

# Wellsville City



## Storm Water Management Plan

2010

# Wellsville Storm Water Management Program

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**WELLSVILLE CITY**

**STORM WATER**

**MANAGEMENT PROGRAM**

**UPDES Permit Number 090033**  
**Coverage Dates August 1, 2010 – July 31, 2015**

November 2010

By: J-U-B ENGINEERS, Inc.



**J-U-B ENGINEERS, INC.**

## **INTRODUCTION**

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. EPA's Storm Water Phase II Rule establishes an MS4 storm water management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that are introduced into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides and fertilizers from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a storm water management program as a means to control polluted discharges from these MS4s. The Storm Water Phase II Rule extends coverage of the NPDES storm water program to certain "small" MS4s but takes a slightly different approach to how the storm water management program is developed and implemented. This approach includes the development of a Storm Water Management Program.

### **Storm Water Management Program**

A Storm Water Management Program should:

- Reduce the discharge of pollutants from the MS4,
- Protect water quality and
- Satisfy the appropriate water quality requirements of the Utah Water Quality Act

Storm water management programs must include:

- Six minimum control measures;
  1. Public Education and Outreach
  2. Public Participation/Involvement
  3. Illicit Discharge Detection and Elimination
  4. Construction Site Runoff Control

## 5. Post-Construction Runoff Control

## 6. Pollution Prevention/Good Housekeeping

- BMPs that will be implemented in each of the six minimum control measures;
- Measurable goals for each BMP (i.e., narrative or numeric standards used to gauge program effectiveness);
- Estimated months and years in which actions to implement each measure will be undertaken, including interim milestones and frequency; and
- The person or persons responsible for implementing or coordinating the storm water program.
- As of November 1, 2010, the SWMP must have an ongoing documentation process as outlined in permit section 4.1.2.
- The municipality must track inspections, enforcement actions, and public education activities.
- Resources to meet the permit requirements are the responsibility of the municipality.
- Annual reports of financial and employee resources must be filed.

### **Permit Requirements**

The best management practices (BMPs) to address the target pollutants found in Wellsville measurable goals to implement the BMPs, submitted in the Notice of Intent as a permit application, become the required storm water management program; however, the Division can require changes to parts of the SWMP and supplementary documents if all or some of them are found to be inconsistent with the provisions of the Permit.

#### **Reports**

Reports must be submitted annually and are due on October 1<sup>st</sup> of each year. The reports must be submitted using the report form found on the division website. They must also be certified by the signing authority.

#### **Record Keeping**

Records required by the NPDES permitting authority must be kept for at least five (5) years and made accessible to the public at reasonable times during regular business hours. Records need not be submitted to the NPDES permitting authority unless the permittee is requested to do so.

**Schedule**

The current Small MS4 Permit is effective August 1, 2010.

Revised SWMP documents are due December 1, 2010 at the Division Offices.

Implementation of a documentation procedure is required 90 days from August 1, 2010.

The current Small MS4 Permit expires July 31, 2015.

**Penalties**

Violations of the permit may result in a fine of up to \$10,000 per day.

Willful or negligent violations of the permit may result in a fine of up to \$25,000 per day.

Secondary violations of the permit are punishable up to \$50,000 per day.

## WELLSVILLE CITY CHARACTERISTICS

### General Information

The Wellsville City Storm Drain System falls under the Public Works Department for the City and is overseen by the City Manager. The City Manager can be contacted at the following address and phone number:

Mr. Don Hartle  
75 E Main St.  
PO Box 6  
Wellsville, UT 84339  
(435) 245-3686

Some general information for Wellsville City follows:

**Population:** 3,272 (July 2009)

**Size:** 2.83 sq. miles

**Geographic Description:** Located on the west side of Cache Valley at the foot of the Wellsville mountain range with elevations ranging from 4480 to 4680.

**Receiving Waters:** Wellsville is a drainage basin for Cutler Reservoir and the Little Bear River.

**Annual Precipitation:** 17.36 inches per year

**Type of Community:** A small rural city with moderate rates of residential growth that are expected to continue for many years.

**Latitude:** 41.63° N

**Longitude:** 111.93° W

The Wellsville storm water system consists of mostly swales, ditches and culverts with some curb and gutters and a few typical piped sections. Most storm water facilities drain into irrigation canals or ditches that eventually empty into the Little Bear River which is a tributary to Cutler Reservoir. The canals and ditches have served as the recipient for storm water flows since the canals and ditches were first built. Very few controls exist within the system. The majority of the streets use swales and ditches to collect storm water runoff with the remaining using curbs and gutters. The city has sanitary sewer service hookups. The sewage is treated at a series of ponds located to the northeast of the city adjacent to the Little Bear River.

The Wellsville storm drain system is basically independent of other communities. The city boundaries extend from the foothills on the west to east of Hwy-89 approximately ½ of a mile on the southeast. It is bounded by unincorporated Cache County.

## **History**

Wellsville is located at the base of the Wellsville Mountain and is Cache County's oldest permanent settlement. It occupies the southwest corner of Cache Valley. In 1856, William H. Maughan was one of the first to settle the area. It was named Maughan's Fort after him. In 1859, Maughan renamed the area Wellsville in honor of Daniel H. Wells. Wellsville was incorporated in 1866 with William H. Maughan as the first mayor.

An abundance of water coupled with its favorable location helped the settlement flourish. There was soon a grist mill, saw mill, brickyard, dairies, co-op, tannery, granaries, ice house, slaughter house, and lush crops growing in the fertile soil.

The chief industries now, as in earlier days, are associated with the soil. There are several fine dairy herds and beef production operation. The business district is now smaller than it was several decades ago, but there are still a few commercial entities. The community is predominately residential so many of the residents are employed outside the community.

## **Local Water Quality Concerns**

The water quality within the City of Wellsville is relatively good. The Little Bear River has been identified as protected under Section 303(d) of the Clean Water Act. The Cutler Reservoir is also listed on the 303d list. The hope and intent of this Storm Water Management program (SWMP) is to maintain that status and possibly even improve the current water quality.

The storm water in Wellsville City drains to a series of canals or ditches that run into existing waterways that contribute to the Little Bear River. For the most part, the existing system has worked well. Continued growth is expected to put some pressure on canal, ditch and swale capacities. In the future it is anticipated that some infrastructure improvements may need to be made to deal with capacity issues. It is likely that these improvements will be made on an "as-needed" basis.

Based upon TMDL's of the Little Bear and Cutler Reservoir along with routine activities within Wellsville, target pollutants for Wellsville City have been identified as the following:

- BOD<sub>5</sub>
- Nitrate as N
- Total Nitrogen (TN)
- Total Phosphorus (TP)
- Total Dissolved Solids (TDS)
- Total Suspended Solids (TSS)
- E. coli

- Oil & Grease
- Turbidity

Wellsville’s SWMP has been geared toward small city applications, targeting the pollutants mentioned. The focus of this plan is to meet the requirement of the Phase II Small Municipal Separate Storm Sewer Systems Permit within the community while trying to stay in harmony with the rural nature of the community and within the existing budget structure.

### Threatened or Endangered Species

The construction of storm water facilities in Wellsville may result in effects to threatened or endangered (T & E) species. Threatened and endangered species are overseen by the Utah Division of Wildlife Resources. Current lists of T&E Species are found at <http://dwrcdc.nr.utah.gov/ucdc/> Listed species for Cache County include:

Species	Status
Maguire Primrose	Threatened
Ute Ladies’ Tresses	Threatened
Yellow-billed Cuckoo	Candidate
Greater Sage-grouse	Candidate
Brown Bear	Threatened (Extirpated)
Canada Lynx	Threatened

A review of the site should be made for these species during planning, design and review. If possible impact may occur to these species, contact the Division of Wildlife Resources.

### Historic Properties

The construction of storm water facilities may result in effects to historic properties. Historic properties may include houses, buildings, ditches, headwalls, or other constructed features that are 50 or more years old. Where historic features are potentially affected, a qualified historian must undertake the following:

- Determine the extent and characteristics of the historic property
- Determine the effect on the historic property
- Coordinate findings with the State Historic Preservation Office

If further information is needed contact the State Historic Preservation Office at [http://history.utah.gov/state\\_historic\\_preservation\\_office/index.html](http://history.utah.gov/state_historic_preservation_office/index.html) or [Jim Dykman](#) or [Lori Hunsaker](#) at 801/533-3555

Wellsville’s SWMP has been geared toward small city applications, targeting the pollutants mentioned. The focus of this plan is to meet the Phase II Small Municipal Separate Storm Sewer Systems Permit within the community, trying to stay in harmony with the rural nature of the community and within the existing budget structure.

## Steering Committee

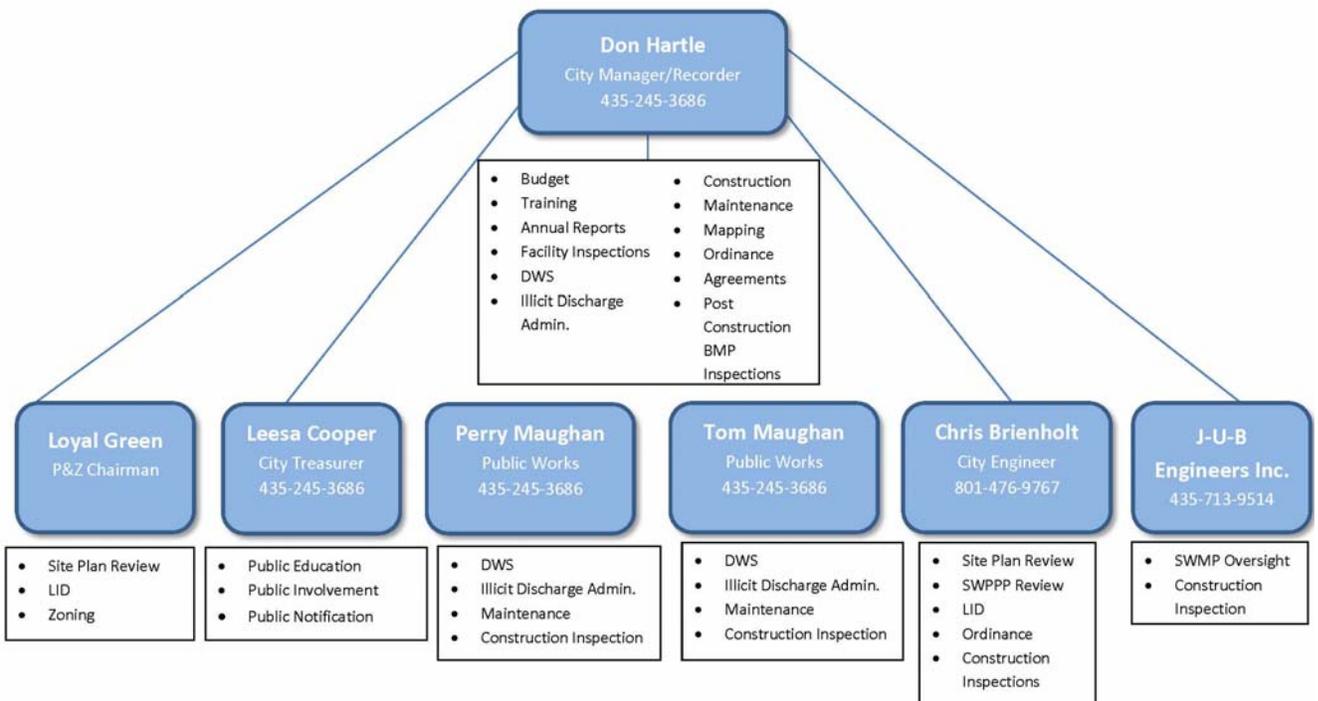
A steering committee was formed early in 2003 for the purpose of addressing the above mentioned water quality items and consider options to develop a storm water management program. The steering committee includes members from the community including:

Name	Representing
Don Hartle	City Manager
Perry Maughan	Public Works Department
Tom Maughan	Public Works Department
Zan Murray	Citizen/Engineer

## MS4 Organization Chart

### Wellsville City

November 2010



## Mission Statement

Before adopting and implementing specific goals and management practices, it is important to establish the main purpose and guiding principles of the Storm Water Management Program. Based on input received from the Steering Committee the following mission statement has been developed:

***Our mission is to maintain or further reduce the already low quantity of pollutants discharged into the Little Bear River watershed, notwithstanding considerable anticipated growth. The following general principles, in order of importance, will guide the implementation of the goals and management practices of this plan:***

***1<sup>st</sup> - Education, Training and Public Participation.***

***Educate the public, train city employees and encourage everyone to do his/her part while facilitating public participation.***

***2<sup>nd</sup> - Standards and Alternative Control Methods.***

***Establish standards and identify alternative methods for the control of such problem areas as construction site and agricultural runoff as well as more common residential sources.***

***3<sup>rd</sup> - Ordinances.***

***Update and enforce ordinances prohibiting illicit discharge of pollutants into the storm water system.***

The first thing that needs to be done is to educate the people. Wellsville City supports the proposed programs of the County and feels that the most effective public education methods will be to pool resources with other communities and institute regional programs. These will be supplemented by use of the city newsletter and bulletin boards to disseminate information. It is anticipated that the effectiveness and participation levels in various programs will be greatly enhanced if the public is first made aware of the problems we face and communication links are provided to facilitate public participation.

The emphasis should be on the positive aspects of our community. Programs, education materials, land use planning and city government proceedings should emphasize voluntary standards and provide ideas of what people can do rather than long lists of things they can't do.

Unfortunately, not everyone or every business will comply with voluntary standards; even when alternative methods for compliance are suggested. It will be necessary to update ordinances that clearly prohibit specific kinds of illicit discharge along with appropriate punishment for violation.

## **MCM – 1 PUBLIC EDUCATION AND OUTREACH**

### **Overview**

The operator of a regulated small MS4 needs to implement a multimedia public education program to distribute educational materials to four focus groups.

- Residents
- Businesses, institutions and commercial facilities
- Developers and
- Contractors

### **Summary of Existing Efforts**

#### ***Educational Materials***

All cities in Cache County contract with Service Area #1 to provide garbage collection, waste services, and a recycling program. The Cache County Council serves as board for Service Area #1, which in turn contracts with Logan City Environmental Division to provide the services. There are educational materials in hard copy at the city and online covering subjects of recycling, waste reduction, and proper disposal that are available at the local landfill. (See the “Supporting Information” section for further documentation)

#### ***Recycling Program***

Along with the solid waste management for the valley, Logan City is the local leader in the valley recycling program. Curbside recycling of typical household items is available across the valley. A hazardous waste dump site is situated adjacent to the landfill where oils, solvents, paints, fuels, appliances and other harmful wastes can be disposed.

#### ***City Used Media***

There is a newsletter that is sent out several times a year with the utility billing. It informs the public of current issues and upcoming events.

#### ***Storm Water Fair***

Annually in the spring, the MS4 Permitted communities combine efforts to conduct a storm water fair for 4<sup>th</sup> graders across the valley. This has been a successful event annually and continues to grow in attendees and educational opportunities at the fair. (See the “Supporting Information” section for further documentation)

#### ***Contractor Training***

Annually Logan City conducts contractor training of standards and specifications of construction in the City. In addition to that training, contractors are educated on the MS4 Permit requirements and inspection requirements for contractors. See the “Supporting Information” tab for information from the annual meetings

### ***Plan and Implementation Measures***

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs. Each BMP is cross referenced alphabetically by code in the “BMP” section to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness. Only those BMPs listed below will be utilized by Wellsville City as part of their SWMP at the present time.

BMP	Code
Classroom Education on Storm Water	CESW
Using Media	UM
Public Education / Participation	PEP
Education Materials	EM
Employee Training	ET

In order to more fully realize the benefit of the BMP the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Education and Outreach.

#### ***Rational for Public Education BMPs***

Educational Materials was selected as a BMP because of its applicability in many of the existing efforts Wellsville utilizes in its Public Education and Outreach Efforts. These include newsletters, brochures, and information distributed at the storm water fair.

Classroom Education on Storm Water was chosen as a BMP based upon the success of the ongoing 4<sup>th</sup> grade storm water fair. The storm water fair creates an outdoor classroom environment for students to learn from an interactive environment.

Using Media is key to any public education and outreach program. Media such as paper and internet can be used to distribute information effectively under Wellsville’s current operations. The City has a website and distributes a newsletter regularly.

Employee Training of practices that need to be followed during development including erosion control plans, low impact development and other BMPs associated with the minimum control measures keeps information fresh on their minds and allows for discussion to better implement the program.

Public Education / Participation allows citizens of the community to become knowledgeable through many efforts. These include educational materials, media and interactive learning events such as a storm water fair.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
1	Selected pollutants	Residents (4th graders)	4.2.1.1 To educate audiences on ways to avoid, minimize, and reduce impacts of storm water discharge	Continue storm water fair annually	Annually	PEP and CESW	Fair occurs annually
1	See list in "desired result" column	General Public	4.2.1.2 Information is provided to target audience on prohibitions against illicit discharges and improper disposal of waste including: maintenance of septic systems; effects of outdoor activities, such as lawn care; benefits of on-site infiltration of storm water; effects of automotive work and car washing on water quality; proper disposal of swimming pool water; and proper management of pet wastes.	Include information on the website and include information in utility bills or city newsletter semi-annually.	Ongoing	PEP and UM	Information is current on website and included in utility bills or city newsletter semi-annually.
1	See list in "desired result" column	Business and Institutions	4.2.1.3 Information is provided to target audience on prohibitions against illicit discharges and improper disposal of waste including: Proper lawn maintenance Benefits of appropriate on-site infiltration of storm water Building and equipment maintenance Use of salt or other deicing materials Proper storage of materials Proper management of waste materials and dumpsters Proper management of parking lot surfaces.	Include information on the website and produce and distribute a flier that is targeted to businesses relating to landscaping and parking lot maintenance.	Ongoing	PEP and UM	Information is current on website and included and brochures are distributed at the time of business license issuance.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
1	Illicit discharge and waste	Contractors, Developers, and plan review staff	4.2.1.4 Reduce adverse impacts from development sites	Assemble packets of information on SWPPP and BMPs that the contractor / developer must read and sign.	By July 2011	EM	Information packets are signed for every new development.
1	Illicit discharge and waste	Employees	4.2.1.5 Information is provided to target audience on prohibitions against illicit discharges and improper disposal of waste including: Equipment inspection to ensure timely maintenance Benefits of appropriate on-site infiltration of storm water Minimization of use of salt or other deicing materials Proper storage of industrial materials Proper management of waste materials and dumpsters Proper management of parking lot surfaces.	Have trainings annually.	Ongoing	ET	Training is completed annually and recorded in the training log.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
1	All pollutants	Permittee engineers, development and plan review staff, land use planners	4.2.1.6 Training on LID, Green Infrastructure, and post construction BMPs	Require an annual meeting with all engineers, development and plan review staff, and land use planners to review the city's LID goals. Discuss what has been done in the past year to meet the goals, and define the upcoming year's goals.	By Oct 2011	ET	Annual meeting occurs
1	All pollutants	All Audiences	4.2.1.7 Evaluate the effectiveness of the public education program by a defined method.	Research evaluation methods and select the best one. Implement the selected evaluation method.	Research by Jan 2012 Implementation by Jan 2013	PEP	Evaluation method chosen (2011) and implemented (2012)

## **MCM -2 PUBLIC PARTICIPATION / INVOLVEMENT**

### **Overview**

Involving the public is key to any successful Storm Water Management Program. Representative from stakeholder groups need to have the ability to be involved and participated in the program through various means. Groups that may be involved include:

- Residences
- Commercial and Industrial Business
- Trade Associations,
- Environmental Groups
- Homeowner Association
- Education Organizations.

To involve these groups, Wellsville currently follows the public notification process for public meetings. This allows members from each of the stakeholder groups to provide input into the SWMP. In addition to this notice, the City has placed the SWMP on the website for public review and comment. Each year after June 30, the City will review any comment and the program operation for the year and implement changes. Then the council will review the changes to the Program and adopt them.

### **Summary of Existing Efforts**

#### ***Steering Committee***

A “Storm Water Steering Committee” consisting of city members was formed in January of 2003 and has taken an active role in selecting the BMPs and developing the initial SWMP for the city. A list of the Steering Committee members is found in the Public Education and Outreach section.

#### ***Recycling Program***

Cache County contracts with the Solid Waste Service Management District to provide a recycling program to the surrounding communities. The program reduces solid waste by recycling and offers proper disposal options for hazardous wastes that can be difficult to dispose of, thereby preventing storm water contamination due to improper disposal of hazardous wastes and solids. The landfill accepts: cardboard, newspaper, aluminum cans, tin/steel cans, plastic pop bottles, plastic milk jugs, green waste, aluminum scrap, ferrous metals, tires, used oil, oil filters, antifreeze, carpet pad, batteries, wood pallets, mixed paper on site for recycling. In addition to the collection facility at the landfill, various drop-sites have been set up throughout the county. The drop sites accept cardboard, newspaper, mixed paper, aluminum cans, tin/steel cans, plastic pop bottles, plastic milk jugs, glass, and green waste. The current drop-site for the city is located west of the Emergency Response building.

**Service Groups**

There are local scout and church groups that have participated in street cleanup and litter reduction.

**Green Waste Collection**

A curbside green waste collection program exists from across the County. It is administered by the Logan Environmental Division acting under contract for Service Area #1 who contracts with the individual cities of Cache County to provide waste services. The Logan Landfill has a green waste facility where green waste can be dropped off and it is either composted or made into wood chips or firewood. The green waste facility encourages donations by offering \$10 of compost or wood chip material for ten loads of compost materials dropped off. This program encourages reuse of an otherwise useless material that could become a solid contaminant in storm water.

**Plan and Implementation Measures**

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs for use within our city as applicable. Each BMP is cross referenced alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in the “BMP” section.

BMP	Code
Public Education / Participation	PEP

In order to more fully realize the benefit of the BMP, the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Public Participation and Involvement.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
2	All pollutants	General public	4.2.2.1 Have a program or policy in place that allows for the public to provide input	Notify the public 15 days in advance of the city council meeting when the SWMP update will be reviewed.	By October 1 2011	PEP	The program or policy is in place
2	All pollutants	General public	4.2.2.2 Have SWMP document available for public review before it's submitted to the state	Have a hard copy of the draft of the permit available at the city offices.	By December 1, 2010	PEP	SWMP document is available for public review a week before public hearing
2	All pollutants	General public	4.2.2.3 Have SWMP document available to the public at all times		By December 1, 2010	PEP	SWMP is updated and posted on the website
2	All pollutants	General public	4.2.2.3 Make updated SWMP document available to the public annually	Post updated SWMP annually	Ongoing	PEP	SWMP is updated and posted on the website annually
2	All pollutants	General public	4.2.2.4 Comply with State and Local public notice requirements	Research and document what the State and Local public notice requirements are. Set goals to comply with them.	By December 1, 2010	PEP	Understand what the state and local public notice requirements are.

## **MCM 3 - ILLICIT DISCHARGE DETECTION AND ELIMINATION**

### **Overview**

Illicit Discharges are non-storm water discharges that enter into natural water bodies through various methods and means. The Illicit Discharge Detection and Elimination (IDDE) control measure is intended to prevent illicit connections and discharges to natural drainages by monitoring outfalls, performing inspections of city owned facilities and maintaining inventories of storm water infrastructure.

### **Summary of Existing Efforts**

#### ***Ordinances***

Wellsville currently has an illicit discharge ordinance in place for the community. This ordinance prevents pollutants other than storm water from entering into the storm water collection system.

There is an ordinance in place that prohibits dumping of leaves, lawn clippings and concrete washouts in the city right-of-way. It assesses a \$500 fine to help with enforcement.

#### ***Hazardous Spills***

Currently, reports of spills are handled through the City office during office hours. When reported to the City, spill reports are logged and assessed by the public works department. Any spills that occur after hours are reported to Bear River Health Department.

Spills that are large in quantity, unknown or have reached a natural water body are reported to the Bear River Health Department. They assist in cleanup of the spill with the aid of the Fire Department and public works department.

#### ***Illicit Discharge Reporting***

Currently, reports of spills are handled by the Wellsville Fire Department or County Health Department. The Wellsville Fire Department has a HAZMAT Response van in its fleet.

#### ***Illegal Dumping***

There are a number of signs in place to discourage illegal dumping.

#### ***Illicit Sanitary Sewer Connections***

The City has not generally experienced problems with individuals or small commercial and industrial businesses illicitly connecting their sanitary waste water piping to storm drains. More-common types of illicit discharges include dairy waste runoff, spills from highway accidents, and concrete truck wash out water. Although it has not been documented, it is also suspected that some homeowners dump used oil, antifreeze and household chemicals into waste ditches.

#### ***Storm Water System Map***

See “Inventories, Maps, & Logs.”

### **Plan and Implementation Measures**

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs for use within our city as applicable. Each BMP is cross referenced alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in the “BMP” section.

BMP	Code
Ordinance Development	OD
Illegal Dumping Controls	IDC
Identify Illicit Connection	IIC
Map Storm Water Drains	MSWD
Non-Storm Water Discharge to Drains	NSWD
Illegal Solids Dumping Controls	ISDC
Community Hotline	CH
Public Education and Participation	PEP
Employee Training	ET
Used Oil Recycling	UOR
Hazardous Waste Management	HWM

In order to more fully realize the benefit of the BMP the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Illicit Discharge Detection and Elimination.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
3	All Pollutants	Contractors, Developers, City Council	4.2.3 Enforcement ability for storm water rules	Review and update the ordinance to conform with new permit	Draft by Aug 2011 & Final Feb 2012	OD	If ordinance is in place and meets the permit requirements
3	N/A	Public Works	4.2.3.1 Maintain Storm Water Map	Establish policy to maintain a Current SD System Map on all new developments within 6 months	Completed by July 1, 2011	MSWD	If policy is in place and meets the permit requirements
3	"	"	"	Implementing policy and have all map updates done within 12 months of final approval.	Completed by July 1, 2012	MSWD	Successful if 90% are input within 12 months
3	"	"	"	Continue implementing policy. Have all map updates done annually	Annually, starting July 2013	MSWD	Successful if 90% are input within 6 months
3	All Pollutants	All Audiences	4.2.3.2 Develop, implement, and prepare in writing a plan to detect and address non-SW discharges	Field assess 20% of all high priority areas and receiving waterbodies	1 July of each year	NSWD	Successful if all screens are done
3	"	"	"	Have SOP in place and training to Staff	Complete by July 1, 2011	NSWD	Successful if completed by that date and staff is following SOP
3	All Pollutants	All Audiences	4.2.3.5 Develop and implement standard operating procedures for characterizing the nature of any illicit discharges found or reported to the Permittee by the hotline developed in 4.2.3.9	Create the Incidence Response Flow Chart and train personnel	Completed by July 1, 2011	IIC, CH	Successful if completed by that date and staff is following Flow Chart

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
3	"	"	"	Review flow chart and SOP with staff and provide training annually.	Ongoing	IIC, CH	Successful if training is completed annually for all staff involved in incident reporting.
3	All Pollutants	All Audiences	4.2.3.6 Develop and implement standard operating procedures for ceasing the illicit discharge 4.2.3.7 Inform public employees, businesses, and general public of hazards associated with illicit discharges and improper disposal of waste	Create the Incidence Response Flow Chart and train personnel	Completed by July 1, 2011	IDC, ISDC	
1	All Pollutants	Public Employees, Businesses and Residents		See MCM 1		PEP, ET	See MCM 1
3	Household Hazardous Waste	Residents	4.2.3.8 Promote or provide services for the collection of household hazardous waste	Put the HHW Address and Phone number on City Web Site	Completed by July 1, 2011	UOR, HWWM	Successful if complete by that date
3	Household Hazardous Waste	Residents	4.2.3.9 Publicly list and publicize a hotline or other telephone number for public reporting of spills and other illicit discharges	Put the HHW Address and Phone number on City Web Site	Completed by July 1, 2011	CH	Successful if complete by that date
3	All Pollutants	All Audiences	4.2.3.10 Adopt and implement procedures for program evaluation and assessment. Include a database for mapping, tracking of the spills or illicit discharges identified and inspections conducted	Create a form for tracking Illicit Discharges	Completed by July 1, 2011	IIC, MSWD	Successful if complete by that date

## MCM4 - CONSTRUCTION SITE RUNOFF CONTROL

### Overview

Runoff from construction sites can be a large contributing factor to storm water pollution. By controlling construction site runoff through planning, design and construction best management practices, pollution to natural water bodies can be greatly reduced. Review of erosion control plans, Storm Water Pollution Prevention Plans and regular site inspection aid in implementation of this control measure to reduce non-storm water discharges.

### Summary of Existing Efforts

#### *Ordinances*

A current city ordinance overviews the requirements of construction projects over one acre with relation to storm water. The ordinance includes: review of a project storm water management concept plan and landscape plan, inspections by the City at construction sites and creation of as-built plans for record at the City offices.

#### *Site Plan Review Procedures*

Stormwater Management Concept Plans are required by the City during the design development process. These plans must include: “sufficient information (e.g., maps, hydrologic calculations, etc.) to evaluate the environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing stormwater generated at the project site.”

#### *Site Inspections*

There are currently inspecting personnel in Public Works who oversee local construction. They are concerned with sewer connections, storm drain and streets. Currently the City utilizes a Registered Storm Water Inspector to inspect construction sites over one acre.

### Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs for use within our city as applicable. Each BMP is cross referenced alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in the “BMP” section.

BMP	Code
Erosion Control Plan	ECP
Establish/Compile Design Standards	ECDS
Dust Controls	DC
Silt Fence	SF

BMP	Code
Straw Bale Barrier	STB
Temporary Drains and Swales	TDS
Certification and Inspector Training	CCIT
Stabilize Construction Entrance	SCE
Portable Toilets	PT
Land use Planning and Management	LUPM
Concrete Waste Management	CWM
Zoning	ZO
Ordinance Development	OD

In order to more fully realize the benefit of the BMP, the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Construction Site Runoff Control.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers	4.2.4.1 Raise awareness of contractors and developers on what is expected on construction sites	Require a SWPPP for every construction site over one acre and less than one acre if part of a CPOD.	Feb. 2012	OD	Successful if 95% of all active construction sites have a working SWPPP
4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers	4.2.4.2 Develop a written enforcement strategy and implement the enforcement provisions of the ordinance or other regulatory mechanism	Draft ordinance to include escalating enforcement provisions	July, 2011	OD	Successful if completed by milestone
4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers, City Council, Plan Reviewers	Have an ordinance that is meaningful and enforceable	Revise ordinance to require a SWPPP on every active construction site over 1 acre and less than one acre if part of a CPOD.	Feb. 2012	OD	If ordinance is in place and meets the permit requirements
4	"	"	"	Revise ordinance to include escalating enforcement provisions	Feb. 2012	OD	Successful if completed by milestone
4	"	"	4.2.4.2 Documentation and tracking of all enforcement actions	Develop and begin using a construction site enforcement action log/database	Feb. 2012	OD	Successful if we have a log and are using it
4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers	4.2.4.3 Develop and implement SOP's for pre-construction SWPPP review for construction sites	Develop checklist and begin to do preconstruction reviews of SWPPP	Feb. 2012	ECP	Successful if we are conducting SWPPP reviews

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
4	"	"	4.2.4.3.1 Conduct a pre-construction meeting	Hold Pre-con meetings on all sites greater than 1 acre or as part of common plan of development	Immediately		Successful if we are conducting Pre-con meetings
4	"	"	4.2.4.3.2 Incorporate into the SWPPP review procedures the consideration of potential water quality impacts and procedures for pre-construction review which shall include the use of a checklist.	Develop a policy to consider potential water quality impacts on all projects - private or municipal	Feb. 2012	ZO	Successful if we have post construction BMPs on 50% of projects
4	"	"	4.2.4.3.3 Incorporate into the SWPPP review procedures for an evaluation of opportunities for use of Low Impact Development (LID) and green infrastructure and when the opportunity exists, encourage such BMPs to be incorporated into the site design.	Develop a policy to consider Low Impact Development practices on all projects - private or municipal	Feb. 2012	ZO	Successful if we have post construction BMPs on 50% of projects
4	"	"	4.2.4.3.4 Identify priority construction sites, including at a minimum those construction sites discharging directly into or immediately upstream of waters that the State	Develop a "sensitive area" map showing areas within the city where "additional" protection may be desired	July, 2011	LUPM	When preconstruction review is complete, documented and filed.
4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers	4.2.4.4.1 Inspections of all new construction sites ... at least monthly by qualified personnel	Conduct monthly inspections of all construction sites -	Feb. 2012	CCIT	Successful if 90% of all active construction sites are inspected monthly
4	"	Contractors, developers and MS4 staff	4.2.4.5 Provide training to city staff and 3rd party designers	Develop a city policy to require all SWPPP inspectors to be RSI inspectors within 6 months	July, 2012	CCIT	Successful if completed by milestone

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
4	"	Contractors, developers and MS4 staff	4.2.4.4.2 ... The Permittee must include in its SWMP document a procedure for being notified by construction operators/owners of their completion of active construction so that verification of final stabilization and removal of all temporary control measures may be conducted.	Develop a written Notice of Termination process for use within the city	Feb. 2012	ECP	Successful if 95% of all active construction sites are terminated appropriately
4	"	Contractors, developers and MS4 staff	"	Train SWPPP inspectors, their supervisors, and any personnel who grant final occupancy permits on the NOT process	Feb. 2012	ECP	Successful if 95% of all active construction sites are terminated appropriately
	"	"	4.2.4.4.3 Conduct Bi-weekly inspections on high priority construction sites	Inspect high priority sites.	Feb. 2012	ECP	Successful if all high priority sites are inspected bi-weekly
	"	"	4.2.4.6 Maintain a log of active construction sites	Establish a log of construction sites	Feb. 2012	ECP	Successful if active construction sites are recorded in the log

## **MCM – 5 LONG TERM STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT**

### **Overview**

The intent of Long Term Storm Water Management is to maintain post construction runoff conditions to those of pre-construction runoff. This pertains to both quantity and quality. Techniques such as Low Impact Development (LID) are encouraged to be used when designing for Long Term Storm Water Management.

Long Term Storm Water Management applies to sites over one acre in size and sites less than one acre when part of a common plan of development (CPoD). Applicability of this minimum control measures also pertains to private and public development sites including roads.

When redevelopment of an area occurs within the community, considerations to reduce storm water runoff and improve water quality must also be considered.

### **Summary of Existing Efforts**

#### ***Ordinances***

An ordinance is in place to implement Long Term Storm Water Management. This ordinance outlines the requirement to reduce storm water runoff from sites and utilize methods to improve water quality through infiltration. Designers are to coordinate with the City regarding their designs prior to beginning work. These designs must maintain sediment and runoff from the site long term.

An ordinance outlining landscaping requirements exists for multi-family dwellings.

### **Plan and Implementation Measures**

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs for use within our city as applicable. Each BMP is cross referenced alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in the “BMP” section.

BMP	Code
Ordinance Development	OD
Land Use Planning / Management	LUPM
Zoning	ZO
Seeding and Planting	SP
Map Storm Water Drains	MSWD

BMP	Code
Riprap	RR
Rock Check Dams	CD
Infrastructure Planning	IPL
BMP Inspection and Maintenance	BMPIM
Infiltration	IN
Grassed Swales	GS

In order to more fully realize the benefit of the BMP, the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Post Construction Runoff Control.

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone		Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)			Date	Assoc. BMP	
5	All Pollutants	All Audiences	4.2.5.1. Develop and adopt an ordinance or other regulatory mechanism that requires long-term post-construction storm water controls at new development and redevelopment sites. (4.2.5.3.1 for flood control structure issues and 4.2.5.3.2 for LID)	Review existing ordinance to determine if it meets requirements of new permit - Use checklist from coaching sessions	June, 2011	OD	If review is complete
5	"	"	"	Draft ordinance revisions	July, 2011	OD	If draft is complete and ready for others to review
5	"	"	"	Adopt updated ordinance	Feb. 2012	OD	If ordinance has been passed
5	"	"	4.2.5.2.2 Documentation on how the requirements of the ordinance or other regulatory mechanism will protect water quality and reduce the discharge of pollutants to the MS4.	Draft a standard to require contractors and developers to submit documentation on: how long-term BMPs were selected, pollutant removal expected from the BMP, and technical basis supporting performance claims	July, 2011	IPL	If draft is completed by the milestone date
5	"	"	"	Adopt revised standard	Feb. 2012	IPL	
5	"	MS4 Staff, City Council	4.2.5.3.3 The Permittee must develop a plan to retrofit existing developed sites that are adversely impacting water quality.	Evaluate facilities that are adversely impacting water quality.	Dec. 2014	IPL	Complete evaluation and document.
5	"	MS4 Staff, Contractors and Developers	4.2.5.3.4 Each Permittee shall develop and define specific hydrologic method or methods for calculating runoff volumes and flow rates...	Review existing design standards to see if they meet new permit requirements - see section 4.2.5.3.4	Dec, 2011	IPL	If standards have been reviewed and comments made
5	"	"	"	Update design standards	June. 2012	IPL	If updated standards have been adopted

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone		Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)			Date			
5	"	"	4.2.5.4.1 Review Storm Water Pollution Prevention Plans (SWPPPs)	See goals for MCM 4				
5	"	"	4.2.5.4.2 Permittees shall provide developers and contractors with preferred design specifications to more effectively treat storm water for different development types... projects located in, adjacent to, or discharging to environmentally sensitive areas.	Locate environmentally sensitive areas within the MS4	<b>July, 2012</b>	IPL	Completed map identifying environmentally sensitive areas	
5	"	"	"	Review map of sensitive areas and identify preferred method(s) of treating storm water to discharge to those areas.	Dec, 2012	IPL	List of preferred method(s)	
5	"	"	4.2.5.4.3 Permittees shall keep a representative copy of information that is provided to design professionals;...the dates of the mailings and lists of recipients.	Keep a revision log for information in the "Design & Construction" section – Contractor Packet Log	July, 2011	EM	If revision log is filled out for all revisions	
5	"	"	"	Log name and date of distribution of Supplemental Guide to Contractors and Developers	July, 2011	EM	If log is up to date and current	
5	"	"	4.2.5.5. All Permittees shall adopt and implement SOPs or similar type of documents for site inspection and enforcement of post-construction storm water control measures.	Review and customize SOPs for inspection and enforcement of post-construction control measures	July, 2011	BMPIM	If inspection and enforcement SOPs are current and being utilized?	

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone		Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)			Date	Assoc. BMP	
5	"	"	4.2.5.5.1 ... require private property owner/operators or qualified third parties to conduct maintenance and provide annual certification that adequate maintenance has been performed and the structural controls are operating as designed to protect water quality. In this case, the Permittee must require a maintenance agreement addressing maintenance requirements for any control measures installed on site.	Review maintenance requirement enforcement under ordinances	July, 2011	BMPIM	Determined approach for maintenance requirement enforcement.
5	"	"	4.2.5.5.3 Inspections and any necessary maintenance must be conducted annually by either the Permittee or through a maintenance agreement, the property owner/operator. On sites where the property owner/operator is conducting maintenance, the Permittee shall inspect those storm water control measures at least once every five years, ...	Inventory post-construction BMPs - see 4.2.5.7.1 for inventory inclusion items	March, 2011	BMPIM	If inventory is complete
5	"	"	"	Identify who is responsible to inspect and/or maintain each post-construction BMP	July, 2011	BMPIM	If list identifies person responsible for inspections/maintenance
5	"	"	"	Develop inspection report form for post-construction BMPs	July, 2011	BMPIM	If form is completed
5	"	"	"	Conduct inspections for city owned BMP's	Ongoing	BMPIM	If completed inspection reports are properly filed

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone		Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)			Date	Assoc. BMP	
5	"	"	"	Conduct inspections on privately owned BMP's	Ongoing	BMPIM	If completed inspection reports are properly filed
5	"	MS4 staff	4.2.5.6. Permittees shall provide adequate training for all staff involved in post-construction storm water management, planning and review, and inspections and enforcement.	Schedule and conduct training for appropriate personnel	Annually	BMPIM	If all appropriate personnel are trained
5	"	"	4.2.5.7 Maintain an inventory of post construction BMP's	Inventory log updated annually	Ongoing		If log is updated

## POLLUTION PREVENTION / GOOD HOUSEKEEPING

### Overview

The intent of the Pollution Prevention / Good Housekeeping control measure is to maintain and construct city owned facilities in such a way to prevent pollutants from entering into the storm water system. This is accomplished by developing and implementing an operation and maintenance program, outlining standard operating procedures (SOPs) and defining roles and responsibilities of staff overseeing the SWMP.

#### Summary of Existing Efforts

The city currently maintains the following items in its storm water system.

Item	Maintenance	Responsible Party/Financing
Catch Basins	Clean water necessary	City/Public Works
Detention Basins	Varies	City/Public Works
Ditches and Canals	Cooperate with Canal co.	Canal Co. / City
Street Sweeping	Periodically when refinished	City/Public Works

### **Recycling Program**

Wellsville City supports Logan City's recycling program through supplying recycling facilities during the community cleanup day. The citizens of the community also use recycle waste containers at the curb. Through the City newsletter, citizens are informed about recycling of hazardous wastes and materials.

### **Operational Procedures**

Wellsville currently operates with a limited amount of equipment. This equipment is serviced, cleaned and fueled at commercial facilities not operated by the public works department. This limits the exposure of potential pollutants to the storm water outfalls in the community.

Much of the maintenance is also performed by contractors. Items such as catch basin cleaning, street sweeping and asphalt maintenance are contracted. Care is taken to inform contractors of storm water requirements on the City that are imposed on contractors as well.

The City stores equipment and materials at the public works facilities near the city office. Vehicles are stored in doors to prevent runoff and leakage spills. Salt and sand are stored under cover to reduce transport of pollutants during rain events.

### **Plan and Implementation Measures**

In order to help meet the goals and objectives of this SWMP, Wellsville City has chosen to adopt the following BMPs for use within our city as applicable. Each BMP is cross referenced

alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in the “BMP” section.

BMP	Code
BMP Inspection and Maintenance	BMPIM
Long Term Operation and Maintenance	LTOM
Street Cleaning	SC
Catch Basin Cleaning	CBC
Employee Training	ET
Building and Grounds Maintenance	BGM
Area Control Procedures	ACP
De-Icing Chemical Use Storage	DCUS
Material Use	MU
Housekeeping Practices	HP
Infrastructure Planning	IPL

In order to more fully realize the benefit of the BMP, the city has set the following goals. The goals set along with the existing efforts fulfill the requirements of the Final Storm Water Phase II Rule for Pollution Prevention/Good Housekeeping.

Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
Pollutant(s)	Audience(s)					
All pollutants	MS4 staff	4.2.6 ...All components of an O & M program shall be included in the SWMP document and must identify the department (and where appropriate, the specific staff) responsible for performing each activity described in this section...	Complete Org chart and define specific responsibilities for all departments shown	Jan. 2011	HP	If org chart is complete and up to date by milestone date
"	"	4.2.6.1. Permittees shall develop and keep current a written inventory of Permittee-owned or operated facilities	Complete listing of MS4 owned/operated facilities	Dec. 2010	HP	If list is completed by milestone date
"	"	4.2.6.2. All Permittees must initially assess the written inventory of Permittee-owned or operated facilities, operations and storm water controls identified in Part 4.2.6.1. for their potential to discharge to storm water the following typical urban pollutants:	Complete assessments and identify "high priority" facilities	Feb. 2011	HP	If assessments are completed and documentation recorded in SWMP
"	"	4.2.6.4. Each "high priority" facility identified in Part 4.2.6.3. must develop facility-specific standard operating procedures (SOPs) or similar type of documents.	Review, customize and update appropriate SOPs	July, 2011	HP	If SOPs are updated and current by milestone date
"	"	4.2.6.6.1 Weekly visual inspections: The Permittee must perform weekly visual inspections of "high priority" facilities in accordance with the developed SOPs to minimize the potential for pollutant discharge.	Develop weekly inspection form and log	July, 2011	HP	Completed inspection form and log
"	"	"	Conduct weekly inspections	Ongoing	HP	If at annual review all weekly inspections are logged and reports completed

Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
Pollutant(s)	Audience(s)					
"	"	4.2.6.6.2 Quarterly comprehensive inspections: At least once per quarter, a comprehensive inspection of "high priority" facilities, including all storm water controls, must be performed	Develop quarterly inspection form(s) and log	July, 2011	HP	Completed inspection form and log
"	"	"	Conduct quarterly comprehensive inspections	Ongoing	HP	If at annual review all quarterly inspections are logged and reports completed
"	"	4.2.6.6.3 Quarterly visual observation of storm water discharges: At least once per quarter, the Permittee must visually observe the quality of the storm water discharges from the "high priority" facilities	Conduct quarterly visual observations of storm water discharges at high priority facilities	Ongoing	HP	If at annual review all quarterly visual monitoring is completed and reports logged and reports completed
"	MS4 Staff, Contractors and Developers	4.2.6.7. The Permittee must develop and implement a process to assess the water quality impacts in the design of all new flood management structural controls that are associated with the Permittee or that discharge to the MS4.	Draft a policy/process to assess water quality impacts on all new flood control projects	July, 2011	IPL	If draft is prepared and ready for internal review process by milestone date
"	"	"	Get policy approved	Dec. 2011	IPL	If policy is approved and adopted by milestone date
"	MS4 staff	4.2.6.7.1 Existing flood management structural controls must be assessed to determine whether changes or additions should be made to improve water quality.	See MCM 5 for goals (part of the retrofit program)			

Pollutant(s)	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
		Audience(s)					
"		"	4.2.6.9. Permittees shall provide training for all employees who have primary construction, operation, or maintenance job functions that are likely to impact storm water quality.	See individual training goals within other MCMs			
"		"	"	Develop a training schedule	July, 2011	ET, HP	If schedule is complete by milestone date
"		"	"	Conduct ongoing training according to schedule	Ongoing	ET, HP	If training is completed and documented according to schedule at annual evaluation

## GLOSSARY OF TERMS

**Authorized Enforcement Agency:** Employees or designees of the director of the municipal agency designated to enforce this ordinance.

**Berm:** An earthen mound used to direct the flow of runoff around or through a structure.

**Best Management Practices (BMPs):** Includes schedules of activities, prohibitions of practices, maintenance procedures, design standards, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly into the waters of the United States. BMPs also include treatment requirements, operating procedures, educational activities, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

**BOD5:** A measure of the amount of oxygen that is consumed by bacteria as it breaks down organic matter in a sample during a five-day period under standardized conditions. It is generally considered to be a measure of organic material in the water.

**CIP (Capital Improvement Plan):** A plan developed by municipalities to identify and prioritize improvements that need to be made in upcoming years.

**Clean Water Act (CWA):** The federal Water Pollution Control Act (33 U.S.C. § 1251 et seq.), and any subsequent amendments thereto.

**Construction Activity:** Activities subject to NPDES Construction Permits. These include construction projects resulting in land disturbance of one acre or more. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

**Conveyance System:** Any channel or pipe for collecting and directing the stormwater.

**Culvert:** A covered channel or large diameter pipe that directs water flow below the ground surface.

**Degradation:** (Biological or chemical) The breakdown of chemical compounds into simpler substances, usually less harmful than the original compound, as with the degradation of a persistent pesticide. (Geological) Wearing down by erosion. (Water) The lowering of the water quality of a watercourse by an increase in the amount of pollutant(s).

**Dike:** An embankment to confine or control water, often built along the banks of a river to prevent overflow of lowlands; a levee.

**Directly Connected Impervious Areas (DCIA):** Impervious surfaces that are directly connected to the storm drainage conveyance system. Directly connected means that there is no chance for infiltration or evapotranspiration before entering the conveyance system.

**Discharge:** The release of stormwater or other substance from a conveyance system or storage container.

**Drainage:** Refers to the collection, conveyance, containment, and/or discharge of surface and stormwater runoff.

**DWS:** Dry Weather Screening

**Erosion:** The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, residential or industrial development, road building, or timber-cutting.

**Fill:** A deposit of earth material placed by artificial means.

**First Flush:** The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants.

**General Permit:** A permit issued under the NPDES program to cover a class or category of stormwater discharges.

**Grading:** The cutting and/or filling of the land surface to a desired slope or elevation.

**Hazardous Waste:** By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (flammable, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

**Heavy Metals:** Metals of high specific gravity, present in municipal and industrial wastes, that pose long-term environmental hazards. Such metals include cadmium, chromium, cobalt, copper, lead, mercury, nickel, and zinc.

***Illicit Connection:*** Any physical connection to a publicly maintained storm drain system allowing discharge of non-storm water which has not been permitted by the public entity responsible for the operation and maintenance of the system.

***Illicit Discharge:*** Any direct or indirect non-storm water discharge to the storm drain system, except discharges from fire fighting activities and other discharges exempted in this ordinance.

***Illicit Discharge Detection and Elimination (IDDE):*** A program that each municipality develops to identify and eliminate any illicit discharges they might have within their collection system.

***Impervious Surface:*** A surface which prevents or retards the penetration of water into the ground including, but not limited to roofs, sidewalks, patios, driveways, parking lots, concrete and asphalt paving, gravel, compacted native surfaces and earthen materials, and oiled, macadam, or other surfaces which similarly impede the natural infiltration of storm water.

***Individual Permit:*** A permit issued under the NPDES program for a specific facility, whereby the unique characteristics of that facility may be addressed through the imposition of special conditions or requirements.

***Infiltration:*** The downward movement of water from the surface to the subsoil. The infiltration capacity is expressed in terms of inches/hour.

***Ingress/Egress:*** The points of access to and from a property.

***Inlet:*** An entrance into a ditch, storm sewer, or other waterway.

***Low Impact Development (LID):*** This term is used to describe means and methods that can be utilized to reduce the impact of development on the environment.

***Minimum Control Measure (MCM):*** The EPA has identified six areas of focus for MS4s in developing a program to minimize the potential for pollutants to leave a jurisdiction and to enter the waters of the United States. These six areas of focus are called minimum control measures and they include:

- 1) Public Education and Outreach
- 2) Public Involvement

- 3) Illicit Discharge Detection and Elimination
- 4) Construction Site Storm Water Control
- 5) Post Construction Storm Water Control
- 6) Pollution Prevention and Good Housekeeping

***Municipal Separate Storm Sewer System (MS4):*** A municipally owned and operated storm water collection system that may consist of any or all of the following: curb & gutter, drainage swales, piping, ditches, canals, detention basins, inlet boxes, or any other system used to convey storm water that discharges into canals, ditches, streams, rivers, or lakes not owned and operated by that municipality.

***Mulch:*** A natural or artificial layer of plant residue or other materials covering the land surface which conserves moisture, holds soil in place, aids in establishing plant cover, and minimizes temperature fluctuations.

***Nonpoint Source:*** Pollution caused by diffuse sources (not a single location such as a pipe) such as agricultural or urban runoff.

***NPDES (National Pollutant Discharge Elimination System):*** EPA's program to control the discharge of pollutants to waters of the United States.

***NPDES Permit:*** An authorization, or license, or equivalent control document issued by EPA or an approved state agency to implement the requirements of the NPDES program.

***Off-site:*** Any area lying upstream of the site that drains onto the site and any area lying downstream of the site to which the site drains.

***On-site:*** The entire property that includes the proposed development.

***Outfall:*** The point, location, or structure where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.

***Point Source:*** Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged.

**Plat:** A map or representation of a subdivision showing the division of a tract or parcel of land into lots, blocks, streets, or other divisions and dedications.

**Pollutant:** Generally, any substance introduced into the environment that adversely affects the usefulness of a resource. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; non-hazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects, and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

**Receiving Waters:** Bodies of water or surface water systems receiving water from upstream constructed (or natural) systems.

**Retention:** The holding of runoff in a basin without release except by means of evaporation, infiltration, or emergency bypass.

**Riparian:** A relatively narrow strip of land that borders a stream or river.

**Riprap:** A combination of large stone, cobbles and boulders used to line channels, stabilize banks, reduce runoff velocities, or filter out sediment.

**Runon:** Stormwater surface flow or other surface flow which enters property other than that where it originated.

**Runoff:** That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into the receiving waters.

**Sedimentation:** The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

**Sheet Flow:** Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

**Source Control:** A practice or structural measure to prevent pollutants from entering

stormwater runoff or other environmental media.

**Stabilization:** The proper placing, grading and/or covering of soil, rock, or earth to ensure its resistance to erosion, sliding, or other movement.

**Standard Operating Procedure (SOP):** A written description of the standard method of performing a given task. Can include a step by step description. SOP's are developed in an effort to bring consistency to a program and to clearly define the expectations of that program. They should be the basis of training programs for municipal employees.

**Storm Drain:** A slotted opening leading to an underground pipe or open ditch for carrying surface runoff.

**Stormwater:** Rainfall runoff, snow melt runoff, and drainage. It excludes infiltration.

**Storm Water Management Program (SWMP):** A document which describes the Best Management Practices and activities to be implemented by a person or business to identify sources of pollution or contamination at a site and the actions to eliminate or reduce pollutant discharges to storm water, storm water conveyance systems, and/or receiving waters.

**Storm Water Pollution Prevention Plan (SWPPP):** A document which describes the general plan for addressing storm water pollutants at a given site. The plan characterizes the nature of the potential pollutants, describes methods and concepts for controlling those pollutants and identifies those responsible for the plan.

**Swale:** An elongated depression in the land surface that is at least seasonally wet, is usually heavily vegetated, and is normally without flowing water. Swales direct stormwater flows into primarily drainage channels and allow some of the stormwater to infiltrate into the ground surface.

**TMDL (Total Maximum Daily Load):** An acronym for and in this Permit refers to a study that: 1) quantifies the amount of a pollutant in a stream; 2) identifies the sources of the pollutant; and 3) recommends regulatory or other actions that may need to be taken in order for the impaired waterbody to meet water quality standards.

**Total Suspended Solids (TSS):** An analytical measure of the amount of sediment

suspended in water. TSS is typically comprised of larger sediment particles and does not include fine clays and silts that might be dissolved.

**Treatment Control BMP:** A BMP that is intended to remove pollutants from stormwater.

**Underground Injection Wells (UIW):** A hole receiving storm water whose top dimension is narrower than the depth.

**UPDES (Utah Pollutant Discharge Elimination System):** The State of Utah's program to control the discharge of pollutants to waters of the United States.

**Waters of the State:** Surface waters and ground waters within the boundaries of the State of Utah and subject to its jurisdiction.

**Waters of the United States:** Surface watercourses and water bodies as defined in 40 CFR § 122.2. including all natural waterways and definite channels and depressions in the earth that may carry water, even though such waterways may only carry water during rains and storms and may not carry storm water at and during all times and seasons.

**Wetlands:** An area that is regularly saturated by surface or ground water and subsequently characterized by a prevalence of vegetation that is adapted for life in saturated soil conditions. Examples include: swamps, bogs, marshes, and estuaries.



## **BMP SUMMARY**

The following section includes a list of Best Management Practices (BMPs) that can be implemented in various circumstances to improve the storm water quality in the community. The table of contents includes all of the Alternate BMPs that may be used. At the end of the BMP section is a list of the Alternate BMPs with some of the BMPs highlighted in yellow. These highlighted items are the BMPs that the city has selected. If you would like to implement an Alternate BMP that has not been adopted by the city, you must receive approval from the city.



## Table of Contents

<u>Combined BMP's</u>	<u>Abbreviation</u>	<u>Minimum Control Measure</u>					
		<i>1- Public Education and Outreach</i>	<i>2- Public Participation/Involvement</i>	<i>3- Illicit Discharge and Elimination</i>	<i>4- Construction Site Runoff Control</i>	<i>5- Post-Construction Runoff Control</i>	<i>6- Pollution Prevention/Good Housekeeping</i>
Aboveground Tank Leak & Spill Control	ATL			<input checked="" type="checkbox"/>			
Alternative Products	AP						<input checked="" type="checkbox"/>
Animal Carcass Removal	ACR						<input checked="" type="checkbox"/>
Area Control Procedures	ACP						<input checked="" type="checkbox"/>
BMP Inspection and Maintenance	BMPIM						<input checked="" type="checkbox"/>
Building and Grounds Maintenance	BGM	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Building, Repair, Remodeling, & Construction	BRRC				<input checked="" type="checkbox"/>		
Catch Basin Cleaning	CBC						<input checked="" type="checkbox"/>
Classroom Education on Storm Water	CESW	<input checked="" type="checkbox"/>					
Community Cleanup	CC		<input checked="" type="checkbox"/>				
Community Hotline	CH		<input checked="" type="checkbox"/>				
Compaction	CP				<input checked="" type="checkbox"/>		
Concrete Waste Management	CWM				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Contaminated or Erodible Surface Areas	CESA				<input checked="" type="checkbox"/>		
Contractor Certification and Inspector Training	CCIT				<input checked="" type="checkbox"/>		
De-Icing Chemical Use Storage	DCUS						<input checked="" type="checkbox"/>



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Dust Controls	DC				<input checked="" type="checkbox"/>		
Educational Materials	EM	<input checked="" type="checkbox"/>					
Employee Training	ET						<input checked="" type="checkbox"/>
Erosion Control Plan	ECP				<input checked="" type="checkbox"/>		
Establish/Compile Design Standards	ECDS				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Extended Detention Basins	EDB				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Geotextiles and Mats	GM				<input checked="" type="checkbox"/>		
Grassed Swales	GS				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Hazardous Waste Management	HWM						<input checked="" type="checkbox"/>
Housekeeping Practices	HP	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Hydromulching	HM					<input checked="" type="checkbox"/>	
Identify Illicit Connections	IIC			<input checked="" type="checkbox"/>			
Illegal Dumping Controls	IDC			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Infiltration	IN					<input checked="" type="checkbox"/>	
Infrastructure Planning	IPL				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Inlet Protection	IP				<input checked="" type="checkbox"/>		
Inspection & Maintenance	IM						<input checked="" type="checkbox"/>
Land Use Planning / Management	LIP					<input checked="" type="checkbox"/>	
Landscape & Irrigation Plan	LIP				<input checked="" type="checkbox"/>		
Leaking Sanitary Sewer Control	LSSC			<input checked="" type="checkbox"/>			



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Long Term Operation and Maintenance	LTOM						<input checked="" type="checkbox"/>
Map Storm Water Drains	MSWD			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
Materials Use	MU	<input checked="" type="checkbox"/>					
Minimizing DCIA's	DCIA					<input checked="" type="checkbox"/>	
Non-Storm Water Discharge to Drains	NSWD			<input checked="" type="checkbox"/>			
Ordinance Development	OD			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Outlet Protection	OP					<input checked="" type="checkbox"/>	
Portable Toilets	PT					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Preservation of Existing Vegetation	PEV				<input checked="" type="checkbox"/>		
Public Education / Participation	PEP	<input checked="" type="checkbox"/>					
Riprap	RR					<input checked="" type="checkbox"/>	
Rock Check Dams	CD				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Sand Bag Barrier	SBB						
Sediment Basin	SB				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Seeding and Planting	SP						
Septic System Controls	SSC					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Service Group Participation	SGP		<input checked="" type="checkbox"/>				
Silt Fence	SGM					<input checked="" type="checkbox"/>	



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Sorbents	SO						<input checked="" type="checkbox"/>
Spill Clean-Up	SCU						<input checked="" type="checkbox"/>
Storm Channel / Creek Maintenance	SCCM		<input checked="" type="checkbox"/>				
Storm Drain Flushing	SDF						<input checked="" type="checkbox"/>
Storm Drain System Signs	SDSS	<input checked="" type="checkbox"/>					
Straw Bale Barrier	STB				<input checked="" type="checkbox"/>		
Stream Cleanup and Monitoring	SCM		<input checked="" type="checkbox"/>				
Street Cleaning	SC						<input checked="" type="checkbox"/>
Temporary and Permanent Seeding	TPS				<input checked="" type="checkbox"/>		
Temporary Drains and Swales	TDS				<input checked="" type="checkbox"/>		
Used Oil Recycling	UOR	<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>
Using Media	UM	<input checked="" type="checkbox"/>					
Vehicle and Equipment Cleaning	VEC				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Vehicle and Equipment Maintenance & Repair	VEMR						<input checked="" type="checkbox"/>
Watershed Organization	WO	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
Zoning	ZO					<input checked="" type="checkbox"/>	



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Area control procedures involve practicing good housekeeping measures such as maintaining indoor or covered material storage and industrial processing areas. If the area is kept clean, the risk of accumulating materials on footwear and clothing is reduced. In turn, the chance of left over pollutants making contact with storm water polluting surface water is minimized.

**APPROACH:**

Area control procedures can be used at any facility where materials may be tracked into areas where they can come in contact with storm water runoff. Areas can include material handling areas, storage areas, or process areas.

Effective practices include the following:

- Cover garments, foot mats, and other devices used to collect residual material near the area should be cleaned regularly.
- Brush off clothing before leaving the area.
- Stomp feet to remove material before leaving the area.
- Use floor mats at area exits.
- Use coveralls, smocks, and other over garments in areas where exposure to material is of greatest concern (employees should remove the over garments before leaving the area).
- Post signs to remind employees about these practices.

**LIMITATIONS:**

May be seen as tedious by employees and therefore may not be followed.

**MAINTENANCE:**

Materials storage areas and industrial processing areas should be checked regularly to ensure that good housekeeping measures are implemented.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Inspect and maintain all structural BMP's (both existing and new) on a routine basis to remove pollutants from entering storm drain inlets. This includes the establishment of a schedule for inspections and maintenance.

**APPROACH:**

Regular maintenance of all structural BMP's is necessary to ensure their proper functionality.

- Annual inspections.
- Prioritize maintenance to clean, maintain, and repair or replace structures in areas beginning with the highest pollutant loading.
- Clean structural BMP's in high pollutant areas just before the wet season to remove sediments and debris accumulated during the summer and fall.
- Keep accurate logs of what structures were maintained and when they were maintained.
- Record the amount of waste collected.

**LIMITATIONS:**

- Cost
- Availability of trained staff



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
  - Medium Impact
  - Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs

- High
  - Medium
  - Low

# BMP: Buildings And Grounds Maintenance

BGM



### PROGRAM ELEMENTS

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

### DESCRIPTION:

Prevent or reduce the discharge of pollutants to storm water from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, and maintaining the storm water collection system.

### APPROACH:

- Preserve existing native vegetation to reduce water, fertilizer, and pesticide needs.
- Carefully use pesticides and fertilizers in landscaping.
- Take care in over-watering landscape sites to reduce the risk of discharge of water contaminated with nutrients and pesticides.
- Integrate pest management where appropriate.
- Sweep paved surfaces.
- Clean the storm drainage system at appropriated intervals, includes marking storm drain inlets to minimize the dumping of inadvertent liquids.
- Properly dispose wash water, sweepings, and sediments.
- Take care of landscaped areas around the facility.
- Clean parking lots and areas other than industrial activity.
- Clean all catch basins in parking lots every 6 to 12 months or whenever the sump is full.
- Sweeping, either vacuum or mechanical, is the most appropriate BMP for cleaning parking lots and basins.

### LIMITATIONS:

Alternative pest/weed controls may not be available, suitable or effective in every case.

### MAINTENANCE:

The BMPs themselves relate to maintenance and do not require maintenance as they do not involve structures.



### TARGETED POLLUTANTS

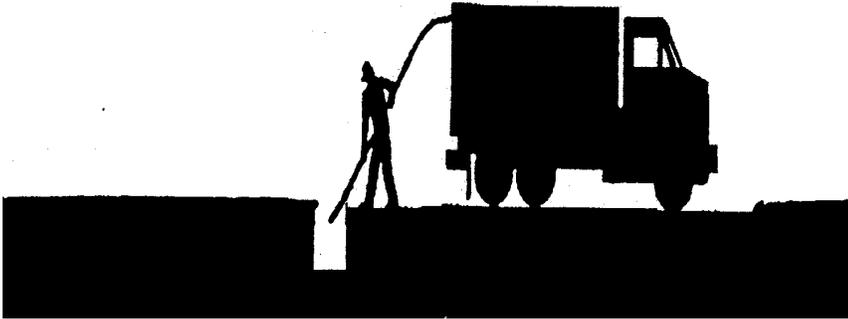
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

### IMPLEMENTATION REQUIREMENTS

- Capital Costs

- High
- Medium
- Low



**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**DESCRIPTION:**

Maintain catch basin and stormwater inlets on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, and restore the catch basins' sediment trapping capacity. A catch basin is distinguished from a stormwater inlet by having at its base a sediment sump designed to catch and retain sediments below the overflow point. This information sheet focuses on the cleaning of accumulated sediments from catch basins.

**APPROACH:**

Regular maintenance of catch basins and inlets is necessary to ensure their proper functioning. Clogged catch basins are not only useless but may act as a source of sediments and pollutants. In general, the key to effective catch basins are:

- At least annual inspections.
- Prioritize maintenance to clean catch basins and inlets in areas with the highest pollutant loading.
- Clean catch basins in high pollutant load areas just before the wet season to remove sediments and debris accumulated during the summer.
- Keep accurate logs of the number of catch basins cleaned.
- Record the amount of waste collected.

**LIMITATIONS:**

There are no major limitations to this best management practice.

**MAINTENANCE:**

Regular maintenance of public and private catch basins and inlets is necessary to ensure their proper functioning. Clogged catch basins are not only useless but may act as a source of sediments and pollutants. In general, the keys to effective catch basins are:

- Annual/monthly inspection of public and private facilities to ensure structural integrity, a clean sump, and a stenciling of catch basins and inlets.
- Keep logs of the number of catch basins cleaned.
- Record the amount of waste collected.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
|--|

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
|--|

BMP: Classroom Education On Storm Water	CESW
 <p><b>Students learn about storm water pollution (Source: City of Sacramento Storm Water Management Program, no date)</b></p>	<p style="text-align: center;"><b>APPLICATIONS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Manufacturing</li> <li><input checked="" type="checkbox"/> Material Handling</li> <li><input type="checkbox"/> Vehicle Maintenance</li> <li><input type="checkbox"/> Construction</li> <li><input type="checkbox"/> Commercial Activities</li> <li><input type="checkbox"/> Roadways</li> <li><input checked="" type="checkbox"/> Waste Containment</li> <li><input checked="" type="checkbox"/> Housekeeping Practices</li> </ul>
<p><b>DESCRIPTION:</b> Classroom education is an integral part of any storm water pollution outreach program. Providing storm water education through schools exposes the message not only to students but to their parents as well. Topics can include Water conservation, proper lawn and garden care, and proper disposal of hazardous household wastes.</p> <p><b>APPROACH:</b></p> <ul style="list-style-type: none"> <li>➤ Building a strong relationship with the school district is the most important step in getting storm water education into the schools.</li> <li>➤ When developing an outreach message for children, choose the age ranges to target.</li> <li>➤ Many additional classroom materials are available for use free of cost. Educational materials available for downloading from the Internet at <a href="http://www.csu.org/water/watereducation/watereducation.html">www.csu.org/water/watereducation/watereducation.html</a>.</li> <li>➤ Should make students aware of the potential impacts of hazardous household materials on water quality and inform residents of ways to properly store, handle, and dispose of the chemicals</li> <li>➤ Water usage in the home can easily be reduced by 15 to 20 percent—without major discomfort—by implementing a program to conserve water in the home.</li> <li>➤ Lawn and garden activities can result in contamination of storm water through pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff and enhance the aesthetics of a property.</li> </ul> <p><b>LIMITATIONS:</b></p> <ul style="list-style-type: none"> <li>➤ One of the limitations of classroom education is being able to incorporate storm water issues into the school curricula. With so many subjects to teach, environmental issues might be viewed as less important.</li> </ul> <p><b>MAINTENANCE:</b></p> <ul style="list-style-type: none"> <li>➤ Programs and educational materials can be re-used, but they must be presented on a continual basis.</li> </ul>	 <p style="text-align: center;"><b>TARGETED POLLUTANTS</b></p> <ul style="list-style-type: none"> <li>■ Sediment</li> <li>■ Nutrients</li> <li>■ Heavy Metals</li> <li>■ Toxic Materials</li> <li>■ Oxygen Demanding Substances</li> <li>■ Oil &amp; Grease</li> <li>■ Floatable Materials</li> <li>■ Bacteria &amp; Viruses</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> </div> <p style="text-align: center;"><b>IMPLEMENTATION REQUIREMENTS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Capital Costs</li> <li><input type="checkbox"/> O&amp;M Costs</li> <li><input type="checkbox"/> Maintenance</li> <li><input type="checkbox"/> Training</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High    <input checked="" type="checkbox"/> Medium    <input type="checkbox"/> Low</li> </ul> </div>

# BMP: Community Cleanup

CC



## APPLICATIONS

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

## DESCRIPTION:

An event in which the community will promote and encourage community members to clean up neighborhoods, city parks, streets, streams, or other properties. This effort involves the removal of litter and bulky waste as well as the removal of green waste, such as yard clippings, trees, branches, leaves, or other types of undesirable vegetation.

## APPROACH:

- Designate an individual or groups of individuals to schedule and organize the cleanup projects, coordinate waste collection and disposal, and assign leaders for supervision of the projects.
- Identify sites that need to be cleaned up in the community, and plan when to have the cleanups.
- Advertise the program and let residents know about cleanup project dates, locations, and what items will be helpful for them to bring to assist in the projects.
- When volunteers are being used for cleanup efforts, municipalities must address the issue of liability. An attorney should be consulted to determine how liability should be handled and draft a waiver for volunteers to sign before participating.

## LIMITATIONS:

- Organization at the municipal level is a limitation to cleanup efforts. Some municipalities do not have the resources to designate staff to oversee a cleanup program and to supervise cleanup activities.
- Limitations to an effective cleanup program are volunteer interest and commitment.

## MAINTENANCE:

- To maintain water quality, cleanup efforts must be recurring; a one-time-only cleanup event might raise awareness in the community, but it will not keep trash out of the river.
- Seasonal or annual cleanup events will help make sure that trash and debris are kept out of public areas as much as possible.



## TARGETED POLLUTANTS

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

## IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Because regulators and authorities cannot monitor all water bodies at once, they sometimes rely on the public to keep them informed of water polluters. Community hotlines provide a means for concerned citizens and agencies to contact the appropriate authority when they see water quality problems.

**APPROACH:**

- Once a city has determined that they need a hotline, they should choose between a telephone or an e-mail hotline.
- A party or agency responsible for maintaining the hotline and responding to incoming complaints must first be identified. The responsible party could be a division of local government, a water quality board, a public utility, or an environmental agency.
- All distributed materials should include pollution hotline numbers and information.
- Curbs should have pumping systems, instead of drainage systems, for collecting spilled materials.
- Generally, an investigation team promptly responds to a hotline call and, in most cases, visits the problem site.
- If a responsible party can be identified, the team informs the party of the problem, offers alternatives for future disposal, and instructs the party to resolve the problem.

**LIMITATIONS:**

- The community's ability to pay for it.
- The ability of the community to keep the hotline staffed.

**MAINTENANCE:**

- The most important part is the responsiveness of the hotline. If a citizen reports an illegal dumping but no action is taken by the appropriate authority, that citizen could lose faith in the hotline and might not call back with future information.



**TARGETED POLLUTANTS**

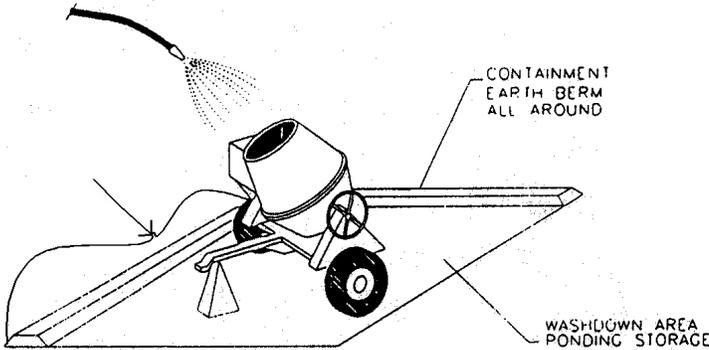
- Sediment
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<ul style="list-style-type: none"> <li>■ High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul>
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**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

<ul style="list-style-type: none"> <li>■ High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul>
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Locate 50' From Nearest Drainage Area.

**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to storm water from concrete waste by conducting washout off-site, performing on-site washout in a designated area, and training employees and subcontractors.

**APPLICATIONS:**

This technique is applicable to all types of sites.

**INSTALLATION/APPLICATION CRITERIA:**

- Store dry and wet materials under cover, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete or cement on-site.
- Perform washout of concrete trucks off-site or in designated areas only.
- Do not wash out concrete trucks into storm drains, open ditches, streets, or streams.
- Do not allow excess concrete to be dumped on-site, except in designated areas.
- When washing concrete to remove fine particles and expose the aggregate, avoid creating runoff by draining the water within a bermed or level area. (See Earth Berm Barrier information sheet.)
- Train employees and subcontractors in proper concrete waste management.

**LIMITATIONS:**

- Off-site washout of concrete wastes may not always be possible.

**MAINTENANCE:**

- Inspect subcontractors to ensure that concrete wastes are being properly managed.
- If using a temporary pit, dispose hardened concrete on a regular basis.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High     Medium     Low



**Municipalities can establish training programs to educate contractors about erosion and sediment control practices**



**Construction reviewers periodically inspect construction sites to ensure that contractors have installed and maintained their erosion and sediment controls properly (Source: University of Connecticut Cooperative Extension System, 2000)**

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

One of the most important factors determining whether or not erosion and sediment controls will be properly installed and maintained on a construction site is the knowledge and experience of the contractor. Many communities require certification for key on-site employees who are responsible for implementing the ESC plan. Several states have contractor certification programs. The State of Delaware requires that at least one person on any construction project be formally certified. The Delaware program requires certification for any foreman or superintendent who is in charge of onsite clearing and land-disturbing activities for sediment and runoff control associated with a construction project.

**APPROACH:**

- Training and certification will help to ensure that the plans are properly implemented and that best management practices are properly installed and maintained.
- Inspector training programs are appropriate for municipalities with limited funding and resources for ESC program implementation.
- Contractor certification can be accomplished through municipally sponsored training courses, or more informally, municipalities can hold mandatory pre-construction or pre-wintering meetings and conduct regular and final inspection visits to transfer information to contractors (Brown and Caraco, 1997).
- To implement an inspector training program, the governing agency would need to establish a certification course with periodic recertification, review reports submitted by private inspectors, conduct spot checks for accuracy, and institute fines or other penalties for noncompliance.
- Curb systems should be maintained through curb repair (patching and replacement).
- To minimize the amount of spilled material tracked outside of the area by personnel, grade within the curbing to direct the spilled materials to a down-slope side of the curbing, thus keeping the spilled materials away from personnel and equipment. Grading will also facilitate clean-up.

**LIMITATIONS:**

- Contractor certification and inspector training programs require a substantial amount of effort on the part of the municipality or regulatory agency.
- They need to develop curricula for training courses, dedicate staff to teach courses, and maintain a report review and site inspection staff to ensure that both contractors and inspectors are fulfilling their obligations and complying with the ESC program.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low

**DESCRIPTION:**  
 A sizeable amount of de-icing chemicals are used each winter on roads, parking lots, and sidewalks in Utah. Sodium chloride (salt) is the main chemical used. Proper use and storage of salt will reduce the chance of high chloride concentration in runoff that may damage the environment.

**APPROACH:**

- Proper storage practices can control sodium chloride pollution in runoff from stockpiles.
- For de-icing use, preventing over-application of salt will reduce quantities of chloride reaching surface or ground water.
- All salt piles should be covered with polyethylene if not stored in a shed. All sand/salt piles should be moved to empty salt sheds or covered during the spring and summer.
- Any runoff from stockpiles should be contained.
- To prevent over-application of salt one must properly calibrate the equipment and monitor the need for de-icing material.
- Another method to prevent the over-application of salt is to limit salt application on low traffic areas and straight level areas, critical areas will, however, need higher levels of service.

**LIMITATIONS:**

- All deicers hold the potential for damaging grass and plant biota should their concentration within the soil becomes unusually high. In amounts recommended for sidewalk and driveway deicing, there is minimal chance of damage to trees, grass, and shrubs. This is especially true if the chemical is used sparingly -- only to undercut snow and ice -- and the slush is not plowed or shoveled into grassy or planted areas.
- Another concern of many businesses and homeowners is the visible deicer residue that may be tracked into a building. This residue occurs because these deicers are solids in their natural state. However, since the residue is water soluble, it cleans up readily using plain water or ordinary household cleaner.
- Salt should not be used to melt every bit of snow and ice. Use only enough to break the ice/pavement bond, then remove the remaining slush by plowing or shoveling.

- APPLICATIONS**
- Manufacturing
  - Material Handling
  - Vehicle Maintenance
  - Construction
  - Commercial Activities
  - Roadways
  - Waste Containment
  - Housekeeping Practices



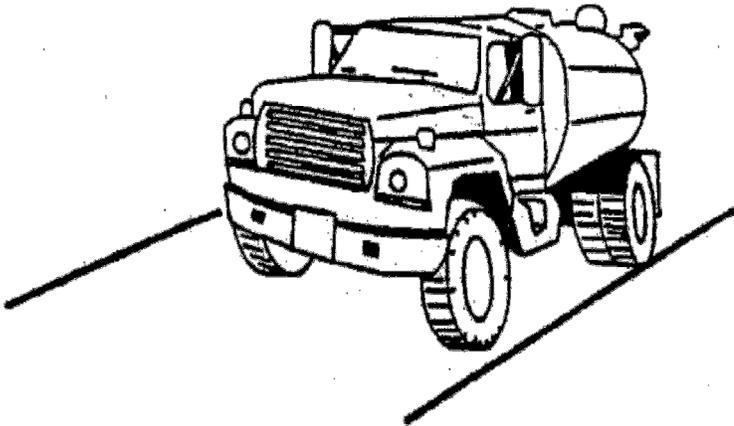
- TARGETED POLLUTANTS**
- Sediment
  - Nutrients
  - Heavy Metals
  - Toxic Materials
  - Oxygen Demanding Substances
  - Oil & Grease
  - Floatable Materials
  - Bacteria & Viruses

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| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
|--|

- IMPLEMENTATION REQUIREMENTS**
- Capital Costs
  - O&M Costs
  - Maintenance
  - Training
- |  |
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| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
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**BMP: Dust Controls**

**DC**



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Dust control measures are used to stabilize soil from wind erosion, and reduce dust by construction activities.

**APPLICATION:**

Dust control is useful in any process area, loading and unloading area, material handling areas, and transfer areas where dust is generated. Street sweeping is limited to areas that are paved.

**INSTALLATION/APPLICATION CRITERIA:**

- Mechanical dust collection systems are designed according to the size of dust particles and the amount of air to be processed. Manufacturers' recommendations should be followed for installation (as well as the design of the equipment).
- Two kinds of street sweepers are common: brush and vacuum. Vacuum sweepers are more efficient and work best when the area is dry.
- Mechanical equipment should be operated according to the manufacturers' recommendations and should be inspected regularly.

**LIMITATIONS:**

- Is generally more expensive than manual systems.
- May be impossible to maintain by plant personnel (the more elaborate equipment).
- Is labor and equipment intensive and may not be effective for all pollutants (street sweepers).

**MAINTENANCE:**

If water sprayers are used, dust-contaminated waters should be collected and taken for treatment. Areas will probably need to be resprayed to keep dust from spreading.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Educational Materials to present information to the public on storm water issues and water quality awareness is an integral part of any storm water education program. Providing storm water education by sending out information with bills, newsletters, or presented at city activities, in city offices, schools, and fair booths, exposes the message to a wide variety of people, if not city-wide. Topics can include Water conservation, proper lawn and garden care, and proper disposal of hazardous household wastes. Many educational materials can be used for city personnel, contractors as well as homeowners or businesses.

**APPROACH:**

- Building a strong relationship with citizens is the most important step in getting storm water education city-wide.
- Educational materials can be tailored to all different age groups and technical background.
- Should make people aware of the potential impacts of hazardous household materials on water quality and inform residents of ways to properly store, handle, and dispose of the chemicals
- Water usage in the home can easily be reduced by 15 to 20 percent—without major discomfort—by implementing a program to conserve water in the home.
- Lawn and garden activities can result in contamination of storm water through pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff and enhance the aesthetics of a property.

**LIMITATIONS:**

- Not everyone will actually read or incorporate the information into their lives.
- Budgets need to have sufficient funds to obtain educational materials and their distribution.

**MAINTENANCE:**

- Programs and educational materials can be re-used, but they must be presented on a continual basis.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**DESCRIPTION:**

Employee training, like equipment maintenance, is a method by which to implement BMPs. Employee training should be used in conjunction with all other BMPs as part of the facility's SWPPP.

The specific employee training aspects of each of the source controls are highlighted in the individual information sheets. The focus of this information sheet is more general, and includes the overall objectives and approach for assuring employee training in stormwater pollution prevention. Accordingly, the organization of this information sheet differs somewhat from the other information sheets in this chapter.

**OBJECTIVES:**

Employee training should be based on four objectives:

- Promote a clear identification and understanding of the problem, including activities with the potential to pollute stormwater;
- Identify solutions (BMPs);
- Promote employee ownership of the problems and the solutions; and
- Integrate employee feedback into training and BMP implementation.

**APPROACH:**

- Integrate training regarding stormwater quality management with existing training programs that may be required for other regulations.
- Employee training is a vital component of many of the individual source control BMPs included in this manual.



**TARGETED POLLUTANTS**

- Sediment
  - Nutrients
  - Heavy Metals
  - Toxic Materials
  - Oxygen Demanding Substances
  - Oil & Grease
  - Floatable Materials
  - Bacteria & Viruses
- |  |
|--|
| <ul style="list-style-type: none"> <li>■ High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
|--|

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- |  |
|--|
| <ul style="list-style-type: none"> <li>■ High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
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**Diversion dikes can be used to contain storm water onsite**

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Erosion control measures must be taken during a construction project. An Erosion Control Plan will be submitted and approved before work can begin on the project. An Erosion Control Plan describes what erosion control BMPs will be implemented, when and where, during the project.

**APPROACH:**

- Create a list of possible erosion control BMPs that could be implemented in any given project.
- Require submittal of erosion & sediment control plans for projects that are on 1 acre and larger sites.
- Develop a review checklist for plan review personnel.
- Provide the review checklist to contractors/developers so they know what is expected.
- Provide inspectors with a copy of the approved plans.

**LIMITATIONS:**

- Must be enforced to be affective.
- Sometimes site conditions are different then planned on and the plans have to be modified.
- The erosion control measures have to be maintained.
- The BMPs have to be installed early on in the project.
- The BMPs have to be removed at the end of the project.



**TARGETED POLLUTANTS**

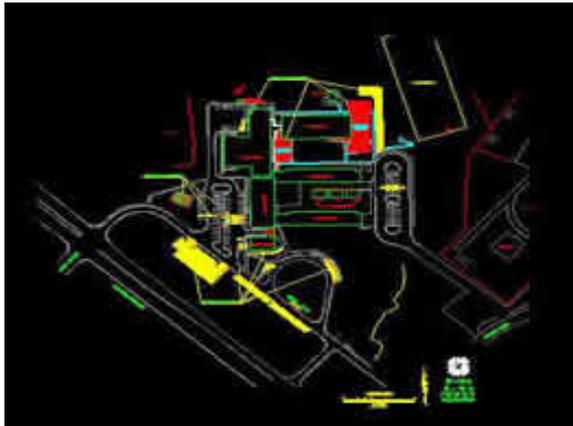
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
  - Medium Impact
  - Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
  - Medium
  - Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Drawings of cities standards that depict specifications for building, construction practices etc. are helpful in communicating to contractors what their responsibilities are. Furthermore Standard drawings show inspectors what is proper practice and provides a minimum requirement to enforce. This also includes compilation of storm water related drawings with other city standard drawings. Drawings may sold to contractors so they can abide by city specs when working inside the city boundary.

**APPROACH:**

- Decide on specifications that reduce water pollutants in a given city.
- Make drawings depicting proper construction practices and acceptable designs
- Compile storm water related drawings into a specification booklet for contractors.
- Require that the design standards be met.
- Train inspectors on what to look for and how to enforce the standards.
- City requirements for an erosion control plan prior to breaking ground on a large development, can have great benefits.

**LIMITATIONS:**

- Some time may be required to decide on standards.
- Drawings will do no good without proper inspection and enforcement

**MAINTENANCE:**

- Specification Drawings may need to change as demands changes



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

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**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

<ul style="list-style-type: none"> <li>■ High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul>
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**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**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.

**APPROACH:**

- Pattern a new program after the many established programs from municipalities around the country. Integrate this best management practice as much as possible with existing programs at your municipality.
- This BMP has two key audiences: municipal employees and the general public.
- For the general public, municipalities should establish a public education program that provides information on such items as storm water pollution and beneficial effects of proper disposal on water quality; reading product labels; safer alternative products; safe storage, handling, and disposal of hazardous products; list of local agencies; and emergency phone numbers. The programs listed below have provided this information through brochures or booklets that are available at a variety of locations including municipal offices, household hazardous waste collection events or facilities, and public information fairs.

Municipal facilities should develop controls on the application of pesticides, herbicides, and fertilizers in public right-of-ways and at municipal facilities. Controls may include:

- List of approved pesticides and selected uses.
- Product and application information for users.
- Equipment use and maintenance procedures.
- Record keeping and public notice procedures.

**LIMITATIONS:**

There are no major limitations to this best management practice.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
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**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

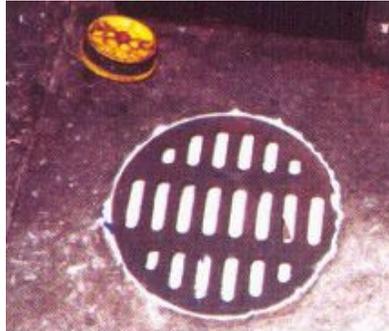
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# BMP: Identifying Illicit Connections

IIC



One of the ways to identify illicit connections is by inspecting storm drain system using video equipment (Source: Drain Patrol, no date)



A common source of pollution from businesses is a floor drain that is improperly connected to a storm drain (Source: Petro-Marine Company, Inc., no date)

## APPLICATIONS

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

## DESCRIPTION:

Involves the identification and elimination of illegal or inappropriate connections of industrial and business wastewater sources to the storm drain system. It attempts to prevent contamination of ground and surface water supplies by regulation, inspection, and removal of these connections. The large amount of storm and sanitary sewer pipes in a community creates a complex and often confusing system of utilities, so it is not unusual for improper connections to occur.

## APPROACH:

- Discharges from industry and business may come from a variety of sources including process wastewater, wash waters, and sanitary wastewater. The following methods are often used for identifying improper industrial discharges to the storm drain system
- *Visual Inspection.* A physical examination of piping connections or analysis by closed circuit camera is used to identify possible illicit connection sites.
- *Piping Schematic Review.* Architectural plans and plumbing details are examined for potential sites where improper connections have occurred.
- *Smoke Testing.* Smoke testing is used to locate connections by injecting a non-toxic vapor (smoke) into the system and following its path of travel.
- *Dye Testing.* Colored dye is added to the drain water in suspect piping. Dyed water appearing in the storm drain system indicates an illegal connection, possibly between the sanitary sewer system and the storm drain.
- Instituting building and plumbing codes to prevent connections of potentially hazardous pollutants to storm drains.
- *Flow Monitoring.* Monitoring increases in storm sewer flows during dry periods can also lead investigators to sources of infiltration due to improper connections.
- *Inspection using video equipment*
- Instituting building and plumbing codes to prevent connections of potentially hazardous pollutants to storm drains.

## LIMITATIONS:

- A local ordinance is necessary to provide investigators with access to private property in order to perform field tests (Ferguson et al. 1997).
- Rain fall can hamper efforts to monitor flows and visual inspections.

## MAINTENANCE:

- 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.



## TARGETED POLLUTANTS

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
|--|

## IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
|--|



**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**DESCRIPTION:**

Implement measures to detect, correct, and enforce against illegal dumping of pollutants on streets, into the storm drain system, and into creeks. Substances illegally dumped on streets, into the storm drain system, and into creeks includes paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes can cause storm water and receiving water quality problems as well as clog the storm drain system.

**APPROACH:**

One of the keys to success is increasing the general public's awareness of the problem and to at least identify the incident, if not correct it. There are a number of ways of accomplishing this:

- Train municipal staff from all departments to recognize and report 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.
- Educate the public.
- Provide the public with a mechanism for reporting such as a hot line.

Establish system for tracking incidents which will identify:

- 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, accident/spills), and
- Responsible parties.

A tracking system also helps manage the program by indicating trends, and identifying who, what, when, and where efforts should be concentrated.

**LIMITATIONS**

The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

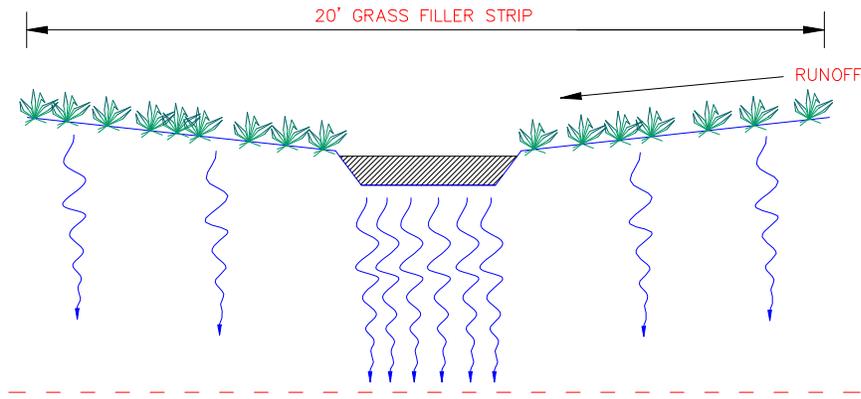
**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low

# BMP: Infiltration

IN



### CONSIDERATIONS

- : Soils
- : Area Required
- : Slope
- 9 Water Availability
- 9 Aesthetics
- 9 Hydraulic Head
- : Environmental Side Effects



### TARGETED POLLUTANTS

- ▬ Sediment
- : Nutrients
- ▬ Heavy Metals
- ▬ Toxic Materials
- ▬ Oxygen Demanding Substances
- ▬ Oil & Grease
- : Floatable Materials
- ▬ Bacteria & Viruses

- High Impact
- ☒ Medium Impact
- ☐ Low or Unknown Impact

### IMPLEMENTATION REQUIREMENTS

- ▬ Capital Costs
- : O&M Costs
- : Maintenance
- 9 Training

- High
- ☒ Medium
- ☐ Low

### DESCRIPTION:

A family of systems in which the majority of the runoff from small storms is infiltrated into the ground rather than discharged to a surface water body. Infiltration systems include: ponds, vaults, trenches, dry wells, porous pavement, and concrete grids.

### APPLICATION:

Suitable site soils and geologic conditions; low potential for long-term erosion in the watershed.

### INSTALLATION/APPLICATION CRITERIA:

- < Volume sized to capture a particular fraction of annual runoff.
- < Pretreatment is necessary in fine soils.
- < Emergency overflow or bypass for larger storms is needed.
- < Observation wells are required in trenches.
- < Infiltration surface must be protected during construction.
- < Pond sides need vegetation to prevent erosion.
- < During construction frequent inspection for clogging is necessary.
- < Line sides of trench with permeable filter fabric
- < Trench should be filled with clean washed stone or gravel. (1.5-3.0 in.)
- < A six inch sand filter layer; cloth lines the bottom of trench.

### LIMITATIONS:

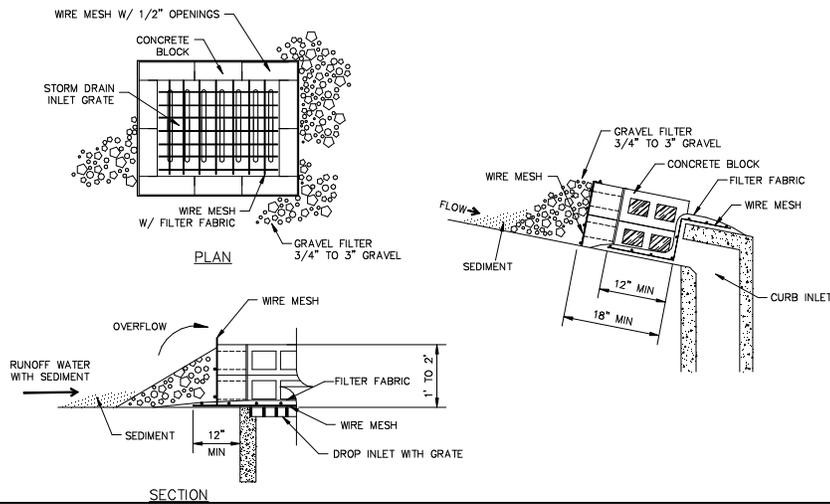
- < Loss of infiltrative capacity and high maintenance cost in fine soils.
- < Low removal of dissolved pollutants in very coarse soils.
- < Not suitable on fill sites or steep slopes.
- < The risk of ground water contamination in very coarse soils, may require ground water monitoring.

### MAINTENANCE:

- < Remove sediment at a frequency appropriate to avoid excessive concentrations of pollutants and loss of infiltrative capacity.
- < Frequent cleaning of porous pavements is required.
- < Maintenance is difficult and costly for underground trenches.

# BMP: Inlet Protection - Concrete Block

IP



## OBJECTIVES

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

## DESCRIPTION:

Concrete block and gravel filter placed over inlet to storm drain system.

## APPLICATION:

Construct at inlets in paved or unpaved areas where upgradient area is to be disturbed by construction activities.

## INSTALLATION/APPLICATION CRITERIA:

- Place wire mesh (with 1/2 inch openings) over the inlet grate extending one foot past the grate in all directions.
- Place concrete blocks around the inlet with openings facing outward. Stack blocks to minimum height of 12-inches and maximum height of 24-inches.
- Place wire mesh around outside of blocks.
- Place gravel (3/4" to 3") around blocks.

## LIMITATIONS:

- Recommended for maximum drainage area of one acre.
- Excess flows may bypass the inlet requiring down gradient controls.
- Ponding will occur at inlet.

## MAINTENANCE:

- Inspect inlet protection after every large storm event and at a minimum of once monthly.
- Remove sediment accumulated when it reaches 4-inches in depth.
- Replace filter fabric and clean or replace gravel if clogging is apparent.



## TARGETED POLLUTANTS

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

## IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High     Medium     Low

<b>BMP: BMP Inspection and Maintenance</b>	<b>IM</b>
 <p>Regular inspection and maintenance of storm water best Management practices is important to ensure that the Practices are functioning properly and to remove trash and organic debris</p>	<p style="text-align: center;"><b>APPLICATIONS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Manufacturing</li> <li><input checked="" type="checkbox"/> Material Handling</li> <li><input type="checkbox"/> Vehicle Maintenance</li> <li><input checked="" type="checkbox"/> Construction</li> <li><input checked="" type="checkbox"/> Commercial Activities</li> <li><input type="checkbox"/> Roadways</li> <li><input checked="" type="checkbox"/> Waste Containment</li> <li><input checked="" type="checkbox"/> Housekeeping Practices</li> </ul>
<p><b>DESCRIPTION:</b> To maintain the effectiveness of postconstruction storm water control best management practices (BMPs), regular inspection of control measures is essential. Inspection and maintenance can be categorized into two groups – expected routine maintenance and nonroutine (repair) maintenance.</p> <p><b>APPROACH:</b></p> <ul style="list-style-type: none"> <li>➤ Curbing can be used at all industrial facilities. It is particularly useful in areas where liquid materials are transferred and as a stormwater runoff control.</li> <li>➤ As with diking, common materials for curbing include earth, concrete, synthetic materials, metal, or other impenetrable materials. Asphalt is also a common material used in curbing. For maximum efficiency, spilled materials should be removed immediately, to allow space for future spills.</li> <li>➤ Curbs should have pumping systems, instead of drainage systems, for collecting spilled materials.</li> <li>➤ Curb systems should be maintained through curb repair (patching and replacement).</li> <li>➤ To minimize the amount of spilled materials tracked outside of the area by personnel, grade within the curbing to direct the spilled mated materials to a down-slope side of the curbing, thus keeping the spilled materials away from personnel and equipment. Grading will also facilitate clean-up.</li> </ul> <p><b>LIMITATIONS:</b></p> <ul style="list-style-type: none"> <li>➤ Curbing is not effective for holding</li> <li>➤ May require more maintenance than diking</li> </ul> <p><b>MAINTENANCE:</b></p> <ul style="list-style-type: none"> <li>➤ Inspection should be conducted before and after storm events.</li> <li>➤ When certain spills occur, cleanup should start immediately, thus preventing overflows and contamination of stormwater runoff.</li> <li>➤ Inspection should also be made to clear clogging debris, prevent dilution by rainwater, and to again prevent overflow of any material.</li> </ul>	<div style="text-align: center;">  </div> <p style="text-align: center;"><b>TARGETED POLLUTANTS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Sediment</li> <li><input type="checkbox"/> Nutrients</li> <li><input checked="" type="checkbox"/> Heavy Metals</li> <li><input checked="" type="checkbox"/> Toxic Materials</li> <li><input type="checkbox"/> Oxygen Demanding Substances</li> <li><input checked="" type="checkbox"/> Oil &amp; Grease</li> <li><input checked="" type="checkbox"/> Floatable Materials</li> <li><input type="checkbox"/> Bacteria &amp; Viruses</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> </div> <p style="text-align: center;"><b>IMPLEMENTATION REQUIREMENTS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Capital Costs</li> <li><input checked="" type="checkbox"/> O&amp;M Costs</li> <li><input checked="" type="checkbox"/> Maintenance</li> <li><input type="checkbox"/> Training</li> </ul>



**DESCRIPTION:**

All developers are required to submit a landscape and irrigation plan for their developments. Lawn and garden activities can result in contamination of storm water through pesticide, soil, and fertilizer runoff. Proper landscape management, however, can effectively reduce water use and contaminant runoff as well as enhance the aesthetics of a property.

**APPROACH:**

- Develop landscape and irrigation plan preparation guidelines.
- Require a landscape and irrigation plan for each new development.
- Educate local developers on how to create effective landscape and irrigation plans for their new developments.
- Educate municipal staff to review property landscape and irrigation plans to minimize runoff.
- Check all new irrigation plans to ensure that there will be no overspray onto impervious surfaces and that the irrigation water will be contained on site.

**LIMITATIONS:**

- More time and effort will be required of the municipal staff to review new development plans.

**MAINTENANCE:**

- Programs and educational materials can be repeatedly sent out or emphasized. Extension service continues to research and provide current data.

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

High Impact  
 Medium Impact  
 Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

<b>BMP: Land Use Planning/Management</b>	<b>LUPM</b>
	<p style="text-align: center;"><b>PROGRAM ELEMENTS</b></p> <p>: New Development            9 Residential            9 Commercial Activities            9 Industrial Activities            9 Municipal Facilities            9 Illegal Discharges</p>
<p><b>DESCRIPTION:</b>            This BMP represents an important opportunity to reduce pollutants in stormwater runoff by using a comprehensive planning process to integrate water quality concerns into the development and redevelopment process. It is applicable to all types of land use and represents one of the most effective pollution prevention practices.</p> <p><b>APPROACH:</b>            The land use planning process need not be complex. A basic schematic model involves:</p> <ul style="list-style-type: none"> <li>&lt; Phase 1 - Goals: Determine clear-cut water quality goals.</li> <li>&lt; Phase 2 - Study: Identify planning area, gather pertinent data, and write a description of the planning area and its associated problems.</li> <li>&lt; Phase 3 - Analysis and Synthesis: Determine and prioritize the water quality needs as they relate to land use.</li> <li>&lt; Phase 4 - Recommendations: Future courses of action are developed to address the identified problems and needs determined previously.</li> <li>&lt; Phase 5 - Adoption: The recommendations are presented to a political body for acceptance and implementation.</li> <li>&lt; Phase 6 - Implementation: Recommendations adopted by the political body are implemented by the locality.</li> </ul> <p><b>LIMITATIONS:</b></p> <ul style="list-style-type: none"> <li>&lt; Land use planning/management frequently addresses sensitive public issues. Restrictions on certain land uses for the purpose of mitigating stormwater pollution may be politically unacceptable.</li> <li>&lt; The use of land use controls and planning for water quality improvements may be limited by the lack of staff to enforce various aspects of local zoning and building codes.</li> <li>&lt; The planning process addresses many public needs and legal requirements which often are in conflict with one another. It is difficult but extremely important to integrate and balance these sometimes competing programs.</li> </ul>	<div style="text-align: center;">  <p><b>SALT LAKE COUNTY</b></p> </div> <p style="text-align: center;"><b>TARGETED POLLUTANTS</b></p> <p># Sediment            : Nutrients            # Heavy Metals            # Toxic Materials            9 Oxygen Demanding Substances            9 Oil &amp; Grease            : Floatable Materials            9 Bacteria &amp; Viruses</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> <input type="checkbox"/> High Impact  <input checked="" type="checkbox"/> Medium Impact  <input type="checkbox"/> Low or Unknown Impact         </p> </div> <p style="text-align: center;"><b>IMPLEMENTATION REQUIREMENTS</b></p> <p>9 Capital Costs            9 O&amp;M Costs            # Regulatory            9 Training            : Staffing            9 Administrative</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> <input type="checkbox"/> High    <input checked="" type="checkbox"/> Medium    <input type="checkbox"/> Low         </p> </div>



<b>APPLICATIONS</b>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Manufacturing</li> <li><input checked="" type="checkbox"/> Material Handling</li> <li><input checked="" type="checkbox"/> Vehicle Maintenance</li> <li><input type="checkbox"/> Construction</li> <li><input type="checkbox"/> Commercial Activities</li> <li><input type="checkbox"/> Roadways</li> <li><input checked="" type="checkbox"/> Waste Containment</li> <li><input checked="" type="checkbox"/> Housekeeping Practices</li> </ul>

**DESCRIPTION:**  
Establishment and implementation of a schedule for long term operation and maintenance procedures for the existing storm drain system.

**APPROACH:**

- Review existing maintenance schedule and/or efforts.
- Review the requirements necessary to maintain the existing storm drain system.
- Create a schedule for long term operation and maintenance of the storm drain system.
- Implement the maintenance schedule.
- Follow up.



**LIMITATIONS:**

- Cost
- Availability of trained staff
- 

<b>TARGETED POLLUTANTS</b>
<ul style="list-style-type: none"> <li>■ Sediment</li> <li><input checked="" type="checkbox"/> Nutrients</li> <li>■ Heavy Metals</li> <li><input type="checkbox"/> Toxic Materials</li> <li><input checked="" type="checkbox"/> Oxygen Demanding Substances</li> <li>■ Oil &amp; Grease</li> <li>■ Floatable Materials</li> <li>■ Bacteria &amp; Viruses</li> </ul>
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<b>IMPLEMENTATION REQUIREMENTS</b>
<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Capital Costs</li> <li>■ O&amp;M Costs</li> <li><input checked="" type="checkbox"/> Maintenance</li> <li><input checked="" type="checkbox"/> Staffing</li> <li><input type="checkbox"/> Training</li> <li><input type="checkbox"/> Administrative</li> </ul>
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**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Create maps of existing storm water drain systems to facilitate spill cleanup and identify illicit connections.

**APPLICATION:**

- Use the map of the storm water drain system to track drainage paths and trace any contaminant problems to their source.
- In the event of a major spill, use the map of the storm water drain system to identify where the contaminants will flow to and cut off the flow before further contamination.

**INSTALLATION/APPLICATION CRITERIA:**

- Using GIS or other mapping programs, create accurate maps of the storm water drain system, including street names and pipe diameters.

**LIMITATIONS:**

**MAINTENANCE:**

- Annually review any development that has occurred and update the map of the storm drain system accordingly.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- |   |
|---|
| <input checked="" type="checkbox"/> High Impact   |
| <input checked="" type="checkbox"/> Medium Impact |
| <input type="checkbox"/> Low or Unknown Impact    |

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |  |                              |
|--|--|------------------------------|
| <input checked="" type="checkbox"/> High | <input checked="" type="checkbox"/> Medium | <input type="checkbox"/> Low |
|--|--|------------------------------|

**BMP: Material Use**

**MU**



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to storm water from material use by using alternative products, minimizing hazardous material use on-site, and training employees and subcontractors.

**APPLICATION:**

The following materials are commonly used on construction sites:

- Pesticides and herbicides, fertilizers, detergents, plaster and other products, petroleum products such as fuel, oil, and grease.
- Other hazardous chemicals such as acids, lime, glues, paints, solvents, and curing compounds.

**INSTALLATION/APPLICATION CRITERIA:**

- Use less hazardous, alternative materials as much as possible.
- Minimize use of hazardous materials on-site.
- Use only materials where and when needed to complete the construction activity.
- Follow manufacturer's instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Personnel who use pesticides should be trained in their use.
- Do not over apply fertilizers, herbicides, and pesticides. Prepare only the amount needed.
- Unless on steep slopes, till fertilizers in to the soil rather than hydroseeding.
- Do not apply these chemicals just before it rains.

**LIMITATIONS:**

Alternative materials may not be available, suitable, or effective in every case.

**MAINTENANCE:**

Maintenance of this best management practice is minimal.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Eliminate non-stormwater discharges to the stormwater collection system. Non-stormwater discharges may include: process wastewaters, cooling waters, wash waters, and sanitary wastewater.

**APPROACH:**

The following approaches may be used to identify non-stormwater discharges:

- Visual inspection: the easiest method is to inspect each discharge point during dry weather. Keep in mind that drainage from a storm event can continue for three days or more and groundwater may infiltrate the underground stormwater collection system.
- Piping Schematic Review: The piping schematic is a map of pipes and drainage systems used to carry wastewater, cooling water, sanitary wastes, etc... A review of the "as-built" piping schematic is 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 the sanitary or process wastewater system and examining the discharge points from the stormwater collection system for discoloration.

**LIMITATIONS:**

- Many facilities do not have accurate, up-to-date schematic drawings.
- Video and visual inspections can identify illicit connections to the storm sewer, but further testing is sometimes required (e.g. dye, smoke) to identify sources.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Existing ordinances relating to storm water are reviewed for compliance. New ordinances are written to prohibit non-storm water discharges into the Municipal Separate Storm Sewer System (MS4), require proper erosion and sediment controls on construction sites, and require the implementation of post-construction runoff controls.

**APPROACH:**

- Review existing storm drain ordinances for consistency and compliance with state regulations and make improvements, if necessary. Ensure that no conflicts will occur with new ordinances that will be written and adopted.
- Write and adopt an ordinance that prohibits (to the extent allowable under State, Tribal, or local law) the discharge of non-storm water discharges into the MS4 with appropriate enforcement procedures and actions.
- Write and adopt an ordinance, with sanctions to ensure compliance, requiring the implementation of proper erosion and sediment controls, and controls for other wastes, on applicable construction sites.
- Write and adopt an ordinance requiring the implementation of post-construction runoff controls to the extent allowable under State, Tribal, or local law.
- Educate the public about the new ordinances.
- Enforce the new ordinances.

**LIMITATIONS:**

- Wording of ordinances is often difficult. It should be specific to serve the intended purpose, but not too specific to cause potential conflicts with other ordinances or situations.
- Once an ordinance is adopted, it can be difficult to modify ordinances to meet changing needs.
- Ordinances have to be enforced to be beneficial.
- Ordinances take time to change.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

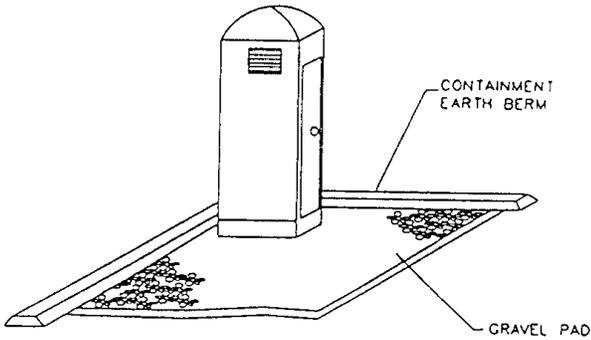
**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low

# BMP: Portable Toilets

PT



1'x1'

### OBJECTIVES

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

### DESCRIPTION:

Temporary on-site sanitary facilities for construction personnel.

### APPLICATION:

All sites with no permanent sanitary facilities or where permanent facility is too far from activities.

### INSTALLATION/APPLICATION CRITERIA:

- Locate portable toilets in convenient locations throughout the site.
- Prepare level, gravel surface and provide clear access to the toilets for servicing and for on-site personnel.
- Construct earth berm perimeter (See Earth Berm Barrier Information Sheet), control for spill/protection leak.

### LIMITATIONS:

No limitations.

### MAINTENANCE:

- Portable toilets should be maintained in good working order by licensed service with daily observation for leak detection.
- Regular waste collection should be arranged with licensed service.
- All waste should be deposited in sanitary sewer system for treatment with appropriate agency approval.



### TARGETED POLLUTANTS

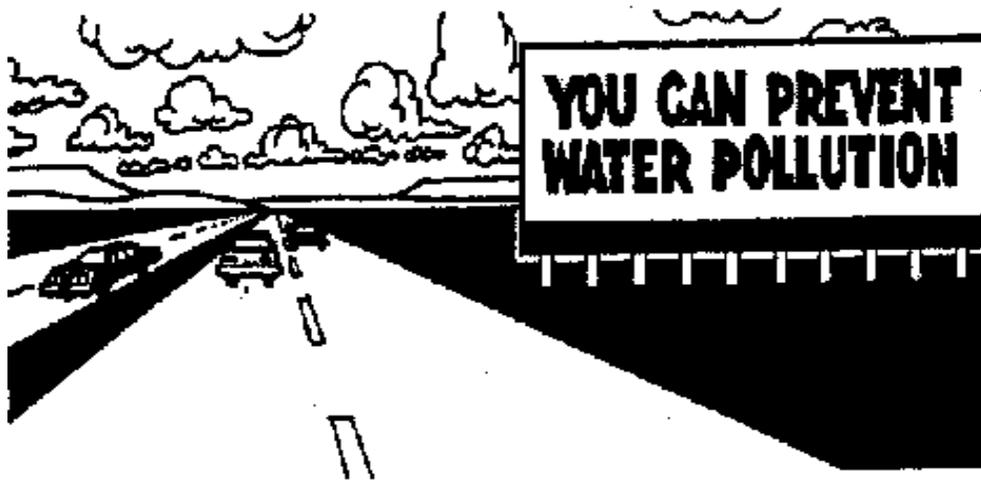
- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- |   |
|---|
| <input checked="" type="checkbox"/> High Impact   |
| <input checked="" type="checkbox"/> Medium Impact |
| <input type="checkbox"/> Low or Unknown Impact    |

### IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |  |                              |
|--|--|------------------------------|
| <input checked="" type="checkbox"/> High | <input checked="" type="checkbox"/> Medium | <input type="checkbox"/> Low |
|--|--|------------------------------|



**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**DESCRIPTION:**

Public education/participation, like an ordinance or a piece of equipment, is not so much a best management practice as it is a method by which to implement BMPs. This information sheet highlights the importance of integrating elements of public education and participation into a municipality's overall plan for stormwater quality management.

A public education and participation plan provides the municipality with a strategy for educating its employees, the public, and businesses about the importance of protecting stormwater from improperly used, stored, and disposed of pollutants. Municipal employees must be trained, especially those that work in departments not directly related to stormwater but whose actions affect stormwater. Residents must become aware that a variety of hazardous products are used in the home and that their improper use and disposal can pollute stormwater. Increased public awareness also facilitates public scrutiny of industrial and municipal activities and will likely increase public reporting of incidents.

**APPROACH:**

- Pattern a new program after the many established programs around the country.
- Implement public education/participation as a coordinated campaign in which each message is related to the last.
- Present a clear and consistent message and image to the public regarding how they contribute to stormwater pollution and what they can do to reduce it.
- Utilize multi-media to reach the full range of audiences.
- Translate messages into the foreign languages of the community to reach the full spectrum of your populace and to avoid misinterpretation of messages.
- Create an awareness and identification with the local watershed.
- Use everyday language in all public pieces. Use outside reviewers to highlight and reduce the use of technical terminology, acronyms, and jargon.
- Make sure all statements have a sound, up-to-date technical basis. Do not contribute to the spread of misinformation.
- Break complicated subjects into smaller more simple concepts. Present these concepts to the public in a metered and organized way to avoid "overloading" and confusing the audience.

**LIMITATIONS:**

None.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

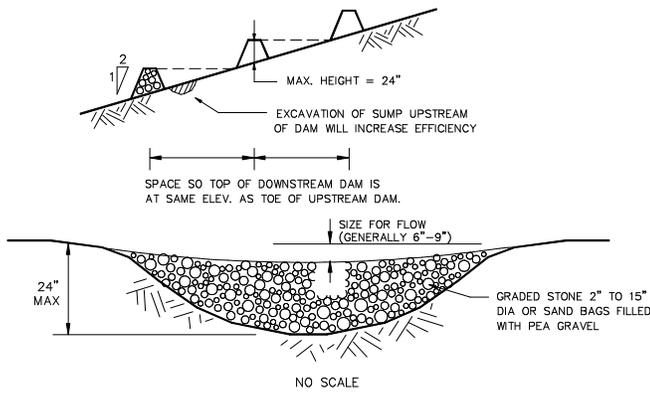
- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low

<b>BMP: Riprap</b>	<b>RR</b>
	<p style="text-align: center;"><b>CONSIDERATIONS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Soils</li> <li><input checked="" type="checkbox"/> Area Required</li> <li><input checked="" type="checkbox"/> Slope</li> <li><input type="checkbox"/> Water Availability</li> <li><input checked="" type="checkbox"/> Aesthetics</li> <li><input type="checkbox"/> Hydraulic Head</li> <li><input checked="" type="checkbox"/> Environmental Side Effects</li> </ul>
<p><b>DESCRIPTION:</b> Riprap is a permanent, erosion-resistant protective layer made of loose stones. It is intended to protect soil from erosion in areas of concentrated runoff. Riprap may also be used to stabilize slopes that are unstable because of seepage problems.</p> <p><b>APPLICATION:</b></p> <ul style="list-style-type: none"> <li>➤ Riprap is normally used at locations where erosive forces from water flow exceed the ability of the soil or vegetative cover to resist those forces.</li> <li>➤ Riprap can be used for pipe outlet protection, channel lining, scour protection, etc.</li> <li>➤ Riprap is commonly used for wave protection on lakes.</li> </ul> <p><b>INSTALLATION/APPLICATION CRITERIA:</b></p> <ul style="list-style-type: none"> <li>➤ For slopes steeper than 2:1, consider using materials other than riprap for erosion protection.</li> <li>➤ If riprap is being planned for the bottom of a permanently flowing channel, the bottom can be modified to enhance fish habitat. This can be done by constructing riffles and pools which simulate natural conditions.</li> <li>➤ When working within flowing streams, measures should be taken to prevent excessive turbidity and erosion during construction. Bypassing base flows or temporarily blocking base flows are two possible methods. Work should be done during a period of low flow.</li> </ul> <p>In designing riprap consider the following:</p> <ul style="list-style-type: none"> <li>➤ Use durable rock, such as granite, and a variety of rock sizes.</li> <li>➤ The thickness of riprap layers should be at least 1.25 times the max. stone diameter.</li> <li>➤ Filter material is usually required between riprap and the underlying soil surface.</li> </ul> <p><b>LIMITATIONS:</b></p> <ul style="list-style-type: none"> <li>➤ Riprap may be unstable on very steep slopes.</li> <li>➤ The placement of a riprap in streams requires a state stream alteration permit.</li> </ul> <p><b>MAINTENANCE:</b></p> <ul style="list-style-type: none"> <li>➤ Riprap should be inspected annually and after major storms.</li> <li>➤ If riprap has been damaged, repairs should be made promptly to prevent a progressive failure.</li> <li>➤ If repairs are needed repeatedly at one location, the site should be evaluated to see if original design conditions have changed.</li> </ul>	<div style="text-align: center;">  </div> <p style="text-align: center;"><b>TARGETED POLLUTANTS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Sediment</li> <li><input type="checkbox"/> Nutrients</li> <li><input type="checkbox"/> Heavy Metals</li> <li><input type="checkbox"/> Toxic Materials</li> <li><input type="checkbox"/> Oxygen Demanding Substances</li> <li><input type="checkbox"/> Oil &amp; Grease</li> <li><input type="checkbox"/> Floatable Materials</li> <li><input type="checkbox"/> Bacteria &amp; Viruses</li> </ul> <div style="border: 1px solid black; padding: 5px;"> <ul style="list-style-type: none"> <li><input type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> </div> <p style="text-align: center;"><b>IMPLEMENTATION REQUIREMENTS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Capital Costs</li> <li><input checked="" type="checkbox"/> O&amp;M Costs</li> <li><input checked="" type="checkbox"/> Maintenance</li> <li><input type="checkbox"/> Training</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <ul style="list-style-type: none"> <li><input type="checkbox"/> High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> </div>



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

A small, temporary dam constructed across a drainage ditch to reduce velocity of concentrated storm water flows, thereby reducing the erosion of the ditch.

**APPLICATION:**

- Temporary drainage paths
- Permanent drainage ways not yet stabilized
- Existing drainage paths receiving increased flows due to construction

**INSTALLATION/APPLICATION CRITERIA:**

- Prepare location of dam by removing any debris and rough grading any irregularities in channel bottom
- Place rocks by hand or with appropriate machinery, do not dump
- Construct dam with center lower to pass design flow
- Construct 50% side slopes on dam

**LIMITATIONS:**

- Maximum recommended drainage area is 10 acres
- Maximum recommended height is 24"
- Do not use in running stream

**MAINTENANCE:**

- Inspect dams daily during prolonged rainfall, after each major rain event and at a minimum of once monthly.
- Remove any large debris and repair any damage to dam, channel or sideslopes
- Remove accumulated sediment when it reaches one half the height of the dam



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul> |
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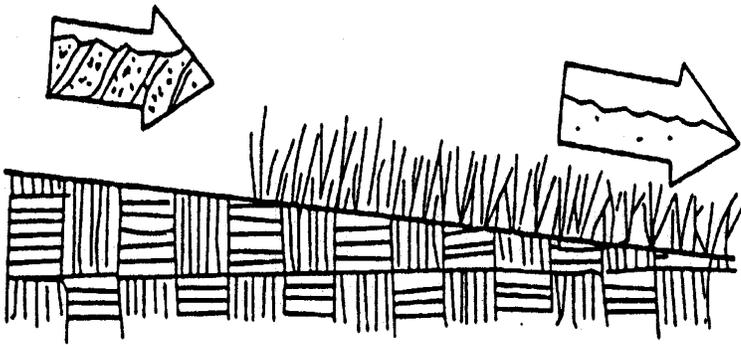
**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |  |                              |
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| <input checked="" type="checkbox"/> High | <input checked="" type="checkbox"/> Medium | <input type="checkbox"/> Low |
|--|--|------------------------------|

# BMP: Seeding and Planting

SP



## OBJECTIVES

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

## DESCRIPTION:

Seeding of grass and plantings of trees, shrubs, vines and ground covers provide long-term stabilization of soil. In some areas, with suitable climates, grasses can be planted for temporary stabilization.

## APPLICATION:

- Appropriate for site stabilization both during construction and post-construction.
- Any graded/cleared areas where construction activities have ceased.
- Open space cut and fill areas.
- Steep slopes, spoil piles, vegetated swales, landscape corridors, stream banks.

## INSTALLATION/APPLICATION CRITERIA:

Type of vegetation, site and seedbed preparation, planting time, fertilization and water requirements should be considered for each application.

### Grasses:

- Ground preparation: fertilize and mechanically stabilize the soil.
- Tolerant of short-term temperature extremes and waterlogged soil composition.
- Appropriate soil conditions: shallow soil base, good drainage, slope 2:1 or flatter.
- Mowing, irrigating, and fertilizing are vital for promoting vigorous grass growth.

### Trees and Shrubs:

- Selection criteria: vigor, species, size, shape & wildlife food source.
- Soil conditions: select species appropriate for soil, drainage & acidity.
- Other factors: wind/exposure, temperature extremes, and irrigation needs.

### Vines and Ground Covers:

- Ground preparation: lime and fertilizer preparation.
- Use proper seeding rates.
- Appropriate soil conditions: drainage, acidity and slopes.
- Generally avoid species requiring irrigation.

## LIMITATIONS:

- Permanent and temporary vegetation may not be appropriate in dry periods without irrigation.
- Fertilizer requirements may have potential to create stormwater pollution.

## MAINTENANCE:

- Shrubs and trees must be adequately watered and fertilized and if needed pruned.
- Grasses may need to be watered and mowed.



## TARGETED POLLUTANTS

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

## IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**Many times an aged or failing septic system requires tank replacement (Source: Texas A&M University, 1995)**

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Prevent new septic systems from failing, detect and correct existing systems that have been failing by educating homeowners installers and inspectors about proper operation and maintenance of septic systems.

**APPROACH:**

- Educational outreach and training help to avoid system failures for owners of both new and existing systems.
- Septic systems should be located to ensure a horizontal distance from surface waters and vertical separation from ground water.
- The proper sizing of a system is necessary to avoid hydraulic overloading.
- In some cases, modifications to septic systems may be necessary in order to ensure proper treatment of wastewater discharges. Household chemicals can kill the bacteria that make the system work and non-degradable materials (cigarette butts, etc.) can clog the system.
- A septic system management program of scheduled pumpouts and regular maintenance is the best way to reduce the possibility of failure for currently operating systems.
- Proper siting and post-construction inspection will work to prevent new systems from failing.

**LIMITATIONS:**

- Reliance on individual on-site inspection to detect failed systems is another major limitation. The individual on-site inspection is very labor-intensive and requires access to private property to pinpoint the exact location of the failing system.
- Perhaps the biggest limitation to correcting failing septic systems is the lack of techniques for detecting individual failed systems.
- Once a septic system has been identified as failing, procedures must be in place to replace that system. The cost to replace a septic system typically ranges between \$3,000 and \$7,000 per unit (NSFC, 1999).

**MAINTENANCE:**

- Periodic maintenance of on-site systems is necessary to ensure their proper functioning. Since many homeowners do not employ these routine maintenance practices, it may be necessary for agencies to establish programs to track pumpouts and maintenance requirements.



**TARGETED POLLUTANTS**

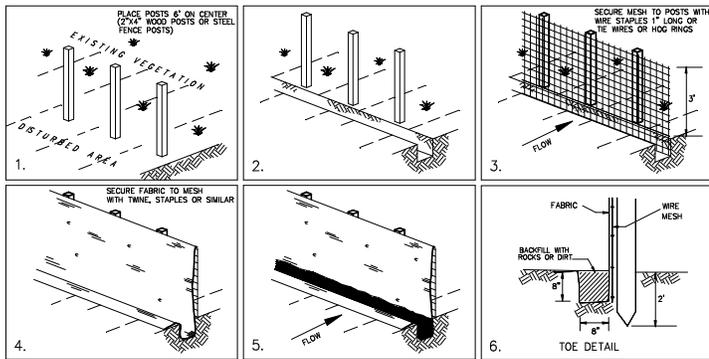
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**OBJECTIVES**

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

**DESCRIPTION:**

A temporary sediment barrier consisting of entrenched filter fabric stretched across and secured to supporting posts.

**APPLICATION:**

- Perimeter control: place barrier at downgradient limits of disturbance
- Sediment barrier: place barrier at toe of slope or soil stockpile
- Protection of existing waterways: place barrier at top of stream bank
- Inlet protection: place fence surrounding catchbasins

**INSTALLATION/APPLICATION CRITERIA:**

- Place posts 6 feet apart on center along contour (or use preassembled unit) and drive 2 feet minimum into ground. Excavate an anchor trench immediately upgradient of posts.
- Secure wire mesh (14 gage min. With 6 inch openings) to upslope side of posts. Attach with heavy duty 1 inch long wire staples, tie wires or hog rings.
- Cut fabric to required width, unroll along length of barrier and drape over barrier. Secure fabric to mesh with twine, staples, or similar, with trailing edge extending into anchor trench.
- Backfill trench over filter fabric to anchor.

**LIMITATIONS:**

- Recommended maximum drainage area of 0.5 acre per 100 feet of fence
- Recommended maximum upgradient slope length of 150 feet
- Recommended maximum uphill grade of 2:1 (50%)
- Recommended maximum flow rate of 0.5 cfs
- Ponding should not be allowed behind fence

**MAINTENANCE:**

- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
- Look for runoff bypassing ends of barriers or undercutting barriers.
- Repair or replace damaged areas of the barrier and remove accumulated sediment.
- Reanchor fence as necessary to prevent shortcutting.
- Remove accumulated sediment when it reaches 1/2 the height of the fence.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

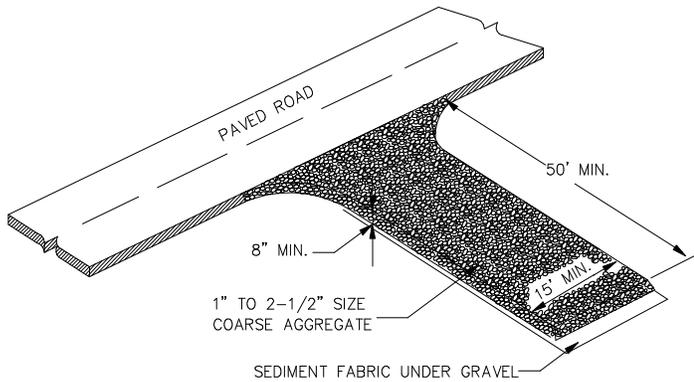
**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low

# BMP: Stabilized Construction Entrance

SCE



### OBJECTIVES

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

### DESCRIPTION:

A stabilized pad of crushed stone located where construction traffic enters or leaves the site from or to paved surface.

### APPLICATIONS:

At any point of ingress or egress at a construction site where adjacent traveled way is paved. Generally applies to sites over 2 acres unless special conditions exist.

### INSTALLATION/APPLICATION CRITERIA:

- Clear and grub area and grade to provide maximum slope of 2%.
- Compact subgrade and place filter fabric if desired (recommended for entrances to remain for more than 3 months).
- Place coarse aggregate, 1 to 2-1/2 inches in size, to a minimum depth of 8 inches.

### LIMITATIONS:

- Requires periodic top dressing with additional stones.
- Should be used in conjunction with street sweeping on adjacent public right-of-way.

### MAINTENANCE:

- Inspect daily for loss of gravel or sediment buildup.
- Inspect adjacent roadway for sediment deposit and clean by sweeping or shoveling.
- Repair entrance and replace gravel as required to maintain control in good working condition.
- Expand stabilized area as required to accommodate traffic and prevent erosion at driveways.



### TARGETED POLLUTANTS

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- |   |
|---|
| <input checked="" type="checkbox"/> High Impact   |
| <input checked="" type="checkbox"/> Medium Impact |
| <input type="checkbox"/> Low or Unknown Impact    |

### IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |  |                              |
|--|--|------------------------------|
| <input checked="" type="checkbox"/> High | <input checked="" type="checkbox"/> Medium | <input type="checkbox"/> Low |
|--|--|------------------------------|

**DESCRIPTION:**  
 Reduce pollutant levels in storm water by removing illegally dumped items and material from storm drainage channels and creeks. Modify channel characteristics to enhance pollutant removal and/or hydraulic capacity.

**APPROACH:**

- Identify illegal dumping hot spots; regular inspection and clean up of hot spots and other storm drainage areas where illegal dumping and disposal occurs.
- Post "No Littering" signs with a phone number for reporting a dumping in-progress.
- Adopt and enforce substantial penalties for illegal dumping and disposal.
- Modify storm channel characteristics to improve channel hydraulics, to increase pollutant removals, and to enhance channel/creek aesthetics and habitat value.
- Maintain accurate logs to evaluate materials removed and improvements made.

**LIMITATIONS:**

- Clean-up 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.
- Worker/public safety may be at risk in crime-ridden areas.
- If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation.

**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges



**TARGETED POLLUTANTS**

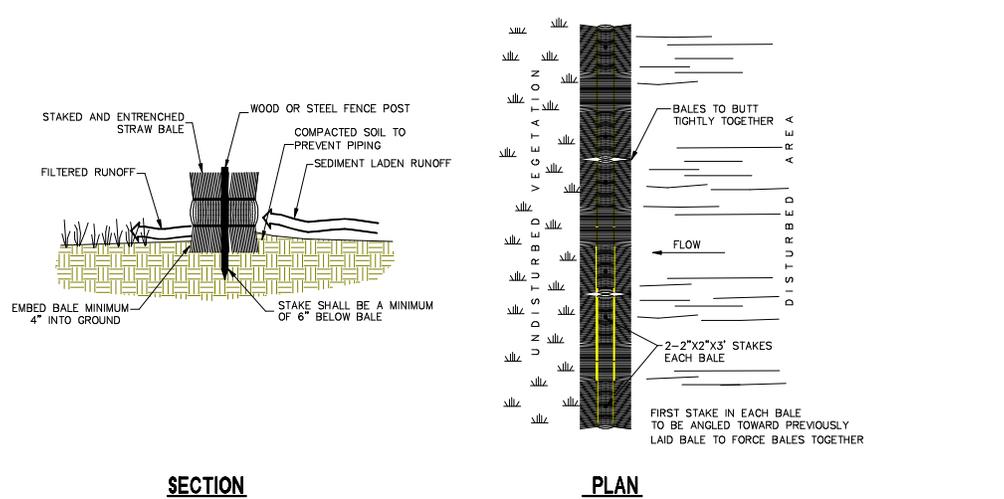
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

- High
- Medium
- Low



- OBJECTIVES**
- Housekeeping Practices
  - Contain Waste
  - Minimize Disturbed Areas
  - Stabilize Disturbed Areas
  - Protect Slopes/Channels
  - Control Site Perimeter
  - Control Internal Erosion

**DESCRIPTION:**  
Temporary sediment barrier consisting of a row of entrenched and anchored straw bales.

- APPLICATION:**
- Perimeter Control: place barrier at downgradient limits of disturbance.
  - Sediment barrier: place barrier at toe of slope or soil stockpile.
  - Protection of existing waterways: place barrier at top of stream bank.
  - Inlet Protection.

- INSTALLATION/APPLICATION CRITERIA:**
- Excavate a 4-inch minimum deep trench along contour line, i.e. parallel to slope, removing all grass and other material that may allow underflow.
  - Place bales in trench with ends tightly abutting, fill any gaps by wedging loose straw into openings.
  - Anchor each bale with 2 stakes driven flush with the top of the bale.
  - Backfill around bale and compact to prevent piping, backfill on uphill side to be built up 4-inches above ground at the barrier.

- LIMITATIONS:**
- Recommended maximum area of 0.5 acre per 100 feet of barrier
  - Recommended maximum upgradient slope length of 150 feet
  - Recommended maximum uphill grade of 2:1 (50%)

- MAINTENANCE:**
- Inspect immediately after any rainfall and at least daily during prolonged rainfall.
  - Look for runoff bypassing ends of barriers or undercutting barriers.
  - Repair or replace damaged areas of the barrier and remove accumulated sediment.
  - Realign bales as necessary to provide continuous barrier and fill gaps.
  - Recompect soil around barrier as necessary to prevent piping.



- TARGETED POLLUTANTS**
- Sediment
  - Nutrients
  - Toxic Materials
  - Oil & Grease
  - Floatable Materials
  - Other Waste

- |   |
|---|
| <input checked="" type="checkbox"/> High Impact   |
| <input checked="" type="checkbox"/> Medium Impact |
| <input type="checkbox"/> Low or Unknown Impact    |

- IMPLEMENTATION REQUIREMENTS**
- Capital Costs
  - O&M Costs
  - Maintenance
  - Training

- |  |  |                              |
|--|--|------------------------------|
| <input checked="" type="checkbox"/> High | <input checked="" type="checkbox"/> Medium | <input type="checkbox"/> Low |
|--|--|------------------------------|

# BMP: Stream Cleanup and Monitoring

SCM



People can become involved in pollution prevention by volunteering to clean up streams (Source: Water Action Volunteers, 1998)

### APPLICATIONS

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

### DESCRIPTION:

Many people are unaware that most storm drains discharge untreated waters directly into local water bodies. A stream cleanup allows concerned citizens to become directly involved in water pollution prevention. Participants volunteer to walk (or paddle) the length of the stream or river, collecting trash and recording information about the quantity and types of garbage that has been removed.

### APPROACH:

- Designating an individual or groups of individuals to schedule and organize the cleanup projects, recruit volunteers, coordinate trash disposal with the local solid waste authority, and assign staff for supervision of the projects.
- The first step for a municipally sponsored stream cleanup program is to identify cleanup sites
- Advertise the program and let service groups know about cleanup project opportunities
- When volunteers are being used for cleanup efforts, municipalities must address the issue of liability. An attorney should be consulted to determine how liability should be handled and draft a waiver for volunteers to sign before participating.
- Cleanup events are also effective at increasing public awareness of pollutant sources and fates, especially when knowledgeable municipal staff is on hand to answer questions, describe the water resources, and discuss non-point-source pollution issues with volunteers.
- Implement an "Adopt A Stream" program where volunteers clean up, monitor, protect, and restore a stretch of stream. The adopting group or organization becomes the primary caretaker of that stretch of stream.

### LIMITATIONS:

- Organization at the municipal level is a limitation to cleanup efforts. Some municipalities do not have the resources to designate staff to oversee a cleanup program and to supervise cleanup activities.
- Limitations to an effective cleanup program are volunteer interest and commitment.

### MAINTENANCE:

- To maintain water quality, cleanup efforts must be recurring; a one-time-only cleanup event might raise awareness in the community, but it will not keep trash out of the river.
- Seasonal or annual cleanup events will help make sure that trash and debris are kept out of the river as much as possible.



### TARGETED POLLUTANTS

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

### IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High
- Medium
- Low



**PROGRAM ELEMENTS**

- New Development
- Residential
- Commercial Activities
- Industrial Activities
- Municipal Facilities
- Illegal Discharges

**DESCRIPTION:**

Reduce the discharges of pollutants to stormwater from street surfaces by conducting street cleaning on a regular basis.

**APPROACH:**

- Prioritize cleaning to use the most sophisticated sweepers, at the highest frequency, and in areas with the highest pollutant loading.
- Restrict street parking prior to and during sweeping.
- Increase sweeping frequency just before the rainy season.
- Proper maintenance and operation of sweepers greatly increase their efficiency.
- Keep accurate operation logs to track programs.
- Reduce the number of parked vehicles using regulations.
- Sweepers effective at removing smaller particles (less than 10 microns) may generate dust that would lead to concerns over worker and public safety.
- Equipment selection can be key for this particular BMP. There are two types used, the mechanical broom sweepers (more effective at picking up large debris and cleaning wet streets), and the vacuum sweepers (more effective at removing fine particles and associated heavy metals). Many communities find it useful to have a compliment of both types in their fleet.

**LIMITATIONS:**

- Conventional sweepers are not able to remove oil and grease.
- Mechanical sweepers are not effective at removing finer sediments.
- Effectiveness may also be limited by street conditions, traffic congestion, presence of construction projects, climatic conditions and condition of curbs.

**MAINTENANCE:**

- Replace worn parts as necessary.
- Install main and gutter brooms of the appropriate weight.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

<ul style="list-style-type: none"> <li>■ High Impact</li> <li><input checked="" type="checkbox"/> Medium Impact</li> <li><input type="checkbox"/> Low or Unknown Impact</li> </ul>
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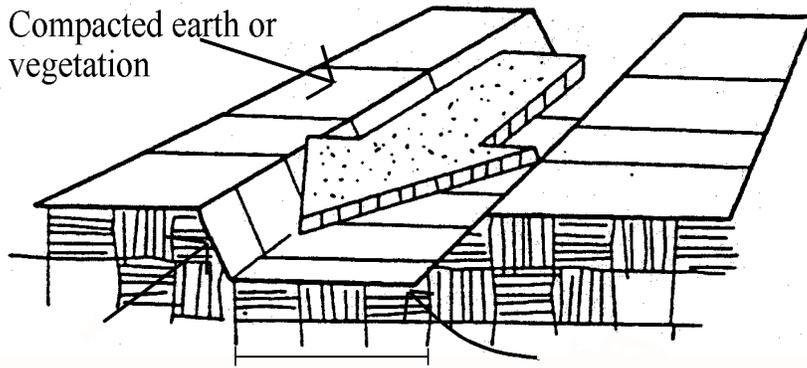
**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Regulatory
- Training
- Staffing
- Administrative

<ul style="list-style-type: none"> <li>■ High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul>
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# BMP: Temporary Drains And Swales

TDS



2 ft (min)  
2:1 or flatter  
Stabilization

### OBJECTIVES

- Housekeeping Practices
- Contain Waste
- Minimize Disturbed Areas
- Stabilize Disturbed Areas
- Protect Slopes/Channels
- Control Site Perimeter
- Control Internal Erosion

### DESCRIPTION:

Temporary drains and swales are used to divert off-site runoff around the construction site, divert runoff from stabilized areas around disturbed areas, and direct runoff into sediment.

### APPLICATIONS:

- Temporary drains and swales are appropriate for diverting any upslope runoff around unstabilized or disturbed areas of the construction site.
- Prevent slope failures. Prevent damage to adjacent property. Prevents erosion and transport of sediments into water ways. Increases the potential for infiltration. Diverts sediment-laden runoff into sediment basins or traps.

### INSTALLATION/APPLICATION:

- Temporary drainage swales will effectively convey runoff and avoid erosion if built properly:
- Size temporary drainage swales using local drainage design criteria. A permanent drainage channel must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drain/swale should conform to predevelopment drainage patterns and capacities.
- Construct the drain/swale with an uninterrupted, positive grade to a stabilized outlet. Provide erosion protection or energy dissipation measures if the flow out of the drain or swale can reach an erosive velocity.

### LIMITATIONS:

- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.

### MAINTENANCE:

- Inspect weekly and after each rain.
- Repair any erosion immediately.
- Remove sediment which builds up in the swale and restricts its flow capacity.



### TARGETED POLLUTANTS

- Sediment
- Nutrients
- Toxic Materials
- Oil & Grease
- Floatable Materials
- Other Waste

- High Impact
- Medium Impact
- Low or Unknown Impact

### IMPLEMENTATION REQUIREMENTS

- Capital Costs
- O&M Costs
- Maintenance
- Training

- High     Medium     Low



**Television can be an effective means of informing the public about storm water problems and outreach events**

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

The media can be strong allies to a storm water pollution prevention campaign in educating the public about storm water issues. Through the media, a program can educate targeted or mass audiences about problems and solutions, build support for remediation and retrofit projects, or generate awareness and interest in storm water management. Best of all, packaging a storm water message as a news story is virtually free!

**APPROACH:**

- > *Newspapers and Magazines.* Newspapers are powerful vehicles for delivering educational information, policy analyses, public notices, and other messages. Many displays at watershed seminars proudly post newspaper articles on the projects being presented in recognition of the importance and impact of newspaper coverage.
- > Newspapers can be accessed in several ways. Depending on the message or event, the appropriate format might be a news release, news advisory, query letter, letter to the editor, or (for urgent, timely information) a news conference
- > *Magazines.* Magazines, like newspapers, allow for greater length and analysis than television and provide the additional benefit of targeting specific audiences (e.g., landscapers, automobile mechanics, farmers, or recreationists).
- > *Radio.* In spite of the popularity of video, radio remains a strong media contender due to its affordable production costs and creative possibilities. Further, commuters who drive to work spend much time in their vehicles.
- > *Television.* Television is the primary source of news for the majority of the population, and local reporters are generally interested in covering environmental stories that pertain to their area.
- > Issues will attract television coverage if they involve local people or issues, focus on unique or unusual attributes, affect many people throughout a region, involve controversy or strong emotions
- > *Internet Message.* Increasingly, the Internet is becoming a powerful means of communication. It provides worldwide access to hundreds of thousands of sites containing millions of documents, chat rooms for special interest groups, and incredible database/mapping features.

**LIMITATIONS:**

- > Working with the media is essentially free, but not always.



**TARGETED POLLUTANTS**

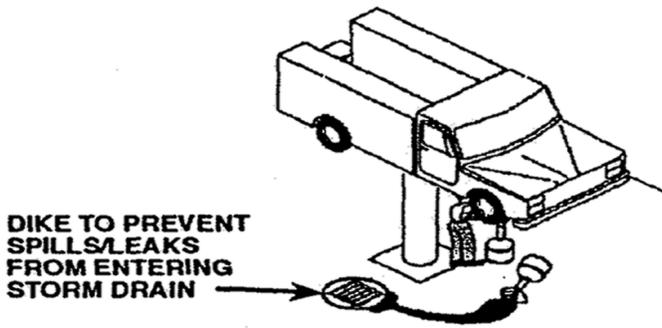
- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- |  |
|--|
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|--|

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |
|--|
| <ul style="list-style-type: none"> <li>■ High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
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(INSIDE MAINTENANCE FACILITY)

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Prevent or reduce the discharge of pollutants to stormwater from vehicles and equipment maintenance and repair by running a dry shop.

**APPROACH:**

- Keep equipment clean, don't allow excessive build-up of oil and grease.
- Keep drip pans or containers under the areas that might drip.
- Do not change motor oil or perform equipment maintenance in non-appropriate areas.
- Inspect equipment for leaks on a regular basis.
- Segregate wastes.
- Make sure oil filters are completely drained and crushed before recycling or disposal.
- Make sure incoming vehicles are checked for leaking oil and fluids.
- Clean yard storm drain inlets regularly and especially after large storms.
- Do not pour materials down drains or hose down work areas; use dry seeping.
- Store idle equipment under cover.
- Drain all fluids from wrecked vehicles.
- Recycle greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic, and transmission fluids.
- Switch to non-toxic chemicals for maintenance when possible.
- Clean small spills with rags, general clean-up with damp mops and larger spills with absorbent material.
- Paint signs on storm drain inlets to indicate that they are not to receive liquid or solid wastes.
- Train employees, minimize use of solvents.

**LIMITATIONS:**

- 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 on-site after working hours.
- Dry pans are generally too small to contain antifreeze, which may gush from some vehicles, so drip pans may have to be purchased or fabricated.
- Dry floor cleaning methods may not be sufficient for some spills.

**MAINTENANCE:**

Should be low if procedures for the approach are followed.



**TARGETED POLLUTANTS**

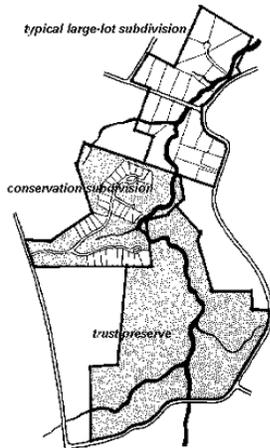
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- Floatable Materials
- Bacteria & Viruses

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|--|

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
- O&M Costs
- Maintenance
- Training

- |  |
|--|
| <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> High</li> <li><input checked="" type="checkbox"/> Medium</li> <li><input type="checkbox"/> Low</li> </ul> |
|--|



Property boundaries differ widely between traditional large-lot zoning, which maximizes the acreage of individual properties, and conservation zoning, which maximizes the amount of shared open space (Source: Arendt, 1996)

**APPLICATIONS**

- Manufacturing
- Material Handling
- Vehicle Maintenance
- Construction
- Commercial Activities
- Roadways
- Waste Containment
- Housekeeping Practices

**DESCRIPTION:**

Zoning is a classification scheme for land use planning. Zoning can serve numerous functions and can help mitigate storm water runoff problems by facilitating better site designs. By correctly applying the right zoning technique, development can be targeted into specific areas, limiting development in other areas and providing protection for the most important land conservation areas.

**APPROACH:**

- Impervious Overlay Zoning: This type of overlay zoning limits future impervious areas.
- Incentive Zoning: This planning technique relies on bonuses or incentives for developers to encourage the creation of certain amenities or land use designs. A developer is granted the right to build more intensively on a property or given some other bonus in exchange for an amenity or a design that the community considers beneficial.
- Performance Zoning: Performance zoning is a flexible approach that has been employed in a variety of fashions in several different communities across the country. Some performance factors include traffic or noise generation limits, lighting requirements, storm water runoff quality and quantity criteria, protection of wildlife and vegetation, and even architectural style criteria
- Urban Growth Boundaries: Urban growth boundaries are sometimes called development service districts and include areas where public services are already provided (e.g., sewer, water, roads, police, fire, and schools).

**LIMITATIONS:**

- Some zoning techniques may be limited by economic and political acceptance and should be evaluated on these criteria as well as storm water management goals.



**TARGETED POLLUTANTS**

- Sediment
- Nutrients
- Heavy Metals
- Toxic Materials
- Oxygen Demanding Substances
- Oil & Grease
- Floatable Materials
- Bacteria & Viruses

- High Impact
- Medium Impact
- Low or Unknown Impact

**IMPLEMENTATION REQUIREMENTS**

- Capital Costs
  - O&M Costs
  - Maintenance
  - Training
- High   
  Medium   
  Low



# Alternate BMPs

Yellow Indicates City Selected BMP's

<b><u>Combined BMP's</u></b>	<b><u>Abbreviation</u></b>
<b><i>1- Public Education and Outreach</i></b>	
Building and Grounds Maintenance	BGM
Classroom Education on Storm Water	CESW
Educational Materials	EM
Employee Training	ET
Housekeeping Practice	HP
Materials Use	MU
Public Education / Participation	PEP
Storm Drain System Signs	SDSS
Used Oil Recycling	UOR
Using Media	UM
Watershed Organization	WO
<b><i>2- Public Participation/Involvement</i></b>	
Community Cleanup	CC
Community Hotline	CH
Public Education/Participation	PEP
Service Group Participation	SGM
Storm Channel / Creek Maintenance	SCCM
Stream Cleanup and Monitoring	SCM
Watershed Organization	WO
<b><i>3- Illicit Discharge Detection and Elimination</i></b>	
Aboveground Tank Leak & Spill Control	ATL
Community Hotline	CH
Employee Training	ET
Hazardous Waste Management	HWM
Identify Illicit Connections	IIC
Illegal Dumping Controls	IDC
Illegal Solids Dumping Controls	ISDC
Leaking Sanitary Sewer Control	LSSC
Map Storm Water Drains	MSWD



# Alternate BMPs

Yellow Indicates City Selected BMP's

<u>Combined BMP's</u>	<u>Abbreviation</u>
Non-Storm Water Discharge to Drains	NSWD
Ordinance Development	OD
Public Education/Participation	PEP
Used Oil Recycling	UOR

<b>4- Consutruction Site Runoff Control</b>	
Building, Repair, Remodeling, & Construction	BRRC
Compaction	CP
Concrete Waste Management	CWM
Contaminated or Erodible Surface Areas	CESA
Contractor Certification and Inspector Training	CCIT
Dust Controls	DC
Erosion Control Plan	ECP
Establish/Compile Design Standards	ECDS
Extended Detention Basins	EDB
Geotextiles and Mats	GM
Grassed Swales	GS
Infrastructure Planning	IPL
Inlet Protection	IP
Landscape & Irrigation Plan	LIP
Land Use Planning / Management	LUPM
Ordinance Development	OD
Portable Toilets	PT
Preservation of Existing Vegetation	PEV
Riprap	RR
Rock Check Dams	CD
Sand Bag Barrier	SBB
Silt Fence	SF
Stabilized Construction Entrance	SCE



# Alternate BMPs

Yellow Indicates City Selected BMP's

<b><u>Combined BMP's</u></b>	<b><u>Abbreviation</u></b>
Straw Bale Barrier	STB
Temporary and Permanent Seeding	TPS
Temporary Drains and Swales	TDS
Vehicle and Equipment Cleaning	VEC
Zoning	ZO

<b><i>5- Post-Construction Runoff Control</i></b>	
BMP Inspection and Maintenance	BMPIM
Extended Detention Basins	EDB
Grassed Swales	GS
Hydromulching	HM
Infiltration	IN
Infrastructure Planning	IPL
Land Use Planning / Management	LUPM
Map Storm Water Drains	MSWD
Minimizing DCIA's	DCIA



# Alternate BMPs

Yellow Indicates City Selected BMP's

<u>Combined BMP's</u>	<u>Abbreviation</u>
Ordinance Development	OD
Outlet Protection	OP
Riprap	RR
Rock Check Dams	CD
Seeding and Planting	SP
Zoning	ZO

<b><i>6- Pollution Prevention/Good Housekeeping</i></b>	
Alternative Products	AP
Animal Carcass Removal	ACR
Area Control Procedures	ACP
BMP Inspection and Maintenance	BMPIM
Building and Grounds Maintenance	BGM
Catch Basin Cleaning	CBC
Concrete Waste Management	CWM
De-Icing Chemical Use Storage	DCUS
Employee Training	ET
Establish/Compile Design Standards	ECDS
Hazardous Waste Management	HWM
Housekeeping Practices	HP
Illegal Dumping Control	IDC
Infrastructure Planning	IPL
Inspection & Maintenance	IM
Long Term Operation and Maintenance	LTOM
Map Storm Water Drains	MSWD
Material Use	MU
Portable Toilets	PT
Sediment Basin	SB
Septic System Controls	SSC
Sorbents	SO
Spill Clean-Up	SCU
Storm Drain Flushing	SDF
Street Cleaning	SC
Used Oil Recycling	UOR
Vehicle and Equipment Cleaning	VEC
Vehicle and Equipment Maintenance & Repair	VEMR
Watershed Organization	WO