-approved marine sanitation device (MSD).
- Portable toilets should be emptied into approved shore side waste handling facilities, and MSDs should be discharged into approved pump out stations.
- Avoid the intake of ballast water in shallow water or areas where bottom sediments are suspended.
- Avoid the intake of ballast water where there is an algal bloom in progress.
- Use as fine a filter as is practical on the ballast water intake ports to eliminate as many organisms and as much particulate matter as possible. Tests have been conducted using 300 micron followed by a 25 micron filter on intakes to see how well they work and hold up in practice.
- Dump estuarine or harbour ballast water at sea and take in fresh high salinity water to eliminate both pollutants and estuarine organisms.
- Ballast water may be discharged into large tanks on shore where it is treated, although the large volumes involved make this a very expensive and logistically difficult option.
- Ballast water may also be discharged into specially oufitted tanker ships which meet incoming ships and take in their ballast water for treatment and discharge of the clean water. The sludge produced would still have to be taken ashore for treatment or disposal. This is also an expensive and logistically difficult process.
- Carry out physical or chemical sterilization or neutralization of ballast water in situ, and subsequent neutralization of the sterilant, if required, before discharge.

Training

- Provide regular training to employees and/or contractors regarding stormwater BMPs for over water activities.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Refer to Spill Prevention, Control & Cleanup.
- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date, and implement accordingly.
- Place an adequate stockpile of spill cleanup materials where it will be readily accessible. Clean leaks, drips, and other spills with as little water as possible. Use rags for small spills, a damp mop for general cleanup, and dry absorbent material for larger spills.
- Store and maintain appropriate spill cleanup materials in a location known to all; and ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
- Clean up spills on docks or boats immediately.

Other Considerations

- Private tenants at marinas may resist restrictions on shipboard painting and maintenance. Existing contracts with tenants may not allow the owner to require that tenants abide by new rules that benefit water quality. Even biodegradable cleaning agents have been found to be toxic to fish.

Requirements

Costs

- Most of the BMPs are of low and modest cost. Exceptions are stations for temporary storage of residual paints and engine fluids, and wastewater pumpout facilities.

Maintenance

- Sweep maintenance yard areas, docks and boat ramps weekly to collect sandblasting material, paint chips, oils, and other loose debris, do not hose down the area to the water or a storm drain.

Supplemental Information

Further Detail of the BMP

- Best management practices for ballast water generally fall into three main categories:
  - Preventing Uptake at the Source - Generally harbors are a poor place to take in ballast water since they are often polluted and when shallow are high in suspended sediments. Open ocean water in a better source of ballast water.
  - Killing or Neutralization During the Voyage - The current fleet of cargo vessels are not built to carry out these processes. New ships should be designed for these kinds of activities but retrofitting may be impossible, difficult or expensive. Any residues or sludges arising from these procedures would have to be separated from the water and discharged on shore for treatment. Many of these processes would render the ballast tanks lethal to the crew and require them to be absolutely airtight and provisions would be necessary for purging and re-introducing a safe breathable atmosphere into the tanks.

- Treatment at the Destination - A further way to reduce the movement of alien organisms in ballast water is to avoid discharge of the ballast water into the destination environment.

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000.
http://www.nalms.org/bclss/bmphome.html#bmp

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

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Program (URMP) -
http://www.projectcleanwater.org/pdf/Model%20Program%20Municipal%20Facilities.pdf

Housekeeping Practices SC-60

Description

Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Related information is provided in BMP fact sheets SC-11 Spill Prevention, Control & Cleanup and SC-34 Waste Handling & Disposal.

Approach

Pollution Prevention

- Purchase only the amount of material that will be needed for foreseeable use. In most cases this will result in cost savings in both purchasing and disposal. See SC-61 Safer Alternative Products for additional information.

- Be aware of new products that may do the same job with less environmental risk and for less or the equivalent cost. Total cost must be used here; this includes purchase price, transportation costs, storage costs, use related costs, clean up costs and disposal costs.

Suggested Protocols

General

- Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area.

- Dispose of wash water, sweepings, and sediments, properly.

- Recycle or dispose of fluids properly.

- Establish a daily checklist of office, yard and plant 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 conspicuous places.

Objectives

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

Targeted Constituents

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

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- Require a signed checklist from every user of any hazardous material detailing amount taken, amount used, amount returned and disposal of spent material.
- Do a before audit of your site to establish baseline conditions and regular subsequent audits to note any changes and whether conditions are improving or deteriorating.
- Keep records of water, air and solid waste quantities and quality tests and their disposition.
- Maintain a mass balance of incoming, outgoing and on hand materials so you know when there are 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 etc. Make sure all employees know about it and what their role is so that it comes into force automatically.

Training
- Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them accountable.
- Train municipal employees who handle potentially harmful materials in good housekeeping practices.
- Train personnel who use pesticides in the proper use of the pesticides. The California Department of Pesticide Regulation license pesticide dealers, certify pesticide applicators and conduct onsite inspections.
- Train employees and contractors in proper techniques for spill containment and cleanup. The employee should have the tools and knowledge to immediately begin cleaning up a spill if one should occur.

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

Other Considerations
- There are no major limitations to this best management practice.
- There are no regulatory requirements to this BMP. Existing regulations already require municipalities to properly store, use, and dispose of hazardous materials

Requirements

Costs

- Minimal cost associated with this BMP. Implementation of good housekeeping practices may result in cost savings as these procedures may reduce the need for more costly BMPs.

Maintenance

- Ongoing maintenance required to keep a clean site. Level of effort is a function of site size and type of activities.

Supplemental Information

Further Detail of the BMP

- The California Integrated Waste Management Board's Recycling Hotline, 1-800-553-2962, provides information on household hazardous waste collection programs and facilities.

Examples

There are a number of communities with effective programs. The most pro-active include Santa Clara County and the City of Palo Alto, the City and County of San Francisco, and the Municipality of Metropolitan Seattle (Metro).

References and Resources

British Columbia Lake Stewardship Society. Best Management Practices to Protect Water Quality from Non-Point Source Pollution. March 2000. http://www.nalms.org/bclss/bmphome.html#bmp

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

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities, Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, Revised by California Coastal Commission, February 2002.

Orange County Stormwater Program http://www.ocwatersheds.com/stormwater/swp_introduction.asp

San Mateo STOPPP - (http://stoppp.tripod.com/bmp.html)

Safer Alternative Products SC-61

Descriptions
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 (batteries, fluorescent lamps).

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 really necessary, and whether alternative products would perform just as well.
- Environmentally Preferable Purchasing Program to minimize 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 including 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
  - Standard operating procedures (SOPs)
  - Purchasing guidelines and procedures

Objectives
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

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  - 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

Training
- Employees who handle potentially harmful materials in the use of safer alternatives.
- Purchasing departments should be encouraged to procure less hazardous materials and products that contain little or no harmful substances or TMDL pollutants.

Regulations
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.

Equipment
- There are no major equipment requirements to this BMP.

Limitations
- Alternative products may not be available, suitable, or effective in every case.

Requirements
Costs
- The primary cost is for staff time to: 1) develop new policies and procedures and 2) educate purchasing departments and employees who handle potentially harmful materials about the availability, procurement, and use of safer alternatives.
- Some alternative products may be slightly more expensive than conventional products.

Supplemental Information
Employees and contractors / service providers can both be educated about safer alternatives by using information developed by a number of organizations including the references and resources listed below.

The following discussion provides some general information on safer alternatives. More specific information on particular hazardous materials and the available alternatives may be found in the references and resources listed below.

- Automotive products – Less toxic alternatives are not available for many automotive products, especially engine fluids. But there are alternatives to grease lubricants, car polishes, degreasers, and windshield washer solution. Rerefined motor oil is also available.
- Vehicle/Trailer lubrication – Fifth wheel bearings on trucks require routine lubrication. Adhesive lubricants are available to replace typical chassis grease.
- Cleaners – Vegetables-based or citrus-based soaps are available to replace petroleum-based soaps/detergents.
- Paint products – Water-based paints, wood preservatives, stains, and finishes are available.
- Pesticides – Specific alternative products or methods exist to control most insects, fungi, and weeds.
- Chemical Fertilizers – Compost and soil amendments are natural alternatives.
- Consumables – Manufacturers have either reduced or are in the process of reducing the amount of heavy metals in consumables such as batteries and fluorescent lamps. All fluorescent lamps contain mercury, however low-mercury containing lamps are now available from most hardware and lighting stores. Fluorescent lamps are also more energy efficient than the average incandescent lamp.
- Janitorial chemicals – Even biodegradable soap can harm fish and wildlife before it biodegrades. Biodegradable does not mean non-toxic. Safer products and procedures are available for floor stripping and cleaning, as well as carpet, glass, metal, and restroom cleaning and disinfecting.

Examples

There are a number of business and trade associations, and communities with effective programs. Some of the more prominent are listed below in the references and resources section.

References and Resources

Note: Many of these references provide alternative products for materials that typically are used inside and disposed to the sanitary sewer as well as alternatives to products that usually end up in the storm drain.

General Sustainable Practices and Pollution Prevention Including Pollutant-Specific Information

California Department of Toxic Substances Control (www.dtsc.ca.gov)

California Integrated Waste Management Board (www.ciwmb.ca.gov)

City of Santa Monica (www.santa-monica.org/environment)

City of Palo Alto (www.city.palo-alto.ca.us/cleanbay)

City and County of San Francisco, Department of the Environment (www.ci.sf.ca.us/sfenvironment)

Earth 911 (www.earth911.org/master.asp)

Environmental Finance Center Region IX (www.greenstart.org/efc9)

Flex Your Power (www.flexyourpower.ca.gov)

GreenBiz.com (www.greenbiz.com)

Green Business Program (www.abag.org/bayarea/enviro/gbus/gb.html)

Pacific Industrial and Business Association (www.piba.org)

Sacramento Clean Water Business Partners (www.sacstormwater.org)

USEPA BMP fact sheet – Alternative products (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/poll_2.cfm)

USEPA Region IX Pollution Prevention Program (www.epa.gov/region09/p2)

Western Regional Pollution Prevention Network (www.westp2net.org)

Metals (mercury, copper)

National Electrical Manufacturers Association - Environment, Health and Safety (www.nema.org)

Sustainable Conservation (www.suscon.org)

Auto Recycling Project

Brake Pad Partnership

Pesticides and Chemical Fertilizers

Bio-Integral Resource Center (www.birc.org)

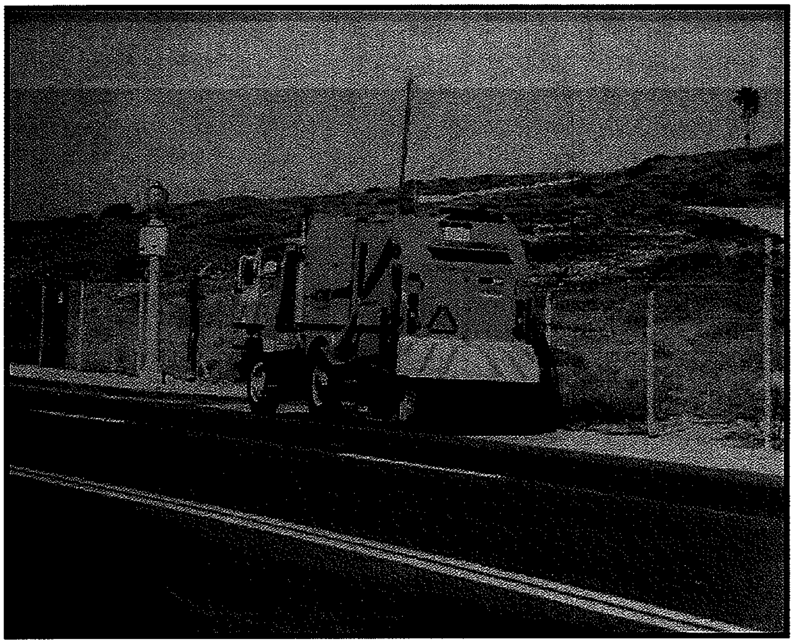
California Department of Pesticide Regulation (www.cdpr.ca.gov)

University of California Statewide IPM Program (www.ipm.ucdavis.edu/default.html)

Dioxins

Bay Area Dioxins Project (http://dioxin.abag.ca.gov/)

Road and Street Maintenance SC-70



Objectives

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

Targeted Constituents

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

Description

Streets, roads, and highways are significant sources of pollutants in stormwater discharges, and operation and maintenance (O&M) practices, if not conducted properly, can contribute to the problem. Stormwater pollution from roadway and bridge maintenance should be addressed on a site-specific basis. Use of the procedures outlined below, that address street sweeping and repair, bridge and structure maintenance, and unpaved roads will reduce pollutants in stormwater.

Approach

Pollution Prevention

- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal)
- Recycle paint and other materials whenever possible.
- Enlist the help of citizens to keep yard waste, used oil, and other wastes out of the gutter.

Suggested Protocols

Street Sweeping and Cleaning

- Maintain a consistent sweeping schedule. Provide minimum monthly sweeping of curbed streets.
- Perform street cleaning during dry weather if possible.

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- Avoid wet cleaning or flushing of street, and utilize dry methods where possible.
- Consider increasing sweeping frequency based on factors such as traffic volume, land use, field observations of sediment and trash accumulation, proximity to water courses, etc. For example:
  - Increase the sweeping frequency for streets with high pollutant loadings, especially in high traffic and industrial areas.
  - Increase the sweeping frequency just before the wet season to remove sediments accumulated during the summer.
  - Increase the sweeping frequency for streets in special problem areas such as special events, high litter or erosion zones.
- Maintain cleaning equipment in good working condition and purchase replacement equipment as needed. Old sweepers should be replaced with new technologically advanced sweepers (preferably regenerative air sweepers) that maximize pollutant removal.
- Operate sweepers at manufacturer requested optimal speed levels to increase effectiveness.
- To increase sweeping effectiveness consider the following:
  - Institute a parking policy to restrict parking in problematic areas during periods of street sweeping.
  - Post permanent street sweeping signs in problematic areas; use temporary signs if installation of permanent signs is not possible.
  - Develop and distribute flyers notifying residents of street sweeping schedules.
- Regularly inspect vehicles and equipment for leaks, and repair immediately.
- If available use vacuum or regenerative air sweepers in the high sediment and trash areas (typically industrial/commercial).
- Keep accurate logs of the number of curb-miles swept and the amount of waste collected.
- Dispose of street sweeping debris and dirt at a landfill.
- Do not store swept material along the side of the street or near a storm drain inlet.
- Keep debris storage to a minimum during the wet season or make sure debris piles are contained (e.g. by berming the area) or covered (e.g. with tarps or permanent covers).

Street Repair and Maintenance

Pavement marking

- Schedule pavement marking activities for dry weather.

- Develop paint handling procedures for proper use, storage, and disposal of paints.
- Transfer and load paint and hot thermoplastic away from storm drain inlets.
- Provide drop cloths and drip pans in paint mixing areas.
- Properly maintain application equipment.
- Street sweep thermoplastic grindings. Yellow thermoplastic grindings may require special handling as they may contain lead.
- Paints containing lead or tributyltin are considered a hazardous waste and must be disposed of properly.
- Use water based paints whenever possible. If using water based paints, clean the application equipment in a sink that is connected to the sanitary sewer.
- Properly store leftover paints if they are to be kept for the next job, or dispose of properly.

Concrete installation and repair

- Schedule asphalt and concrete activities for dry weather.
- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).
- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.
- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.
- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.
- When making saw cuts in pavement, use as little water as possible and perform during dry weather. Cover each storm drain inlet completely with filter fabric or plastic during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site. Alternatively, a small onsite vacuum may be used to pick up the slurry as this will prohibit slurry from reaching storm drain inlets.
- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Patching, resurfacing, and surface sealing

- Schedule patching, resurfacing and surface sealing for dry weather.
- Stockpile materials away from streets, gutter areas, storm drain inlets or watercourses. During wet weather, cover stockpiles with plastic tarps or berm around them if necessary to prevent transport of materials in runoff.
- Pre-heat, transfer or load hot bituminous material away from drainage systems or watercourses.
- Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and maintenance holes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and until all water from emulsified oil sealants has drained or evaporated. Clean any debris from covered maintenance holes and storm drain inlets when the job is complete.
- Prevent excess material from exposed aggregate concrete or similar treatments from entering streets or storm drain inlets. Designate an area for clean up and proper disposal of excess materials.
- Use only as much water as necessary for dust control, to avoid runoff.
- Sweep, never hose down streets to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains.
- 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.

Equipment cleaning maintenance and storage

- Inspect equipment daily and repair any leaks. Place drip pans or absorbent materials under heavy equipment when not in use.
- Perform major equipment repairs at the corporation yard, when practical.
- If refueling or repairing vehicles and equipment must be done onsite, use a location away from storm drain inlets and watercourses.
- Clean equipment including sprayers, sprayer paint supply lines, patch and paving equipment, and mud jacking equipment at the end of each day. Clean in a sink or other area (e.g. vehicle wash area) that is connected to the sanitary sewer.

Bridge and Structure Maintenance

Paint and Paint Removal

- Transport paint and materials to and from job sites in containers with secure lids and tied down to the transport vehicle.
- Do not transfer or load paint near storm drain inlets or watercourses.

- Test and inspect spray equipment prior to starting to paint. Tighten all hoses and connections and do not overfill paint container.
- Plug nearby storm drain inlets prior to starting painting where there is significant risk of a spill reaching storm drains. Remove plugs when job is completed.
- If sand blasting is used to remove paint, cover nearby storm drain inlets prior to starting work.
- Perform work on a maintenance traveler or platform, or use suspended netting or tarps to capture paint, rust, paint removing agents, or other materials, to prevent discharge of materials to surface waters if the bridge crosses a watercourse. If sanding, use a sander with a vacuum filter bag.
- Capture all clean-up water, and dispose of properly.
- Recycle paint when possible (e.g. paint may be used for graffiti removal activities). Dispose of unused paint at an appropriate household hazardous waste facility.

Graffiti Removal

- Schedule graffiti removal activities for dry weather.
- Protect nearby storm drain inlets prior to removing graffiti from walls, signs, sidewalks, or other structures needing graffiti abatement. Clean up afterwards by sweeping or vacuuming thoroughly, and/or by using absorbent and properly disposing of the absorbent.
- When graffiti is removed by painting over, implement the procedures under Painting and Paint Removal above.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a landscaped or dirt area. If such an area is not available, filter runoff through an appropriate filtering device (e.g. filter fabric) to keep sand, particles, and debris out of storm drains.
- If a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound), plug nearby storm drains and vacuum/pump wash water to the sanitary sewer.
- Consider using a waterless and non-toxic chemical cleaning method for graffiti removal (e.g. gels or spray compounds).

Repair Work

- Prevent concrete, steel, wood, metal parts, tools, or other work materials from entering storm drains or watercourses.
- Thoroughly clean up the job site when the repair work is completed.
- When cleaning guardrails or fences follow the appropriate surface cleaning methods (depending on the type of surface) outlined in SC-71 Plaza & Sidewalk Cleaning fact sheet.

- If painting is conducted, follow the painting and paint removal procedures above.
- If graffiti removal is conducted, follow the graffiti removal procedures above.
- If construction takes place, see the Construction Activity BMP Handbook.
- Recycle materials whenever possible.

Unpaved Roads and Trails

- Stabilize exposed soil areas to prevent soil from eroding during rain events. This is particularly important on steep slopes.
- For roadside areas with exposed soils, the most cost-effective choice is to vegetate the area, preferably with a mulch or binder that will hold the soils in place while the vegetation is establishing. Native vegetation should be used if possible.
- If vegetation cannot be established immediately, apply temporary erosion control mats/blankets; a comma straw, or gravel as appropriate.
- If sediment is already eroded and mobilized in roadside areas, temporary controls should be installed. These may include: sediment control fences, fabric-covered triangular dikes, gravel-filled burlap bags, biobags, or hay bales staked in place.

Non-Stormwater Discharges

Field crews should be aware of non-stormwater discharges as part of their ongoing street maintenance efforts.

- Refer to SC-10 Non-Stormwater Discharges
- Identify location, time and estimated quantity of discharges.
- Notify appropriate personnel.

Training

- Train employees regarding proper street sweeping operation and street repair and maintenance.
- Instruct employees and subcontractors to ensure that measures to reduce the stormwater impacts of roadway/bridge maintenance are being followed.
- Require engineering staff and/or consulting A/E firms to address stormwater quality in new bridge designs or existing bridge retrofits.
- Use a training log or similar method to document training.
- Train employees on proper spill containment and clean up, and in identifying non-stormwater discharges.

Spill Response and Prevention

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

Other Considerations

- Densely populated areas or heavily used streets may require parking regulations to clear streets for cleaning.
- No currently available conventional sweeper is effective at removing oil and grease. Mechanical sweepers are not effective at removing finer sediments.
- Limitations may arise in the location of new bridges. The availability and cost of land and other economic and political factors may dictate where the placement of a new bridge will occur. Better design of the bridge to control runoff is required if it is being placed near sensitive waters.

Requirements

Costs

- The maintenance of local roads and bridges is already a consideration of most community public works or transportation departments. Therefore, the cost of pollutant reducing management practices will involve the training and equipment required to implement these new practices.
- The largest expenditures for street sweeping programs are in staffing and equipment. The capital cost for a conventional street sweeper is between $60,000 and $120,000. Newer technologies might have prices approaching $180,000. The average useful life of a conventional sweeper is about four years, and programs must budget for equipment replacement. Sweeping frequencies will determine equipment life, so programs that sweep more often should expect to have a higher cost of replacement.
- A street sweeping program may require the following.
  - Sweeper operators, maintenance, supervisory, and administrative personnel are required.
  - Traffic control officers may be required to enforce parking restrictions.
  - Skillful design of cleaning routes is required for program to be productive.
  - Arrangements must be made for disposal of collected wastes.

- If investing in newer technologies, training for operators must be included in operation and maintenance budgets. Costs for public education are small, and mostly deal with the need to obey parking restrictions and litter control. Parking tickets are an effective reminder to obey parking rules, as well as being a source of revenue.

Maintenance

- Not applicable

Supplemental Information

Further Detail of the BMP

Street sweeping

There are advantages and disadvantages to the two common types of sweepers. The best choice depends on your specific conditions. Many communities find it useful to have a compliment of both types in their fleet.

Mechanical Broom Sweepers - More effective at picking up large debris and cleaning wet streets. Less costly to purchase and operate. Create more airborne dust.

Vacuum Sweepers - More effective at removing fine particles and associated heavy metals. Ineffective at cleaning wet streets. Noisier than mechanical broom sweepers which may restrict areas or times of operation. May require an advance vehicle to remove large debris.

Street Flushers - Not affected by biggest interference to cleaning, parked cars. May remove finer sediments, moving them toward the gutter and stormwater inlets. For this reason, flushing fell out of favor and is now used primarily after sweeping. Flushing may be effective for combined sewer systems. Presently street flushing is not allowed under most NPDES permits.

Cross-Media Transfer of Pollutants

The California Air Resources Board (ARB) has established state ambient air quality standards including a standard for respirable particulate matter (less than or equal to 10 microns in diameter, symbolized as PM10). In the effort to sweep up finer sediments to remove attached heavy metals, municipalities should be aware that fine dust, that cannot be captured by the sweeping equipment and becomes airborne, could lead to issues of worker and public safety.

Bridges

Bridges that carry vehicular traffic generate some of the more direct discharges of runoff to surface waters. Bridge scupper drains cause a direct discharge of stormwater into receiving waters and have been shown to carry relatively high concentrations of pollutants. Bridge maintenance also generates wastes that may be either directly deposited to the water below or carried to the receiving water by stormwater. The following steps will help reduce the stormwater impacts of bridge maintenance:

- Site new bridges so that significant adverse impacts to wetlands, sensitive areas, critical habitat, and riparian vegetation are minimized.

- Design new bridges to avoid the use of scupper drains and route runoff to land for treatment control. Existing scupper drains should be cleaned on a regular basis to avoid sediment/debris accumulation.

- Reduce the discharge of pollutants to surface waters during maintenance by using suspended traps, vacuums, or booms in the water to capture paint, rust, and paint removing agents. Many of these wastes may be hazardous. Properly dispose of this waste by referring to CA21 (Hazardous Waste Management) in the Construction Handbook.

- Train employees and subcontractors to reduce the discharge of wastes during bridge maintenance.

De-icing

- Do not over-apply deicing salt and sand, and routinely calibrate spreaders.

- Near reservoirs, restrict the application of deicing salt and redirect any runoff away from reservoirs.

- Consider using alternative deicing agents (less toxic, biodegradable, etc.).

References and Resources

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

Orange County Stormwater Program
http://www.ocwatersheds.com/stormwater/swp_introduction.asp

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Fresh Concrete and Mortar Application Best Management Practices for the Construction Industry. June.

Santa Clara Valley Urban Runoff Pollution Prevention Program. 2001. Roadwork and Paving Best Management Practices for the Construction Industry. June.

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Roadway and Bridge Maintenance. On-line http://www.epa.gov/npdes/menuofbmps/poll_13.htm

Objectives

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

Targeted Constituents

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

Description

Pollutants on sidewalks and other pedestrian traffic areas and plazas are typically due to littering and vehicle use. This fact sheet describes good housekeeping practices that can be incorporated into the municipality's existing cleaning and maintenance program.

Approach

Pollution Prevention

- Use dry cleaning methods whenever practical for surface cleaning activities.
- Use the least toxic materials available (e.g. water based paints, gels or sprays for graffiti removal).

Suggested Protocols

Surface Cleaning

- Regularly broom (dry) sweep sidewalk, plaza and parking lot areas to minimize cleaning with water.
- Dry cleanup first (sweep, collect, and dispose of debris and trash) when cleaning sidewalks or plazas, then wash with or without soap.
- Block the storm drain or contain runoff when cleaning with water. Discharge wash water to landscaping or collect water and pump to a tank or discharge to sanitary sewer if allowed. (Permission may be required from local sanitation district.)

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- Block the storm drain or contain runoff when washing parking areas, driveways or drive-throughs. Use absorbents to pick up oil; then dry sweep. Clean with or without soap. Collect water and pump to a tank or discharge to sanitary sewer if allowed. Street Repair and Maintenance.

Graffiti Removal

- Avoid graffiti abatement activities during rain events.
- Implement the procedures under Painting and Paint Removal in SC-70 Roads, Streets, and Highway Operation and Maintenance fact sheet when graffiti is removed by painting over.
- Direct runoff from sand blasting and high pressure washing (with no cleaning agents) into a dirt or landscaped area after treating with an appropriate filtering device.
- Plug nearby storm drain inlets and vacuum/pump wash water to the sanitary sewer if authorized to do so if a graffiti abatement method generates wash water containing a cleaning compound (such as high pressure washing with a cleaning compound). Ensure that a non-hazardous cleaning compound is used or dispose as hazardous waste, as appropriate.

Surface Removal and Repair

- Schedule surface removal activities for dry weather if possible.
- Avoid creating excess dust when breaking asphalt or concrete.
- Take measures to protect nearby storm drain inlets prior to breaking up asphalt or concrete (e.g. place hay bales or sand bags around inlets). Clean afterwards by sweeping up as much material as possible.
- Designate an area for clean up and proper disposal of excess materials.
- Remove and recycle as much of the broken pavement as possible to avoid contact with rainfall and stormwater runoff.
- When making saw cuts in pavement, use as little water as possible. Cover each storm drain inlet completely with filter fabric during the sawing operation and contain the slurry by placing straw bales, sandbags, or gravel dams around the inlets. After the liquid drains or evaporates, shovel or vacuum the slurry residue from the pavement or gutter and remove from site.
- Always dry sweep first to clean up tracked dirt. Use a street sweeper or vacuum truck. Do not dump vacuumed liquid in storm drains. Once dry sweeping is complete, the area may be hosed down if needed. Wash water should be directed to landscaping or collected and pumped to the sanitary sewer if allowed.

Concrete Installation and Repair

- Schedule asphalt and concrete activities for dry weather.

- Take measures to protect any nearby storm drain inlets and adjacent watercourses, prior to breaking up asphalt or concrete (e.g. place san bags around inlets or work areas).

- Limit the amount of fresh concrete or cement mortar mixed, mix only what is needed for the job.

- Store concrete materials under cover, away from drainage areas. Secure bags of cement after they are open. Be sure to keep wind-blown cement powder away from streets, gutters, storm drains, rainfall, and runoff.

- Return leftover materials to the transit mixer. Dispose of small amounts of hardened excess concrete, grout, and mortar in the trash.

- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile, or dispose in the trash.

- Protect applications of fresh concrete from rainfall and runoff until the material has dried.

- Do not allow excess concrete to be dumped onsite, except in designated areas.

- Wash concrete trucks off site or in designated areas on site designed to preclude discharge of wash water to drainage system.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.

- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.

- Cover litter receptacles and clean out frequently to prevent leaking/spillage or overflow.

- Clean parking lots on a regular basis with a street sweeper.

Training

- Provide regular training to field employees and/or contractors regarding surface cleaning and proper operation of equipment.

- Train employee and contractors in proper techniques for spill containment and cleanup.

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

Spill Response and Prevention

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

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

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Limitations related to sweeping activities at large parking facilities may include current sweeper technology to remove oil and grease.
- Surface cleaning activities that require discharges to the local sewering agency will require coordination with the agency.
- Arrangements for disposal of the swept material collected must be made, as well as accurate tracking of the areas swept and the frequency of sweeping.

Requirements

Costs

- The largest expenditures for sweeping and cleaning of sidewalks, plazas, and parking lots are in staffing and equipment. Sweeping of these areas should be incorporated into street sweeping programs to reduce costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Community education, such as informing residents about their options for recycling and waste disposal, as well as the consequences of littering, can instill a sense of citizen responsibility and potentially reduce the amount of maintenance required by the municipality.

Additional BMPs that should be considered for parking lot areas include:

- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low concentrations.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Structural BMPs such as storm drain inlet filters can be very effective in reducing the amount of pollutants discharged from parking facilities during periods of rain.

References and Resources

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

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July. 1998.

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Santa Clara Valley Urban Runoff Pollution Prevention Program. Maintenance Best Management Practices for the Construction Industry. Brochures: Landscaping, Gardening, and Pool; Roadwork and Paving; and Fresh Concrete and Mortar Application. June 2001.

San Diego Stormwater Co-permittees Jurisdictional Urban Runoff Management Plan. 2001. Municipal Activities Model Program Guidance. November.

Fountain & Pool Maintenance SC-72

Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Description

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

Approach

Pollution Prevention

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

Suggested Protocols

Pools and Fountains

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

Targeted Constituents

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑
Oxygen Demanding	☑

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- Never clean a filter in the street or near a storm drain.
- Rinse cartridge filters onto a dirt area, and spade filter residue into soil.
- Backwash diatomaceous earth filters onto dirt. Dispose of spent diatomaceous earth in the garbage. Spent diatomaceous earth cannot be discharged to surface waters, storm drainage systems, septic systems, or on the ground.
- If there is not a suitable dirt area discharge filter backwash or rinsewater to the sanitary sewer if permitted to do so by the local sewering agency.

Lakes and Lagoons

- Reduce fertilizer use in areas around the water body. High nitrogen fertilizers can produce excess growth requiring more frequent mowing or trimming, and may contribute to excessive algae growth.
- To control bacteria, discourage the public from feeding birds and fish (i.e. place signs that prohibit feeding of waterfowl).
- Consider introducing fish species that consume algae. Contact the California Department of Fish and Game for more information on this issue.
- Mechanically remove pond scum (blue-green algae) using a 60 micron net.
- Educate the public on algae and that no controls are necessary for certain types of algae that are beneficial to the water body.
- Control erosion by doing the following:
  - Maintain vegetative cover on banks to prevent soil erosion. Apply mulch or leave clippings to serve as additional cover for soil stabilization and to reduce the velocity of stormwater runoff.
  - Areas should be designed (sloped) to prevent runoff and erosion and to promote better irrigation practices.
  - Provide energy dissipaters (e.g. riprap) along banks to minimize potential for erosion.
  - Confine excavated materials to surfaces away from lakes. Material must be covered if rain is expected.
- Conduct inspections to detect illegal dumping of clippings/cuttings in or near a lake. Materials found should be picked up and properly disposed of.
- Avoid landscape wastes in and around lakes should be avoided by either using bagging equipment or by manually picking up the material. Collect trash and debris from within water bodies where feasible
- Provide and maintain trash receptacles near recreational water bodies to hold refuse generated by the public.

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

Training

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

Spill Response and Prevention

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

Other Considerations

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

Requirements

Costs

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

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

When dredging is conducted, adhere to the following:

- Dredge with shovels when laying/maintaining pipes.
- To determine amount to dredge, determine rate of volume loss due to sediments.
- For large lakes, dredge every 10 years.
- When dredging small lakes, drain lake.
- When dredging large lakes, use vacuum equipment.
- After dredging test sediment piles for proper disposal. Dredged sediment can be used as fill, or may have to be land filled.

References and Resources

King County Stormwater Pollution Control Manual. Best Management Practices for Businesses. 1995. King County Surface Water Management. July. On-line: http://dnr.metrokc.gov/wlr/dss/spcm.htm

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

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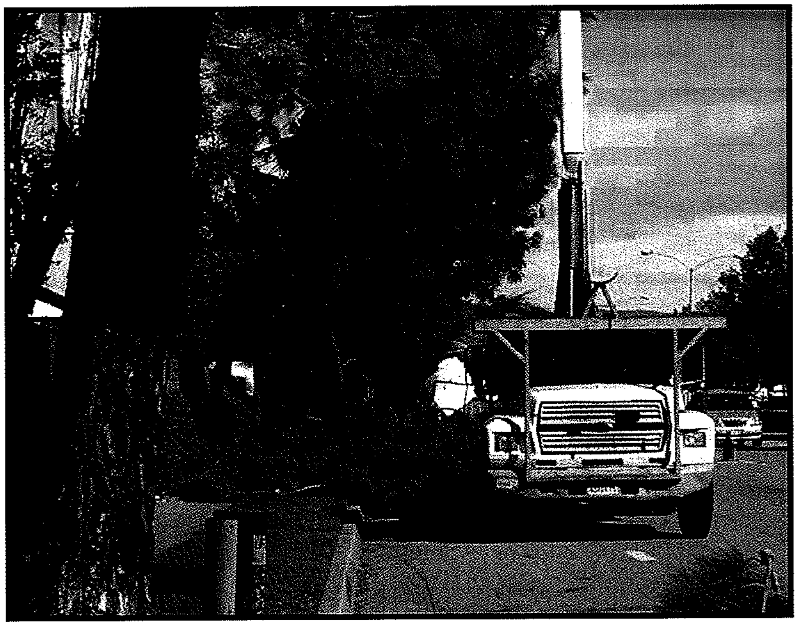
Landscape Maintenance SC-73



Objectives

- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

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

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Description

Landscape maintenance activities include vegetation removal; herbicide and insecticide application; fertilizer application; watering; and other gardening and lawn care practices. Vegetation control typically involves a combination of chemical (herbicide) application and mechanical methods. All of these maintenance practices have the potential to contribute pollutants to the storm drain system. The major objectives of this BMP are to minimize the discharge of pesticides, herbicides and fertilizers to the storm drain system and receiving waters; prevent the disposal of landscape waste into the storm drain system by collecting and properly disposing of clippings and cuttings, and educating employees and the public.

Approach

Pollution Prevention

- Implement an integrated pest management (IPM) program. IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools.
- Choose low water using flowers, trees, shrubs, and groundcover.
- Consider alternative landscaping techniques such as naturescaping and xeriscaping.
- Conduct appropriate maintenance (i.e. properly timed fertilizing, weeding, pest control, and pruning) to help preserve the landscapes water efficiency.

- Consider grass cycling (grass cycling is the natural recycling of grass by leaving the clippings on the lawn when mowing. Grass clippings decompose quickly and release valuable nutrients back into the lawn).

Suggested Protocols

Mowing, Trimming, and Weeding

- Whenever possible use mechanical methods of vegetation removal (e.g mowing with tractor-type or push mowers, hand cutting with gas or electric powered weed trimmers) rather than applying herbicides. Use hand weeding where practical.

- Avoid loosening the soil when conducting mechanical or manual weed control, this could lead to erosion. Use mulch or other erosion control measures when soils are exposed.

- Performing mowing at optimal times. Mowing should not be performed if significant rain events are predicted.

- Mulching mowers may be recommended for certain flat areas. Other techniques may be employed to minimize mowing such as selective vegetative planting using low maintenance grasses and shrubs.

- Collect lawn and garden clippings, pruning waste, tree trimmings, and weeds. Chip if necessary, and compost or dispose of at a landfill (see waste management section of this fact sheet).

- Place temporarily stockpiled material away from watercourses, and berm or cover stockpiles to prevent material releases to storm drains.

Planting

- Determine existing native vegetation features (location, species, size, function, importance) and consider the feasibility of protecting them. Consider elements such as their effect on drainage and erosion, hardiness, maintenance requirements, and possible conflicts between preserving vegetation and the resulting maintenance needs.

- Retain and/or plant selected native vegetation whose features are determined to be beneficial, where feasible. Native vegetation usually requires less maintenance (e.g., irrigation, fertilizer) than planting new vegetation.

- Consider using low water use groundcovers when planting or replanting.

Waste Management

- Compost leaves, sticks, or other collected vegetation or dispose of at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

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

- Reduce the use of high nitrogen fertilizers that produce excess growth requiring more frequent mowing or trimming.

- Avoid landscape wastes in and around storm drain inlets by either using bagging equipment or by manually picking up the material.

Irrigation

- Where practical, use automatic timers to minimize runoff.
- Use popup sprinkler heads in areas with a lot of activity or where there is a chance the pipes may be broken. Consider the use of mechanisms that reduce water flow to sprinkler heads if broken.
- Ensure that there is no runoff from the landscaped area(s) if re-claimed water is used for irrigation.
- If bailing of muddy water is required (e.g. when repairing a water line leak), do not put it in the storm drain; pour over landscaped areas.
- Irrigate slowly or pulse irrigate to prevent runoff and then only irrigate as much as is needed.
- Apply water at rates that do not exceed the infiltration rate of the soil.

Fertilizer and Pesticide Management

- Utilize a comprehensive management system that incorporates integrated pest management (IPM) techniques. There are many methods and types of IPM, including the following:
  - Mulching can be used to prevent weeds where turf is absent, fencing installed to keep rodents out, and netting used to keep birds and insects away from leaves and fruit.
  - Visible insects can be removed by hand (with gloves or tweezers) and placed in soapy water or vegetable oil. Alternatively, insects can be sprayed off the plant with water or in some cases vacuumed off of larger plants.
  - Store-bought traps, such as species-specific, pheromone-based traps or colored sticky cards, can be used.
  - Slugs can be trapped in small cups filled with beer that are set in the ground so the slugs can get in easily.
  - In cases where microscopic parasites, such as bacteria and fungi, are causing damage to plants, the affected plant material can be removed and disposed of (pruning equipment should be disinfected with bleach to prevent spreading the disease organism).
  - Small mammals and birds can be excluded using fences, netting, tree trunk guards.
  - Beneficial organisms, such as bats, birds, green lacewings, ladybugs, praying mantis, ground beetles, parasitic nematodes, trichogramma wasps, seed head weevils, and spiders that prey on detrimental pest species can be promoted.
- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.

- Use pesticides only if there is an actual pest problem (not on a regular preventative schedule).
- Do not use pesticides if rain is expected. Apply pesticides only when wind speeds are low (less than 5 mph).
- Do not mix or prepare pesticides for application near storm drains.
- Prepare the minimum amount of pesticide needed for the job and use the lowest rate that will effectively control the pest.
- Employ techniques to minimize off-target application (e.g. spray drift) of pesticides, including consideration of alternative application techniques.
- Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.
- Calibrate fertilizer and pesticide application equipment to avoid excessive application.
- Periodically test soils for determining proper fertilizer use.
- Sweep pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.
- Purchase only the amount of pesticide that you can reasonably use in a given time period (month or year depending on the product).
- Triple rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Dispose of empty pesticide containers according to the instructions on the container label.

Inspection

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

Training

- Educate and train employees on use of pesticides and in pesticide application techniques to prevent pollution. Pesticide application must be under the supervision of a California qualified pesticide applicator.
- Train/encourage municipal maintenance crews to use IPM techniques for managing public green areas.
- Annually train employees within departments responsible for pesticide application on the appropriate portions of the agency's IPM Policy, SOPs, and BMPs, and the latest IPM techniques.

- Employees who are not authorized and trained to apply pesticides should be periodically (at least annually) informed that they cannot use over-the-counter pesticides in or around the workplace.
- Use a training log or similar method to document training.

Spill Response and Prevention

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

Other Considerations

- The Federal Pesticide, Fungicide, and Rodenticide Act and California Title 3, Division 6, Pesticides and Pest Control Operations place strict controls over pesticide application and handling and specify training, annual refresher, and testing requirements. The regulations generally cover: a list of approved pesticides and selected uses, updated regularly; general application information; equipment use and maintenance procedures; and record keeping. The California Department of Pesticide Regulations and the County Agricultural Commission coordinate and maintain the licensing and certification programs. All public agency employees who apply pesticides and herbicides in "agricultural use" areas such as parks, golf courses, rights-of-way and recreation areas should be properly certified in accordance with state regulations. Contracts for landscape maintenance should include similar requirements.
- All employees who handle pesticides should be familiar with the most recent material safety data sheet (MSDS) files.
- Municipalities do not have the authority to regulate the use of pesticides by school districts, however the California Healthy Schools Act of 2000 (AB 2260) has imposed requirements on California school districts regarding pesticide use in schools. Posting of notification prior to the application of pesticides is now required, and IPM is stated as the preferred approach to pest management in schools.

Requirements

Costs

Additional training of municipal employees will be required to address IPM techniques and BMPs. IPM methods will likely increase labor cost for pest control which may be offset by lower chemical costs.

Maintenance

Not applicable

Supplemental Information

Further Detail of the BMP

Waste Management

Composting is one of the better disposal alternatives if locally available. Most municipalities either have or are planning yard waste composting facilities as a means of reducing the amount of waste going to the landfill. Lawn clippings from municipal maintenance programs as well as private sources would probably be compatible with most composting facilities

Contractors and Other Pesticide Users

Municipal agencies should develop and implement a process to ensure that any contractor employed to conduct pest control and pesticide application on municipal property engages in pest control methods consistent with the IPM Policy adopted by the agency. Specifically, municipalities should require contractors to follow the agency's IPM policy, SOPs, and BMPs; provide evidence to the agency of having received training on current IPM techniques when feasible; provide documentation of pesticide use on agency property to the agency in a timely manner.

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Drainage System Maintenance SC-74

Photo Credit: Geoff Brosseau

Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

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

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Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff that may contain certain pollutants. Maintaining catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis will remove pollutants, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Approach

Suggested Protocols

Catch Basins/Inlet Structures

- Municipal staff should regularly inspect facilities to ensure the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC-75 Waste Handling and Disposal).
- Clean catch basins, storm drain inlets, and other conveyance structures in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed of. Do not dewater near a storm drain or stream.
- Except for small communities with relatively few catch basins that may be cleaned manually, most municipalities will require mechanical cleaners such as eductors, vacuums, or bucket loaders.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect flushed effluent and pump to the sanitary sewer for treatment.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge from cleaning a storm drain pump station or other facility to reach the storm drain system.
- Conduct quarterly routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.
- Sample collected sediments to determine if landfill disposal is possible, or illegal discharges in the watershed are occurring.

Open Channel

- Consider modification of storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies

(SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS

Illicit Connections and Discharges

- During routine maintenance of conveyance system and drainage structures field staff should look for evidence of illegal discharges or illicit connections:
  - Is there evidence of spills such as paints, discoloring, etc.
  - Are there any odors associated with the drainage system
  - Record locations of apparent illegal discharges/illicit connections
  - Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of up gradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
  - Once the origin of flow is established, require illicit discharger to eliminate the discharge.
- Stencil storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

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

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

Training

- Train crews in proper maintenance activities, including record keeping and disposal.

- Only properly trained individuals are allowed to handle hazardous materials/wastes.

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

- Train municipal employees and educate businesses, contractors, and the general public in proper and consistent methods for disposal.

- Train municipal staff regarding non-stormwater discharges (See SC-10 Non-Stormwater Discharges).

Spill Response and Prevention

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

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

- Cleanup spills immediately and use dry methods if possible.

- Properly dispose of spill cleanup material.

Other Considerations

- Cleanup activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and disposal of flushed effluent to sanitary sewer may be prohibited in some areas.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

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

- Private property access rights may be needed to track illegal discharges up gradient.

- Requirements of municipal ordinance authority for suspected source verification testing for illicit connections necessary for guaranteed rights of entry.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget. A careful study of cleaning effectiveness should be undertaken before increased cleaning is implemented. Catch basin cleaning costs are less expensive if vacuum street sweepers are available; cleaning catch basins manually can cost approximately twice as much as cleaning the basins with a vacuum attached to a sweeper.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Encouraging reporting of illicit discharges by employees can offset costs by saving expense on inspectors and directing resources more efficiently. Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Requires technical staff to detect and investigate illegal dumping violations, and to coordinate public education.

Supplemental Information

Further Detail of the BMP

Storm Drain flushing

Sanitary sewer flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in sanitary sewer systems. The same principles that make sanitary sewer flushing effective can be used to flush storm drains. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as to an open channel, to another point where flushing will be initiated, or over to the sanitary sewer and on to the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. The deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce the impacts of stormwater pollution, a second inflatable device, placed well downstream, may be used to re-collect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to re-collect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75 percent for organics and 55-65 percent for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm drain flushing.

Flow Management

Flow management has been one of the principal motivations for designing urban stream corridors in the past. Such needs may or may not be compatible with the stormwater quality goals in the stream corridor.

Downstream flood peaks can be suppressed by reducing through flow velocity. This can be accomplished by reducing gradient with grade control structures or increasing roughness with boulders, dense vegetation, or complex banks forms. Reducing velocity correspondingly increases flood height, so all such measures have a natural association with floodplain open space. Flood elevations laterally adjacent to the stream can be lowered by increasing through flow velocity.

However, increasing velocity increases flooding downstream and inherently conflicts with channel stability and human safety. Where topography permits, another way to lower flood elevation is to lower the level of the floodway with drop structures into a large but subtly excavated bowl where flood flows we allowed to spread out.

Stream Corridor Planning

Urban streams receive and convey stormwater flows from developed or developing watersheds. Planning of stream corridors thus interacts with urban stormwater management programs. If local programs are intended to control or protect downstream environments by managing flows delivered to the channels, then it is logical that such programs should be supplemented by management of the materials, forms, and uses of the downstream riparian corridor. Any proposal for steam alteration or management should be investigated for its potential flow and stability effects on upstream, downstream, and laterally adjacent areas. The timing and rate of flow from various tributaries can combine in complex ways to alter flood hazards. Each section of channel is unique, influenced by its own distribution of roughness elements, management activities, and stream responses.

Flexibility to adapt to stream features and behaviors as they evolve must be included in stream reclamation planning. The amenity and ecology of streams may be enhanced through the landscape design options of 1) corridor reservation, 2) bank treatment, 3) geomorphic restoration, and 4) grade control.

Corridor reservation - Reserving stream corridors and valleys to accommodate natural stream meandering, aggradation, degradation, and over bank flows allows streams to find their own form and generate less ongoing erosion. In California, open stream corridors in recent urban developments have produced recreational open space, irrigation of streamside plantings, and the aesthetic amenity of flowing water.

Bank treatment - The use of armoring, vegetative cover, and flow deflection may be used to influence a channel's form, stability, and biotic habitat. To prevent bank erosion, armoring can be done with rigid construction materials, such as concrete, masonry, wood planks and logs, riprap, and gabions. Concrete linings have been criticized because of their lack of provision of biotic habitat. In contrast, riprap and gabions make relatively porous and flexible linings. Boulders, placed in the bed reduce velocity and erosive power.

Riparian vegetation can stabilize the banks of streams that are at or near a condition of equilibrium. Binding networks of roots increase bank shear strength. During flood flows, resilient vegetation is forced into erosion-inhibiting mats. The roughness of vegetation leads to lower velocity, further reducing erosive effects. Structural flow deflection can protect banks from erosion or alter fish habitat. By concentrating flow, a deflector causes a pool to be scoured in the bed.

Geomorphic restoration – Restoration refers to alteration of disturbed streams so their form and behavior emulate those of undisturbed streams. Natural meanders are retained, with grading to gentle slopes on the inside of curves to allow point bars and riffle-pool sequences to develop. Trees are retained to provide scenic quality, biotic productivity, and roots for bank stabilization, supplemented by plantings where necessary.

A restorative approach can be successful where the stream is already approaching equilibrium. However, if upstream urbanization continues new flow regimes will be generated that could disrupt the equilibrium of the treated system.

Grade Control - A grade control structure is a level shelf of a permanent material, such as stone, masonry, or concrete, over which stream water flows. A grade control structure is called a sill, weir, or drop structure, depending on the relation of its invert elevation to upstream and downstream channels.

A sill is installed at the preexisting channel bed elevation to prevent upstream migration of nick points. It establishes a firm base level below which the upstream channel can not erode.

A weir or check dam is installed with invert above the preexisting bed elevation. A weir raises the local base level of the stream and causes aggradation upstream. The gradient, velocity, and erosive potential of the stream channel are reduced. A drop structure lowers the downstream invert below its preexisting elevation, reducing downstream gradient and velocity. Weirs and drop structure control erosion by dissipating energy and reducing slope velocity.

When carefully applied, grade control structures can be highly versatile in establishing human and environmental benefits in stabilized channels. To be successful, application of grade control structures should be guided by analysis of the stream system both upstream and downstream from the area to he reclaimed.

Examples

The California Department of Water Resources began the Urban Stream Restoration Program in 1985. The program provides grant funds to municipalities and community groups to implement stream restoration projects. The projects reduce damages from streambank aid watershed instability arid floods while restoring streams' aesthetic, recreational, and fish and wildlife values.

In Buena Vista Park, upper floodway slopes are gentle and grassed to achieve continuity of usable park land across the channel of small boulders at the base of the slopes.

The San Diego River is a large, vegetative lined channel, which was planted in a variety of species to support riparian wildlife while stabilizing the steep banks of the floodway.

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Waste Handling and Disposal SC-75

Objectives

- Cover
- Contain
- Educate
- Reduce/Reuse

Targeted Constituents

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

Description

It is important to control litter to eliminate trash and other materials in stormwater runoff. Waste reduction is a major component of waste management and should be encouraged through training and public outreach. Management of waste once it is collected may involve reuse, recycling, or proper disposal.

Approach

Pollution Prevention

- Reuse products when possible.
- Encourage recycling programs with recycling bins, used oil collection, etc.

Suggested Protocols

Solid Waste Collection

- Implement procedures, where applicable, to collect, transport, and dispose of solid waste at appropriate disposal facilities in accordance with applicable federal, state, and local laws and regulations.
- Include properly designed trash storage areas. If feasible provide cover over trash storage areas.
- Regularly inspect solid waste containers for structural damage. Repair or replace damaged containers as necessary.

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- Secure solid waste containers; containers must be closed tightly when not in use.
- Do not fill waste containers with washout water or any other liquid.
- Ensure that only appropriate solid wastes are added to the solid waste container. Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc. may not be disposed of in solid waste containers (see chemical/ hazardous waste collection section below).
- Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.
- Refer to SC-34 Waste Handling and Disposal for more information regarding solid waste facilities.

Waste Reduction and Recycling

- Recycle wastes whenever possible. Many types of waste can be recycled, recycling options for each waste type are limited. All gasoline, antifreeze, waste oil, and lead-acid batteries can be recycled. Latex and oil-based paint can be reused, as well as recycled. Materials that cannot be reused or recycled should either be incinerated or disposed of at a properly permitted landfill.
- Recycling is always preferable to disposal of unwanted materials.
- Recycling bins for glass, metal, newspaper, plastic bottles and other recyclable household solid wastes should be provided at public facilities and/or for residential curbside collection.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide litter receptacles in busy, high pedestrian traffic areas of the community, at recreational facilities, and at community events.
- Clean out and cover litter receptacles frequently to prevent spillage.

Illegal Dumping

Substances illegally dumped on streets and into the storm drain system and creeks include paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clipping, and pet wastes.

- Post "No Dumping" signs with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Landscaping and beautification efforts of hot spots might also discourage future dumping.
- See SC-74 Drainage System Maintenance, and SC-10 Non-Stormwater Discharges.

Requirements

Costs

- The costs for a solid waste source control program vary depending on the type of method. The cost of a community education program or a plan to increase the number of trash receptacles can be very minimal. Costs for structural controls such as trash racks, bar screens, and silt traps can be quite costly ranging from $250,000 to $900,000.

- A collection facility or curbside collection for used oil may result in significant costs. Commercial locations (automobile service stations, quick oil change centers, etc.) as collection points eliminate hauling and recycling costs.

- Collection and disposal of hazardous waste can be very expensive and requires trained operators; laboratory and detection equipment; and extensive record keeping including dates, types, and quantities.

- Use of volunteer work forces can lower storm drain stenciling program costs. Stenciling kits require procurement of durable/disposable items. The stenciling program can aid in the cataloging of the storm drain system. One municipality from the state of Washington has estimated that stenciling kits cost approximately $50 each. Stencils may cost about $8 each including the die cost on an order of 1,000. Re-orders cost about $1/stencil. Stencil designs may be available from other communities. Stencil kits should be provided on a loan basis to volunteer groups free of charge with the understanding that kit remnants are to be returned.

Maintenance

- The primary staff demand for stenciling programs is for program setup to provide marketing and training. Ongoing/follow-up staff time is minimal because of volunteer services.

- Staffing requirements are minimal for oil recycling programs if collection/recycling is contracted out to a used oil hauler/recycler or required at commercial locations.

- Staff requirements for maintaining good housekeeping BMPs at waste handling sites is minimal.

Supplemental Information

Further Detail of the BMP

Waste Reduction

An approach to reduce stormwater pollution from waste handling and disposal is to assess activities and reduce waste generation. The assessment is designed to find situations where waste can be eliminated or reduced and emissions and environmental damage can be minimized. The assessment involves collecting process specific information, setting pollution prevention targets, and developing, screening and selecting waste reduction options for further study. Starting a waste reduction program is economically beneficial because of reduced raw material purchases and lower waste disposal fees.

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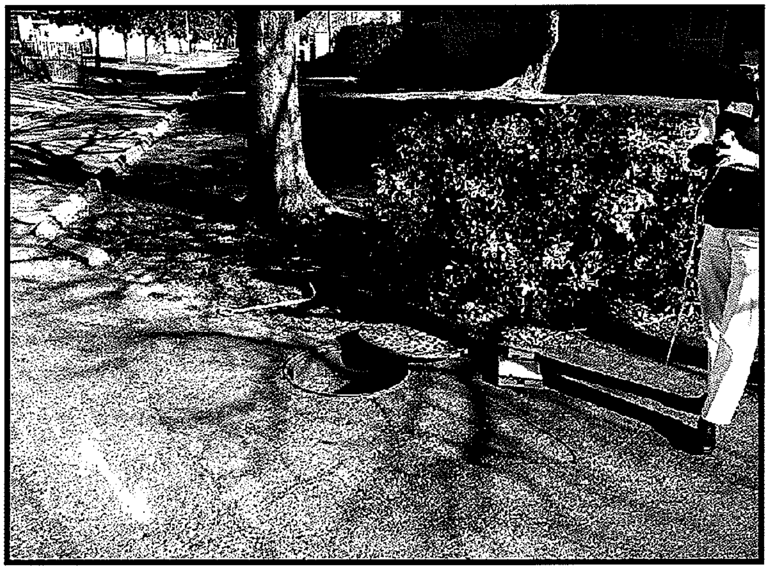
Water & Sewer Utility Maintenance SC-76



Objectives

- Contain
- Educate
- Reduce/Minimize

Targeted Constituents

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

Description

Although the operation and maintenance of public utilities are not considered chronic sources of stormwater pollution, some activities and accidents can result in the discharge of pollutants that can pose a threat to both human health and the quality of receiving waters if they enter the storm drain system. Sewage incident response and investigation may involve a coordinated effort between staff from a number of different departments/agencies. Cities that do not provide maintenance of water and sewer utilities must coordinate with the contracting agency responsible for these activities and ensure that these model procedures are followed.

Approach

Pollution Prevention

Inspect potential non-stormwater discharge flow paths and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).

Suggested Protocols

Water Line Maintenance and Cleaning

Procedures can be employed to reduce pollutants from discharges associated with water utility operation and maintenance activities. Planned discharges may include fire hydrant testing, flushing water supply mains after new construction, flushing lines due to complaints of taste and odor, dewatering mains for maintenance work. Unplanned discharges from treated, recycled water, raw water, and groundwater systems operation and maintenance activities can occur from water main

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breaks, sheared fire hydrants, equipment malfunction, and operator error.

Planned discharges

- Identify a suitable discharge option in the following order of preference:
  - Apply to the land.
  - Reuse water for dust suppression, irrigation, or construction compaction.
  - Discharge to a sanitary sewer system with approval.
  - Discharge to the storm drain system using applicable pollution control measures. (Only available to clean water discharges such as water main/ water storage tank/water hydrant flushing).
- If water is discharged to a storm drain, control measures must be put in place to control potential pollutants (i.e. sediment, chlorine, etc.). Examples of some storm drain protection options include:
  - Silt fence – appropriate where the inlet drains a relatively flat area.
  - Gravel and wire mesh sediment filter – Appropriate where concentrated flows are expected.
  - Wooden weir and fabric – use at curb inlets where a compact installation is desired.
- Prior to discharge, inspect discharge flow path and clear/cleanup any debris or pollutants found (i.e. remove trash, leaves, sediment, and wipe up liquids, including oil spills).
- General Design considerations for inlet protection devices include the following:
  - The device should be constructed such that cleaning and disposal of trapped sediment is made easy, while minimizing interference with discharge activities.
  - Devices should be constructed so that any standing water resulting from the discharge will not cause excessive inconvenience or flooding/damage to adjacent land or structures.
- The effectiveness of control devices must be monitored during the discharge period and any necessary repairs or modifications made.

Unplanned Discharges

- Stop the discharge as quickly as possible.
- Inspect flow path of the discharged water:
  - Identify erodible areas which may need to be repaired or protected during subsequent repairs or corrective actions

  - Identify the potential for pollutants to be washed into the waterway

- If repairs or corrective action will cause additional discharges of water, select the appropriate procedures for erosion control, chlorine residual, turbidity, and chemical additives. Prevent potential pollutants from entering the flow path.

Sanitary Sewer Maintenance

Applicable to municipalities who own and operated a sewage collection system. Facilities that are covered under this program include sanitary sewer pipes and pump stations owned and operated by a municipality. The owner of the sanitary sewer facilities is the entity responsible for carrying out this prevention and response program.

- Clean sewer lines on a regular basis to remove grease, grit, and other debris that may lead to sewer backups.

- Establish routine maintenance program. Cleaning should be conducted at an established minimum frequency and more frequently for problem areas such as restaurants that are identified

- Cleaning activities may require removal of tree roots and other identified obstructions.

- During routine maintenance and inspection note the condition of sanitary sewer structures and identify areas that need repair or maintenance. Items to note may include the following:

  - Cracked/deteriorating pipes

  - Leaking joints/seals at manhole

  - Frequent line plugs

  - Line generally flows at or near capacity

  - Suspected infiltration or exfiltration.

- Prioritize repairs based on the nature and severity of the problem. Immediate clearing of blockage or repair is required where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g. pump station failures, sewer line ruptures, sewer line blockages). These repairs may be temporary until scheduled or capital improvements can be completed.

- Review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure.

Spills and Overflows

- Identify and track sanitary sewer discharges. Identify dry weather infiltration and inflow first. Wet weather overflow connections are very difficult to locate.

- Locate wet weather overflows and leaking sanitary sewers using conventional source identification techniques such as monitoring and field screening. Techniques used to identify other illicit connection sources can also be used for sewer system evaluation surveys (see SC74 Drainage System Operation and Maintenance).

- Implement community awareness programs for monitoring sanitary sewer wet weather overflows. A citizen's hotline for reporting observed overflow conditions should be established to supplement field screening efforts.

- Establish lead department/agency responsible for spill response and containment. Provide coordination within departments.

- When a spill, leak, and/or overflow occurs and when disinfecting a sewage contaminated area, take every effort to ensure that the sewage, disinfectant and/or sewage treated with the disinfectant is not discharged to the storm drain system or receiving waters. Methods may include:

  - Blocking storm drain inlets and catch basins

  - Containing and diverting sewage and disinfectant away from open channels and other storm drain fixtures (using sandbags, inflatable dams, etc.)

  - Removing the material with vacuum equipment

- Record required information at the spill site.

- Perform field tests as necessary to determine the source of the spill.

- Develop notification procedures regarding spill reporting.

Septic Systems

- Ensure that homeowners, installers, and inspectors are educated in proper maintenance of septic systems. This may require coordination with staff from other departments. Outreach to homeowners should include inspection reminders informing then that inspection and perhaps maintenance is due for their systems. Recommend that the system be inspected annually and pumped-out regularly.

- Programs which seek to address failing septic systems should consider using field screening to pinpoint areas where more detailed onsite inspection surveys are warranted.

Training

- Conduct annual training of water utility personnel and service contractors. (field screening, sampling, smoke/dye testing, TV inspection).

- OSHA-required Health and Safety Training 29 CFR 1910.120 plus annual Refresher Training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and federal OSHA 29 CFR 1910.146).

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

Other Considerations
- Enact ordinance granting "right-of-entry" to locate potentially responsible parties for sewer overflows.
- Reliance on individual onsite inspection to detect failed septic systems can be a major limitation. The individual onsite inspection is very labor-intensive and requires access to private property to pinpoint the exact location of the failing system.
- A significant limitation to correcting failing septic systems is the lack of techniques available for detecting individual failed septic systems.

Requirements
Costs
- Departmental cooperation recommended for sharing or borrowing staff resources and equipment from municipal wastewater department.
- Infiltration, inflow, and wet weather overflows from sanitary sewers are very labor and equipment intensive to locate.
- The costs associated with detecting and correcting septic system failures are subject to a number of factors, including availability of trained personnel, cost of materials, and the level of follow-up required to fix the system problems.

Maintenance
- Minimum 2-person teams to perform field screening and associated sampling.
- Larger teams required for implementing other techniques (i.e. zinc chloride smoke testing, fluorometric dye testing, television camera inspection and physical inspection with confined space entry) to identify sewer system leaks.
- Program coordination required for handling emergencies, record keeping, etc.
- Many of the problems associated with improper use of septic systems may be attributed to lack of user knowledge on operation and maintenance. Educational materials for homeowners and training courses for installers and inspectors can reduce the incidence of pollution from these widespread and commonly used pollution control devices.

Supplemental Information

Further Detail of the BMP

Onsite Sewage Disposal Systems

New onsite sewage disposal systems should be designed, located, and installed away from open waterbodies and sensitive resources such as wetlands and floodplains. A protective separation between the OSDS and groundwater should also be established. OSDSs should be operated and maintained to prevent surface water discharges and reduce pollutant loadings to groundwater. Inspection of OSDSs should occur regularly and repairs made immediately. New or replacement plumbing fixtures should be of the high efficiency type.

Typical Sanitary Sewer Problems

- Old and deteriorated main and lateral pipes - Sewers range in age from 30 to 100 years with an average age of 50 years.
- Cracked sewer pipes - Existing sewers are mostly clay pipes which can crack as they deteriorate with age and also by earth movement.
- Misaligned and open pipe joints - Most of the mortar used to seal the joints between sections of clay pipe has deteriorated.
- Undersized sewer pipe - The existing sewer system is overloaded due to new sewer hook-ups, underground water infiltration, and illegal roof and/or yard drain connections.
- Defective manholes - Old manholes are made of bricks. Typical problems associated with brick manholes are loose bricks, missing bricks, and misaligned manholes.
- Missing and/or unrecorded sewer pipes and manholes - This problem is typical in the easement/backline sewer. Sewer pipe locations shown on the sewer record map are different from the actual sewer location.
- Sewer main under houses and other improvements - Complaints of sewer main alignment crossing the house and other improvements. A solution to this problem requires an agreement with the property owner for a new sewer easement at a relocated line.

Causes of Sanitary Sewer Backups

- Root infiltration - Tree roots are a major cause of backups.
- Water inflow/infiltration - Rain water entering the sewer pipe causes overflows.
- Solids - Typical solids that buildup in the pipe and cause backups are grease, dirt, bones, tampons, paper towels, diapers, broken dishware, garbage, concrete, and debris.
- Structural defects in pipes and manholes - Sags in the line, cracks, holes, protruding laterals, misaligned pipe, offset joints are all possible causes of backups.

Design Considerations

Sanitary sewer overflows can often be reduced or eliminated by a number of practices, in addition to sewer system cleaning and maintenance, including the following:

- Reducing infiltration and inflow through rehabilitation and repair of broken or leaking sewer lines.
- Enlarging or upgrading the capacity of sewer lines, pump stations, or sewage treatment plants.
- Constructing wet weather storage and treatment facilities to treat excess flows.
- Addressing SSOs during sewer system master planning and facilities planning.

Septic Systems

Two field screening techniques that have been used with success at identifying possible locations of failing septic systems are the brightener test and color infrared (CIR) aerial photography. The first involves the use of specific phosphorus-based elements found in many laundry products, often called brighteners, as an indicator of the presence of failing onsite wastewater systems. The second technique uses color infrared (CIR) aerial photography to characterize the performance of septic systems. This method has been found to be a quick and cost-effective method for assessing the potential impacts of failing systems and uses variations in vegetative growth or stress patterns over septic system field lines to identify those systems that may potentially be malfunctioning. Then a more detailed onsite visual and physical inspection will confirm whether the system has truly failed and the extent of the repairs needed. These inspections may be carried out by county health departments or other authorized personnel.

References and Resources

Alameda Countywide Clean Water Program on-line
http://www.ci.berkeley.ca.us/pw/Storm/stormala.html

Los Angeles County Stormwater Quality. Public Agency Activities Model Program. On-line: http://ladpw.org/wmd/npdes/public_TC.cfm

Orange County Stormwater Program
http://www.ocwatersheds.com/StormWater/swp_introduction.asp

Santa Clara Valley Urban Runoff Pollution Prevention Program. 1997 Urban Runoff Management Plan. September 1997, updated October 2000.

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United States Environmental Protection Agency (USEPA). 2001. Illicit Discharge Detection and Elimination. On-line: http://cfpub.epa.gov/npdes/stormwater/menuofbmps/illi_1.cfm

United States Environmental Protection Agency (USEPA). 2001. Pollution Prevention/Good Housekeeping for Municipal Operators Septic System Controls. On-line: http://www.epa.gov/npdes/menuofbmps/poll_14.htm