SWMP
MS4 SPDES PERMIT NYR20A470

TOWN OF PHILIPSTOWN
238 MAIN STREET
COLD SPRING, NEW YORK 10516

POLICIES & PROCEDURES DOCUMENT FOR POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS FOR MS4 SPDES PERMIT COMPLIANCE WITH MINIMUM MEASURE # 6

MARCH 2008

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March 12, 2008

William Mazzuca, Supervisor
Town of Philipstown
238 Main Street
Cold Spring, New York 10516

RE: YEAR 5 POLICIES & PROCEDURES DOCUMENT FOR POLLUTION PREVENTION & GOOD HOUSEKEEPING FOR THE TOWN OF PHILIPSTOWN SWMP PROGRAM

Dear Supervisor Mazzuca:

In accordance with the Town's SPDES Permit, attached are twelve (12) copies of the final version of the Policies and Procedures Document prepared for the Town of Philipstown.

The primary objective of this document is to assist the Town's Highway Department and the Recreation Department in gaining a thorough awareness o of the key elements for a successful program for Pollution Prevention and Good Housekeeping.

Accordingly, this document contains policies and procedures and discusses guiding principles for pollution prevention. In addition, the document (Refer to Appendix A-1 through A-8 and B-1 through B-2) contains USEPA Fact Sheets on the implementation of Best Management Practices (BMPs) for pollution prevention for municipal operations.

After this document has been adopted by the town, please distribute copies, to your administrative, operation and maintenance supervisory staff that may be involved in the stormwater implementation program.

If you have any questions, or wish to discuss any of the above items, please do not hesitate to contact me at 203-431-2683 or by e-mail at cfeconsulting@sbcglobal.net.

Very truly yours,

Wellington J. Carvalho, P.E.
CFE Consulting Services, LLC

TOWN OF PHILIPSTOWN
238 MAIN STREET
COLD SPRING, NEW YORK 10516

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POLICIES & PROCEDURES DOCUMENT FOR POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS FOR MS4 SPDES PERMIT COMPLIANCE WITH MINIMUM MEASURE # 6	
ORIGINAL DOCUMENT DATE ____	**ORIGINAL DOCUMENT PREPARED BY:** Wellington J. Carvalho, P.E. CFE Consulting Services, LLC 638-2 Danbury Road Ridgefield, CT 06877 203-431-2683, 203-438-5018
LATEST REVISION NO. ____	
DATE OF REVISION ____	**Date Prepared: March 10, 2008**

APPROVED BY	DATE	ORGANIZATION

COPY NO _____

ASSIGNED TO: _____

POLICIES & PROCEDURES DOCUMENT FOR POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS FOR MS4 SPDES PERMIT COMPLIANCE WITH MINIMUM MEASURE # 6

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POLICIES & PROCEDURES DOCUMENT FOR POLLUTION PREVENTION AND GOOD HOUSEKEEPING FOR MUNICIPAL OPERATIONS FOR MS4 SPDES PERMIT COMPLIANCE WITH MINIMUM MEASURE # 6

1.0 INTRODUCTION

This Policies and Procedures Document is intended to set a framework for Pollution Prevention and Good Housekeeping programs for municipal operations and facilities in the Town of Philipstown (Town).

Pollution Prevention and good Housekeeping is one of six minimum control measures required under the New York State Department of Environmental Conservation (NYSDEC) SPDES Permit for stormwater discharges.

The key elements for a successful program for Pollution Prevention and Good Housekeeping programs include:

- A coherent and unified approach to setting priorities, policies and procedures for municipal operations
- good record keeping and inventories of all materials purchased and stored at the site
- worker training for all operations related to stormwater management
- adequate staffing for maintenance of equipment and implementation of Best Management Practices (BMPs) for Pollution Prevention and Good Housekeeping programs
- Continued re-evaluation and re-assessment of Pollution Prevention and Good Housekeeping programs and documenting progress of measurable goals achieved

Many of the above elements have already been developed to some degree by the Highway Department and the Recreation Department, the two major departments involved in the municipal operation in the Town of Philipstown. However, the above key elements should be re-visited and priorities revised, as Town continues to upgrade and improve its stormwater management program.

1.1 MINIMUM REQUIREMENTS

Under the SPDES Permit issued by NYSDEC the Town is required to:

- Design and implement an operation and maintenance program to reduce and prevent the 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
- Develop measurable goals to ensure the reduction of all pollutants of concern in

stormwater discharges to the maximum extent practicable

1.2 DEFINITIONS

A listing of definitions used in this document follows:

Stormwater – includes rainwater, surface runoff from rain water and snowmelt as conveyed from the land during a rainfall or snow event

MS4 – Municipal Separate Storm Sewer System not only includes a system of underground storm sewer pipes, catch basins, curbs and storm drains, but includes roads with drainage systems, man-made channels and ditches, designed for collecting or conveying storm water

Land Disturbance – Land disturbance from construction-related activities include the removal of existing vegetative cover, through clearing, grading, excavation and re-shaping of the land, exposing the underlying soil, changing the slope and shape of the land, and thereby resulting in soil erosion and sedimentation

Soil Erosion and Sedimentation – Soil erosion and sedimentation involves the wearing away of loose soil through the action of stormwater runoff, the transportation by the runoff and ultimately the deposition of the soil

Sediment Pollution Damage – Sediment pollution causes physical damage (reduced stream capacity, reduced storm drain capacity, increased flooding and loss of land), chemical damage (water temperature changes from decreased water depth), and biological damage (burying of bottom living organisms, decrease in biological diversity)

Waters of the United States - Waters of the United States include all interstate lakes, coastal waterways, rivers and streams, including wetlands, sloughs, wet meadows, natural ponds, or other waters that could or would affect Waters of the United States

2.0 POLICIES AND PROCEDURES DOCUMENT

This Policies and Procedures Document (Document) has been prepared to ensure strict adherence to New York State Department of Environmental Conservation (NYSDEC) regulations covering the MS4 SPDES Permit NYR20A470, issued to the Town of Philipstown, 238 Main Street, Cold Spring, NY 10516.

2.1 SOURCES OF BEST MANAGEMENT PRACTICES

Several key documents contain a list of Best Management Practices (BMPs) that should be consulted when implementing NYSDEC SPDES Permit requirements for Pollution Prevention and Good Housekeeping. These sources include:

- Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State
- Pollution Prevention/Good Housekeeping for Municipal Operations (USEPA). This document is available at the following web address:

http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm

- New York State – Pollution Prevention Guidance for Small Business and Local Government. This document is available at the following web address:

  http://www.dec.state.ny.us/website/ppu/eppgsblg.pdf

- New York State Stormwater Management Design Manual
- NY Standards and Specifications for Erosion and Sediment Control

The above referenced documents are available for a detailed review on the NYSDEC Stormwater Website at:

http://www.dec.state.ny.us/website/dow/mainpage.htm

- Massachusetts DEP and USEPA Region I, Winter 2001, Unpaved Roads BMP Manual. This document is available at the following web address:

  http://www.berkshireplanning.org/4/download/dirt_roads.pdf

2.2 ADMINISTRATION

The Town representative responsible for the overall administration of this Document, and the approval of any changes to this Document, shall be the Town Supervisor or representative delegated by the Town Supervisor.

3.0 MUNICIPAL OPERATIONS

NYSDEC recommends that municipalities conduct a self-assessment of their existing policies, procedures and activities that relate to pollution prevention and good housekeeping. This assessment should identify both strengths and gaps or revisions needed to be addressed for compliance with Phase II Stormwater Permit. This assessment should be conducted yearly for each of the major municipal operations which, for the Town of Philipstown, include:

- Road Maintenance
- Winter Road Salt/Sanding Applications
- Vehicle and Fleet Maintenance
- Storm Drainage Maintenance
- Parks and Open Space Management

Self assessment should include:

- Review of staff and adequacy of staff
- Training of staff in pollution prevention and good housekeeping
- Proper maintenance of equipment needed for carry out municipal operations

3.1 GUIDING PRINCIPLES FOR POLLUTION PREVENTION

Priorities for pollution prevention, as recommended in NYSDEC document, * should include:

- **Preventing Pollution at its Source**
  Examples include:
  - sweeping streets
  - secondary containment at storage sites
  - re-vegetating eroding slopes
  - animal waste collection and management

- **Manage Clean Water Runoff and Minimize Pollutant Exposure to Clean Water.**
  Examples include:
  - covering of storage soil/chemical materials stock piles
  - roof drainage management
  - site drainage capture through silt fencing
  - site runoff diversion
  - maximizing of infiltration of runoff
  - seeding to control erosion

- **Minimize Use of Potential Pollutants**
  Examples include:
  - reduced or alternative pesticide use
  - reduced fertilizer use
  - reduced road salt and abrasive use
  - reduced or alternative exterior cleaning product use

- **Plan for Spills and Accidents**
  Examples include:
  - providing secondary containment
  - assigning responsible person/team for response
  - posting of procedures and emergency contacts

- **Practice Preventive Maintenance**
  Examples include:
  - providing containment of minor leaks and spills with drip pans, absorbent pads
  - use of dry cleanup methods rather than washing
  - establishing inspection calendar and incorporate into records/data system
  - establishing equipment maintenance and calibration calendar and incorporate into records/data system

(* from May 2006, NYSDEC Municipal Pollution Prevention and Good Housekeeping Program Assistance)

- **Practice Preventive Maintenance**
  Examples include:
  - providing containment of minor leaks and spills with drip pans, absorbent pads
  - use of dry cleanup methods rather than washing
  - establishing inspection calendar and incorporate into records/data system
  - establishing equipment maintenance and calibration calendar and incorporate into records/data system

- **Identifying and Inspecting Potential Pollution Sources**
  Examples include:
  - all material storage sites, especially those with any outside loading or unloading operations
  - all fueling sites
  - all drainage structures and components
  - all pesticide/fertilizer application areas
  - all winter salt /sanding storage stock pile areas

- **Planning of New Facilities to Include Stormwater Pollution Prevention**
  Examples include:
  - minimizing of impervious surfaces
  - maintaining stream buffers zones
  - infiltration of runoff
  - elimination of pollutant exposure
  - providing spill containment measures and stormwater management practices

- **Improving of Data Collection, Mapping and Records Maintenance**
  Examples include:
  - incorporating geographic information systems into pollution prevention planning
  - maintenance of chemical usage data
  - keeping inspection, repair and maintenance records up to date

- **Train and Reward Employees**
  Examples include:
  - seeking of employee ideas on pollution and prevention practices
  - rewarding of employees who participate in pollution prevention programs
  - providing staff training on stormwater pollution prevention practices
  - providing fact sheets and web postings on pollution prevention

- **Improve Communications and Coordination**
  Examples include:
  - coordinate stormwater pollution prevention with county and state agencies
  - develop public outreach and citizen participation
  - post informational signs at special project sites
  - encourage participation by citizens in special events such as hazardous waste collection community cleanup days

3.2 USEPA FACT SHEETS FOR POLLUTION PREVENTION

The following USEPA Fact Sheets have been included in the Appendix of this Document:

- Appendix A-1 - Materials Management
- Appendix A-2 - Municipal Vehicle and Equipment Maintenance
- Appendix A-3 - Municipal Vehicle and Equipment Washing
- Appendix A-4 - Parking Lot and Street Cleaning
- Appendix A-5 - Storm Drain System Cleaning
- Appendix A-6 - Road Salt Application and Storage
- Appendix A-7 - Spill Response and Prevention
- Appendix A-8 - Municipal Landscaping
- Appendix B-1 - Unpaved Roads
- Appendix B-2 - Parking Lot Construction/Reconstruction

APPENDIX A-1
MATERIALS MANAGEMENT

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

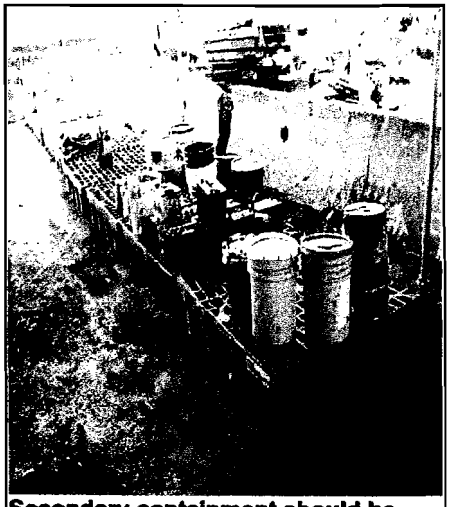
Materials Management

Click here to comment on this fact sheet

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Facilities

Description



Secondary containment should be used to prevent materials from contaminating stormwater

Responsible management of 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 development, use, and disposal. 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 be easily 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 the potential to pollute stormwater runoff.

Another consideration is regular material inventories [PDF - 109 KB - 4 pp]. 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 facility consists of three major steps (USEPA, 1992):

- Identify all hazardous and nonhazardous substances present at 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 at 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.

References

WEF and the ASCE. 1998. *Urban Runoff Quality Management.* WEF Manual of Practice No. 23 and ASCE Manual and Report on Engineering Practice No. 87. Water Environment Federation, Technical Practice Committee, Water Quality and Ecology Subcommittee, Alexandria, VA, and American Society of Civil Engineers, Urban Water Resources Research Council, Reston, VA.

USEPA. 1992. *Stormwater Management for Industrial Activities.* U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Click here to comment on this fact sheet

APPENDIX A-2
MUNICIPAL VEHICLE AND EQUIPMENT MAINTENANCE

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Municipal Vehicle and Equipment Maintenance

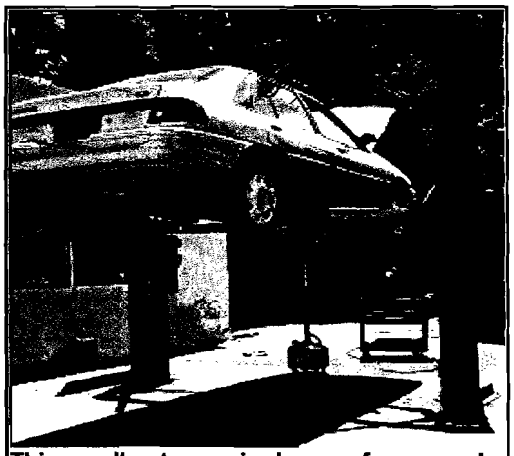
Click here to comment on this fact sheet

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

Description

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:



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

- 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 EXIT Disclaimer 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

Alameda Countywide Clean Water Program. 1992. *Keeping it all in tune: Car repair and pollution prevention*. Alameda Countywide Clean Water Program, Hayward, CA.

Center for Watershed Protection. 1995. Auto Recyclers-Onsite BMPs Mitigate Urban Runoff Hotspots. *Watershed Protection Techniques*, Vol 1, No. 4.

Natural Resources Defense Council. 1999. *Stormwater Strategies: Community Responses to Runoff Pollution.* Natural Resources Defense Council, Inc, New York, NY.

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APPENDIX A-3
MUNICIPAL VEHICLE AND EQUIPMENT WASHING

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Municipal Vehicle and Equipment Washing

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

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

California Stormwater Quality Association (CASQA). 2004. California Stormwater Industrial/Commercial Best Management Practice Handbook. Stormwater Quality Task Force, Sacramento, CA.

Center for Watershed Protection. 1999. On Watershed Behavior. Watershed Protection Techniques 3(3): 671-679.

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APPENDIX A-4
PARKING LOT AND STREET CLEANING

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Parking Lot and Street Cleaning

Click here to comment on this fact sheet

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

Description

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

Streets, roads, highways and parking lots accumulate significant amounts of pollutants that contribute to stormwater pollutant runoff to surface waters. Pollutants, including sediment, debris, trash, road salt, and trace metals can be minimized by street sweeping. 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 Sweepers

Municipalities can choose between the three different types of street sweepers (mechanical, regenerative air and vacuum filter) keeping in mind the targeted pollutants, pollutant type (large debris to particles less than 10 microns in diameter (PM10)), types of surfaces, travel distances, noise ordnances, and costs. Municipals often find it useful to have a compliment of each type of street sweeper in their fleet (CASQA, 2003).

Each type of street sweeper has it advantages and disadvantages concerning pollutant removal effectiveness, traveling speed, and noise generated by the street sweeper. With the different types of modern street sweepers capable of removing PM10 particles, price and personal preference are the primary selection criteria for most users (Keating, no date). No definitive independent studies have yet been staged to determine "the best" sweeping system. Anecdotal data has also been inconclusive (Keating, no date).

Applicability

Street sweeping is practiced in most urban areas, often as an aesthetic practice to remove trash, sediment buildup, and large debris from curb gutters (RIPDES, no date). Effective street sweeping programs can remove several tons of debris a year from city streets minimizing pollutants in stormwater runoff. In colder climates, street sweeping can be used during the spring snowmelt to reduce pollutants in stormwater runoff from road salt, sand and grit.

Implementation

An effective municipal street sweeping program should address at a minimum the following components:

Street Sweeping Schedule: Designing and maintaining a street sweeping schedule can increase the efficiency of a program. A successful program will need to be flexible to accommodate climate conditions and areas of concern. Areas of concern should be based on traffic volume, land use, field observations of sediment and trash accumulation and proximity to surface waters (CASQA, 2003). Street sweeping in these areas may need to be increased and the schedule amended. It is recommended that schedules include minimum street sweeping frequencies of at least once a year. In cold climates prone to snowfall the Connecticut Department of Environmental Protection recommends that municipalities conduct street sweeping as soon as possible after the snow melts (McCarthy, 2005). Removal of the accumulated sand, grit, and debris from roads after the snow melts reduces the amount of pollutants entering surface waters.

To evaluate the effectiveness of a street sweeping program, municipalities should maintain accurate logs of the number of curb-miles swept and the amount of waste collected (CASQA, 2003). Monthly or yearly intakes (per ton) can be measured per district, road, season, or mile. This information can be used to develop a written plan, schedule, and periodic re-evaluation for street sweeping that would target the following:

- those roadways with contributing land uses (high level of imperviousness, high level of industrial activity) that would be expected to show high pollutant concentrations and
- those roadways that have consistently accumulated proportionately greater amounts of materials (pounds per mile swept) between currently scheduled sweeps (Curtis, 2002).

Gross intake amounts can be presented to regulatory agencies and to finance directors to measure performance. The City of Dana Point, California reported that when sweeping was conducted twice a month, the monthly debris intake was 23 tons. Dana Point then increased street sweeping frequency to a weekly basis and the monthly total increased to 46 tons of debris (City of Dana Point, 2003).

Street Sweepings Storage and Disposal: Street sweeping material often includes sand, salt, leaves, and debris removed from roads. Often the collected sweepings contain pollutants and must be tested prior to disposal to determine if the material is hazardous. Municipals should adhere to all federal and state regulations that apply to the disposal and reuse of sweepings.

Municipalities are encouraged to develop comprehensive management plans for the handling of sweepings. A critical aspect of a management plan is selecting a location for storing and processing street sweepings (McCarthy, 2005). Storage locations should be equipped with secondary containment and possibly overhead coverage to prevent stormwater 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. To estimate the size of the storage location, estimate the volume of sweepings either on a ton-per-street mile or on pounds-per-capita basis (McCarthy, 2005). An average figure for urban areas is 20.25 tons-per street-mile (McCarthy, 2005).

Street Sweepings Reuse Practices: Although sweepings may contain pollutants, federal

and state regulations may allow the reuse of sweepings for general fill, parks, road shoulders and other applications as long as the material is not a threat to surface waters. Prior to reuse, trash, leaves, and other debris from sweepings should be removed by screening or other methods (MPCA, 1997). Trash and debris removed should be disposed of by recycling or sent to a landfill (MPCA, 1997).

Parking Policy: Established parking policies increases the effectiveness of a street sweeping program. Parking policies can be established as city ordinance and incorporate 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 (CASQA, 2003).

Operation and Maintenance Program: A municipality should dedicate time for daily and weekly equipment maintenance. Regular maintenance and daily start up inspections insures that street sweepers are kept in good working condition (City of Greeley, 1998). It is vital for municipals to inventory and properly stock parts to prevent downtime and decrease productivity. Old sweepers should be replaced with new technologically-advanced sweepers, preferably modern sweepers that maximize pollutant removal (CASQA, 2003).

Limitations and Cost Considerations

Street sweeping programs are limited by costs. The largest expenditures include staffing and equipment (CASQA, 2003). The capital cost for a conventional street sweeper is between $60,000 and $120,000 with newer technologies approaching $180,000 (CASQA, 2003). Street sweepers have an average life span of 4 years yet more modern street sweepers have been reported to surpass the 4 year average, therefore programs must budget for equipment replacement. The following table shows cost estimates compared to equipment life span and operation and maintenance for two types of sweepers: mechanical and vacuum.

Table 1. Estimated costs for two types of street sweepers

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

Effectiveness

Street sweeping can be an effective measure in reducing pollutants in stormwater runoff. During the year 2000, the Department of Highway Services and Bethesda Urban Partnership in Montgomery County, Maryland swept approximately 14,373 miles of roadways and removed 2,464 tons of materials (Curtis, 2002). Decreasing the amount of pollutants in roads before they are picked up by stormwater runoff reduces pollutants in surface waters.

Using modern efficient street sweepers may reduce the need for other structural stormwater controls. Municipal stormwater managers should compare potential benefits and costs of street sweeping. Street sweeping may prove to be more cost-effective than certain structural controls, especially in more urbanized areas with greater areas of pavement (SMRC, Rhode Island).

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APPENDIX A-5
STORM DRAIN SYSTEM CLEANING

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Storm Drain System Cleaning

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

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). Cleaning increases dissolved oxygen, reduces levels of bacteria, and supports 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 (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)

Some common pollutants found in storm drains include:

- trash and debris
- sediments
- oil and grease
- antifreeze
- paints
- cleaners and solvents
- pesticides
- fertlizers
- animal waste
- detergents

Applicability

This measure applies 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):

- Cleaning storm drains by flushing is more successful for pipes smaller than 36 inches in diameter.
- A water source is necessary for cleaning.
- 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

Ferguson et al. (1997) report removal of 55 to 65 percent for non-organic 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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APPENDIX A-6
ROAD SALT APPLICATION AND STORAGE

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Road Salt Application and Storage

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Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

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 occurs in 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 stormwater. 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 EXIT Disclaimer website.

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.

Table 1. Deicing Alternatives (Keating, 2004)

Substance	Cost	Characteristics
Calcium Chloride ($CaCl_2$)	Flake $290/ton, pellet $340/ton	• Melts ice at temperatures of -25 ° F • If used as recommended, will not harm vegetation
Magnesium Chloride ($MgCl_2$)	Flake $260/ton, pellet $300/ton	• Lowest practical temperature: 5 ° F • If used as recommended, will not harm vegetation; however, $MgCl_2$, on a percentage basis, contains 17-56% more chloride ion than other salt-type deicers
Potassium Chloride (KCl)	$240/ton	• Lowest practical temperature: 12 ° F • Will not harm vegetation
Urea	$280/ton	• Lowest practical temperature: 15 ° F • Will not harm vegetation
Calcium Magnesium Acetate (CMA)	$2,000/ton	• Will work below 0 ° F • Low toxicity and biodegradable

Maintenance Considerations

Covering stored road salts may be costly; however, the benefits are greater than the perceived costs. Properly storing road salts prevents the salt from lumping together, which makes it easier to load and apply. In addition, covering salt storage piles reduces salt loss from stormwater 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.

If used 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 roadways 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 mounted in the cabs of spreader-trucks help maintenance workers apply the proper amount of road salt. Alternative materials, such as sand or gravel, should be used in especially sensitive areas.

Cost Considerations See Table 1 for the costs of different deicing alternative substances.

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APPENDIX A-7
SPILL RESPONSE AND PREVENTION

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Spill Response and Prevention

Click here to comment on this fact sheet

Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Facilities

Description

Spill response and prevention plans should clearly state how to stop the source of the spill, how to contain and clean up the spill, how to dispose of contaminated materials, and how to train personnel to prevent and control future spills.

A person works to prevent a spill from entering a storm sewer (DAWG, 2000)

Applicability

Construction sites that use or store hazardous materials should have a spill prevention and control plan. Hazardous materials include pesticides, paints, cleaners, petroleum products, fertilizers, and solvents. See the Hazardous Materials Storage fact sheet for more information on storing these materials.

Siting and Design Considerations

Identify potential spill or source areas, such as loading and unloading, storage and processing areas, places that generate dust or particulate matter, 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 should be taken to reduce spill potential and impacts on stormwater 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 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 or filling procedures that minimize spills from tanks and other equipment.
- Replacing toxic materials with less or non-toxic products.

Provide documentation of spill response equipment and procedures to be used, ensuring that procedures are clear and concise. Give step-by-step instructions for spill response 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.
- Describe safety measures to take 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 or prevented. Some municipalities have set up 1-800 numbers for citizens to call in the event of spills. This helps ensure 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. A well conceived plan reduces the likelihood of accidental spills and helps speed an effective response if they occur. Training might be necessary to ensure that all workers can 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 effectively reduces the risk of surface and ground water contamination. However, to be effective, workers must be trained, materials and cleanup equipment available, and procedures 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 increases labor costs.

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APPENDIX A-8
MUNICIPAL LANDSCAPING

U.S. ENVIRONMENTAL PROTECTION AGENCY

National Pollutant Discharge Elimination System (NPDES)

Municipal Landscaping

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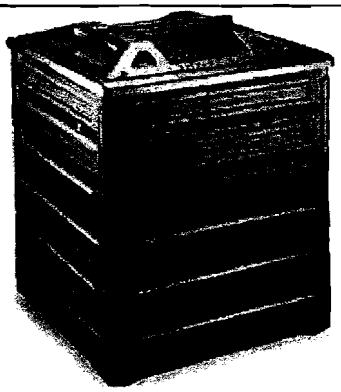
Minimum Measure: Pollution Prevention/Good Housekeeping for Municipal Operations

Subcategory: Municipal Activities

Description



A typical composting bin (Source: Alameda County Waste Management Authority, 2001)

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.

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 EXIT Disclaimer 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 EXIT Disclaimer 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.)

The following websites provide education and information regarding safe pesticide use and disposal:

- University of Nebraska's Pesticide Education Resources EXIT Disclaimer
- University of Illinois College of Agricultural, Consumer, and Environmental Sciences' Pesticide Safety Education EXIT Disclaimer
- Pennsylvania State University Pesticide Education Program's Pesticide Urban Initiative EXIT Disclaimer
- Washington State University's Pesticide and Environmental Stewardship EXIT Disclaimer
- National Coalition Against the Misuse of Pesticides'Beyond Pesticides EXIT Disclaimer
- Cornell University's Pesticide Management Education Program EXIT Disclaimer
- The Pesticide Education Center EXIT Disclaimer

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 EXIT Disclaimer 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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APPENDIX B-1
UNPAVED ROADS

FACT SHEET ON UNPAVED ROADS

(From Unpaved Roads BMP Manual, Winter 2001, prepared for Massachusetts DEP, Bureau of Resource Protection and USEPA)

ROAD SURFACES

Unpaved roads generally carry local traffic between rural lands and villages, and provide connecting links between paved collector roads.. The top layer of gravel on these roads must be shaped, compacted, and smoothed to ensure a good riding surface and to allow runoff to move quickly from the road surface to established drainage ways.

IMPORTANCE TO WATER QUALITY

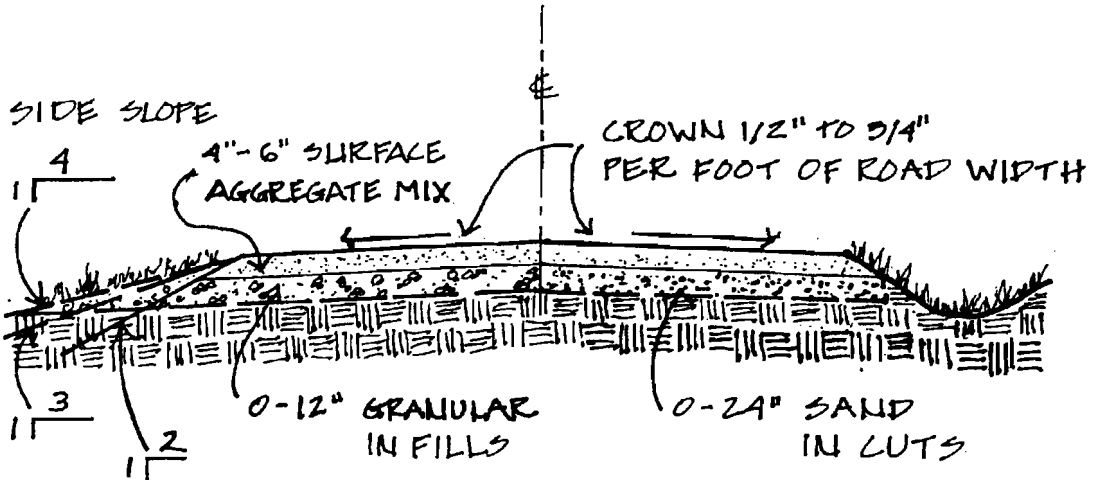
Surface water that is not effectively conveyed from the road surface to a drainage channel can result in deterioration of the road surface, safety problems resulting from ice build up, and various erosion problems. Immediate removal of runoff from the road surface will prevent many of the problems associated with surface deterioration. This will lengthen the life of the road surface, as well as lessen maintenance frequency and costs. It will also decrease the amount of sediment carried by road runoff into waterways.

GENERAL ROAD SURFACE PRINCIPLES

☑ Preserve and maintain a proper road crown for good drainage (free water cannot be allowed to stand in ruts or potholes or it will soak into the surface.)

☑ Keep the road surface tight and impervious.

☑ Perform regular drainage maintenance and grading.



GUIDELINES FOR GRADING

- Grade roads in the spring as soon as the frost leaves the ground, or as soon as possible after a rain while the surface materials are still moist but not wet.
- Limit the amount of road surface disturbed to that which can be stabilized by the end of the workday.
- Grade when gravel is moist after or during a light rain (do not grade if heavy rain is in the forecast.)
- Crown roads 1/2 to 3/4 inch for each foot of road width, measured from the center of the roadway to the outside edge, to ensure good drainage.
- Outslope roads with over-the-bank drainage problems entirely toward the ditched side of the road.
- When possible, compact the entire width of the newly graded roadway with a steel wheel roller by end of day.
- Scarify the existing surface to blend the soils and improve compaction.
- Add approximately 2 to 3 inches of new material to correct any faults.
- Add new material by running a truck down the center of the roadway and dumping; then blend the old material with the new using a grader, followed by compaction using a steel wheel roller.
- Regravel road surface every 4 to 5 years with 2-3 inches of new gravel; this should be built into the regular operations budget rather than a capital expenditure.
- A recommended aggregate mix would be uniformly graded from coarse to fine; approximate sizes for surface composition are: soil (<.074 mm), sand (.074-2.0 mm) and aggregate (>2.0 mm.)
- Be sure not to leave a gravel or sod berm between the road and the ditch slope.

GENERAL EROSION CONTROL PRINCIPLES

☑ Keep disturbed areas small. As you increase the amount of disturbed earth, you increase the likelihood of soil erosion.

☑ Stabilize disturbed areas ASAP. Bare, disturbed soil is likely to erode, especially during a rainstorm. Use grass seed, hay mulch, erosion control matting, silt fence, etc. to minimize the loss of soil from the site.

☑ Keep water velocities low by retaining vegetation on site. Water that moves slowly is less likely to cause erosion. Removing grass, vegetation, and topsoil increases the amount and speed of runoff.

☑ Protect disturbed areas from stormwater runoff. Use the BMPs outlined in this manual (e.g. diversion ditches) to prevent water from entering and running over disturbed areas.

☑ Keep sediment within work boundaries. Retain sediment at the work site by filtering water as it flows and detaining "dirty" water for a period so that soil particles and nutrients settle out.

☑ Follow up and inspect recent work. At the end of the workday, check to make sure all erosion controls are in place and working properly. Make repairs if necessary.

☑ Visit recently completed jobs as often as possible, but especially after a rainstorm, to check on stabilization efforts and potential problems.

Matrix of Road Surface BMP's For Maintenance Work

What you observe...	*How bad is the problem...*	*How to fix it...*
Improper drainage	Minor	☑ Grade shoulders and ditches ☑ Clean ditches ☑ Install waterbars if appropriate
Improper drainage	Major	☑ Clean ditches ☑ Reconstruct surface, base, and drainage ☑ Install waterbars if appropriate
Dust	Minor	☑ Apply liquid/solid dust control
Dust	Major	☑ Add minor gravel, regrade, compact
Improper Cross Section	Minor	☑ Reshape (blading or dragging), ☑ Reshape with minor added material
Improper Cross Section	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Potholes	Minor	☑ Spot regravelling
Potholes	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Rutting	Minor	☑ Reshape (blading or dragging) ☑ Reshape with minor added material
Rutting	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Loose Aggregates *or* Ravelling	Minor	☑ Reshape (blading or dragging) ☑ Reshape with minor added material
Loose Aggregates *or* Ravelling	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Corrugations	Minor	☑ Reshape (blading or dragging) ☑ Reshape with minor added material
Corrugations	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Soft Spots	Minor	☑ Reshape (blading or dragging) ☑ Reshape with minor added material
Soft Spots	Major	☑ Regrade ☑ Add major gravel, regrade, compact
Depressions	Minor	☑ Reshape (blading or dragging) ☑ Reshape with minor added material
Depressions	Major	☑ Regrade ☑ Add major gravel, regrade, compact

Matrix of Ditch BMP's for Maintenance		
What you observe...	*How bad is the problem...*	*How to fix It...*
Erosion in Ditch	Minor	☑ Perform regular maintenance ☑ Line ditch appropriately ☑ Install velocity controls*
Erosion in Ditch	Major	☑ Perform regular maintenance ☑ Regrade ditch ☑ Line ditch appropriately ☑ Install velocity controls*
Ditch can't handle volume	Minor	☑ Install ditch turnouts ☑ Increase ditch width/depth
Ditch can't handle volume	Major	☑ Install ditch turnouts ☑ Construct diversion itches/berms ☑ Increase width/depth

** When making decisions about the use of velocity controls, keep in mind that the size of the ditch and amount and velocity of the water will determine the type and the design. The use of velocity controls in anything but a small shallow ditch should generally be referred to an engineer to ensure appropriate design.*

Matrix of Culvert BMP's		
What you observe...	*What the Reasons Might Be...*	*How to fix it...*
Scouring/erosion at the inlet	• Ditch too steeply graded • Poor location/alignment • Clogged pipe	☑ Line the inlet with stone ☑ Properly align the culvert ☑ Clean/flush the culvert
Scouring/erosion at the outlet	• Pipe sloped too much • Pipe is too small	☑ Build a stone splash pad ☑ Check size and replace with larger pipe if necessary
Ponded or puddled water	• Invert is too high • Ditch grade is too flat	☑ Reset the pipe to match the invert to the channel bottom ☑ Regrade ditch to maintain correct flow
Dented/crushed ends	• Traffic/snow plows are hitting the ends	☑ Fix pipe ends; mark and protect
Heavy corrosion	• Water flowing through the culvert is acidic	☑ Install a sleeve of PVC in the existing pipe or replace the steel pipe with a non-corrosive pipe (PVC, aluminum, concrete)
Piping around the outlet	• Pipe is incorrectly installed, resulting in water flowing outside the pipe	☑ Reinstall pipe with proper bedding and compaction ☑ Install a headwall
Sediment build-up	• Not enough slope	☑ Reinstall pipe with a slope of at least ¼" per foot
Objects blocking the pipe	• Debris traveling from the ditch to the culvert	☑ Remove blockage ☑ Install check dams upstream
Sagging bottom	• Foundation material has settled on or has low bearing capacity	☑ Reinstall pipe with suitable and properly compacted foundation material
Crushed top	• Not enough cover • Soil around walls not compacted • Traffic loads are too heavy	☑ Add cover ☑ Reinstall pipe deeper and/or with suitable and properly compacted bedding material ☑ Install multiple smaller pipes or pipe with different shape ☑ Replace with stronger pipe

Matrix of Outlet Protection BMP's		
What you are trying to achieve...	*How to achieve it...*	*Consideration for use...*
Natural sediment filter Improved appearance	• Natural filter zones • Enhanced or created filter zones	☑ Little maintenance required, low cost.
Slow velocity of water at outlet Control or reduce erosion at outlet Settle out sediments	• Rock apron	☑ Use only where there is an adequate filter strip between outlet and waterbody.
	• Rip rap conveyance channel*	☑ Use on fill slopes, steep slopes where outlet flows close to surface waters.
	• Splash/plunge pool*	☑ Use where storage of runoff is necessary before discharge.
	• Level spreader*	☑ Changes concentrated flow into sheet flow.

*May require site-specific engineering assistance.

Matrix of Bank Stabilization BMP's			
Bank Stabilization Technique	*Examples*	*Appropriate Uses*	*Role of Vegetation*
Grading Techniques	-Cut and fill -Notching -Terracing -Counterweights	On slopes no greater than 2H:1V and where structural stabilization techniques not needed	Once re-established, will act as adequate stabilizer
Vegetative	-Seeding of grass -Hydroseeding	Use on slopes where slight to moderate stabilization is needed to control water and wind erosion and minimize frost effects	Control weeds, bind and retain soil, filter soil from runoff, intercept raindrops, and maintain infiltration
Bioengineering Techniques* (trees & shrubs)	-Live Fascine -Live Stakes -Brushlayering -Sprigs and plugs	Control rills and gullies Control movement of soil Filter sediment	Same as above, but also reinforce soil, minimize downslope movement of soil, improve appearance
Combinations*	-Live cribwall -Vegetated gabion -Vegetated rock wall -Joint planting	Same as above, but also control erosion on cut and fill slopes subject to scour and erosion	Same as above, but also reinforce soil, minimize downslope movement of soil, improve appearance
Structural*	-Rock wall -Gabion baskets -Rip rap -Geotextiles, mats and blankets	Use on eroding slopes with seepage problems and/or slopes with non-cohesive soils	Not applicable

* May require site-specific engineering assistance.

APPENDIX B-1
PARKING LOT CONSTRUCTION/RECONSTRUCTION

Modifications to FAQ # 40.

Finalized: September 12, 2006

40. Is the repaving of a road or parking lot considered a construction activity that requires permit coverage (GP-02-01)?

A: Repaving, as defined herein, is an activity which does not require permit coverage. Repaving is defined as the resurfacing of an existing pavement/concrete road or parking lot, or resurfacing of a road or parking lot that has under gone grinding or milling operations, where a layer of pavement or concrete remains after the grinding or milling. Construction activity that does not result in land disturbance (soil exposure) is not required to obtain coverage under GP-02-01.

40A. Does road or parking lot reconstruction require permit coverage?

A: Road or parking lot reconstruction is defined as removal of the full depth of the pavement/concrete layer(s) with varying levels of disturbance to the subbase and subgrade layers. Road or parking lot reconstruction may or may not require permit coverage. The need for permit coverage is based on factors such as the type and thickness of the subbase layer and the level of disturbance of the subbase layer. The following criteria should be used to determine which road and parking lot reconstruction projects are considered regulated land disturbances that require permit coverage:

- If the existing subbase material is not a processed crushed stone, washed stone (e.g. mixed ones and twos), or a material equivalent to NYS DOT subbase course (see Section 304 of NYS DOT Standard Specifications); the project will require permit coverage if the total disturbance (including other site disturbances) is one or more acres.

- If the existing subbase layer on the road or parking lot reconstruction project is less than 6 inches in depth, the project will require permit coverage if the total disturbance (including other site disturbances) is one or more acres.

- If the road or parking lot reconstruction involves the complete removal of the subbase layer or disturbance of the bottom 6 inches of the subbase layer (less than six inches of subbase would remain after removal of pavement/concrete), the project will require permit coverage if the total disturbance (including other site disturbances) is one or more acres.

- If the subbase layer is six inches or more in depth after the removal of the pavement/concrete layer(s) and the subbase material is equivalent to one of the materials specified in the first bullet above, that area is not considered a regulated disturbance and should not be included when calculating the total disturbance.