HYDE PARK CITY

established in 1860

HYDE PARK CITY STORM WATER MANAGEMENT PROGRAM

SIGNING AUTHORITY

UPDATED NOVEMBER 2025

Items updated since previous SWMP Update:

- Log of SWMP reviews and updates – Page 2
- Deadlines – Page 6
- Population – Page 7
- Identifying specific pollutants and sources (Table B-6) - Pages 9-10
- Advisory Committee – Page 11
- Contact information – Page 12
- City Budget and Staffing – Page 12
- Standards – Page 18
- Site Plan Review – Page 18
- Phase II Requirements – Page 19
- Summary of Existing Efforts – Page 20

REVIEWS AND UPDATES LOG

DATE	REVIEWED/UPDATED	SIGNATURE
9/18/2025	**Updated**	Seth Thompson
11/5/2025	Updated	Seth Thompson

Table of Contents

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.

Storm Water Management Program

A Storm Water Management Program should:

- Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- Protect water quality;
- Satisfy the appropriate water quality requirements of the Clean Water Act; and
- Be phased in over a five year period.

Storm water management programs must include:

- Best Management Practices (BMPs) for each of the six minimum control measures;
    - Public Education and Outreach
    - Public Participation/Involvement
    - Illicit Discharge Detection and Elimination
    - Construction Site Runoff Control
    - Post-Construction Runoff Control
    - Pollution Prevention/Good Housekeeping
- Measurable goals for each minimum control measure (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.

Permit Application and Notice of Intent

Phase II Rule encourages the development of a storm water management program by requiring a Notice of Intent (NOI) describing the storm water management program to be submitted to the NPDES permitting authority. The Notice of Intent becomes the permit application.

Cities required to permit under Phase II are allowed to cooperate and work together with neighboring cities in the application process. The permittee may join with a Phase I city or another Phase II city in applying for a permit. The individual MS4s may share responsibility for program development with neighboring communities and/or take advantage of existing local or state programs.

Permit Requirements

The chosen measurable goals, submitted in the Notice of Intent as a permit application, become the required storm water management program; however, the NPDES permitting authority can require changes in the mix of chosen BMPs and measurable goals if all or some of them are found to be inconsistent with the provisions of the Phase II Final Rule. Likewise, the permittee can change its mix of BMPs if it determined that the program is not as effective as it could be.

Reports

Reports must be submitted annually and are due October 1st of each year of the permit term. The report must be submitted using the report forms found on the Division's Website. The Permittee shall sign and certify the annual report.

Record Keeping

Records required by the NPDES permitting authority must be kept for at least 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.

Deadlines

- The Current small MS4 became effective March 11, 2025.
- A revised Storm Water Management Program (SWMP) is due at the Division Office on October 1, 2025.
- The Storm Water Management Program must be reviewed annually.
- The current MS4 permit expires May 11, 2026.

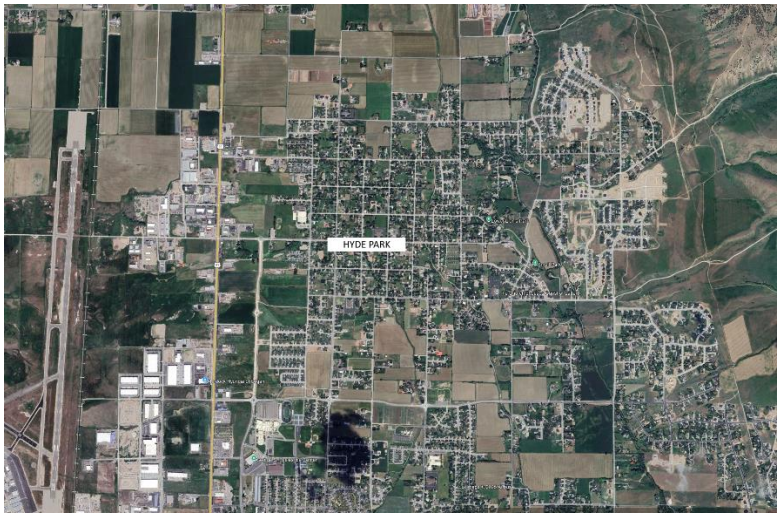
Penalties

The NPDES permit that the operator of a regulated small MS4 is required to obtain is federally enforceable, thus subjecting the permittee to potential enforcement actions and penalties by the NPDES permitting authority if the permittee does not fully comply with application or

permit requirements. This federal enforceability also includes the right for interested parties to sue under citizen suit provision (section 405) of CWA.

HYDE PARK CITY CHARACTERISTICS

General Information



Permit Number: UTR090000
Population: 5,766
Size: 3.4 sq. miles
Geographic Description: Located on the East side of the Valley, 5 miles North of Logan City with elevations varying between 4448 to 4680 ft.
Receiving Waters: Hyde Park is located in the Bear River drainage basin.
Annual Precipitation: 17.36 inches per year
Type of Community: A small city with high rates of residential growth that are expected to continue for many years.
Latitude: 41.78 degrees N
Longitude: 111.81 degrees W

Storm Drain System

The Hyde Park storm water system consists of curb and gutters, culverts, a few typical piped sections, swales, and canals. Most storm water facilities drain into one of three irrigation canals. All three canals begin at the Logan River diverting water to serve the community's agricultural needs.

The Logan Northern Canal begins at the Logan River and runs north through North Logan, Hyde Park, and Smithfield and eventually drains into the Bear River. The Logan-Hyde Park Smithfield Canal begins at the Logan River flows north through North Logan, and Hyde Park

and discharges into Summit Creek in Smithfield, which drains into the Bear River. The Hyde Park North Field (twin ditches) is served by the Logan River and flows north through North Logan. One of the twin ditches turns to the west where it flows through the west fields at 2200 North in North Logan and the other ditch continues north and turns west at 375 North in Hyde Park. Both of these ditches eventually drain into the Bear River. The canals have acted as a part of the storm water system since the cities establishment. Very few controls exist within the system. Most of the streets use drainage swales and ditches with the remaining ones using curb and gutter to collect storm water runoff.

Sanitary Sewer System

The city is served by a sanitary sewer system that is connected to and treated in Logan City. The city has an ordinance requiring any new development within 300 feet of the existing sanitary sewer to connect. With the new sanitary sewer lines that have been installed in the past 5 years, there are now only two homes in the city that cannot be connected to the system that are on separate septic systems. The rest of the city is connected to the sanitary sewer system.

History

Hyde Park is a growing well-planned residential community located five miles north of Logan City. It was settled in 1860 by William Hyde. Hyde Park was incorporated in 1892. Today there are over 3,500 residents in the city. Besides the residential characteristics, Hyde Park has considerable economic activity within its borders. The Master Plan includes an economic development corridor along Highway 91, which is the main highway running north-south through the city. The long range planning makes it possible to obtain large tracts of land for both commercial and residential development.

Local Water Quality Concerns

The city has experienced some flooding associated with insufficient capacities of canals and culverts. Continued growth is expected to place additional pressure on the system. Some infrastructure improvements will be needed to deal with capacity issues. It is likely that these improvements will be made on an “as-needed” basis.

Currently, there are valve controls on the canals that, in the case of flooding, can be opened to allow more water down canal laterals and divert water from the main canal. Control of these valves in the case of flooding and/or need to divert water is performed by the Cache Highline canal company per the maintenance agreement between the canal company and the city.

The water quality within the city is relatively good. None of the streams or waterways have been identified as protected under Section 303(d) of the Clean Water Act. The hope and intent of this Storm Water Management program (SWMP) is to maintain that status and possibly even improve the current water quality.

As stated previously, the storm water in Hyde Park City drains to a series of canals where it is transported through fields for irrigation. Any unused water eventually finds its way into the Bear River. The Bear River flows to Cutler

Reservoir, which has been listed on the 2020 303(d) list of impaired water bodies. Below is the information from that list.

List ID – UT-16010202-004
Water Body Name: Bear River-5
Water Body Description: Bear River from Malad River Confluence to Culter Reservoir
TMDL Establishment Date: Feb 23, 2010
TDML Pollutant Description: Phosphorus

Like most communities in the valley, the biggest concerns involve the following target pollutants:

- sediment loads coming from disturbed sites and streets,
- fertilizers and pesticides coming from lawns and farmlands,
- oils and grease coming from the roadways,
- BOD's, and
- nitrates.
- See Table B-6 from the Cache Valley Storm, Water Standards

Pollutant Source	Potential Pollutant Material	Actual Pollutant
Residential Yard Runoff	Organic trash such as leaves, grass trimmings, decomposing vegetation, and animal waste. Application of fertilizers, pesticides, and herbicides	Phosphorus, Nitrogen, BOD, E.coli, pesticides, herbicides, and other chemicals.
Roadway and Parking Lots	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage and trash.	TDS, TSS, Phosphorus, Nitrogen, Petroleum Products, Trash
Commercial Malls, Industrial Parks	Organic trash such as leaves, grass trimmings, decomposing vegetation, and animal waste. Application of fertilizers, pesticides, and herbicides	TDS, TSS, Phosphorus, Nitrogen, Petroleum Products, Trash, BOD, E.coli, pesticides, herbicides, and other chemicals.

	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage and trash.	
Retail Gasoline Outlets	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage, and trash	Petroleum Products, Trash, BOD, E.coli, pesticides, herbicides, and other chemicals.
Large Grassed Areas (parks, churches, etc.) and Golf Courses	Organic trash such as leaves, grass trimmings, decomposing vegetation, and animal waste. Application of fertilizers, pesticides, and herbicides	Phosphorus, Nitrogen, BOD, E.coli, pesticides, herbicides, and other chemicals.
Animal Operations (Feed Lots, Veterinary Clinics, Research Facilities)	Animal Waste	Phosphorus, Nitrogen, BOD, E.coli, pesticides, herbicides, and other chemicals.

Hyde Park's SWMP has been geared toward small city applications, targeting the pollutants mentioned. The focus of this plan is to do what we can within the community, trying to stay in harmony with the rural nature of the community and within the existing budget structure.

Threatened and Endangered Species

The Construction of stormwater facilities may result in effects to threatened or endangered (T & E) species. The Utah Division of Wildlife Resources oversees threatened and endangered species. The following web sites are helpful in determining the status of any species of interest.

- http://wildlife.utah.gov/habitat/pdf/endgspec.pdf
- http://www.fws.gov/endangered/
- http://dwrcdc.nr.utah.gov/ucdc/

Listings related to Hyde Park City:

The following are Cache County (and by extension Hyde Park City's) list of federally listed Threatened (T), Endangered (E), and Candidate (C) Species:

Common Name	Scientific Name	Status
Maguire Primrose	Prima maguirei	Threatened
Ute Ladies' Tresses	Spiranthes diluvialis	Threatened
Monarch Butterfly	Danaus Plexippus	Candidate
Suckley's Cuckoo Bumble Bee	Bombus suckleyi	Proposed Endangered
Canada Lynx	Lynx canadensis	Threatened
North American Wolverine	Gulo gulo luscus	Threatened

Historic Properties

The construction of stormwater facilities may result in effects to historic properties. Historic properties may include houses, building, 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 https://history.utah.gov/about-us/contact-us.

Listings related to Hyde Park City:
John E. Lee House - 123 W Center St, Hyde Park City, UT, 84318

Advisory Committee

An Active Advisory Committee was formed in the fall of 2009 for the purpose of addressing the above mentioned water quality items and consider options to develop a storm water management program. The current steering committee includes members from the community including:

Name	Representing
Gerald Osborne	Council Member
Brett Knight	Public Works Director
Ryder Anderson	Storm Water Inspector
Ben Sorensen	Storm Water Inspector

Contact Information

The Hyde Park City Storm Drain System falls under the Public Works Department for the City. The Public Works Director can be contacted at the following address and phone number:

Brett Knight
P.O. Box 489
113 East Center Street
Hyde Park, UT 84318
(435) 563-0179
brett.k@hpcutah.gov

City Budget and Staffing

See most recent Hyde Park City Budget and staffing on the Hyde Park City Website https://www.hpcutah.gov/. This information is also included in the annual MS4 report.

PUBLIC EDUCATION AND OUTREACH

Phase II Requirements

1. The operator of a regulated small Municipal Separate Storm Sewer System (MS4) needs to implement a public education program to promote behavior change by the public to reduce water quality impacts associated with pollutants in stormwater and illicit discharges. The education program must target the following four audiences, (1) residents, (2) institutions, industrial, and commercial facilities, (3) developers and contractors (construction), and (4) MS4-owned or operated facilities.

2. Determine the appropriate best management practices (BMP's) and measurable goals for this minimum control measure.

Summary of Existing Efforts

Educational Materials

All cities in Cache County contract with Cache County Service Area c/o Logan City to provide garbage collection, waste services, and a recycling program. There are educational materials covering subjects of recycling, waste reduction, and proper disposal available on Logan City's Website http://www.loganutah.org/index.cfm

Recycling Education

In contracting with Cache County Service Area c/o Logan City to provide waste services, a recycling program is included. There is an education program that provides free education programs to the entire county. Some of these programs are classroom presentations, landfill tours, and education displays at events such as fairs, home and garden shows, etc.

City used Media

Hyde Park City has a website that is located at: www.hydepark.utahlinks.org

Hyde Park City has a Facebook page that is located at:
https://www.facebook.com/hydeparkutah

Hyde Park sends out a monthly newsletter with the utility bills. It informs the public of current issues and upcoming events. Storm water education materials have been incorporated into this regular mailing. It has included information for adults and games for youth.

Stormwater Fair
Hyde Park City has worked together with Logan City, North Logan, Smithfield, Providence, Nibley, Millville, Hyrum, and Wellsville to sponsor an annual stormwater fair for the 4th grade students of Cache County. The classes taught previously in this fair included Water Treatment, Water Cycle, Canal / Water Quality, Rivers and Streams, Source Protection, and Water Conservation.

Contractor Training Meeting
A contractor-training meeting was held in conjunction with Logan City and other Cache Valley Communities. Generalized information for stormwater management, standards and specifications was presented to the attendees.

Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's for use within our city as applicable. After extensive training and review of each BMP we have determined these to be the most potentially effective for our City. Each BMP is cross-referenced alphabetically by code in Appendix B to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness.

The following rational was used in selecting each BMP.

Educational Materials
This will allow the City to educate the public using newsletters, the City website, the City Facebook page, Stormwater Fairs, etc.

Classroom Education on Storm Water
Providing stormwater education to schools exposes the message not only to students but to their parents as well.

Public Education / Participation
Public Education plans provide municipalities with a strategy for educating its employees, the public and businesses about the importance of protecting from pollutants of stormwater.

Employee Training
Training will help employees understand the potential pollutants to stormwater and allow them identify and help eliminate potential problems.

The BMP's listed below will be utilized by Hyde Park City as part of their SWMP at the present time.

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

In order to more fully realize the benefit of the BMP's 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.

(See Appendix A for MCM 1 goals)

PUBLIC PARTICIPATION / INVOLVEMENT

Phase II Requirements

1. Comply with applicable State, and local public notice requirements; and

2. Provide opportunities for public involvement and participation at least two (2) times annually through activities such as advisory panels, public hearings, watershed committees, stewardship programs, and environmental activities.

3. Determine the appropriate best management practices (BMP's) and measurable goals for this minimum control measure.

Summary of Existing Efforts

Advisory Committee
A "Storm Water Advisory Committee" consisting of city members was formed in the fall of 2009 and has taken an active role in selecting the BMP's and developing this SWMP for the city.

Recycling Program
All cities in Cache County contract with Cache County Service Area c/o Logan City Environmental Division for waste management services, which include a recycling program.

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: steel, cardboard, aluminum, mixed papers, newspaper, magazines, plastic milk jugs, pop bottles, glass, tin cans, aluminum scrap, steel scrap, brass, ink jet cartridges, and cell phones on site for recycling.

Curbside recycling was made available to Hyde Park City residents in April 2004. In July of 2006 the recycling program became mandatory. Logan City Environmental Division picks up 90-gallon containers full of recyclables bi-weekly. Items collected include Newspaper, mixed paper, cardboard, paperboard, aluminum cans, tin/steel cans and any #1 - #7 plastic container.

Green Waste Collection

A curbside green waste collection program exists for Hyde Park City. Waste Management provides green waste collection services for Hyde Park City. The green waste is collected and composted and turned into wood chips or firewood at the Logan City Landfill green waste facility. The Logan City Landfill green waste facility can also be used by Hyde Park City residents to drop off green waste. This program encourages reuse of an otherwise useless material that could become a solid contaminant in storm water.

Adopt a Highway

The Lions club cleans up a section of Hyde Park Lane, which reduces garbage and potential storm water contaminants. This clean up project takes place three times per year.

Service Groups

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

Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's for use within our city as applicable. This BMP is cross-referenced alphabetically by code to a fact sheet that describes the BMP, its applicability, its limitations, and its effectiveness in Appendix B.

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 Involvement and Participation.

(See Appendix A for MCM 2 goals)

ILLICIT DISCHARGE DETECTION AND ELIMINATION

Phase II Requirements

1. Must include a storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;

2. Through an ordinance, or other regulatory mechanism, a prohibition (to the extent allowable under State, or local law) on non-storm water discharges into the MS4, and appropriate enforcement procedures and actions;

3. A plan to detect and address non-storm water discharges, including spills, illicit connections, sanitary sewer overflows, and illegal dumping, into the MS4;

4. The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and

5. The determination of appropriate best management practices (BMP's) and measurable goals for this minimum control measure.

Summary of Existing Efforts

Hyde Park City has developed an ordinance designed to specifically prohibit illicit discharges to the storm drain systems. Hyde Park's storm drain system consists of curb and gutters, culverts, a few typical piped sections, swales, retention ponds and canals.

Currently, reports of spills are handled by Hyde Park City Public Works in connection with the Bear River Health Department.

The City has not generally experienced problems with individuals or businesses illicitly connecting their sanitary wastewater piping to storm drains. More common types of illicit discharges include spills from highway accidents, concrete truck wash out water, and oil spills.

Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's 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 Appendix B.

BMP	Code
Ordinance Development	OD
Illegal Dumping Controls	IDC
Map Storm Water Drains	MSWD
Community Hotline	CH
Employee Training	ET

In order to more fully realize the benefit of the BMP's, 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.

(See Appendix A for MCM 3 goals)

Additionally, the city has created a list of city owned facilities and city owned high priority facilities based on the MS4 permits requirements. The high priority facilities are assessed using the attached High Priority Facility Inspection List and Detection Form. The process for determining high priority facilities considers storm water controls in place, possible pollutants, proximity to fresh water and water bodies, and the potential for discharging pollutants to impaired waters. The Hyde Park City Shop is the only location that has been currently identified as a High Priority Facility.

CONSTRUCTION SITE RUNOFF CONTROL

Phase II Requirements

1. Have an ordinance or other regulatory mechanism requiring the implementation of proper erosion and sediment controls, and controls for other wastes, on applicable construction sites;

2. Have procedures for site plan review of construction plans that consider potential water quality impacts;

3. Have procedures for site inspection and enforcement of control measures;

4. Have sanctions to ensure compliance (established in the ordinance or other regulatory mechanism);

5. Establish procedures for the receipt and consideration of information submitted by the public; and

6. Determine the appropriate best management practices (BMP's) and measurable goals for this minimum control measure.

Summary of Existing Efforts

Ordinances

Section 4 in the Hyde Park City storm water ordinance.

Standards

Hyde Park City has adopted the Cache Valley Storm Water Standards.

Site Plan Review

The Land Use Authority currently reviews site plans of construction plans looking for potential water quality impacts such as requiring submittal of an erosion control plan as part of the building permit process. The city has developed a review document to help make sure LID and BMP practices and devices are being included in each development.

Site Inspectors

There are several inspectors who oversee local construction. They are concerned with sewer connections, storm drain and streets. Although no city ordinances currently exist regarding erosion control, the inspectors make decisions using good judgment of what proper construction technique is and can require contractors to clean up streets and causes of contamination. Bonds are held until inspections, including the NOT inspection, are complete.

Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's 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 Appendix B.

BMP	Code
Ordinance Development	OD
Erosion Control Plan	ECP
Zoning	ZO
Contractor Certification and Inspector Training	CCIT

In order to more fully realize the benefit of the BMP's, 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.

(See Appendix A for MCM 4 goals)

POST-CONSTRUCTION STORM WATER MANAGEMENT

Phase II Requirements

1. Develop and implement strategies which include a combination of structural and/or non-structural best management practices (BMP's);

2. Have an ordinance or other regulatory mechanism requiring the implementation of post construction runoff controls to mirror the pre-development stormwater run-off on the site, and to reduce the discharge of stormwater;

3. Ensure adequate long-term operation and maintenance of controls;

4. Determine the appropriate best management practices (BMP's) and measurable goals for this minimum control measure;

5. Inspect privately owned and city owned storm water structures and BMPs as required in MS4 permit and as needed,

6. Create a list of high priority areas and facilities yearly in accordance with the MS4 Permit and inspect them as required. The high priority facilities are assessed using the attached High Priority Facility Inspection List and Detection Form in Appendix C. The process for determining high priority facilities considers storm water controls in place, possible pollutants, proximity to fresh water and water bodies, and the potential for discharging pollutants to impaired waters;

7. Inspect existing stormwater control devices and BMPs and create a list of sites that need to be retrofitted. This assessment is to follow the attached Retrofit Decision Guide for Storm Water Facilities in Appendix C;

8. Create a retrofit plan to address sites in number 7.

Summary of Existing Efforts

Regulation

The City has implemented a regulatory mechanism that requires post construction runoff controls to be used to reduce stormwater discharge.

Landscape Plan Review

Developers are required to present a plan outlining landscaping plans to the city.

Plan and Implementation Measures

In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's 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 Appendix B.

BMP	Code
Ordinance Development	OD
Infrastructure Planning	IPL
Education Materials	EM
BMP Inspection and Maintenance	BMPIM
Landscape and Irrigation Plan	LIP

In order to more fully realize the benefit of the BMP's 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.

(See Appendix A for MCM 5 goals)

POLLUTION PREVENTION / GOOD HOUSEKEEPING

Phase II Requirements

1. Develop and implement an operation and maintenance program with the ultimate goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system;

2. Include employee training on how to incorporate pollution prevention / good housekeeping techniques into municipal operations such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

3. Include standard operating procedures and documents.

4. Determine the appropriate best management practices (BMP's) and measurable goals for this minimum control measure.

Summary of Existing Efforts

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

Item	Maintenance
Catch Basins, Sumps, & Storm Pipes	Inspected once every 3 years and cleaned as needed
Retention/Detention Basins	Cleaned once per year and as needed
Ditches and Canals	Performed by canal company yearly
Street Sweeping	Once per year and as needed

Recycling Program
The City participates in a recycling program. (See Recycling Program on pg. 12)

Educational Materials
The City has educational materials. (See Educational Material on pg. 9)

Green Waste Collection
The City has a Green Waste Collection program (See Green Waste Collection on pg. 12)

Plan and Implementation Measures
In order to help meet the goals and objectives of this SWMP, Hyde Park City has chosen to continue using the following BMP's 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 Appendix B.

BMP	Code
Housekeeping Practices	HP
Infrastructure Planning	IPL
Education Materials	EM

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.

(See Appendix A for MCM 6 goals)

APPENDIX A

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 1 Public Education and Outreach

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
1.1	All pertinent pollutants	Residents and Businesses	4.2.1.1 To educate audiences about impacts from storm water discharge	Post articles in the newsletter on a quarterly basis.	Ongoing	PEP and EM	If articles are printed 4 times a year.
1.2	All pertinent pollutants	Residents (4th graders)	4.2.1.1 To educate audiences on ways to avoid, minimize, and reduce impacts of storm water discharge	Participate with Logan City on a storm water fair annually	Annually	PEP and CESW	Fair occurs annually
1.3	All pertinent pollutants	Residents and Businesses	4.2.1.1 To educate audiences on actions individuals can take to improve water quality	Participate with Logan City on a storm water fair annually	Annually	PEP and EM	Fair occurs annually
1.4	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 annually.	Ongoing	PEP and EM	Information is current on website and included in utility bills or city newsletter annually.

1.5	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 EM	Information is current on website and included and brochures are distributed at the time of business license issuance.
1.6	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 for the contractor / developer.	Ongoing	EM	Information packets are given to every new development
1.7	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.

1.8	All pollutants	Plan review staff	4.2.1.6 Training on LID, Green Infrastructure, and post construction BMPs	Require an annual meeting 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.	Ongoing	ET	Annual meeting occurs
1.9	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 (2022). Implement the selected evaluation method (2023)	Research by Jan 2023 Implementation by Jan 2024	PEP	Evaluation method chosen (2022) and implemented (2023)
1.10	All pollutants	All Audiences	4.2.1.8 Document why certain BMPs were chosen for public education program (over others)	Include an explanation in the SWMP.	January 1, 2026		Documented rationale included in the SWMP.

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 2 Public Participation / Involvment

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
2.1	All pollutants	General public	4.2.2.1 Have a program or policy in place that allows for the public to provide input	Nofify the public in advance of the city council meeting when the SWMP update will be reviewed.	Ongoing	PEP	The program or policy is in place
2.2	All pollutants	General public	4.2.2.2 Have SWMP document available for public review	Have a hard copy of the draft of the permit available at the city offices	Ongoing	PEP	SWMP document is available for public review a week before public hearing
2.3	All pollutants	General public	4.2.2.3 Have SWMP document available to the public at all times	Post the SWMP on the website	By December 31, 2021	PEP	SWMP is updated and posted on the website
2.4	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

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 3 Illicit Discharge Detection and Elimination

HYDE PARK CITY
established in 1860

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Associated BMPs	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
3.1	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	Completed by Dec 31, 2022	OD	If ordinance is in place and meets the permit requirements
3.2	N/A	Public Works	4.2.3.1 Maintain Storm Water Map	Update storm water map annually with new developments.	Ongoing	MSWD	Successful if 90% of new developments are input.
3.3	All Pollutants	All Audiences	4.2.3.2 Develop, implement, and prepare in writing a plan to detect and address non-SW discharges	Do Dry weather screening 20% of all outfalls each year	1 July of each year	NSWD	Successful if all screens are done
3.3a	"	"	"	Have SOP in place and training to Staff	Ongoing	NSWD	Successful if completed by that date and staff is following SOP
3.4	All Pollutants	All Audiences	4.2.3.3 Implement a written plan to detect and address non-storm water discharges	Create and implment plan	Complete by July 1, 2023	IDC	Successful if implemented by that date
3.5	All Pollutants	All Audiences	4.2.3.4 Develop and implement standard operating procedures for tracing the source of illicit discharge	Develop and implement SOP	Complete by July 1, 2023	IDC	Successful if implemented by that date
3.6	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, 2023	IDC, CH	Successful if completed by that date and staff is following Flow Chart
3.6a	"	"	"	Review flow chart and SOP with staff and provide training annually.	Ongoing	IDC, CH	Successful if training is completed annually for all staff involved in incident reporting.
3.7	All Pollutants	All Audiences	4.2.3.6 Develop and implement standard operating procedures for ceasing the illicit discharge	Create the Incidence Response Flow Chart and train personnel	Completed by July 1, 2023	IDC	Successful if training is completed annually for all staff involved in incident reporting.
3.8	All Pollutants	Public Employees, Businesses and Residents	4.2.3.7 Inform public employees, businesses, and general public of hazards associated with illicit discharges and improper disposal of waste	See MCM 1.1 and 1.7		PEP, ET	See MCM 1.1 and 1.7
3.9	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, 2023	PEP	Successful if complete by that date

3.10	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, 2023	CH	Successful if complete by that date
3.11	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 spreadsheet for tracking Illicit Discharges	Completed by July 1, 2023	IDC, PEP	Successful if complete by that date
3.12	All Pollutants	Staff, contracted staff, other responsible entities	4.2.3.11 Train staff who might observe illicit discharge and illicit connections annually in the IDDE program and new employees within 60 days of hire.	Train staff annually and new employees within 60 days of hire	Ongoing	IIC, IDC	Successful if training is completed annually for all staff who might observe illicit discharge and illicit connections.

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 4 Construction Site Runoff Control

HYDE PARK CITY
established in 1860

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
4.1	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, or if part of a common plan of development.	Ongoing	OD	Successful if 90% of all active construction sites have a working SWPPP
4.2	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	September, 2022	OD	Successful if completed by milestone
4.3	"	"	4.2.4.2 Documentation and tracking of all enforcement actions	Use a construction site enforcement action log/database	Ongoing	OD	Successful if we have a log and are using it
4.4	Sediment, Construction Site Debris, Hydrocarbons	Contractors and Developers	4.2.4.3 Implement SOP's for pre-construction SWPPP review for construction sites	Preconstruction reviews of SWPPP	Ongoing	ECP	Successful if we are conducting SWPPP reviews
4.5	"	"	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	Ongoing	ECP	Successful if we are conducting Pre-con meetings
4.6	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 - Emphasize self inspections - sensitive areas to be inspected twice monthly	Ongoing	CCIT	Successful if 75% of all active construction sites are inspected monthly

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
4.7	Sediment, Construction Site Debris, Hydrocarbons	Contractors, developers and MS4 staff	4.2.4.4.2 The Permittee must inspect all phase of construction.	Inspect each phase of construction	Ongoing	ECP	Successful if 75% of all active construction sites are inspected at each phase of construction.
4.8	"	"	4.2.4.4.3 Conduct Bi-weekly inspections on high priority construction sites	Inspect high priority sites bi-weekly	Ongoing	ECP	Successful if all high priority sites are inspected bi-weekly
4.9	"	MS4 Staff	4.2.4.5 Train all staff involved with implementing the construction storm water program on these activities.	Hold annually trainings	Ongoing	ECP	Successful if training is held annually
4.10	"	"	4.2.4.6 Maintain a log of active construction sites	Maintain log	Ongoing	ECP	Successful if active construction sites are recorded in the log

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 5 Post Construction Runoff Control

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
5.1	All Pollutants	MS4 Staff, Contractors and Developers	4.2.5.1. Develop a development/redevelopment program that prevents or minimizes impacts to water quality (4.2.5.3.1 for flood control structure issues, 4.2.5.3.2 for renention, and 4.2.5.3.3 for LID)	Review existing program to determine if it meets requirements of new permit	Dec, 2022	OD	If review is complete
5.2	"	"	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.	Review existing regulatory mechanism to determine if it meets requirements of new permit	Dec, 2022	OD	If review is complete
5.2a	"	"	"	Draft ordinance revisions (if needed)	Mar, 2023	OD	If draft is complete and ready for others to review
5.2b	"	"	"	Adopt updated ordinance (if needed)	May, 2023	OD	If ordinance has been passed
5.3	"	"	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	Dec, 2022	IPL	If draft is completed by the milestone date

MCM	Target		Permit Reference/Desired Result	Measurable Goal	Milestone	Assoc.	Measure of Success
	Pollutant(s)	Audience(s)			Date	BMP	(Effectiveness)
5.4	"	MS4 Staff, City Council	4.2.5.3. Adopt and implement procedures for site plan review which evaluates potential water quality impacts.	Site plan reviews include evaluation of water quality impacts	Ongoing	BMPIM	If 80% of site plan reviews include an evaluation of water quality impacts.
5.5	"	MS4 Staff	4.2.5.4. Maintain an inventory of all post-construction structural storm water control measures for new developments or redeveloped sites that are one acre or larger.	Update the inventory annually	Ongoing	BMPIM	If inventory is updated
5.6	"	"	4.2.5.5. 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

General Permit for Discharges from Small Municipal
Separate Storm Sewer Systems (MS4s)
Measurable Goals - MCM 6 Pollution Prevention and Good Housekeeping

HYDE PARK CITY
established in 1860

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
6.1	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…	Update Org chart and define specific responsibilities for all departments shown	Dec. 2022	HP	If org chart is complete and up to date by milestone date
6.2	"	"	4.2.6.1. Permitees shall develop and keep current a written inventory of Permittee-owned or operated facilities	Complete listing of MS4 owned/operated facilities annually	Ongoing	HP	If list is updated annually
6.3	"	"	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	Dec. 2022	HP	If assessments are completed and documenation recorded in SWMP
6.4	"	"	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	Dec. 2022	HP	If SOPs are updated and current by milestone date

MCM	Target		Desired Result	Measurable Goal	Milestone	Assoc.	Measure of Success
	Pollutant(s)	Audience(s)			Date	BMP	(Effectiveness)
6.5	"	"	4.2.6.5.1 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.	Conduct monthly inspections	Ongoing	HP	If at annual review all monthly inspections are logged and reports completed
6.6	"	"	4.2.6.5.2 Semi annual comprehensive inspections: At least twice per year, a comprehensive inspection of “high priority” facilities, including all storm water controls, must be performed	Conduct semi annual comprehensive inspections	Ongoing	HP	If at annual review all semi annual inspections are logged and reports completed
6.7	"	"	4.2.6.5.3 Annual visual observation of storm water discharges: At least once per year, the Permittee must visually observe the quality of the storm water discharges from the “high priority” facilities	Conduct annual visual observations of storm water discharges at high priority facilities	Ongoing	HP	If at annual review all annual visual monitoring is completed and logged and reports completed
6.8	"	"	4.2.6.6. Develop and implement SOPs to protect water quality at each of the facilities owned or operated by the Permittee.	Develop and implement SOPs	Dec. 2022	HP	If developed and implemented by date
6.9	"	MS4 Staff, Contractors and Developers	4.2.6.7. Implement contractually-required documentation and/or periodic site visits to check that ocntractors performing O&M for the Permittee are using appropriate storm water controls and following the SOPs.	Conduct periodic site visits to check that contractors performing O&M are using appropriate sotrm water controls and following the SOPs	Ongoing	HP	If site visits occur for 80% of contractors performing O&M.

MCM	Target		Desired Result	Measurable Goal	Milestone Date	Assoc. BMP	Measure of Success (Effectiveness)
	Pollutant(s)	Audience(s)					
6.10	"	MS4 Staff, Contractors and Developers	4.2.6.8. 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	Dec. 2022	IPL	If draft is prepared and ready for internal review process by milestone date
6.10a	"	"	"	Get policy approved	Feb. 2023	IPL	If policy is approved and adopted by milestone date
6.11	"	MS4 staff	4.2.6.8.1 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)			
6.12	"	"	4.2.6.9. Permittee must develop a plan to retrofit existing developed sites that the Permittee owns or operates that are adversely impacting water quality.	Create plan if an existing developed site begins to adversely impact water quality	As needed	IPL	If plan is created once adverse water quality impacts are observed
6.13	"	"	4.2.6.10. 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 that will meet this requirement			

MCM	Target		Desired Result	Measurable Goal	Milestone	Assoc.	Measure of Success
	Pollutant(s)	Audience(s)			Date	BMP	(Effectiveness)
6.13a	"	"	"	Conduct ongoing training according to schedule	Ongoing	EM, HP	If training is completed and documented according to schedule at annual evaluation

APPENDIX B

BMP: Aboveground Tank Leak And Spill Control

ATL

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 aboveground storage tanks by installing safeguards against accidental releases, installing secondary containment, conducting regular inspections, and training employees in standard operating procedures and spill cleanup techniques.

The most common causes of unintentional releases are:
- Installation problems,
- Failure of piping systems (pipes, pumps, couplings, hoses, and valves),
- External corrosion and structural failure,
- Spills and overfills due to operator error, and
- Leaks during pumping of liquids or gases from truck to a storage tank or vice versa.

APPROACH:
- Integrate efforts with existing aboveground petroleum storage tank programs through the local Fire Department and Health Department, and area and business emergency response plans through the City, County, or Fire District.
- Use engineering safeguards to reduce the chance for spills.
- Perform regular maintenance.

LIMITATIONS:
For larger spills, a private spill clean-up company or Hazmat team may be necessary.

MAINTENANCE:
Maintenance is critical to preventing leaks and spills. Conduct routine inspections and:
- Check for external corrosion and structural failure,
- Check for spills and overfills due to operator error,
- Check for failure of piping system (pipes, pumps, flanger, coupling, hoses, and valves),
- Check for leaks or spills during pumping of liquids or gases from truck to storage facility or vice versa.

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: Alternative Products

AP

Examples of alternative products include rechargeable batteries, baking soda, olive oil, vegetable oil, a lemon, a toothbrush, and a rag

APPLICATIONS

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

DESCRIPTION:

Using alternatives to toxic substances drastically reduces their presence in storm water and receiving waters. The most common toxic substances found in the home are cleaners, automotive products, and pesticides. Fertilizers, paints, and fuels are among other common hazardous substances frequently found in ground water because of improper disposal (WEF and ASCE, 1998).

APPROACH:

➢ The promotion of safer alternative products should be coupled with other programs designed to reduce the presence of hazardous or toxic materials in homes and storm water runoff such as hazardous materials collection, good housekeeping or material management practices, oil and automotive waste.

- ➢ One of the best ways to encourage homeowners to switch to alternatives to potentially harmful products is to educate them.
- ➢ *Aerosols*. Pump-type or non-aerosol products should be used.
- ➢ *Chemical fertilizers*. Composting yard clippings and food scraps is an option. Manure (in measured amounts) is another alternative to chemical fertilizers.
- ➢ *Household cleaners and detergents.* Baking soda is an excellent cleanser with mild abrasive power that can be used in lieu of heavy-duty cleansers. A mixture of 1 quart water and 2 tablespoons of vinegar can be used as a window cleaner. Three parts olive oil mixed with one part white vinegar can be used for a wood cleanser. Borax and lemon juice make an excellent toilet cleaner. Many other non- or less-toxic alternatives to harsh cleansers exist. A listing of these alternatives can be found at www.healthdept.co.pierce.wa.us/sourceprotection/alter.html.

LIMITATIONS:

- ➢ In some cases, alternative products may not be readily available.
- ➢ The biggest impediment to instituting widespread use of alternative products is public awareness. Municipal staff must convince people to change old habits or to try new products.

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: Animal Carcass Removal

ACR

APPLICATIONS

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

DESCRIPTION:

Removal and proper disposal of animal carcass' can improve storm water quality by reducing pollution or contamination.

APPROACH:

Animal carcass disposal can have a negative impact upon water quality. If not done properly, carcass disposal can lead to pollution or contamination of water intended for domestic use. Carcasses should be disposed of within 24 hours. Options for disposal:

- Rendering: This is done by contracting with private rendering companies. Animals that cannot be rendered include sheep, chickens (feathers), and fish (scales). Sheep and chickens can be buried or cremated. Fish can be used as food for dogs, coyotes, or alligators.
- Burial: Contact district health if you intend to bury animal carcasses, but keep in mind that carcasses should be buried at least 6 feet deep and treated with lime and pesticides.
- Cremation. Cremation of any animal carcass within ¼ mile of a municipality could be in violation of the law.

It is not recommended to leave the carcass of any animal within ¼ mile of any inhabited dwellings, public highways, or streams of water for more than 24 hours. Disposal of a carcass shall not be in water or on a publicly used road.

LIMITATIONS:

- Location awareness.

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: Area Control Procedures

ACP

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

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

■ High ☒ Medium ☐ Low

BMP: BMP Inspection and Maintenance

BMPIM

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
- ☒ Maintenance
- ☒ Staffing
- ☐ Training
- ☐ Administrative

■ 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

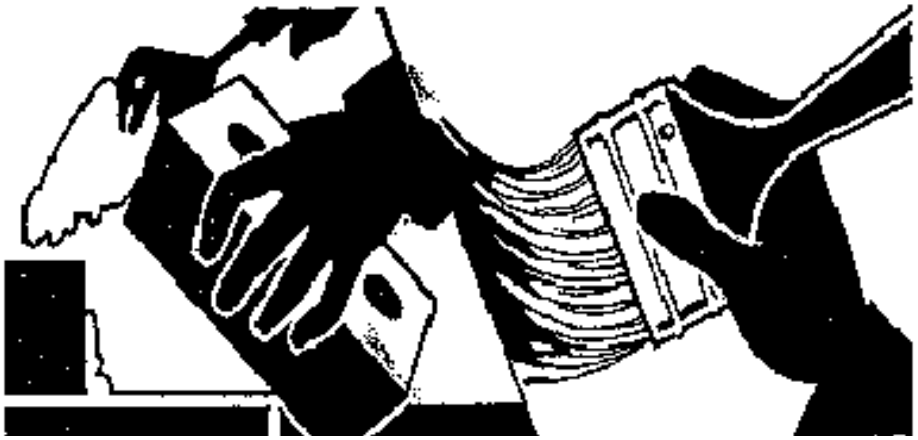
IMPLEMENTATION REQUIREMENTS

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

■	High	☒	Medium	☐	Low

BMP: Building Repair, Remodeling, and Construction

BRRC



PROGRAM ELEMENTS

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

DESCRIPTION:

Prevent or reduce the discharge of pollutants to stormwater from building repair, remodeling and construction by using soil erosion controls, enclosing or covering building material storage areas, using good housekeeping practices, using safer alternative products, and training employees.

APPROACH:

- Use soil erosion control techniques if bare ground is temporarily exposed.
- Use permanent soil erosion control techniques if the remodeling clears buildings that are not to be replaced.
- Enclose painting operations consistent with local air quality regulations and OSHA.
- Properly store materials that are normally used in repair and remodeling such as paints and solvents.
- Properly store and dispose waste materials generated from the activity.
- Maintain good housekeeping practices while work is underway.

LIMITATIONS:

- This BMP is for minor construction only.
- Hazardous waste that cannot be re-used or recycled must be disposed of by a licensed hazardous waste hauler.
- Safer alternative products may not be available, suitable, or effective in every case.
- Be certain that actions to help stormwater quality are consistent with OSHA and air quality regulations.

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

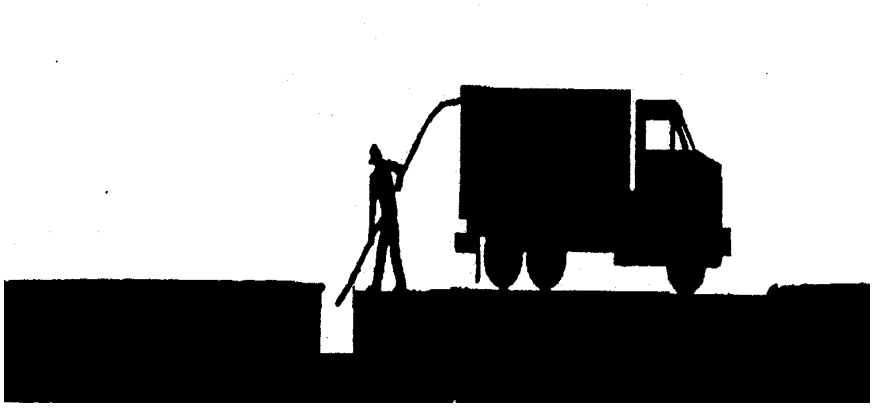
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Catch Basin Cleaning

CBC



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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
■ O&M Costs
☐ Regulatory
☒ Training
■ Staffing
☒ Administrative

■ High ☒ Medium ☐ Low

BMP: Classroom Education On Storm Water

CESW

Students learn about storm water pollution (Source: City of Sacramento Storm Water Management Program, no date)

DESCRIPTION:

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.

APPROACH:

- Building a strong relationship with the school district is the most important step in getting storm water education into the schools.
- When developing an outreach message for children, choose the age ranges to target.
- Many additional classroom materials are available for use free of cost. Educational materials available for downloading from the Internet at www.csu.org/water/watereducation/watereducation.html.
- 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
- 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:

- 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.

MAINTENANCE:

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

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

■ High ☒ Medium ☐ Low

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

BMP: Community Hotlines

CH

Posters and magnets can be used to publicize hotlines

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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

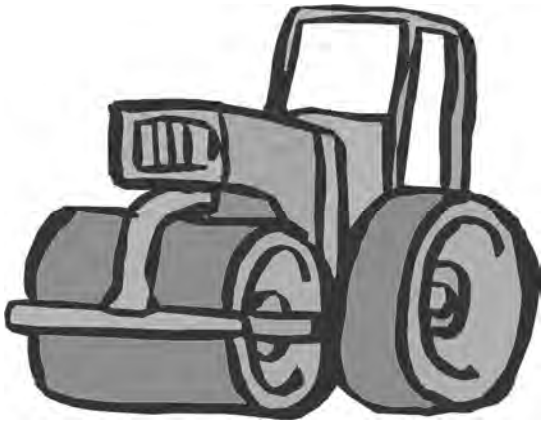
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Compaction

CP



OBJECTIVES

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

DESCRIPTION:

Use of rolling, tamping, or vibration to stablize fill materials and control erosion by increasing the soil density. Increasing the density of soil improves soil strength, reduces long-term soil settlement, and provides resistance to erosion.

APPLICATIONS:

- Stabilize fill material placed around various structures.
- Improve soil in place as foundation support for roads, parking lots, and buildings.

INSTALLATION/APPLICATION CRITERIA:

- Make sure soil moisture content is at optimum levels.
- Use proper compaction equipment.
- Install sediment control and storm water management devices below compacted areas and runon interceptor devices above these areas. Drainage from compacted areas must be carefully planned to protect adjacent uncompacted soils.
- The surface of compacted areas should be scarified and seeded or mulched and seeded to increase the effectiveness of compaction.

LIMITATIONS:

- Compaction tends to increase runoff.
- Over-compaction will hamper revegetation efforts.

MAINTENANCE:

No maintenance required.

TARGETED POLLUTANTS

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

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

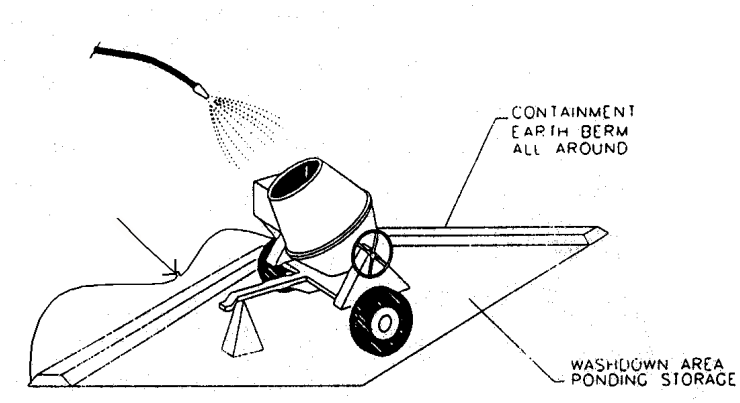
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Concrete Waste Management

CWM



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

BMP: Contaminated or Erodible Surface Areas

CESA

PROGRAM ELEMENTS

☒ New Development
☐ Residential
☒ Commercial Activities
☒ Industrial Activities
☒ Municipal Facilities
☐ Illegal Discharges

DESCRIPTION:
Prevent or reduce the discharge of pollutants to stormwater from contaminated or erodible surface areas by leaving as much vegetation on-site as possible, minimizing soil exposure time, stabilizing exposed soils, and preventing stormwater runon and runoff.

APPROACH:
This BMP addresses soils which are not so contaminated as to exceed criteria but the soil is eroding and carrying pollutants off in the stormwater.

Contaminated or erodible surface areas can be controlled by:
- Preservation of natural vegetation,
- Re-vegetation,
- Chemical stabilization,
- Removal of contaminated soils, or
- Geosynthetics.

LIMITATIONS:
Disadvantages of preserving natural vegetation or re-vegetating include:
- Requires substantial planning to preserve and maintain the existing vegetation.
- May not be cost-effective with high land costs.
- Lack of rainfall and/or poor soils may limit the success of re-vegetated areas.

Disadvantages of chemical stabilization include:
- Creation of impervious surfaces.
- May cause harmful effects on water quality.
- Is usually more expensive than vegetative cover.

MAINTENANCE:
Maintenance should be minimal, except if irrigation of vegetation is necessary.

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: Contractor Certification &Inspector Training

CCIT

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

BMP: De-Icing Chemical Use and Storage

DCUS

APPLICATIONS

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

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 too 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.

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

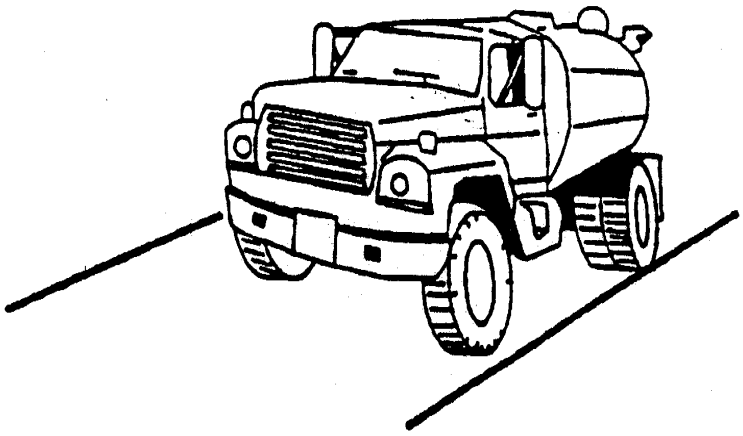
IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
■ O&M Costs
☒ Maintenance
☐ Training

■ High ☒ Medium ☐ Low

BMP: 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 weepers 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

BMP: Educational Materials

EM

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

BMP: Employee Training

ET

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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
☒ O&M Costs
☐ Regulatory
■ Training
☒ Staffing
☒ Administrative

■ High ☒ Medium ☐ Low

BMP: Erosion Control Plan

ECP

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

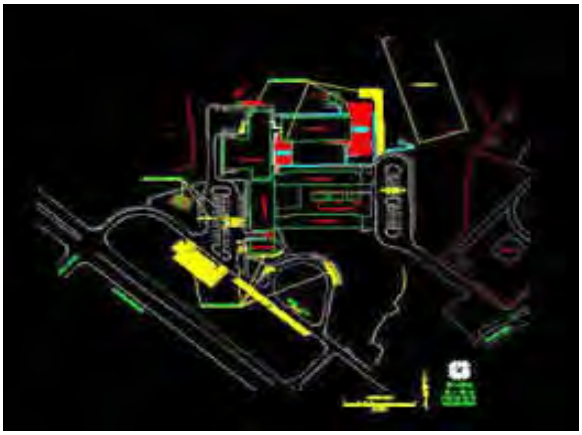
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Establish/Compile Design Standards

ECDS



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

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

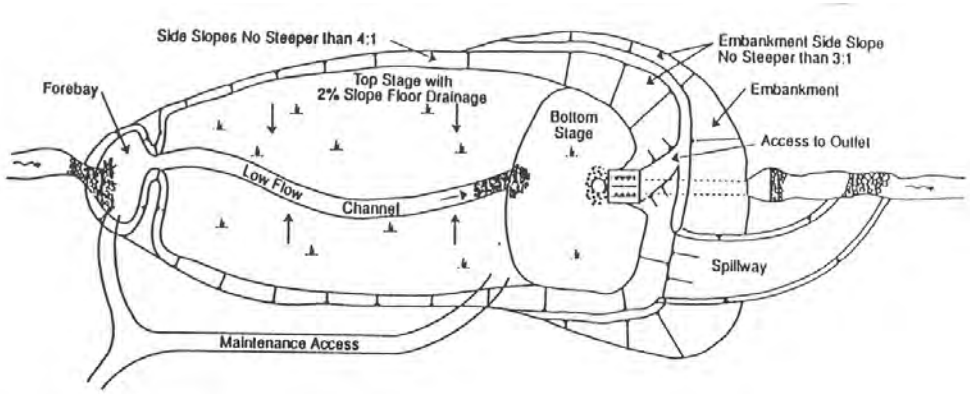
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Extended Detention Basins

EDB



DESCRIPTIONS:

Extended detention basins are dry between storms. During a storm the basin fills. A bottom outlet releases the stormwater slowly to provide time for sediments to settle.

APPLICATION:

- Objective is to remove only particulate pollutants.
- Use where lack of water prevents the use of wet ponds, wetlands or biofilters.
- Use where wet ponds or wetlands would cause unacceptable mosquito conditions.

INSTALLATION/APPLICATION CRITERIA:

- Basin volume is sized to capture a particular fraction of the runoff.
- Drawdown time of 24 to 40 hours is required.
- A shallow basin with large surface area performs better than a deep basin with the same volume.
- Place energy dissipators at the entrance to minimize bottom erosion and resuspension.
- Vegetate side slopes and bottom to the maximum extent practical.
- If side erosion is particularly severe, consider paving or soil stabilization.
- If floatables are a problem, protect outlet with a trash rack or other device.
- Provide bypass or pass through capabilities for 100-year storm.

LIMITATIONS:

- May be less reliable than other treatment control BMPs. Inability to vegetate banks and bottom may result in erosion and resuspension.
- Limitation of the orifice diameter may preclude use in small watersheds.
- Requires differential elevation between inlet and outlet.

MAINTENANCE:

- Check outlet regularly for clogging.
- Check banks and bottom of basin for erosion and correct as necessary.
- Remove sediment when accumulation reaches 6-inches, or if resuspension is observed.

CONSIDERATIONS

☐ Soils
☒ Area Required
☐ Slope
☐ Water Availability
☐ Aesthetics
☒ 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
☐ Training

■ High ☒ Medium ☐ Low

BMP:Geotextiles and Mats

GM

TYPICALLY FOR
SLOPES > 15%
FLOW RATES VARY ACCORDING TO MANUFACTURER
INSTALLATION PARALLEL TO SLOPE

OBJECTIVES

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

DESCRIPTION:
Mattings made of natural or synthetic material which are used to temporarily or permanently stabilize soil.

APPLICATION:
- Typically suited for post-construction site stabilization, but may be used for temporary stabilization of highly erosive soils.
- Channels and streams.
- Steep slopes.

INSTALLATION/APPLICATION CRITERIA:
- Mattings may be applied to disturbed soils and where existing vegetation has been removed.
- The following organic matting materials provide temporary protection until permanent vegetation is established, or when seasonal circumstances dictate the need for temporary stabilization until weather or construction delays are resolved: Jute mattings and straw mattings.
- The following synthetic mattings may be used for either temporary or post-construction stabilization, both with and without vegetation: excelsior matting, glass fiber matting, mulch matting.
- Staples are needed to anchor the matting.

LIMITATIONS:
- Mattings are more costly than other BMP practices, limiting their use to areas where other BMPs are ineffective (e.g., channels, steep slopes).
- May delay seed germination, due to reduction in soil temperature.
- Installation requires experienced contractor to ensure soil stabilization and erosion protection.

MAINTENANCE:
- Inspect monthly and after significant rainfall.
- Re-anchor loosened matting and replace missing matting and staples as required.

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: Grassed Swales

GS

Grassed swales can be used along roadsides and parking lots to collect and treat storm water runoff

APPLICATIONS

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

DESCRIPTION:

A series of vegetated, open channel management practices designed specifically to treat and attenuate storm water runoff for a specified water quality volume. Storm water is treated through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils.

APPROACH:

- Grassed swales can be applied in most situations with some restrictions. Swales are very well suited for treating highway or residential road runoff because they are linear practices.
- Grassed channels are a good treatment option within watersheds that drain to cold water streams. These practices do not pond water for a long period of time and often induce infiltration. As a result, standing water will not typically be subjected to warming by the sun in these practices.
- Grassed swales should be used on sites with relatively flat slopes of less than 4 percent slope; 1 to 2 percent slope is recommended.
- A small fore-bay should be used at the front of the swale to trap incoming sediments. A pea gravel diaphragm, a small trench filled with river run gravel, should be used as pretreatment for runoff entering the sides of the swale.
- Swales should also have the capacity to pass larger storms (typically a 10-year storm) safely.

LIMITATIONS:

- Grassed swales cannot treat a very large drainage area.
- Wet swales may become a nuisance due to mosquito breeding.

MAINTENANCE:

- Maintenance of grassed swales mostly involves maintenance of the grass or wetland plant cover.

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: Hazardous Waste Management

HWM

PROGRAM ELEMENTS

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

DESCRIPTION:

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

APPLICATION:

Many of the chemicals used on-site can be hazardous materials which become hazardous waste upon disposal. These wastes may include:

- Paints and solvents; petroleum products such as oils; fuels and greases; herbicides and pesticides; acids for cleaning masonry; and concrete curing compounds.

In addition, sites with existing structures may contain wastes which must be disposed of in accordance with federal, state and local regulations, including:

- Sandblasting grit mixed with lead, cadmium or chromium based paints, asbestos, and PCBs.

INSTALLATION/APPLICATION CRITERIA:

The following steps will help reduce stormwater pollution from hazardous wastes:

- Use all of the product before disposing of the container.
- Do not remove the original product label, it contains important safety and disposal information.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried off-site by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

LIMITATIONS:

Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste collector.

MAINTENANCE:

- Inspect hazardous waste receptacles and areas regularly.
- Arrange for regular hazardous waste collection.

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: Housekeeping Practices

HP

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

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

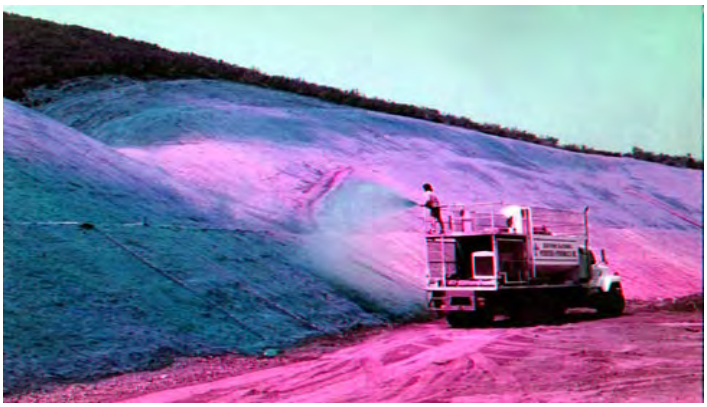
IMPLEMENTATION REQUIREMENTS

- ☐ Capital Costs
- ☒ O&M Costs
- ☐ Regulatory
- ■ Training
- ☒ Staffing
- ☐ Administrative

■ High ☒ Medium ☐ Low

BMP: Hydromulching

HM



OBJECTIVES

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

DESCRIPTION:

A combination of wood fiber mulch, processed grass, or hay or straw mulch and a tacking agent. It is made into a slurry, then applied to bare slopes or other bare areas to provide temporary stabilization.

APPLICATIONS:

- Small roadside slopes.
- Large, relatively flat areas.

INSTALLATION/APPLICATION CRITERIA:

- Legume seeds should be pellet inoculated with the appropriate bacteria.
- The seed should not remain in the hydromulcher tank for more than 30 minutes.
- Wood fiber may be dyed to aid in uniform application.
- Slurry should be uniformly applied until an adequate coverage is achieved.
- The applicator should not be directed at one location for a long period of time; erosion will occur.

LIMITATIONS:

- Will lose effectiveness after 1 year.
- Can use only on physically stable slopes (at natural angle of repose, or less).

MAINTENANCE:

- Periodically inspect for damage caused by wind, water, or human disturbance.
- Promply repair damaged areas.

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: 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)

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.

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

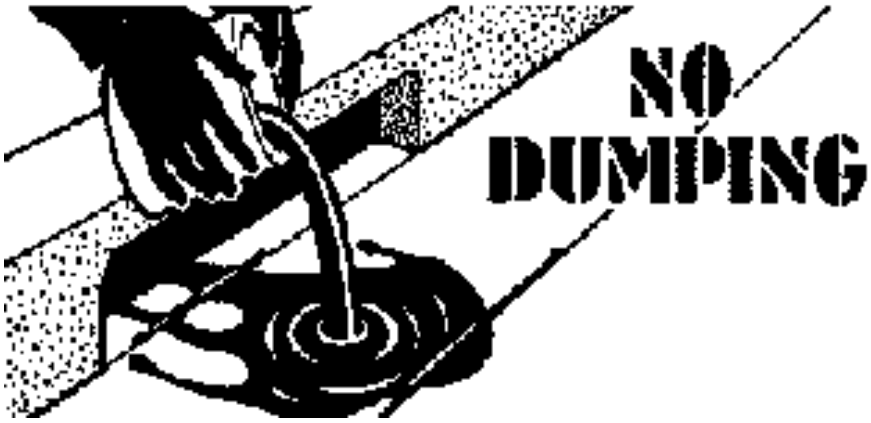
IMPLEMENTATION REQUIREMENTS

- ■ Capital Costs
- ☒ O&M Costs
- ☒ Maintenance
- ☐ Training

■ High ☒ Medium ☐ Low

BMP: Illegal Dumping Controls

IDC



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: Infrastructure Planning

IPL

Developers can design streets and pedestrian paths to maximize convenience and safety while at the same time minimizing impervious surface area (Source: The Rouse Company, no date)

APPLICATIONS

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

DESCRIPTION:

This practice requires changes in the regional growth planning process to contain sprawl development. Sprawl development is the expansion of low-density development into previously undeveloped land. The American Farmland Trust has estimated that the United States is losing about 50 acres an hour to suburban and exurban development (Longman, 1998). This sprawl development requires local governments to extend public services to new residential communities whose tax payments often do not cover the cost of providing those services. For example, in Prince William County, Virginia, officials have estimated that the costs of providing services to new residential homes exceeds what is brought in from taxes and other fees by $1,600 per home (Shear and Casey, 1996).

Infrastructure planning makes wise decisions to locate public services—water, sewer, roads, schools, and emergency services—in the suburban fringe and direct new growth into previously developed areas, discouraging

Low-density development. Generally, this is done by drawing a boundary or envelope around a community, beyond which major public infrastructure investments are discouraged or not subsidized. Meanwhile, economic and other incentives are provided within the boundary to encourage growth in existing neighborhoods.

APPROACH:

- Sprawl development negatively impacts water quality in several ways. The most significant impact comes from the increase in impervious cover that is associated with sprawl growth. In addition to rooftop impervious area from new development, extension of road systems and additions of paved surface from driveways create an overall increase in imperviousness.
- *Urban Growth Boundaries*. This planning tool establishes a dividing line that defines where a growth limit is to occur and where agricultural or rural land is to be preserved. Often, an urban services area is included in this boundary that creates a zone where public services will not be extended.
- *Infill/Community Redevelopment*. This practice encourages new development in unused or underutilized land in existing urban areas. Communities may offer tax breaks or other economic incentives to developers to promote the redevelopment of properties that are vacant or damaged.

LIMITATIONS:

- Intense development of existing areas can create a new set of challenges for storm water program managers. Storm water management solutions are often more difficult and complex in ultra-urban areas than in suburban areas
- Infrastructure planning is often done on a regional scale and requires a cooperative effort between all the communities within a given region in order to be successful.

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

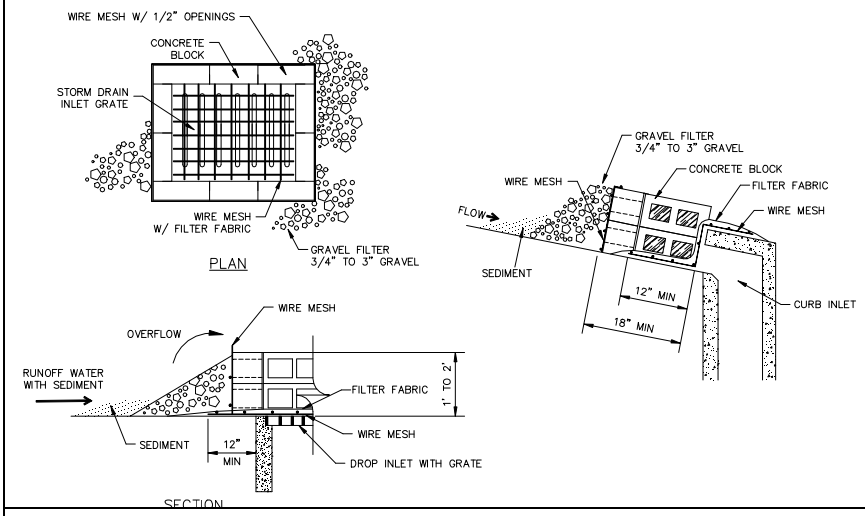
IMPLEMENTATION REQUIREMENTS

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

■ High	☒ Medium	☐ Low

BMP: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 ½ 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

BMP: BMP Inspection and Maintenance

BMPIM

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
☒ Maintenance
☒ Staffing
☐ Training
☐ Administrative

■ High ☒ Medium ☐ Low

BMP: Land Use Planning/Management

LUPM

PROGRAM ELEMENTS

☒ New Development
☐ Residential
☐ Commercial Activities
☐ Industrial Activities
☐ Municipal Facilities
☐ Illegal Discharges

DESCRIPTION:
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.

APPROACH:
The land use planning process need not be complex. A basic schematic model involves:

- Phase I - Goals: Determine clear-cut water quality goals.
- Phase 2 - Study: Identify planning area, gather pertinent data, and write a description of the planning area and its associated problems.
- Phase 3 - Analysis and Synthesis: Determine and prioritize the water quality needs as they relate to land use.
- Phase 4 - Recommendations: Future courses of action are developed to address the identified problems and needs determined previously.
- Phase 5 - Adoption: The recommendations are presented to a political body for acceptance and implementation.
- Phase 6 - Implementation: Recommendations adopted by the political body are implemented by the locality.

LIMITATIONS:
- 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.
- 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.
- 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.

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: Landscape & Irrigation Plan

LIP

APPLICATIONS

☒ Manufacturing
☐ Material Handling
☐ Vehicle Maintenance
■ Construction
☒ Commercial Activities
☐ Roadways
☐ Waste Containment
☒ Housekeeping Practices

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.

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

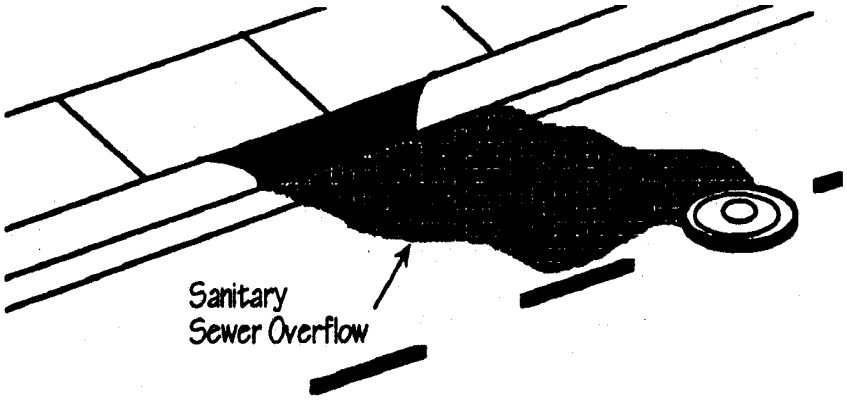
IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
☒ O&M Costs
☐ Maintenance
☒ Training

■ High ☒ Medium ☐ Low

BMP: Leaking Sanitary Sewer Control

LSSC



PROGRAM ELEMENTS

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

DESCRIPTION:

Implement control procedures for identifying, repairing, and remediating sewer blockages, infiltration, inflow, and wet weather overflows from sanitary sewers into the storm drain conveyance system. Procedures include field screening, follow-up testing, and complaint investigation.

APPROACH:

- Identify dry weather infiltration and inflow first. Wet weather overflow connections are very difficult to locate.
- Locate wet weather overflows and leaking sanitary sewers using conventional source identification techniques.
- Coordinate with ongoing infiltration and inflow (I & I) program to locate sources of exfiltration during I & I inspections.
- Design, site, operate, and maintain on-site sewage disposal systems to prevent nutrient/pathogen loadings to surface waters and to reduce loadings to groundwater.

Leaking sanitary sewer detection techniques include:

- Field screening program (including field analytical testing),
- Fluorometric dye testing,
- Zinc chloride smoke testing,
- Television camera inspection,
- Nessler Reagent test kits for ammonia detection,
- Citizens' hotline reporting of wet weather sanitary overflows.

LIMITATIONS:

- Private property access rights needed to perform field screening/testing along storm drain right-of-ways.
- Requirements of municipal ordinance authority for suspected source verification testing necessary for guaranteed rights of entry.

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: Long Term Operation and Maintenance

LTOM

APPLICATIONS

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

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
-

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
- ☒ Staffing
- ☐ Training
- ☐ Administrative

■	High	☒	Medium	☐	Low

BMP: Map Storm Water Drains

MSWD

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

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

IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ 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

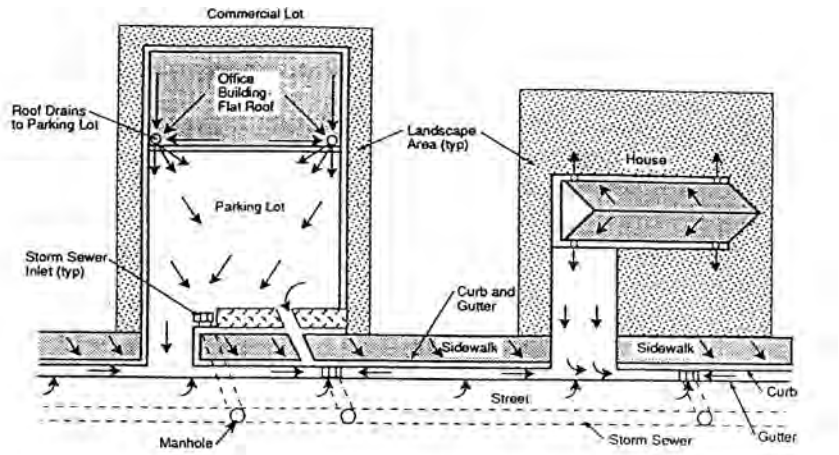
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Minimizing DCIAs

DCIA



DESCRIPTION:

Minimizing directly connected impervious areas (DCIAs) is a structural BMP strategy that requires a basic change in drainage design philosophy. The basic principle is to direct stormwater runoff to landscaped areas, grass buffer strips, and vegetated swales to slow down the rate of runoff, reduce runoff volumes, attenuate peak flows, and encourage filtering and infiltration of stormwater.

APPLICATION:

It can be made an integral part of drainage planning for any development.

INSTALLATION/APPLICATION CRITERIA:

- Use on sites with general terrain slopes flatter than 3-4%.
- Design the site drainage flowpath to maximize flow over vegetated areas before leaving a site.
- Minimize ground slopes to limit erosion and slow down water flow.
- Select vegetation that will not only survive, but also enhance water quality.

LIMITATIONS:

- Potential increase in site open space requirements over the traditional development systems.
- Introduction of a nonconventional development design strategy.
- Infiltration of water near building foundations and parking lots is a concern.
- Will likely result in increased maintenance along the swales.

MAINTENANCE:

- Maintain grass and other vegetation.
- Pick up debris.
- Conduct ongoing inspections for potential erosion problems and changes in drainage patterns.
- Remove sediment buildup and replace damaged grass cover.

CONSIDERATIONS

☐ Soils
☐ Area Required
☒ Slope
☐ Water Availability
☒ Aesthetics
☐ 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
☐ Training

■ High ☒ Medium ☐ Low

BMP: Non-Stormwater Discharges To Drains

NSWD

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

BMP: Ordinance Development

OD

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

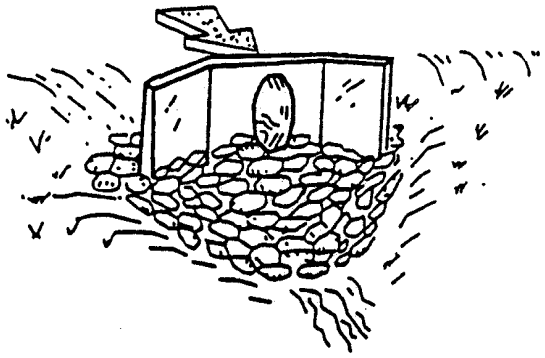
IMPLEMENTATION REQUIREMENTS

■ Capital Costs
■ O&M Costs
☐ Maintenance
☐ Training

■ High ☒ Medium ☐ Low

BMP: Outlet Protection

OP



OBJECTIVES

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

DESCRIPTION:

A rock outlet protection is a physical device composed of rock, grouted riprap, or concrete rubble which is placed at the outlet of a pipe to prevent scour of the soil caused by high pipe flow velocities, and to absorb flow energy to produce non-erosive velocities.

APPLICATIONS:

- Wherever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach.
- Rock outlet protection is best suited for temporary use during construction becasue it is usually less expensive and easier to install than concrete aprons or energy dissipators.
- A sediment trap below the pipe outlet is recommended if runoff is sediment laden.
- Permanent rock riprap protection should be designed and sized by the engineer as part of the culvert, conduit or channel design.
- Grouted riprap should be avoided in areas of freeze and thaw because the grout will break up.

INSTALLATION/APPLICATION CRITERIA:

Rock outlet protection is effective when the rock is sized and placed properly. When this is accomplished, rock outlets do much to limit erosion at pipe outlets. Rock size should be increased for high velocity flows. Best results are obtained when sound, durable, angular rock is used.

LIMITATIONS:

- Large storms often wash away the rock outlet protection and leave the area susceptible to erosion.
- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat.

MAINTENANCE:

- Inspect after each significant rain for erosion and/or disruption of the rock, and repair immediately.
- Grouted or wire-tied rock riprap can minimize maintenance requirements.

TARGETED POLLUTANTS

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

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

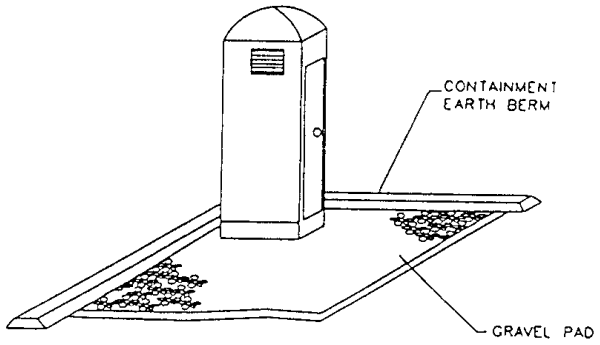
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: 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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

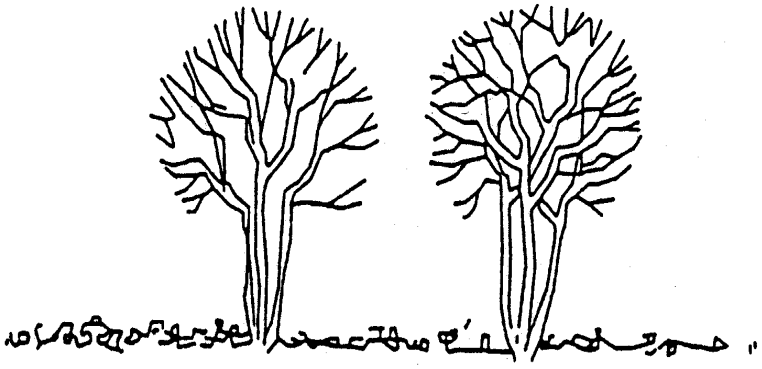
IMPLEMENTATION REQUIREMENTS

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

■ High	☒ Medium	☐ Low

BMP: Preservation of Existing Vegetation

PEV



OBJECTIVES

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

GENERAL DESCRIPTION:

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs and/or grasses that serve as erosion controls.

APPLICATIONS:

This technique is applicable to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

INSTALLATION/APPLICATION CRITERIA:

- Clearly mark, flag or fence vegetation or areas where vegetation should be preserved.
- Prepare landscaping plans which include as much existing vegetation as possible and state proper care during and after construction.
- Define and protect with berms, fencing, signs, etc. a setback area from vegetation to be preserved.
- Propose landscaping plans which do not include plant species that compete with the existing vegetation.
- Do not locate construction traffic routes, spoil piles, etc. where significant adverse impact on existing vegetation may occur.

LIMITATIONS:

- Requires forward planning by the owner/developer, contractor and design staff.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactorily for the planned development.
- May not be cost effective with high land costs.

MAINTENANCE:

- Inspection and maintenance requirements for protection of vegetation are low.
- Maintenance of native trees or vegetation should conform to landscape plan specifications.

TARGETED POLLUTANTS

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

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

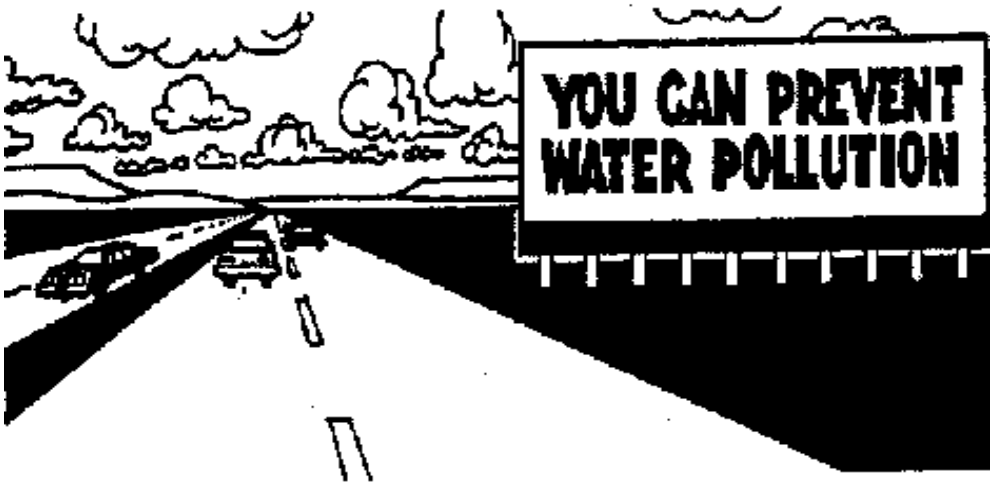
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Public Education/Participation

PEP



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

BMP: Riprap

RR

CONSIDERATIONS

☒ Soils
☒ Area Required
☒ Slope
☐ Water Availability
☒ Aesthetics
☐ Hydraulic Head
☒ Environmental Side Effects

DESCRIPTION:

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.

APPLICATION:

- 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.
- Riprap can be used for pipe outlet protection, channel lining, scour protection, etc.
- Riprap is commonly used for wave protection on lakes.

INSTALLATION/APPLICATION CRITERIA:

- For slopes steeper than 2:1, consider using materials other than riprap for erosion protection.
- 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.
- 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.

In designing riprap consider the following:

- Use durable rock, such as granite, and a variety of rock sizes.
- The thickness of riprap layers should be at least 1.25 times the max. stone diameter.
- Filter material is usually required between riprap and the underlying soil surface.

LIMITATIONS:

- Riprap may be unstable on very steep slopes.
- The placement of a riprap in streams requires a state stream alteration permit.

MAINTENANCE:

- Riprap should be inspected annually and after major storms.
- If riprap has been damaged, repairs should be made promptly to prevent a progressive failure.
- If repairs are needed repeatedly at one location, the site should be evaluated to see if original design conditions have changed.

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

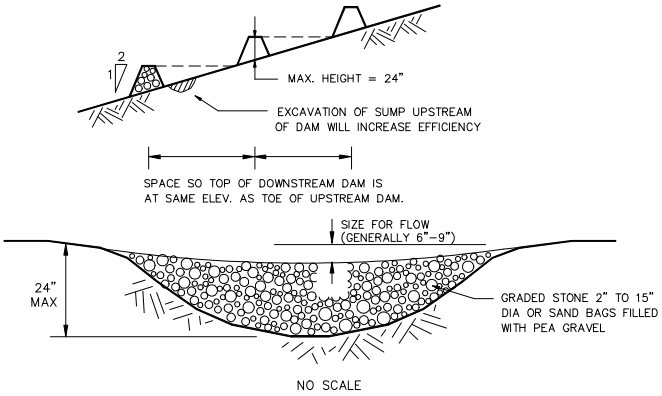
IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
☒ O&M Costs
☒ Maintenance
☐ Training

■ High ☒ Medium ☐ Low

BMP: Rock Check Dams

CD



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

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

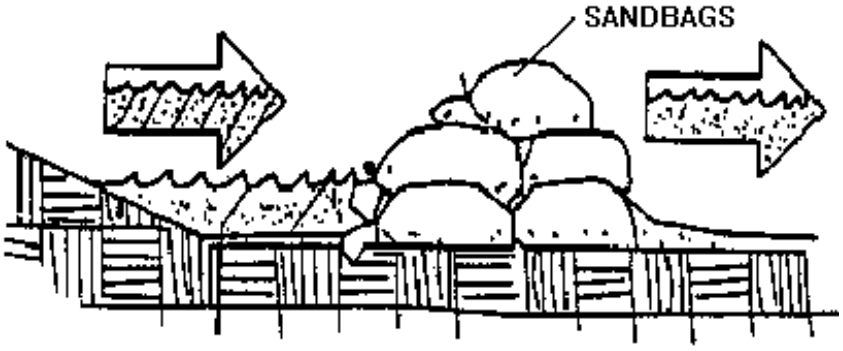
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Sand Bag Barrier

SBB



OBJECTIVES

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

DESCRIPTION:

Stacking sand bags along a level contour creates a barrier which detains sediment-laden water, ponding water upstream of the barrier and promoting sedimentation.

APPLICATION:

- Along the perimeter of the site.
- May be used in drainage areas up to 5 acres.
- Along streams and channels
- Across swales with small catchments.
- Around temporary spoil areas.
- Below the toe of a cleared slope.

INSTALLATION/APPLICATION CRITERIA:

- Install along a level contour.
- Base of sand bag barrier should be at least 48 inches wide.
- Height of sand bag barrier should be at least 18 inches high.
- 4 inch PVC pipe may be installed between the top layer of sand bags to drain large flood flows.
- Provide area behind barrier for runoff to pond and sediment to settle.
- Place below the toe of a slope.

LIMITATIONS:

- Sand bags are more expensive than other barriers, but also more durable.
- Burlap should not be used.

MAINTENANCE:

- Inspect after each rain.
- Reshape or replace damaged sand bags immediately.
- Replace sediment when it reaches six inches in depth.

TARGETED POLLUTANTS

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

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

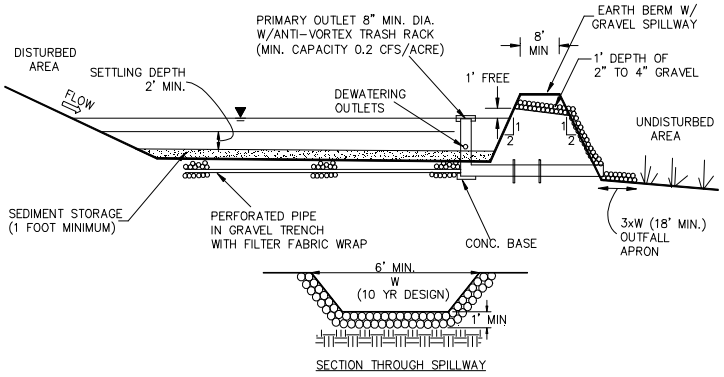
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Sediment Basin

SB



OBJECTIVES

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

DESCRIPTION:

A pond created by excavation or construction of an embankment, and designed to retain or detain runoff sufficiently to allow excessive sediment to settle.

APPLICATION:

- At the outlet of all disturbed watersheds 10 acres or larger.
- At the outlet of smaller disturbed watersheds, as necessary.
- Where post construction detention basins will be located.

INSTALLATION/APPLICATION CRITERIA:

- Design basin for site specific location, maintain effective flow length 2 times width.
- Excavate basin or construct compacted berm containment, ensure no downgradient hazard if failure should occur. (Provide minimum of 67 cy. per acre of drainage area).
- Construct dewatering and outfall structure and emergency spillway with apron.

LIMITATIONS:

- Should be sized based on anticipated runoff, sediment loading and drainage area size.
- May require silt fence at outlet for entrapment of very fine silts and clays.
- May require safety fencing to prevent public access.
- Height restrictions for embankment regulated by Utah Division of Dam Safety.

MAINTENANCE:

- Inspect after each rainfall event and at a minimum of monthly.
- Repair any damage to berm, spillway or sidewalls.
- Remove accumulated sediment as it reaches 2/3 height of available storage.
- Check outlet for sedimentation/erosion of downgradient area and remediate as necessary. Install silt fence if sedimentation apparent.

TARGETED POLLUTANTS

- ■ Sediment
- ☐ Nutrients
- ☒ Toxic Materials
- ☐ Oil & Grease
- ☒ Floatable Materials
- ☐ Other Waste

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

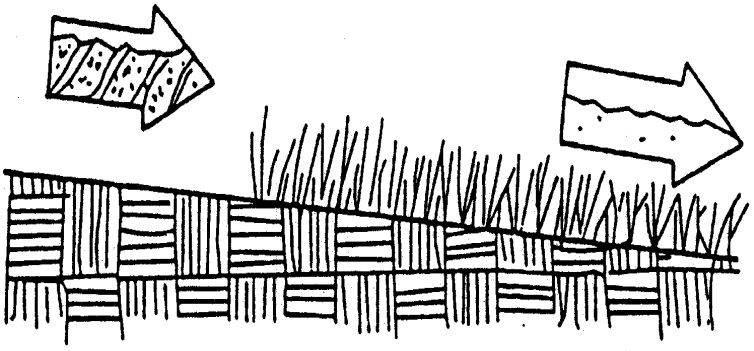
IMPLEMENTATION REQUIREMENTS

- ■ Capital Costs
- ☒ O&M Costs
- ☒ Maintenance
- ☐ Training

■ High ☒ Medium ☐ Low

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

BMP: Septic Systems Controls

SSC

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

BMP: Service Group Participation

SGP

APPLICATIONS

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

DESCRIPTION:

Citizens of the local community can volunteer to carry out various service projects. These projects allow citizens to become directly involved in improving the community.

APPROACH:

- Designate an individual or groups of individuals to schedule and organize the service projects, recruit volunteers, coordinate any trash disposal with the local solid waste authority, and assign staff for supervision of the projects.
- The first step for a municipally sponsored service program is to identify needed service projects.
- Advertise the program and let citizens know about service project opportunities. Projects can be advertised on bulletin boards, in a newsletter, on a website, etc.
- When volunteers are being used for service projects, 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.
- Service events are also effective at increasing public awareness of the need to better the community.

LIMITATIONS:

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

MAINTENANCE:

- Service project lists need to be updated continually.

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

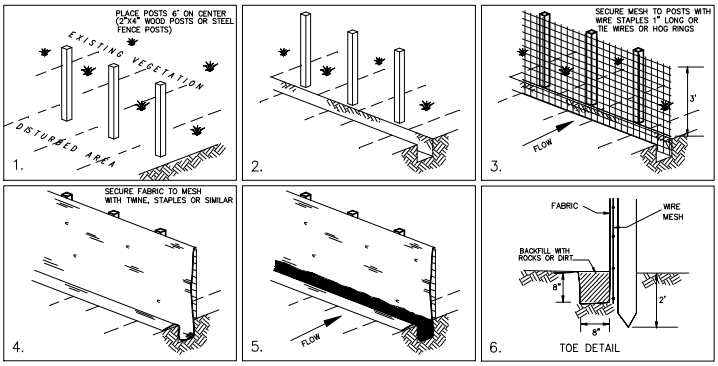
IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
☒ O&M Costs
☐ Maintenance
☐ Training

■ High ☒ Medium ☐ Low

BMP: Silt Fence

SF



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 ½ 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

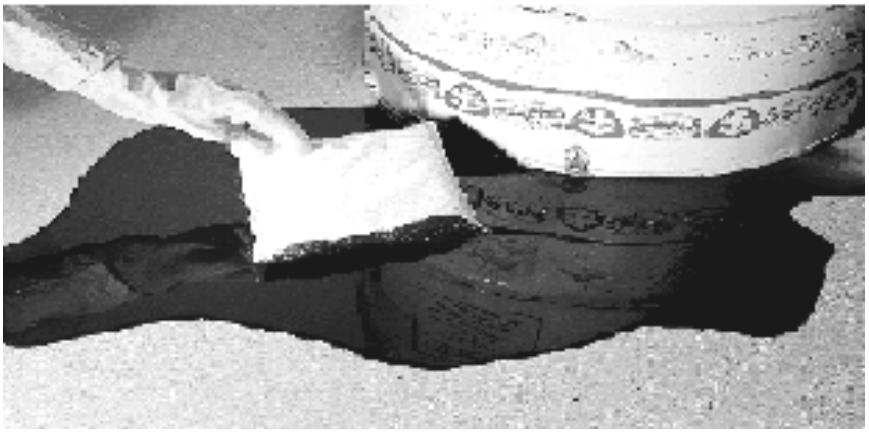
IMPLEMENTATION REQUIREMENTS

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

■ High	☒ Medium	☐ Low

BMP: Sorbents

SO



CONSIDERATIONS

- ☐ Soils
- ☐ Area Required
- ☐ Slope
- ☐ Water Availability
- ☐ Aesthetics
- ☐ Hydraulic Head
- ☒ Environmental Side Effects

DESCRIPTION:

Sorbents are materials that are capable of cleaning up spills through the chemical processes of adsorption and absorption. Sorbents adsorb (an attraction to the outer surface of a material) or absorb (taken in by the material like a sponge) only when they come in contact with the sorbent materials.

Sorbents include, but are not limited to, the following:

- Common materials such as clays, sawdust, straw and fly ash
- Polymers - polyurethane and polyolefin
- Activated Carbon - powdered or granular
- "Universal Sorbent Material" - a silicate glass foam consisting of rounded particles that can absorb the material.

APPLICATION:

Sorbents are useful BMPs for facilities with liquid materials onsite.

INSTALLATION/APPLICATION CRITERIA:

- Personnel should know the properties of the spilled material(s) to know which sorbent is appropriate. To be effective, sorbents must adsorb the material spilled but must not react with the spilled material to form hazardous or toxic substances.
- Apply immediately to the release area.
- Application is generally simple: the sorbent is added to the area of release, mixed well, and allowed to adsorb or absorb.
- Many sorbents are not reusable once they have been used.
- Proper disposal is required.

LIMITATIONS:

- Requires a knowledge of the chemical makeup of a spill (to choose the best sorbent).
- May be an expensive practice for large spills.
- May create disposal problems and increase disposal costs by creating a solid waste and potentially a hazardous waste.

MAINTENANCE:

No information available.

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: Spill Clean-Up

SCU

OBJECTIVES

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

DESCRIPTION:
Practices to clean-up leakage/spillage of on-site materials that may be harmful to receiving waters.

APPLICATION:
All sites

GENERAL:
- Store controlled materials within a storage area.
- Educate personnel on prevention and clean-up techniques.
- Designate an Emergency Coordinator responsible for employing preventative practices and for providing spill response.
- Maintain a supply of clean-up equipment on-site and post a list of local response agencies with phone numbers.

METHODS:
- Clean-up spills/leaks immediately and remediate cause.
- Use as little water as possible. NEVER HOSE DOWN OR BURY SPILL CONTAMINATED MATERIAL.
- Use rags or absorbent material for clean-up. Excavate contaminated soils. Dispose of clean-up material and soil as hazardous waste.
- Document all spills with date, location, substance, volume, actions taken and other pertinent data.
- Contact local Fire Department and State Division of Environmental Response and Remediation (Phone #536-4100) for any spill of reportable quantity.

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: Storm Channel/Creek Maintenance

SCCM

PROGRAM ELEMENTS

☒ New Development
☐ Residential
☐ Commercial Activities
☐ Industrial Activities
☒ Municipal Facilities
☒ Illegal Discharges

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.

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

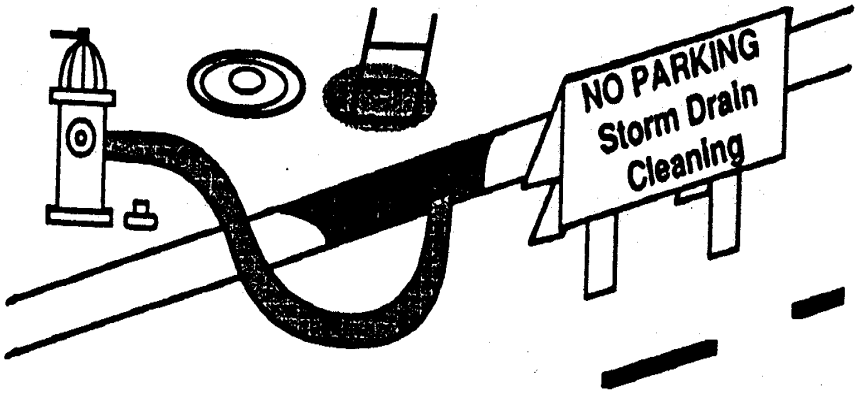
IMPLEMENTATION REQUIREMENTS

☐ Capital Costs
☒ O&M Costs
☒ Regulatory
☒ Training
☒ Staffing
☐ Administrative

■ High ☒ Medium ☐ Low

BMP: Storm Drain Flushing

SDF



PROGRAM ELEMENTS

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

DESCRIPTION:

A storm drain is "flushed" with water to suspend and remove deposited materials. Flushing is particularly beneficial for storm drain pipes with grades too flat to be self-cleansing. Flushing helps ensure pipes convey design flow and remove pollutants from the storm drain system.

APPROACH:

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Whenever possible, flushed effluent should be collected, decanted, evaporated, and disposed of in a landfill.

LIMITATIONS:

- Most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity).
- Water source must be available.
- May have difficulty finding downstream area to collect sediments.
- Requires liquid/sediment 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: Storm Drain System Signs

SDSS

PROGRAM ELEMENTS

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

DESCRIPTION:
Stenciling of the storm drain system (inlets, catch basins, channels, and creeks) with prohibitive language/graphic icons discourages the illegal dumping of unwanted materials.

APPROACH:
- Create a volunteer work force to stencil storm drain inlets.
- An important aspect of a stenciling program is the distribution of informational flyers that educate the neighborhood (business and residential) about storm water pollution, the storm drain system, and the watershed. The flyers should also provide information on alternatives such as recycling, household hazardous waste disposal, and safer products.
- Because a stenciling program primarily involves volunteer services, liability release forms and volunteer identification notices should also be administered.
- Readability of stencils is critical to their effectiveness. Wherever possible stencils should be painted on a smooth surface such as cement, as opposed to asphalt.
- Use municipal staff to erect signs near drainage channels and creeks.
- An effectively implemented stenciling program encourages change in personal behavior and helps minimize non-point source pollutants from entering the storm drain system. An additional benefit is that waste and catch basin maintenance is minimized through the reduction of disposed materials into storm drain inlets. Finally a well-implemented stenciling program encourages the use of household hazardous waste collection and used oil recycling programs.

LIMITATIONS:
- Private property access limits stenciling to publicly-owned areas.
- Program is highly dependent on volunteer response.
- Storm drain inlets that are physically blocked will be missed or require follow-up.
- High traffic/commercial/industrial zones are the responsibility of city staff.
- Ongoing maintenance is needed to maintain readable signs.

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

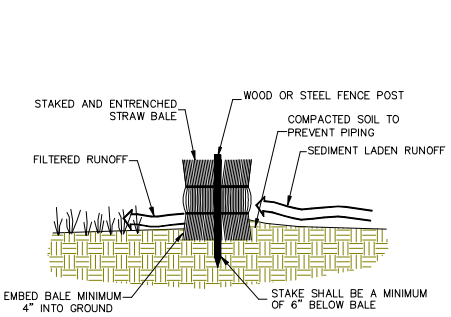
IMPLEMENTATION REQUIREMENTS

☐ Capital Costs
☒ O&M Costs
☐ Regulatory
☒ Training
☐ Staffing
☐ Administrative

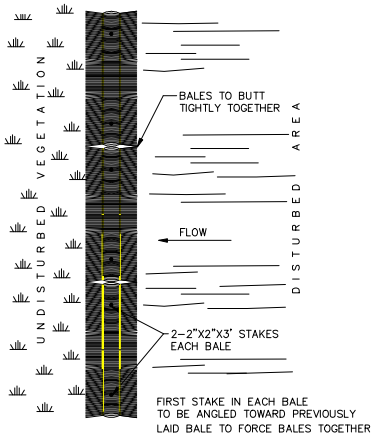
■ High ☒ Medium ☐ Low

BMP: Straw Bale Barrier

STB



SECTION



PLAN

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.
- Recompact soil around barrier as necessary to prevent piping.

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: 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

BMP: Street Cleaning

SC

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

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

IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Temporary and Permanent Seeding

TPS

OBJECTIVES

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

DEFINITION:

Temporary seeding - establishment of short term cover by application of rapidly germinating seed mix (alternatively hydroseeding may be utilized).
Permanent seeding - establishment of final term cover by application of perennial seed mix (alternatively sod may be utilized).

APPLICATION:

Disturbed areas that are at final grade and which will not be disturbed by continuing activities on site. Also areas that are not at final grade but which will be left untouched in excess of one year.

RECOMMENDED SEED MIX:

The recommended seed mix will be dependent on site specific information such as elevation, exposure, soils, water available and topography. Check with the County Extension Service for recommended mixes for site specific conditions:

Utah State University Extension Service
2001 South State Street #S1200
Salt Lake City, Utah 84190
phone (801) 468-3170

LIMITATIONS:

- Limited to areas that will not be subject to traffic or high usage.
- May require irrigation and fertilizer which creates potential for impacting runoff quality.
- May only be applied during appropriate planting season, temporary cover required until that time.

INSTALLATION:

- Roughen soil to a depth of 2 inches. Add fertilizer, manure, topsoil as necessary.
- Evenly distribute seed using a commonly accepted method such as; breast seeding, drilling, hydroseeding.
- Use a seed mix appropriate for soil and location that will provide rapid germination and growth. Check with County for recommended mix and application rate.
- Cover area with mulch if required due to steep slopes or unsuitable weather conditions.

MAINTENANCE:

- Provide irrigation as required to establish growth and to maintain plant cover through duration of project.
- Reseed as necessary to provide 75% coverage
- Remediate any areas damaged by erosion or traffic.
- When 75% coverage is achieved inspect monthly for damage and remediate as necessary.

TARGETED POLLUTANTS

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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

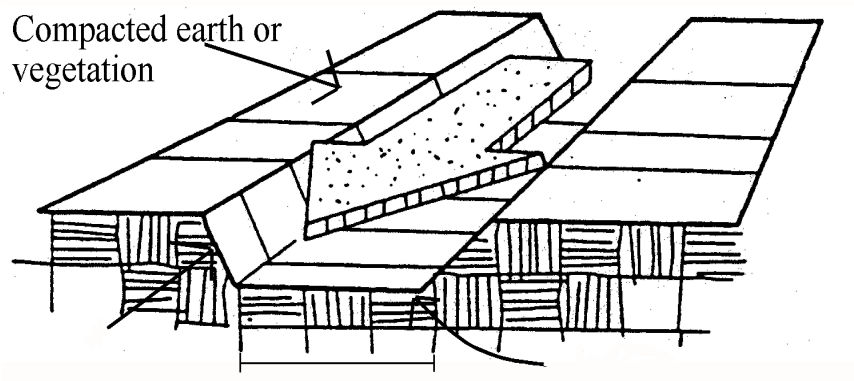
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: 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

BMP: Used Oil Recycling

UOR

Used oil can be disposed of at a waste collection facility, where it will be collected and later sent to a recycling facility

APPLICATIONS

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

DESCRIPTION:

Used motor oil is a hazardous waste because it contains heavy metals picked up from the engine during use. Since it is toxic to humans, wildlife, and plants, it should be disposed of at a local recycling or disposal facility.

APPROACH:

- When establishing oil recycling programs, municipalities should provide the public with the proper informational resources.
- The public can also call 1-800-RECYCLE or contact Earth's 911 at www.1800cleanup.org/ for more information.
- Municipalities also need to address oil filter recycling in their recycling programs.
- To make recycling motor oil more convenient for the do-it-yourselfers, oil recycling programs should be located throughout all communities.
- Two types of programs currently in use are drop-off locations and curbside collection. Drop-off locations include service stations, recycling centers, auto parts retail stores, quick lubes, and landfills.

LIMITATIONS:

- If oil is mixed with other substances or if storage containers have residues of other substances, this can contaminate oil and make it a hazardous waste.
- It is often difficult to effectively educate the public and convince them of the importance of recycling oil. This limitation can be addressed if municipalities include recycling information in utility bill inserts, newspaper ads, and mailings.

MAINTENANCE:

- Costs for used motor oil recycling programs vary depending on whether a community has already established similar types of recycling programs.
- Major costs associated with oil recycling programs include advertisement costs and oil collection costs.

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: Using the Media

UM

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

■ High Impact
☒ Medium Impact
☐ Low or Unknown Impact

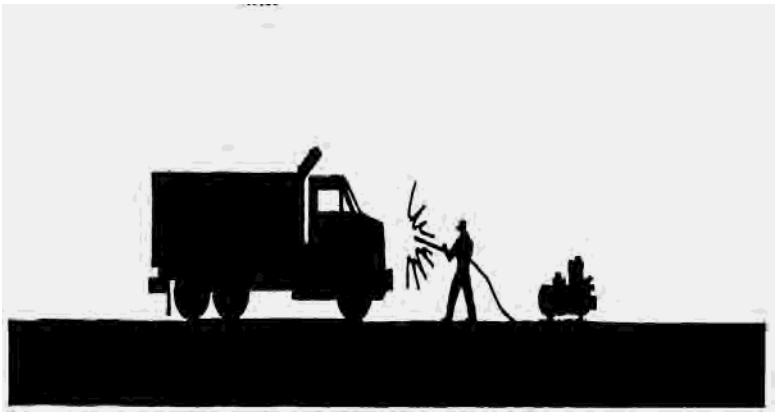
IMPLEMENTATION REQUIREMENTS

☐ Capital Costs
☐ O&M Costs
☐ Maintenance
☐ Training

■ High ☒ Medium ☐ Low

BMP: Vehicle And Equipment Cleaning

VEC



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 vehicle and equipment washing and steam cleaning by using off-site facilities, washing in designated, contained areas only, eliminating discharges to the storm drain by infiltrating or recycling the wash water, and training employees and subcontractors.

APPROACH:

- Use off-site commercial washing and steam cleaning businesses as much as possible. Washing vehicles and equipment outdoors or in areas where wash water flows onto paved surfaces or into drainage pathways can pollute storm water. If you wash a large number of vehicles or pieces of equipment, consider conducting this work at an off-site commercial business. These businesses are better equipped to handle and dispose of the wash waters properly. Performing this work off-site can also be economical by eliminating the need for a separate washing operation at your site.
- If washing must occur on-site, use designated, bermed wash areas to prevent wash water contact with storm water, creeks, rivers, and other water bodies. The wash area can be sloped for wash water collection and subsequent infiltration into the ground.
- Use as little water as possible to avoid having to install erosion and sediment controls for the wash area. Use phosphate-free biodegradable soaps. Educate employees and subcontractors on pollution prevention measures. Do not permit steam cleaning on-site. Steam cleaning can generate significant pollutant concentrations.

LIMITATIONS:

- Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades.
- Sending vehicles/equipment off-site should be done in conjunction with Stabilized Construction Entrance.(See BMP in the Construction Section).
- The measures outlined in this fact sheet are insufficient to address all the environmental impacts and compliance issues related to steam cleaning.

MAINTENANCE:

- Minimal, some berm repair may be necessary.

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

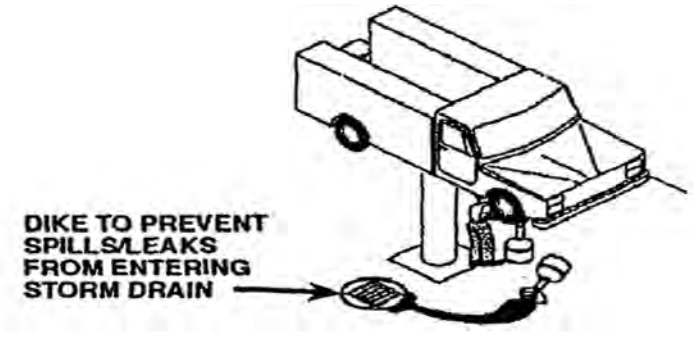
IMPLEMENTATION REQUIREMENTS

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

■ High ☒ Medium ☐ Low

BMP: Vehicle And Equipment Maintenance & Repair

VEMR



(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

- ☐ 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: Watershed Organization

WO

A group of stakeholders meets to discuss important issues affecting their watershed

APPLICATIONS

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

DESCRIPTION:

The group can consist of local governments, citizens, nonprofit environmental groups, and local universities, among others. The purpose of a watershed organization is to restore, protect, and promote the natural resources of the watershed. Watershed organization meetings can be in the form of a local storm water management panel, a public meeting, or any type of interactive, information-sharing event.

APPROACH:

- A stakeholder should have a vested interest in solving storm water management problems for the particular water body. Representatives from several local newspapers, radio stations, and television news departments should be included.
- Local businesses that might be effected by storm water fees associated with impervious area would also be good members.
- The municipality must decide how to approach stakeholders. Flyers and media stories can be used to educate stakeholders and to prepare them for a public meeting.
- Rules for conducting the meeting must be agreed upon and can be addressed with the following questions: Will the meeting be facilitated? Will decisions be made by consensus? What approach will the group take?
- A question and answer period and a time for comments should be planned. It is often difficult to get people to speak in public, but it is a good way for them to express their opinions and concerns.
- Watershed organizations typically sponsor such projects as: Field trips and tours, Meetings and workshops, Canoe trips, Volunteer monitoring, Cleanup and restoration days, Educational programs for schools, civic groups, and other local organizations, Media relations, Opinion surveys, Focus groups (CTIC, no date).

LIMITATIONS:

- It takes time and skill to establish partnerships and create an effective watershed organization.
- Limitations include finding an appropriate location and time to meet, costs associated with planning and holding meetings, and keeping the stakeholders organized and focused enough to get items accomplished.

MAINTENANCE:

- Meetings must be continued, and involvement encouraged and subjects focused.

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

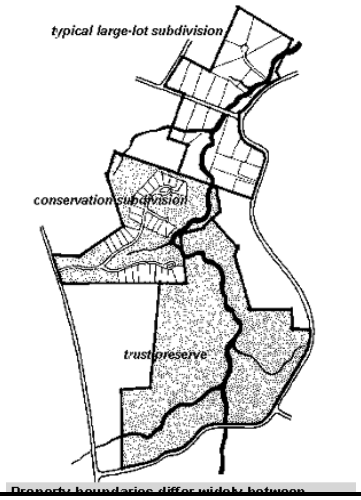
IMPLEMENTATION REQUIREMENTS

☒ Capital Costs
☐ O&M Costs
☐ Maintenance
☒ Training

■ High ☒ Medium ☐ Low

BMP: Zoning

ZO



Property boundaries differ widely between

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.

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

■ High ☒ Medium ☐ Low

APPENDIX C

High Priority Facility Inspection List and Detection Form

Areas Considered

Area	Locations	Storm Water Control	Possible Pollutants
Composting facilities	None in Hyde Park City	NA	NA
Equipment storage and maintenance facilities	Hyde Park City Shop	Vegetative berm and retention basins.	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage and trash.
Fuel farms	None in Hyde Park City	NA	
Hazardous waste disposal facilities	None in Hyde Park City	NA	
Hazardous waste handling and transfer facilities	None in Hyde Park City	NA	
Incinerators	None in Hyde Park City	NA	
Landfills	None in Hyde Park City	NA	
Landscape maintenance facilities on municipal property	Hyde Park City Shop	Vegetative berm and retention basins.	Trash and grass trimmings
Materials storage yards	Hyde Park City Shop	Vegetative berm and retention basins.	Salt, sediment, trash
Pesticide storage facilities	Hyde Park City Shop	Vegetative berm and retention basins.	Pesticide spills
Public buildings, including libraries, police stations, fire stations, municipal buildings, restrooms, and similar Permittee-owned or operated buildings	Hyde Park City Shop, City Hall Building, and Restrooms at Public Parks	Shop: Vegetative berm and retention basins. City Hall: ADS storm tech chambers Public Parks:	Organic trash such as leaves, grass trimmings, decomposing vegetation, and animal waste. Application of fertilizers, pesticides, and herbicides. Regular trash as well.
Public parking lots	At Public Park Locations and City Hall Building	Public Parks: City Hall: ADS storm tech chambers	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage and trash.
Public golf course maintenance facilities	None in Hyde Park City	NA	
Public swimming pool maintenance facilities	None in Hyde Park City	NA	

Public works yards	Hyde Park City Shop	Vegetative berm and retention basins.	Oils, Fuel, Fuel Combustion byproducts, salt, sediment, garbage and trash.
Public Marinas and Boat Launches	None in Hyde Park City	NA	
Recycling facilities	None in Hyde Park City	NA	
Salt storage facilities and de-icing storage facilities	Hyde Park City Shop	Vegetative berm and retention basins.	Salt
Solid waste handling and transfer facilities	None in Hyde Park City	NA	
Street repair and maintenance facilities and or shed sites	Hyde Park City Shop	Vegetative berm and retention basins.	Oils, Fuel, Fuel Combustion byproducts.
Vehicle storage and maintenance yards	Hyde Park City Shop	Vegetative berm and retention basins.	Oils, Fuel, Fuel Combustion byproducts
Airports	None in Hyde Park City	NA	
Animal control facilities	None in Hyde Park City	NA	
Vehicle salvage yards	None in Hyde Park City	NA	
Chemical storage facilities	Hyde Park City Shop	Vegetative berm and retention basins.	Chemicals
Transportation hubs, including bus stations	None in Hyde Park City	NA	
Other potential locations	None in Hyde Park City	NA	

Decision Criteria (See MS4 4.2.6.3)

- Are pollutants stored at the site?
- Are there improperly stored material at the site?
- Are there potential pollutant-generating activities performed outside (e.g. changing automotive fluid)?
- Is the site in close proximity to fresh water and water bodies, including but not limited to, streams, canals, rivers, ponds, and lakes
- Is there potential to discharge pollutant(s) of concern to impaired waters?

In reviewing the areas and design criteria listed above, the following location(s) have been identified as High Priority Facilities:

- Hyde Park City Shop

Notes form determining high priority sites:

- In determining the high priority facilities, the construction date of the facility was included in the discussion. The probability of pollutants entering the storm water system and strength of the pollutants was also included in the discussion.
- In park areas there is limited hardscape that does not discharge storm water directly to the street without going through landscape and grass.
- City Hall has underground chambers for the new extension. The older part of the parcel has limited hardscape that discharges directly into the street without going through landscape first.
- The public works department stores a lot of materials (chemical, salts, vehicles, and construction materials). It has vehicle maintenance areas.

This list has been reviewed and updated on: _____

Has been reviewed by: _____

Signature: _____

*Keep a copy of each time this list is reviewed and updated. At a minimum, it should be reviewed and updated once a year.

Retrofit Decision Guide for Storm Water Facilities

Section 1: Location Assessment

Per MS4 Section 4.2.6.9, the following criteria need to be considered for each existing developed site owned or operated by the city.

- Proximity to waterbody;
- Current assessment of waterbody with the goal to improve impaired waterbodies and protect unimpaired waterbodies;
- Hydrologic condition of the receiving waterbody;
- Proximity to sensitive ecosystem or protected area; and
- Any sites that could be further enhanced by retrofitting storm water controls.

Section 2: Water Quality Assessment

- See the Cache Valley Storm Water Standards for a list of pollutants that are most likely produced from the site (Pages 9-11). Make a list of the pollutants.
- Is the 80th percentile storm being retained on site?
- Analyze existing water quality BMPs. Are there existing BMPs? Do they address the pollutants from the site? Are they effective or still working?
- Is the 100-year storm being detained or retained on site?

Section 3: Ranking Sites

- Rank the sites, with the sites that pose the greatest negative effect on the environment and surrounding water bodies as the highest priority.
- Determine and implement BMPs that address the site pollutants.
- Create a schedule and create an action plan on when and how these sites will be retrofitted. The DWQ LID Guide and the Cache County Storm Water Standards are to be used in determining BMPs and storm water design.

Section 4: Assessment Process:

- Receiving waters:
    - Same for all of Hyde Park: Hopkins Slough
    - Not High Quality/Impaired
- Sensitive Ecosystems or Protected Area
    - The west side of the city is closer to wetlands
    - The west side of the city is known to have higher ground water.
    - Sites in the industrial zone are known to have standing water in detention and retention basins.
    - Older commercial developments do not retain/detain as much as current code requires.

Section 5: Ranked List of Potential Retrofit Sites

1. Industrial and commercial sites west of Highway 91(West Side of the City)
    a. Groundwater is higher in this area.
    b. This area is closer to sensitive ecosystems such as wetlands.
    c. The sites have BMPs to address stormwater and potential pollutants on site.
    d. The 80th percentile storm is being retained at these sites.
    e. No retrofit actions needed currently. City will continue to monitor these areas.
2. Commercial Developments west of 200 West and with high groundwater.
    a. The city is known to have higher ground water west of 200 West street.
    b. This area is closer to sensitive ecosystems such as wetlands.
    c. The sites have BMPs to address stormwater and potential pollutants on site.
    d. The 80th percentile storm is being retained at these sites.
    e. No retrofit actions needed currently. City will continue to monitor these areas.