New York State
Department of Environmental Conservation

## Division of Water

# Construction Management Practices Catalogue For Nonpoint Source Pollution Prevention In New York State

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New York State Department of Environmental Conservation

George E. Pataki, Governor

Erin M. Crotty, Commissioner

# CONSTRUCTION MANAGEMENT PRACTICES CATALOGUE

# FOR

# NONPOINT SOURCE POLLUTION PREVENTION

# AND

# WATER QUALITY PROTECTION

# IN

# NEW YORK STATE

Prepared By:

Construction Management Practices Sub-Committee
Of The
New York State Nonpoint Source Management Practices
Task Force

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TABLE OF CONTENTS

## LIST OF TABLES

CONSTRUCTION MANAGEMENT PRACTICES

FOR

NONPOINT SOURCE POLLUTION PREVENTION

AND

WATER QUALITY PROTECTION

IN

NEW YORK STATE

# I. INTRODUCTION

## A. Nonpoint Source Management Practice Task Force

### *Background*

The Water Quality Act of 1987 placed increased attention on the development and implementation of nonpoint source control programs. Section 319 of the Act required states to prepare an Assessment Report identifying waterbodies affected by nonpoint source pollution, determining categories of nonpoint sources that are significant problems in the state and listing state programs available for the control of nonpoint source pollution. The Assessment was merged with New York's Priority Water Problems list in 1991. It is now know as the Priority Water Bodies List. States were also required to prepare a Management Program which explained how they planned to deal with the source categories causing the major problems.

The New York State Department of Environmental Conservation (DEC) by virtue of its statutory authority for the management of water resources and control of water pollution in the state, has assumed the lead responsibility for control of nonpoint source pollution. One action taken by DEC to carry out its NPS responsibility was the development of a Nonpoint Source Management Plan in 1990. The Management Plan outlines how DEC will identify, describe and evaluate management practices to be used to reduce nonpoint sources of pollution and make recommendations for additional control options needed to address nonpoint source pollution. A major update of the Nonpoint Source Management Program was completed in 1999.

### *Candidate Management Practices*

In New York, a list of candidate management practices was developed in 1989 by the Nonpoint Source Working Group, a task force under DEC leadership, composed of federal and state agencies and groups representing a broad range of issues and source categories. The Working Group recognized that there are numerous practices available with potential to control nonpoint source pollution, however, the management practices were not systematically inventoried or evaluated for effectiveness in preventing or remediating nonpoint water quality problems in a statewide context. In addition, they were not catalogued in a form that facilitated their widespread use throughout the state.

A Nonpoint Source Management Practice Task Force was created in early 1990 according to the guidelines contained in the Nonpoint Source Assessment Report. Many of the federal and state agencies from the Working Group were invited to participate in a meeting of the Task Force on February 1, 1990. At that meeting there was a discussion of the process to be followed for establishing the list of management practices, and each agency was given an opportunity to identify sub-committees on which they wanted to participate.

## B. Construction Management Practices Sub-Committee

In September 1991, a Construction Management Practices Sub-Committee was formed under DEC leadership to address construction as a source of nonpoint source pollution. Members of the Sub-Committee represented federal, state and local agencies, research institutions, private construction contractors, and consulting engineers.

The primary task of the Sub-Committee was to identify and evaluate man-agement practices for controlling nonpoint source pollution from construction sites. The preliminary list of candidate management practices developed by the Nonpoint Source Working Group was assessed by the Sub-Committee as an initial step. Summary sheets of the management practices deemed to be valuable were drafted by a DEC staff member, reviewed by the Sub-Committee, revised based on comments, and assembled to form the basis of the catalogue's Construction Section.

## C. NPS Pollution in New York State

### *The NPS Assessment*

In early 1989,a process was established to enhance DEC's list of segments having water quality problems. DEC, working in conjunction with the New York State Soil and Water Conservation Committee, initiated a two-phased approach to identify problem waterbodies. The first phase had each County Soil and Water Conservation District conduct a survey of nonpoint source pollution in their county. Districts invited agencies, groups, and individuals from within the county to participate in identifying water quality problems. Districts collected information and presented it to DEC during the next phase of the process.

The second phase consisted of meetings of representatives from the key agencies within each county to discuss the results of the NPS survey. These meetings, held during the summer of 1989, provided the County Soil and Water Conservation District personnel and DEC Regional Water and Fisheries staff with an opportunity to discuss water quality problems in each county. When there was a consensus that a water quality problem existed on a specific waterbody, information regarding the problem was recorded. The existence of a land use associated with nonpoint source was not sufficient to be considered a problem. A designated use of a surface waterbody or groundwater must be precluded, impaired, stressed or threatened to be regarded as a problem.

***Precluded*** *Water quality and/or associated habitat degradation precludes, eliminates or does not support a designated use; natural ecosystem functions may be significantly disrupted. This category is used for the most severe impacts.*

***Impaired*** *Water quality and/or habitat characteristics frequently impaired a designated use. Also applied when the designated use is supported, but at a level significantly less that would otherwise be expected. Natural ecosystem functions may be disrupted. These waters have severe impacts.*

***Stressed*** *Reduced water quality is occasionally evident and designated uses are intermittently or marginally restricted; natural ecosystem may exhibit adverse changes. These waters have moderate impacts.*

***Threatened*** *Water quality presently supporting designated use and ecosystem experiencing no obvious signs of stress; however, existing or changing land use patterns may result in restricted usage or ecosystem disruption. These waters have the least impact.*

The Bureau of Water Quality Management (now Watershed Management) merged the information collected during the update process with the segment information contained in the Division of Water's 1988 Priority Water Problem List and compiled it in a series of databases. During the fall and winter of 1990, that information underwent a verification process which was conducted at each DEC Regional Office. Divisions of Water and Fisheries staff verified the degree of the problem, and the uses that are affected. In December of 1991, the Division of Water's Bureau of Monitoring and Assessment, in conjunction with the Bureau of Water Quality Management, published the Priority Water Problem List (PWP). The last statewide list was the 1996 Priority Waterbodies List (PWL). Water quality data is now collected on a rotating schedule with statewide reporting published in the biannual 305b Report.

According to the 1996 PWL, 1,328 waterbody segments, affecting over 2.8 million acres were identified as having water quality impacts from nonpoint sources of pollution. Nearly 500 segments were identified as being "precluded" as a result of nonpoint source pollution, with over 200 segments "impaired", almost 400 "stressed", and over 200 "threatened".

The PWL indicated that low pH, from acid rain, was by far the primary pollutant affecting the largest number of waterbody segments (395), followed by sediment (294), nutrients (293), and pathogens (134). Similarly, atmospheric deposition (acid rain) was the primary source of pollutants affecting the most segments (397), followed by agriculture (197), urban runoff (188), and failing on-site sewage systems (145). (**Note**: See the New York 1996 Priority Water Bodies List for additional information.)

### *Construction as a Source of Nonpoint Source Pollution*

According to the 1996 Priority Water Bodies List, construction is the primary source of water quality problems on a relatively small number of waterbodies. Forty (40) segments are identified -- the impact on the majority being classified as either stressed or threatened (Table #1A displays the severity of the problems listed). As a primary source, construction affects 109 miles of rivers and 1,380 acres of lakes and bays in New York State. An additional 158 segments of waterbodies are impacted by construction as a secondary source of pollution.

## TABLE #1A

## WATERBODIES IMPACTED BY CONSTRUCTION

(Construction as a Primary Source)

| WATERBODY TYPE | SEVERITY Precluded Threatened | Impaired | Stressed | | TOTA L |
|---|---|---|---|---|---|
| River Segments | 4 (12 miles) | | 12 (32.7 miles) | 13 (65.3 miles) | 29 |
| Bay Segments | | 1 (40 acres) | | | 1 |
| Great Lake Segment | | 1 (6 miles) | | | 1 |
| Lake/Res. Segments | 1 (19 acres) | | 6 (1257 acres) | 2 (64 acres) | 9 |
| TOTAL | 5 | 2 | 18 | 15 | 40 |

## TABLE #1B

## TYPE OF POLLUTION FROM DIFFERENT FORMS OF CONSTRUCTION

(Construction as a Primary Source)

| CONSTRUCTION SOURCE SUB-CATEGORY | TYPE OF POLLUTANT Sediment | Nutrients | TOTAL |
|---|---|---|---|
| Land Development | 32 | 2 | 34 |
| Highway/Bridge Construction | 4 | 0 | 4 |
| Unspecified Construction | 2 | 0 | 2 |
| TOTAL | 38 | 2 | 40 |

Approximately 50,000 acres are under construction in New York State at any given time. Earth disturbances may take place for a relatively short period of time, but the resulting movement of sediment and other pollutants is often severe. Average soil erosion rates are estimated to be ten times the tolerable amount for New York soils. More importantly, in urban areas, over 50% of the soil eroded from construction sites can end up in streams.

Sediment is the primary pollutant identified with construction sites. Ninety-five percent (95%) of the segments which identified construction as the primary source listed sediment as the primary pollutant. Nutrients were listed as the primary pollutant for the remaining segments. Thermal stress and oxygen-demanding materials were identified as construction-related pollutants on some segments where construction was a secondary source.

As shown in Table #1B, land development was the primary form of construction affecting water quality. Highway and bridge construction was also found to be a significant source of sediment and sediment-related pollutants.

Sediment is a major pollutant in New York State. It destroys fish spawning areas, eliminates aquatic food sources, and causes gill abrasion. The flow capacity of natural channels is reduced, recreational values are compromised, and treatment costs of water supplies rise from increased sediment loads. In addition, nutrients and other pollutants become attached to sediment particles and are transported to waterbodies by stormwater runoff from construction sites.

## D. What Are Construction Management Practices?

Construction management practices prevent or reduce the availability, release, or transport of substances which adversely affect surface and ground waters. They diminish the generation of pollutants from construction sites. While a management practice can have standards associated with its installation, operation or maintenance, it does not impose effluent limits for specific substances.

Construction management practices are implemented by private, commercial or governmental entities, through voluntary action, financial incentives, or regulatory requirements. They can have a broad, generic application or can be highly specific to certain geographic, climatologic, hydrologic and chemical factors.

The Construction Management Practices Sub-Committee evaluated 35 practices for their effectiveness in controlling nonpoint source pollution. They are listed in Table #5. Summary sheets of the management practices follow the table and describe how each practice functions, how groundwater and surface water is impacted, and how effective each practice is for controlling certain pollutants. Also outlined on the sheets are the practice's advantages and disadvantages, its relative cost, and its operation and maintenance requirements. Where appropriate, the references listed for each practice include sources of standards and specifications.

Construction management practices can be categorized as *operational, vegetative, or structural,* depending upon their purpose, function and design.

***Operational practices*** Are practices that involve changes in management, usually resulting in a change in day-to-day decision-making. *Construction Waste Management* and *Hazardous Material Management* are examples of operational management practices.

***Vegetative practices*** Increase the amount of herbaceous and/or woody vegetation on the construction site or critically eroding area. *Temporary Vegetative Cover* and *Filter Strip* are examples of vegetative management practices.

***Structural practices*** Are usually practices that require engineering design, and often control surface runoff, the primary transporter of most Construction pollutants. *Silt Fence* and *Temporary Sediment Trap* are examples of structural management practices.

Depending on the lifespan of the management practice, they may be temporary or permanent in their ability to control pollutants from Construction nonpoint sources.

With few exceptions, the practices listed in the Catalogue are currently in use by most segments of New York's Construction community.

The tables which follow were prepared to help users of the Catalogue understand how and when the management practices function best.

Table #2 outlines the common construction-related pollutants controlled by each practice. Since sediment is the pollutant of greatest interest, this table also indicates the manner in which sediment is controlled.

Table #3 describes the expected impacts of the management practices on surface water and groundwater resources. Impacts can be positive or, in certain cases, negative in varying degrees. As with the other tables, more detailed information is provided in the summary sheets for the specific management practices.

Table #4 displays the varying effects of time on the management practices. The first section of the table illustrates when the practice is most often used in relation to the active construction period, and the second indicates the practice's normal lifespan.

## E. Construction Management Practice Summary Sheet Overview

A sample outline for a management practice summary sheet is shown on page 11.

The first seven entries are self-explanatory.

*viii.* *Practice Effectiveness*: summarizes the documented practice effectiveness for controlling the NPS pollutants identified. This information is based on written national water quality research findings, university and agency research, water quality monitoring and water quality modeling.

Practice effectiveness can be quite variable, due to watershed location, specific site conditions (soils drainage, slope, vegetative cover, rainfall, runoff, etc.), individual management techniq-ues, and the contribution of additional management practices used in a best management system. This section presents practice effectiveness as a range of quantitative values, or where the information is not available, in qualitative terms. The information provided should be used as guidance when estimating the potential effectiveness of the management practice within a specific watershed planning situation.

*x.* *Items Define:* defines what impacts, if any, the practice will have on surface water or ground water quality. Impacts are defined as None (neutral), Beneficial (positive), Slight (negative), Moderate (negative), and Severe (negative). See Table #3 for a summary of impacts.

Entries xi through xvi in Figure #2 are all self-explanatory.

xvii. References are those used in the evaluation of the management practice are cited in this section. Many publications are nationally recognized sources of management practice evaluations and in-formation. Every effort was made to utilize existing information from university research and agency information from New York State. When that information was not available, and other states had appropriate information, it was cited. Management practice design standards and specifications are located in the references with the appropriate bold notation. In some cases, several agency or organizational standards and specifications were cited in this section.

## F. <u>How To Use This Catalogue</u>

This portion of the Management Practices Catalogue is intended to be used as a reference document by those involved with the development, review or implementation of erosion/sediment/pollution control plans for construction sites. Long-term control of nonpoint source pollution from built-up areas is addressed in the Urban/Stormwater Runoff Section. Users of the Catalogue are strongly encouraged to integrate management practices from both sections to provide optimum water quality protection on developing areas.

"Best" management practices (BMPs) can be selected from the Catalogue based on the application of professional judgment to solve a particular nonpoint source problem in a specific watershed or program setting. The Catalogue is not a design manual and should not be used to replace standards and specifications.

Erosion and sediment control plans will form the basis of nonpoint source management on construction sites. The planning aspect is key to establishing effective controls. Management practices alone are simply scattered "building blocks". They must be properly placed and timed to provide a well-coordinated structure for controlling pollutants.

It is also critical that the erosion and sediment control plan be closely integrated with the land development plan and construction schedule for the site. More detailed guidance on proper planning procedures is available in

Section 2 of the ***New York Guidelines for Urban Erosion and Sediment Control*** and in Chapter 4 of ***Reducing the Impacts of Stormwater Runoff from New Development***. These documents, and a waterproof, pocket-sized Erosion and Sediment Control Field Notebook, are all available from the Empire State Chapter of the Soil and Water Conservation Society, P.O. Box 1686, Syracuse, NY, 13201-1686.

As important as thorough planning is, it is no more important than the proper execution of the erosion and sediment control plan. The specific components of the plan need to be effectively communicated to each individual involved with their implementation. Management practices need to be installed, maintained and removed, if necessary, according to proper design. Flexibility to modify planned practices needs to be built into the implementation process, and modifications need to be sufficiently monitored. The references cited above will offer additional guidance in this regard.

## MANAGEMENT PRACTICE SUMMARY SHEET

### ◂ MANAGEMENT PRACTICE TITLE ▸ i.

| | |
|---|---|
| *DEFINITION* | *ii* |
| *WATER QUALITY PURPOSE* | *iii* |
| *SOURCE CATEGORY* | *iv* |
| *POLLUTANTS CONTROLLED* | *v* |
| *WHERE USED* | *vi* |
| *PRACTICE DESCRIPTION* | *vii* |
| *PRACTICE EFFECTIVENESS* | *viii* |
| *IMPACT ON SURFACE WATER* | *ix* |
| *IMPACT ON GROUNDWATER* | *x* |
| *ADVANTAGES* | *xi* |
| *DISADVANTAGES* | *xii* |
| *PRACTICE LIFESPAN* | *xiii* |
| *COST* | *xiv* |
| *OPERATION AND MAINTENANCE* | *xv* |
| *MISCELLANEOUS COMMENTS* | *xvi* |
| *REFERENCES* | xvii |

**Sample Management Practice Summary Sheet**

TABLE #2
HOW CONSTRUCTION MANAGEMENT PRACTICES WORK

| MANAGEMENT PRACTICES | NONPOINT SOURCE POLLUTANTS CONTROLLED | | | | FORM OF SEDIMENT CONTROL | | |
|---|---|---|---|---|---|---|---|
| | SEDIMENT | NUTRIENTS | THERMAL STRESS | $O_2$- DEMANDING SUBSTANCES | SOIL STABILIZATION | RUNOFF CONTROL | SEDIMENT TRAPPING |
| Administrative Control Mechanisms | x | x | x | x | ● | ● | ● |
| Check Dam | x | | | | | | ● |
| Construction Road Stabilization | x | | | | ● | | ● |
| Construction Waste Management | x | x | | x | ● | ● | |
| Critical Area Protection: | | | | | | | |
| . Mulching | x | x | | | ● | | |
| . Temporary Vegetative Cover | x | x | | | ● | | |
| . Permanent Vegetative Cover | x | x | | | ● | | |
| . Structural Slope Protection | x | | | | ● | | |
| . Streambank and Shoreline Protection | x | x | x | | ● | | |
| Diversion | x | x | | x | | ● | |
| Dust Control | x | | | | ● | | ● |
| Filter Strip | x | x | x | x | | | ● |
| Grade Stabilization Structure | x | | | | | ● | |
| Grass Waterway | x | x | | | | ● | |
| Hazardous Material Management | | x | | | N/A | N/A | N/A |
| Level Spreader | x | | | | | ● | |
| Lined Waterway or Outlet | x | | | | | ● | |
| Paved Flume | x | | | | | ● | |

TABLE #2
HOW CONSTRUCTION MANAGEMENT PRACTICES WORK
(Continued)

| MANAGEMENT PRACTICES | NONPOINT SOURCE POLLUTANTS CONTROLLED | | | | FORM OF SEDIMENT CONTROL | | |
|---|---|---|---|---|---|---|---|
| | SEDIMENT | NUTRIENTS | THERMAL STRESS | $O_2$- DEMANDING SUBSTANCES | SOIL STABILIZATION | RUNOFF CONTRO L | SEDIMENT TRAPPING |
| Pipe Slope Drain | x | | | | | ● | |
| Planned Land Grading | x | | | | ● | ● | |
| Silt Fence | x | | | | | | ● |
| Stabilized Construction Entrance | x | | | | | | ● |
| Staged Clearing and Grading | x | | | | ● | | |
| Storm Drain Inlet Protection | x | | | | | | ● |
| Straw Bale Dike | x | | | | | | ● |
| Subsurface Drain | x | | | | | ● | |
| Sump Pit | x | | | | | ● | |
| Temporary Dike/Swale | x | | | | | ● | |
| Temporary Sediment Basin | x | x | | | | | ● |
| Temporary Sediment Trap | x | x | | | | | ● |
| Temporary Storm Drain Diversion | x | | | | | ● | |
| Temporary Watercourse Crossing | x | | | | | | ● |
| Topsoiling | x | | | | ● | | |
| Turbidity Curtain | x | | | | | | ● |
| Waterbar | x | | | | | ● | |

## TABLE #3
## CONSTRUCTION MANAGEMENT PRACTICE IMPACT ON WATER RESOURCES

| MANAGEMENT PRACTICE | IMPACT ON SURFACE WATER | | | | | IMPACT ON GROUNDWATER | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NONE | BENEFICIAL | SLIGHT | MODERATE | SEVERE | NONE | BENEFICIAL | SLIGHT | MODERATE | SEVERE |
| Administrative Control Mechanisms | | ● | | | | | ● | | | |
| Check Dam | | ● | | | | ● | | | | |
| Construction Road Stabilization | | ● | | | | ● | | | | |
| Construction Waste Management | | ● | | | | | ● | | | |
| Critical Area Protection: | | | | | | | | | | |
| . Mulching | | ● | | | | ● | ● | ● | | |
| . Temporary Vegetative Cover | | ● | | | | ● | ● | | | |
| . Permanent Vegetative Cover | | ● | | | | ● | | ● | | |
| . Structural Slope Protection | | ● | | | | ● | | | | |
| . Streambank and Shoreline Protection | | ● | | | | ● | | | | |
| Diversion | | ● | | | | ● | | ● | | |
| Dust Control | | ●[2] | | | | ●[2] | | | | |
| Filter Strip | | ● | | | | | | ● | | |
| Grade Stabilization Structure | | ● | | | | ● | | ● | | |
| Grassed Waterway | | ● | | | | ● | | ● | | |
| Hazardous Material Management | | ● | | | | | ● | | | |
| Level Spreader | | ● | | | | ● | | ● | | |
| Lined Waterway or Outlet | | ●[1] | | | | ● | | | | |
| Paved Flume | | ●[1] | | | | ● | | | | |

1 MP could increase delivery of dissolved or suspended pollutants to surface waters due to high flow velocities.

2 Improper use or storage of materials could have detrimental effects on water quality.

## TABLE #3
## CONSTRUCTION MANAGEMENT PRACTICE IMPACT ON WATER RESOURCES
## (Continued)

| MANAGEMENT PRACTICE | IMPACT ON SURFACE WATER | | | | | IMPACT ON GROUNDWATER | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NONE | BENEFICIAL | SLIGHT | MODERATE | SEVERE | NONE | BENEFICIAL | SLIGHT | MODERATE | SEVERE |
| Pipe Slope Drain | | ● | | | | ● | | | | |
| Planned Land Grading | | ● | | | | ● | | | | |
| Silt Fence | | ● | | | | ● | | | | |
| Stabilized Construction Entrance | | ● | | | | ● | | | | |
| Staged Clearing and Grading | | ● | | | | ● | | | | |
| Storm Drain Inlet Protection | | ● | | | | ● | | | | |
| Straw Bale Dike | | ● | | | | ● | | | | |
| Subsurface Drain | | ● | ● | | | ● | ● | | | |
| Sump Pit | | ● | | | | ● | | | | |
| Temporary Dike/Swale | | ● | | | | ● | | ● | | |
| Temporary Sediment Basin | | ● | | | | ● | | ● | | |
| Temporary Sediment Trap | | ● | | | | ● | | ● | | |
| Temporary Storm Drain Diversion | | ● | | | | ● | | | | |
| Temporary Watercourse Crossing | | ● | | | | ● | | | | |
| Topsoiling | | ● | | | | ● | | | | |
| Turbidity Curtain | | ● | | | | ● | | | | |
| Waterbar | | ● | | | | ● | | | | |

NOTE: Improper design, installation, or maintenance of management practices could have negative impacts on surface water or groundwater resources.

# TABLE #4

## EFFECTS OF TIME ON CONSTRUCTION MANAGEMENT PRACTICES

| MANAGEMENT PRACTICES | WHEN THEY ARE USED | | | | HOW LONG THEY LAST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRE-CONSTRUCT | CONSTRUCTION PERIOD | POST-CONSTRUCT | PERMANENT | PROJECT DURATION | 0-6 MO. | 6-12 MO. | 1-2 YR. | 2-3 YR. | 3-10 YR. | 10+ YR. |
| Administrative Control Mechanisms | • | • | • | • | | | | | | | •2 |
| Check Dam | • | • | | | | | • | | | | |
| Construction Road Stabilization | • | • | | | | | | • | | | |
| Construction Waste Management | | • | | | • | | | | | | |
| Critical Area Protection: | | | | | | | | | | | |
| •Mulching | | • | • | | | | | •1 | | | |
| •Temporary Vegetative Cover | | • | | | | | • | | | | |
| •Permanent Vegetative Cover | | • | • | • | | | | | | | • |
| •Structural Slope Protection | | • | • | • | | | | | | | • |
| •Streambank and Shoreline Protection | • | • | • | • | | | | | | | •2 |
| Diversion | • | • | • | • | | | | | | | • |
| Dust Control | | • | | | | •1 | | | | | |
| Filter Strip | • | • | • | | | | | | | • | |
| Grade Stabilization Structure | • | • | • | • | | | | | | | • |
| Grassed Waterway | • | • | • | • | | | | | | | • |
| Hazardous Material Management | | • | | | • | | | | | | |
| Level Spreader | • | • | • | | | | • | | | | |
| Lined Waterway or Outlet | • | • | • | • | | | | | | | • |
| Paved Plume | • | • | • | • | | | | | | | • |

1 Certain forms of this MP have longer lifespans
2 Certain forms of this MP have shorter lifespans

# TABLE #4

## EFFECTS OF TIME ON CONSTRUCTION MANAGEMENT PRACTICES
## (continued)

| MANAGEMENT PRACTICES | WHEN THEY ARE USED | | | | HOW LONG THEY LAST | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRE-CONSTRUCT | CONSTRUCTION PERIOD | POST-CONSTRUCT | PERMANENT | PROJECT DURATION | 0-6 MO. | 6-12 MO. | 1-2 YR. | 2-3 YR. | 3-10 YR. | 10 + YR. |
| Pipe Slope Drain | • | • | | | | | • | | | | |
| Planned Land Grading | | • | • | • | | | | | | | • |
| Silt Fence | • | • | | | | | • | | | | |
| Stabilized Construction Entrance | • | • | | | | | | • | | | |
| Staged Clearing and Grading | | • | | | • | | | | | | |
| Storm Drain Inlet Protection | • | • | | | | | • | | | | |
| Straw Bale Dike | • | • | | | | • | | | | | |
| Subsurface Drain | • | • | • | • | | | | | | | • |
| Sump Pit | | • | | | | | • | | | | |
| Temporary Dike/Swale | • | • | | | | | • | | | | |
| Temporary Sediment Basin | • | • | | | | | | | • | | |
| Temporary Sediment Trap | • | • | | | | | | • | | | |
| Temporary Storm Drain Diversion | • | • | | | | | • | | | | • |
| Temporary Watercourse Crossing | • | • | | | | | | • | | | |
| Topsoiling | | • | • | • | | | | | | | • |
| Turbidity Curtain | • | • | • | | | • | | | | | |
| Waterbar | • | • | • | | | | | • | | | |

## G. Updating the Construction Management Practices Catalogue

### *New York Nonpoint Source Coordinating Committee (NYNPSCC)*

The member agencies and organizations of the New York Nonpoint Source Coordinating Committee (NYNPSCC) will be the entity to conduct the updating of all sections of the Management Practices Catalogue.

Members of the NYNPSCC include the following representatives:

. NYS Department of Agriculture and Markets

. NYS Department of Environmental Conservation

. NYS Department of State, Division of Coastal Resources

. NYS Soil and Water Conservation Committee

. NYS Department of Health

. NYS Department of Transportation

. NYS Water Resources Institute

. Cornell Cooperative Extension

. NYS Sea Grant Extension

. NYS Department of Law

. NYS Office of Rural Affairs

. NYS Legislative Commission on Water Resource Needs of New York

. New York City Department of Environmental Protection

. U.S. Dept. of Agriculture, Farm Services Agency

. U.S. Department of Agriculture, Natural Resources Conservation Service

. U.S. Geological Survey

. U.S. Environmental Protection Agency, Region II

The New York State Department of Environmental Conservation (DEC), by virtue of its statutory authority for the management of water resources and control of water pollution in the state, has assumed the leadership role for the New York Nonpoint Source Coordinating Committee. DEC Provides a staff member to assist with the Coordinating Committee activities. The staff member is located at the NYS Department of Environmental Conservation, Division of Water, Bureau of Watershed Management, 50 Wolf Road, Albany NY 12233-3508.

DEC will convene a meeting of the NYNPSCC annually to review management practices for inclusion in the Catalogue, and to discuss their responsibilities in the Updating Process.

The responsibilities of the NYNPSCC will be to:

- Review proposed additions, deletions, and revisions to the Management Practices Catalogue.

- Identify additional categories of nonpoint source pollution that have not been adequately addressed in the list of management practices.

- Suggest research or demonstration projects on unproven or new management practices that appear to have potential for protecting water quality.

- Periodically review the state list of management practices to verify the status of each practice. This review should be based on recently published literature and new or previously unknown research or demonstration projects.

Although the NYNPSCC meets quarterly, one meeting a year will be devoted to an annual review of proposed additions, deletions, and revisions to the Catalogue. Any agency, organization, or group may propose an addition, deletion, or revision to the Catalogue, provided that it meets the following conditions described below.

***Conditions for Updating the Catalogue***

The NYNPSCC will recognize four conditions for updating the Catalogue:

- Creation of a new management practice by the agency, university, or recognized group.

- Modification of an existing management practice, either in its design requirements or operation and maintenance , requiring a modification of the practice definition, water quality purpose, practice description, practice effectiveness, impacts on surface or groundwater, advantages/disadvantages, practice lifespan, or cost.

- Emerging research data which indicates a change in management practice effectiveness and/or pollutants controlled, requiring modifications of water quality purpose, practice description, practice effectiveness, practice impacts on surface or groundwater, advantage/disadvantages, practice lifespan, or cost.

- Revisions in state or national water quality policy that necessitate a higher level of waterbody protection, resulting in higher management practice performance standards. Policy revisions would result in additions or deletions of management practices, modifications of practice description, design requirements, operation and maintenance requirement, practice effectiveness, impacts on surface and groundwater, cost and miscellaneous comments.

***How to Propose an Update of the Catalogue***

1. By December 31 of each year, proposed updates should be stated in writing, and submitted to the attention of the New York Nonpoint Source Coordinating Committee, NYSDEC, Bureau of Watershed Management, 50 Wolf Road, Albany, NY 12233-3508.

2. The Coordinating Committee will review the proposed updates at their next regularly scheduled meeting. A sub-committee of the Coordinating Committee may be formed to study the update and request input from groups not represented on the Coordinating Committee.

3. The subcommittee of the Coordinating Committee will review the proposed updates and determine if they meet the conditions for updating the Catalogue. In consultation with other interested groups, it will make a recommendation to the members of the New York Nonpoint Source Coordinating Committee by May 1 of the following year.

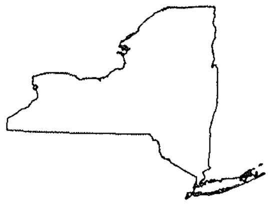
4. When the proposed update is approved, staff of the New York Nonpoint Source Coordinating Committee will make the appropriate changes and distribute copies of the addition to all Coordinating Committee members and holders of the current Catalogue.

## II. CONSTRUCTION MANAGEMENT PRACTICES LISTING

- Summary Page (Table #5)
- Management Practices Summary Sheets

## Table #5
## MANAGEMENT PRACTICES FOR CONSTRUCTION

| | | | | | |
|---|---|---|---|---|---|
| Administrative Control Mechanisms | Pg. 1 | Aug. '92 | Silt Fence | Pg. 41 | Aug. '92 |
| Check Dam | Pg. 3 | Aug. '92 | Stabilized Construction Entrance | Pg. 43 | Aug. '92 |
| Construction Road Stabilization | Pg. 5 | Nov. '95 | Staged Clearing and Grading | Pg. 45 | Aug. '92 |
| Construction Waste Management | Pg. 7 | June '94 | Storm Drain Inlet Protection | Pg. 47 | Aug. '92 |
| Critical Area Protection: | | | Straw Bale Dike | Pg. 49 | Aug. '92 |
| ♦ Mulching | Pg. 9 | Sept. '92 | | | |
| ♦ Temporary Vegetative Cover | Pg. 11 | Aug. '92 | | | |
| ♦ Permanent Vegetative Cover | Pg. 13 | Sept. '92 | | | |
| ♦ Structural Slope Protection | Pg. 15 | Aug. '92 | | | |
| ♦ Streambank & Shoreline Protection | Pg. 17 | Aug. '92 | | | |
| Diversion | Pg. 19 | Aug. '92 | Stream Sediment Mat | Pg. 51 | Apr. '94 |
| Dust Control | Pg. 21 | Feb. '93 | Subsurface Drain | Pg. 53 | Aug. '92 |
| Filter Strip | Pg. 23 | Sept. '92 | Sump Pit | Pg. 55 | Aug. '92 |
| Grade Stabilization Structure | Pg. 25 | Aug. '92 | Temporary Dike/Swale | Pg. 57 | Aug. 92 |
| Grassed Waterway | Pg. 27 | Aug. '92 | Temporary Sediment Basin | Pg. 59 | Aug. '92 |
| Hazardous Material Management | Pg. 29 | Aug. '92 | Temporary Sediment Trap | Pg. 61 | Apr. '94 |
| Level Spreader | Pg. 31 | Aug. '92 | Temporary Storm Drain Diversion | Pg. 63 | Aug. '92 |
| Lined Waterway or Outlet | Pg. 33 | Aug. '92 | Temporary Watercourse Crossing | Pg. 65 | Aug. '92 |
| Paved Flume | Pg. 35 | Aug. '92 | Topsoiling | Pg. 67 | Aug. '92 |
| Pipe Slope Drain | Pg. 37 | Aug. '92 | Turbidity Curtain | Pg. 69 | Apr. '98 |
| Planned Land Grading | Pg. 39 | Aug. '92 | Waterbar | Pg. 71 | Aug. '92 |



# MANAGEMENT PRACTICE SUMMARY SHEET

## ADMINISTRATIVE CONTROL MECHANISMS

| | |
|---|---|
| ***DEFINITION*** | Regulations, permit processes, and other controls available to local units of government for reducing nonpoint source pollution. |
| ***WATER QUALITY PURPOSE*** | To require the use of nonpoint source pollution management practices at certain times and/or in certain geographic areas. |
| ***SOURCE CATEGORY*** | Construction. |
| ***POLLUTANTS CONTROLLED*** | Sediments, nutrients, thermal stress, and other nonpoint source pollutants. |
| ***WHERE USED*** | Lands where construction activities threaten streams, rivers, lakes, wetlands or coastal waterbodies. |
| ***PRACTICE DESCRIPTION*** | Administrative control mechanisms include erosion and sediment control ordinances, subdivision rules and regulations, site review, zoning regulations, and special easements or covenants. They can be adopted county-wide, town-wide, or for special designated areas such as stream corridors or watersheds. Common components of erosion and sediment control mechanisms include a sound, legal framework; financial guarantees or bonds; inspection, enforcement, and penalty provisions; and a public education program. Erosion and sediment control ordinances often interface with other local statutes. Administrative control mechanisms may be tied to state or federal legislation. |
| ***PRACTICE EFFECTIVENESS*** | Administrative control mechanisms reduce nonpoint source pollution best when they are based on a systematic assessment of the problem, are provided with adequate statutory jurisdiction, and rely upon clear and enforceable standards. Using theoretical models in Maryland watersheds, the installation of erosion and sediment control systems was estimated to be 91% to 97% effective in controlling sediment yields. Erosion and sediment control ordinances are usually most effective when adopted as separate legislation. Local regulations work well when supported by adequate resources from the governing body. |
| ***IMPACT ON SURFACE WATER*** | Beneficial. |
| ***IMPACT ON GROUNDWATER*** | Beneficial. |

***ADVANTAGES***

*Provides communities with assurance that nonpoint source pollution problems from construction sites will be addressed in a systematic manner.

***DISADVANTAGES***

*New control mechanisms can add costs to the construction industry and to the administering agencies.

***PRACTICE LIFESPAN***

Normally long-term.

***COST***

Costs to implement controls will vary. Least costly when administered concurrently with other regulatory programs.

***OPERATION AND MAINTENANCE***

Requires adequate staffing for review, inspection, and enforcement phases. Technical training should be provided to maintain staff capabilities. Regulations and standards need periodic assessing and updating.

***MISCELLANEOUS COMMENTS***

Administrative control mechanisms need to be based on sound principles of natural resource management and nonpoint source pollution control. Model ordinances should be reviewed as control mechanisms are being developed (see References below). Local interagency cooperation can reduce administrative costs and is most effective when structured through formal memoranda of understanding.

***REFERENCES***

Dawson, Alexandra D. Role of Volunteer Boards in Environmental Regulations: Pitfalls and Promise. pp. 55-56 of Conference Proceedings-Soil and Water Management: Planning for Site Development. Southern New England Chapter of the Soil Conservation Society of America. Auburn, MA. March 16-17, 1987.

Dutchess County Soil and Water Conservation District. Dutchess Co. Soil Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989. (1)

Long Island Regional Planning Board. Nonpoint Source Management Handbook. Hauppauge, NY. 1984. (1)

Maryland Department of Natural Resources. Erosion and Sediment Control Practices: An Annotated Bibliography. Annapolis, MD. July 1983.

Mertes, James D. Trends in Governmental Control of Erosion and Sedimentation in Urban Development. Journal of Soil and Water Conservation. November-December 1989.

NYS Department of Environmental Conservation. DeGaetano, P. Erosion and Sediment Control Guidelines for New Development. Division of Water Technical and Operation Guidance Series. Albany, NY. April 1991.

NYS Department of Environmental Conservation. Morton, W. Stream Corridor Management: A Basic Reference Manual. Albany, NY. January 1986. (1)

NYS Department of Environmental Conservation. Reducing the Impacts of Stormwater Runoff from New Development. Albany, NY. April 1992. (1)

NYS Department of State. Site Development Plan Review: Site Review Procedures and Guidelines. Revised: August 1978. (1)

USEPA. The Lake and Reservoir Restoration Guidance Manual. Washington, DC. 1990.

## MANAGEMENT PRACTICE SUMMARY SHEET

# CHECK DAM

***DEFINITION***

Small, temporary stone dams constructed across a swale or drainageway.

***WATER QUALITY PURPOSE***

To reduce erosion in a drainageway and to trap sediment being transported by concentrated flows.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used in small channels where permanent stabilization is not practical and where erosion is occurring or anticipated. The contributing drainage area is 2 acres or less. Not suited for use in streams.

***PRACTICE DESCRIPTION***

Check dams are constructed of graded stone 2 to 15 inches in diameter. The height of the dam is 2 feet or less and side slopes are 2:1 or flatter. The center of the dam is at least 9 inches below the height of its abutments to natural ground. Check dams are spaced such that the toe of the upstream dam is at the same elevation as the crest of the downstream dam. Filter fabric is used beneath the stone. Check dams reduce the erosive potential and transport capacity of flow by decreasing runoff velocity.

***PRACTICE EFFECTIVENESS***

If carefully located and designed, check dams can be effective for preventing gully erosion and can settle out a high proportion of the sediment load in runoff. Check dams can also be an effective emergency measure.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Relatively easy to design and install. *A valuable emergency measure when small channels erode. *Useful for trapping small amounts of sediment or debris upstream of culverts and other drainage structures.

***DISADVANTAGES***

*Only suited to channels with small drainage areas. *Some hand labor required for proper installation. *Frequent inspection required for erosion problems around abutments and at the downstream end of the dam.

***PRACTICE LIFESPAN***

One year or less.

***COST***

Relatively inexpensive.

***OPERATION AND MAINTENANCE***

Inspect after each runoff event for scouring, stone displacement, and sedimentation. Repair immediately. Remove excessive sediment. Line channel between dams with stone if necessary.

***MISCELLANEOUS COMMENTS***

Within 30 days following permanent stabilization of the contributing drainage area, the check dams should be removed. Clean sediment and remove check dams during periods of low or no flow. Removed materials should be stabilized on-site. Properly grade check dam site to conform with channel grade and cross-section. Stabilize soil beneath check dams with vegetative cover and mulch, or other erosion control materials.

***REFERENCES***

NYS Department of Environmental Conservation. DeGaetano, P. Erosion and Sediment Control Guidelines for New Development. Division of Water Technical and Operation Guidance Series. Albany, NY. April 1991.

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

NYS Department of Transportation. Construction Guidelines for Temporary Erosion Controls. July 1987.

NYS Department of Transportation. Construction Supervision Manual. October 1984.

NYS Department of Transportation. Standard Specifications. January 1990. **(Management Practice Design Standard and Specification)**

NYS Department of Transportation. Highway Design Manual. December 1986.

State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June, 1991.

# CONSTRUCTION ROAD STABILIZATION

***DEFINITION***

The temporary stabilization of access routes, on-site vehicle transportation routes, and parking areas on construction sites.

***WATER QUALITY PURPOSE***

To control erosion of temporary road beds and parking areas where sediment from these areas could impact water resources.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

All traffic routes and parking areas to be utilized by construction traffic.

***PRACTICE DESCRIPTION***

Construction road stabilization involves the proper planning and installation of non-erosive access routes and parking areas on the work site. Road layout is based on soil, drainage, and topographic considerations. Contours are followed as much as possible. Surface water is controlled using properly installed management practices. Areas where the water table is expected within 18 inches of the surface are avoided. Road grades are normally 12% or less. Road banks are 2:1 or flatter. One-lane roads are at least 14 feet wide and two-lane roads are at least 24 feet wide. A 6-inch course of NYSDOT sub-base or equivalent is used for surfacing. Culverts and other drainage measures are designed to carry peak flows from a 10-year storm, as a minimum.

***PRACTICE EFFECTIVENESS***

Construction road stabilization has significant positive effects where heavy equipment operation would otherwise degrade aquatic habitats. Traffic and parking areas are especially prone to erosion and sediment production. Proper water control and surfacing with non-erosive materials effectively controls these problems.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Can reduce regrading required for final stabilization of permanent road beds. *Improves site efficiency and working conditions during adverse weather.

***DISADVANTAGES***

*Re-application of aggregate may be needed during the con-struction period. *Temporary roads and their associated measures may need to be removed if they interfere with the eventual surface treatment of the area.

***PRACTICE LIFESPAN***

Two (2) years.

***COST***

Moderate. Varies according to soil conditions, drainage characteristics, and traffic requirements.

***OPERATION AND MAINTENANCE***

Inspect traffic and parking areas regularly and re-surface as needed. Check associated drainage measures for erosion and sedimentation problems. Maintain healthy vegetative growth on adjacent slopes and disturbed areas.

***MISCELLANEOUS COMMENTS***

Parking areas should be located where grades are sufficient for surface drainage but are no steeper than 3%. Cut and fill slopes should be vegetated as soon as grading is completed. Install sediment control measures (i.e., *Temporary Sediment Trap, Storm Drain Inlet Protection, Silt Fence*) to control sediment transport from traffic areas to watercourses. The Temporary Watercourse Crossing management practice should be utilized in conjunction with Construction Road Stabilization where waterways must be crossed.

***REFERENCES***


Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

NYS Department of Transportation. Highway Design Manual. December 1986.

NYS Department of Transportation. Standard Specifications. January 1990. **(Management Practice Design Standard and Specification)**

USDA. Soil Conservation Service. Effects of Conservation Practices on Water Quantity and Quality. Washington, DC. October 1988.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Access Road. Washington, DC. April 1982. **(Management Practice Design Standard and Specification)**

USDA. Forest Service. Permanent Logging Roads for Better Woodlot Management. Broomall, PA. September 1978.

State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June, 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# CONSTRUCTION WASTE MANAGEMENT

***DEFINITION***

The proper use or disposal of solid waste materials from construction sites.

***WATER QUALITY PURPOSE***

To minimize the opportunity for construction waste products to contaminate surface or ground waters.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Oxygen demand, sediment, and nutrients.

***WHERE USED***

All construction sites generating waste materials.

***PRACTICE DESCRIPTION***

Construction waste management involves the salvage or proper disposal of waste produced at the construction site. Such materials most often include cleared trees, brush, stumps, stone, and associated sediment. Old structures, concrete or asphalt pavement may be involved in urban areas. Packing materials, scrap products, and other wastes are also generated at construction sites.

Salvage of materials is encouraged. Timber may be utilized for sawlogs, pulp, or firewood. Limbs and brush may be chipped and used on-site for mulch. Only minimal amounts of organic material should be buried in any one location at the construction site. Burial locations and material stockpiles should be distant from waterbodies. Waste materials should not be burned. Waste which cannot be properly salvaged or buried on-site should be delivered to an approved landfill or composting facility.

Solid wastes and litter are handled according to the appropriate federal, state and local regulations. Toilet facilities meet appropriate safety and health regulations.

***PRACTICE EFFECTIVENESS***

Effective preventive measure which relies upon restricting the proximity of pollutants to waterbodies, limiting their concentration, and promoting good "housekeeping" techniques.

No quantitative studies of practice effectiveness available.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

Beneficial.

***ADVANTAGES***

*Easily incorporated into comprehensive site development plans. *Encourages recycling of materials. *May reduce construction costs. *Improves aesthetics. *Supported by existing regulations at all levels of government.

***DISADVANTAGES***

*Requires continuous attention during the life of the construction project.

***PRACTICE LIFESPAN***

Duration of the construction project.

***COST***

Normally low.

***OPERATION AND MAINTENANCE***

Waste production must be anticipated and planned for. Waste materials normally need to move in a planned fashion from their source, to stockpile areas, to their final salvage or disposal sites. This transfer system should be regularly monitored for effectiveness.

***MISCELLANEOUS COMMENTS***

Burying large amounts of organic material (trees, stumps, etc.) in one location can result in subsidence problems as the material decomposes. By minimizing land clearing operations, the generation of waste material will decrease. See Title 6 NYCRR Parts 360, 373, and 374 regarding legal requirements for Hazardous Waste Management and Solid Waste Management, including Construction and Demolition Debris. Refer to *Hazardous Material Management* for dealing with hazardous substances at a construction site. Refer to *Planned Land Grading* for information on placement of surplus fill. Hazardous wastes and unknown materials should not be accepted at construction sites.

***REFERENCES***

NYS Department of Environmental Conservation. Morton, W. Stream Corridor Management: A Basic Reference Manual. Albany, NY. January 1986.

NYS Department of Environmental Conservation. Waste Reduction Guidance Manual. Albany, NY. March 1989.

NYS Department of State. Official Compilation of Codes, Rules, and Regulations of the State of New York. Albany, NY.

• Title 6 -Pt. 360: Solid Waste Management/Pts 371, 373, 374: Haz. Waste Management -- • Title 9 - Pt. 900: Required Plumbing Facilities

NYS Department of Transportation. Construction Supervision Manual. October 1984.

NYS Department of Transportation. Highway Design Manual. December 1986.

NYS Department of Transportation. Standard Specifications. January 1990. **(Management Practice Design Standard and Specification)**

State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June 1991.

USDA. Soil Conservation Service. National Engineering Handbook. Washington, DC. October 1986. **(Management Practice Design Standard and Specification)**

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Obstruction Removal. Syracuse, NY. October 1980. **(Management Practice Design Standard and Specification)**

MANAGEMENT PRACTICE SUMMARY SHEET

## CRITICAL AREA PROTECTION: Mulching

| | |
|---|---|
| ***DEFINITION*** | The application of plant residues or other suitable materials to protect permanent vegetative cover or to stabilize soil independently. |
| ***WATER QUALITY PURPOSE*** | To reduce runoff, sediment and nutrient delivery to waterbodies. |
| ***SOURCE CATEGORY*** | Construction. |
| ***POLLUTANTS CONTROLLED*** | Sediment and nutrients. |
| ***WHERE USED*** | On critically eroding areas that have recently been seeded or planted to permanent vegetative cover and on unvegetated areas that require protection from wind or water erosion. |
| ***PRACTICE DESCRIPTION*** | Mulching consists of hand or machine applications of hay, straw, stone, wood fiber, netting, mats, geotextiles, or paper cellulose to protect a recently disturbed surface. Straw and hay are the most commonly used mulch materials. Mats and geotextile fabrics are often used to establish seedings in waterways. Long-term mulches such as crushed stone and wood chips are often applied over a layer of filter cloth or plastic and are not normally used with seedings.<br><br>Mulching controls runoff and prevents soil erosion by intercepting rainfall, reducing runoff and increasing infiltration, thereby reducing sediment and nutrient delivery to waterbodies. |
| ***PRACTICE EFFECTIVENESS*** | Mulch, as a protective cover, is very effective for temporary control of surface runoff, thereby controlling sediment and nutrient losses. With proper maintenance it may also provide very effective long-term control. Mulch can also serve effectively for dust control. |
| ***IMPACT ON SURFACE WATER*** | Beneficial. |
| ***IMPACT ON GROUNDWATER*** | Although mulching may increase infiltration, impacts will range from slight to none. |
| ***ADVANTAGES*** | *Mulch retards runoff, provides immediate cover, and prevents erosion. *Mulch prevents the loss of surface-applied nutrients and conserves moisture. *Mulch protects the plants during germination and establishment phases. *Some mulches add organic matter to the soil. *Mulching controls weeds and reduces soil crusting. |

**DISADVANTAGES**

*On large sites, mulching by hand is impractical. *Machine mulching and hydromulching is expensive. *Mats and netting require hand installation, which may be expensive. *Stone and wood chip mulches may slip on slopes steeper than 3 to 1.

**PRACTICE LIFESPAN**

Varies. Three to six months for straw, hay and paper mulch, and one to two years for wood mulch, mats and netting. Stone and wood chips may be maintained for two years or more.

**COST**

Normally low for hay and straw. Wood fiber, paper cellulose, mats and netting may be expensive in some areas.

**OPERATION AND MAINTENANCE**

Inspect frequently and replace mulch as needed. Protect from traffic.

**MISCELLANEOUS COMMENTS**

Peg and twine, netting, or other anchoring method should be used on slopes or in drainageways. To keep non-woody, loose mulch on the slope, use a non-asphalt, chemical anchoring spray, applied by a hydroseeder. Associated erosion control and drainage practices need to be installed prior to mulching. Consideration should be given to mulching in stages.

**REFERENCES**

Connecticut Council on Soil and Water Conservation. Guidelines for Soil Erosion and Sediment Control-Connecticut. Hartford, CT. January 1985.

Empire State Chapter. Soil & Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. (Management Practice Design Standard and Specification)

Irondequoit Bay Coordinating Committee. Best Management Practices for Stormwater Runoff Management. May 1985.

Jontos, Bruzzi, and Bruzzi. The Use of Hydroseeding Chemical Mulches for Soil Stabilization. pp. 101-111 of Seminar Proceedings: Sediment and Erosion Control Conference. Connecticut Association of Soil and Water Conservation Districts. February 29 to March 1, 1984.

Maryland Department of Natural Resources. Erosion and Sediment Control Practices: An Annotated Bibliography. Annapolis, MD. July 1983.

NYS Department of Transportation. Standard Specifications. Albany, NY. January 1990. (Management Practice Design Standard and Specification)

USDA. Soil Conservation Service. Guide to Conservation Plantings on Critical Areas for New York. Syracuse, NY. June 1991.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Mulching. Washington, DC. 1977. (Management Practice Design Standard and Specification)

*MANAGEMENT PRACTICE SUMMARY SHEET*

## CRITICAL AREA PROTECTION: Temporary Vegetative Cover

***DEFINITION***

Close-growing grasses or legumes established primarily for temporary, seasonal soil protection and improvement.

***WATER QUALITY PURPOSE***

To control wind and water erosion, and to prevent sediment and nutrients from entering waterbodies.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment and nutrients.

***WHERE USED***

On disturbed areas, topsoil stockpiles, borrow areas, or any environmentally sensitive area where permanent cover cannot be immediately established.

***PRACTICE DESCRIPTION***

Temporary vegetative cover consists of planting short-term vegetation on exposed soil areas at construction sites. Rye grasses and small grains are commonly used. Seed can be drilled, broadcast, or hydroseeded. Mulch is often applied following seeding.

Temporary vegetative cover provides interim protection from soil and nutrient movement. Detachment and transport of soil particles are reduced.

***PRACTICE EFFECTIVENESS***

Temporary vegetative cover can be an effective erosion control practice, but only if significant growth occurs before the onset of cold weather. One study indicated a six-fold reduction in downstream suspended sediment. It is best established immediately following soil disturbance activities and is most effective when used in conjunction with mulching.

***IMPACT ON SURFACE WATER***

Beneficial, as long as significant growth is established.

***IMPACT ON GROUNDWATER***

None to beneficial. Some temporary seedings utilize residual N from the soil, reducing the risk of leaching losses during fall, winter and early spring.

Legume seedings may reduce the need for nitrogen fertilizers since they "fix" their own nitrogen.

***ADVANTAGES***

*Provides quick cover. *Reduces loss of sediment-bound nutrients. *Conserve soil moisture. *Utilizes excess N, and reduces leaching. *Controls dust.

***DISADVANTAGES***

*Difficult to establish during mid summer without irrigation. *Requires the use of other management practices to control concentrated flows of water.

***PRACTICE LIFESPAN***

Short. Approximately one year.

***COST***

Relatively inexpensive. Can reduce maintenance costs associated with structural practices.

***OPERATION AND MAINTENANCE***

Protect from traffic. Areas with poor initial establishment may require re-seeding.

***MISCELLANEOUS COMMENTS***

Selection of appropriate plant materials should be guided by references cited. Consideration should be given to establishing vegetation in stages and to utilizing mulches if past the end of the growing season or during mid-summer. Temporary vegetative cover should not be substituted for the early establishment of permanent measures.

***REFERENCES***


Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

Irondequoit Bay Coordinating Committee. Best Management Practices for Stormwater Runoff Management. May 1985.

Metropolitan Washington Council of Governments. Schueler, Thomas and Lugbill, Jon. Performance of Current Sediment Control Measures at Maryland Construction Sites. Washington, DC. January 1990.

New Jersey State Soil Conservation Committee. Standards for Soil Erosion and Sediment Control in New Jersey. April 1987.

NYS Department of Environmental Conservation. Longabucco, P., Controlling Agricultural Nonpoint Source Water Pollution in New York State: A Guide to the Selection of Best Management Practices to Improve and Protect Water Quality. Albany, NY. 1991.

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USDA. Soil Conservation Service. Effects of Conservation Practices on Water Quantity and Quality. Washington, DC. October 1988.

USDA. Soil Conservation Service. Guide to Conservation Plantings on Critical Areas for New York. Syracuse, NY. June 1991.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Cover and Green Manure Crop. Syracuse, NY. June 1985. **(Management Practice Design Standard and Specification)**

## MANAGEMENT PRACTICE SUMMARY SHEET

# CRITICAL AREA PROTECTION: Permanent Vegetative Cover

***DEFINITION***

To establish and/or preserve permanent vegetation on highly erodible areas or land vulnerable to nonpoint source pollution.

***WATER QUALITY PURPOSE***

To stabilize highly erodible areas, discourage conversion of environmentally sensitive areas, and prevent sediment and nutrients from entering waterbodies.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment and nutrients.

***WHERE USED***

On critically eroding areas, steep slopes, roadbanks, aquifer recharge areas, wetlands, mined land, or any environmentally sensitive area requiring vegetative protection.

***PRACTICE DESCRIPTION***

Permanent vegetative cover can be used in many different situations. It results in the establishment or protection of herbaceous or woody vegetation and can include stabilizing eroding areas using biotechnology, hydroseeding and mulching, sodding and the use of container-grown plants. This practice includes seeding cool season grasses and legumes, warm season grasses, placing sod, planting trees and shrubs, utilizing and protecting existing perennial vegetation.

Permanent vegetative cover controls surface runoff, sediment and solid phase nutrients by providing long-term perennial cover for critical areas.

***PRACTICE EFFECTIVENESS***

Grass is the most effective vegetation for pollutant removal and erosion control. Permanent vegetative cover can reduce soil loss by up to 95%, and nitrogen loss in surface runoff by up to 90%. Reductions in surface runoff vary according to vegetation type and densities; however, 50% to 90% reductions are not uncommon. Permanent cover is best established immediately after final grading and is most effective when used in conjunction with mulching..

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

Slight. Permanent vegetative cover increases infiltration, and may cause some mobile nutrients and pesticides to be transported to groundwater.

***ADVANTAGES***

*Vegetation is a relatively inexpensive management practice. *Improves wildlife habitat. *May function like a filter strip. *Some areas may have potential for limited recreation use. *Improves aesthetics.

***DISADVANTAGES***

*Construction sites may require additional site preparation, including stockpiling and applying topsoil, adding soil nutrients, or extensive slope stabilization prior to implementing permanent vegetative cover. *Soil compaction problems may also need to be corrected.

***PRACTICE LIFESPAN***

This practice has a long lifespan provided that the integrity of the cover is maintained.

***COST***

Varies. Ranges from "no-cost", when existing vegetation is used, to up to $1,000 (or more) per acre for hydroseeding critically eroding areas. Inaccessibility increases costs.

***OPERATION AND MAINTENANCE***

Varies, depending upon vegetation. Ranges from low O&M effort for tree plantings to high O&M effort (mowing, topdressing) for grasses and legumes. Protect from traffic.

***MISCELLANEOUS COMMENTS***

Selection of appropriate plant materials should be guided by references cited. Nutrients applied during vegetation establishment should be guided by soil test results. Till the soil cross-slope when establishing new seedings. Limit soil placement over tree and shrub roots to 3-inch depths. The maintenance of permanent vegetative cover on environmentally sensitive areas may require the acquisition of conservation easements to ensure long-term protection of the land. Consideration should also be given to establishing vegetation in stages. Permanent seeding should optimally be undertaken in the spring from March 21 through May 20, and in late summer and early fall from August 25 to October 15. During the peak summer months and in the fall after October 15 when seeding is found to be impracticable, an appropriate mulch should be applied. Permanent seeding may be undertaken during summer if plans provide for adequate watering of the seedbed. This is a practice which normally continues to function beyond the period of construction.

## *REFERENCES*


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- Sodding and Placing Jute Mesh or Other Approved Erosion Control Materials.
- Turf and Wildflower Establishment
- Planting
- Topsoil

USDA. Soil Conservation Service. Guide to Conservation Plantings on Critical Areas for New York. Syracuse, NY. June 1991.

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- Critical Area Planting — August, 1983
- Tree Planting — November,1986
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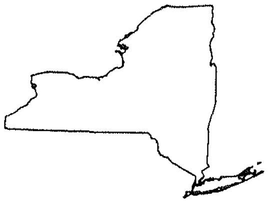

# MANAGEMENT PRACTICE SUMMARY SHEET

## CRITICAL AREA PROTECTION: Structural Slope Protection

***DEFINITION***

The stabilization of erosive slopes with rip-rap, walls, or other non-vegetative materials.

***WATER QUALITY PURPOSE***

To reduce the movement of sediment from erosive slopes to waterbodies.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

On slopes where seepage problems, toe instability, or other site limitations preclude the use of vegetation or mulches alone. Not used on streambanks (see Critical Area Protection: Streambank and Shoreline Protection).

***PRACTICE DESCRIPTION***

Structural slope protection includes loose or grouted rock rip-rap, cribbing or retaining walls, and concrete block paving. Brush, trees, stumps, and other objectionable materials are removed and the slope is properly graded before installing this practice. Drainage, filter and bedding materials are installed prior to the structure. Rip-rap is durable, angular, and well-graded. It is sized according to its specific site conditions. Void spaces are minimized. Retaining walls may be cast-in-place concrete, precast concrete units, metal bin-type or gabions. Slope paving consists of solid concrete blocks (approximately 18"L x 6"T x 8"W) and may be grouted. Complexities such as foundation bearing capacity, sliding, overturning, drainage and loading systems increase the need for careful design of retaining walls and slope paving.

***PRACTICE EFFECTIVENESS***

Retaining walls and rip-rap provide good control of soil erosion problems on slopes. Proper design and installation is essential. No information is available on the effectiveness of slope paving- results are expected to be similar to those for other forms of structural slope protection.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Loose rip-rap is usually easy to install. *Little maintenance is normally required. *Useful practice where land rights limit flattening of slopes.

***DISADVANTAGES***

*Non-porous materials will increase stormwater runoff. *Design of retaining walls is usually complex. *Rip-rap is normally not suited to slopes steeper than 1½:1.

***PRACTICE LIFESPAN***

Ten (10) years or longer.

***COST***

Moderate to high.

***OPERATION AND MAINTENANCE***

Inspect annually for soil subsidence, rock displacement, wall or block movement, and clogged drains. Repair promptly. Control woody growth.

***MISCELLANEOUS COMMENTS***

Soil stability and internal drainage are extremely important considerations for the proper design and installation of this practice. Adjacent disturbed areas should be seeded and mulched immediately. Where applicable, safety concerns must also be addressed during design. This is a practice which normally continues to function beyond the period of construction.

***REFERENCES***


Dutchess County Soil and Water Conservation District. Dutchess County Soil Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989.

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## MANAGEMENT PRACTICE SUMMARY SHEET

# CRITICAL AREA PROTECTION: Streambank and Shoreline Protection

***DEFINITION***

The use of vegetation, structures, biotechnology, or management techniques to stabilize and protect streambanks and shorelines.

***WATER QUALITY PURPOSE***

To reduce sediment and nutrients entering waterbodies from eroding streambanks and shorelines.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment, nutrients, and thermal modification.

***WHERE USED***

Streambanks, lake shores, estuaries and coastal shorelines.

***PRACTICE DESCRIPTION***

Streambank and shoreline protection involves one or more of the following components:

- vegetation (rushes, sedges, grasses, legumes, shrubs or trees).
- structural improvements (slope stabilization, filter fabric, riprap, deflectors, fencing, bulkheads, or groin systems).
- management techniques (removing debris, fallen trees, or gravel bars in the flood plain on the inside curves of the stream).
- biotechnical alternatives (the use of willow wattles, live cribwalls, brush layering, or other mutually reinforcing vegetative and structural practices).

***PRACTICE EFFECTIVENESS***

The effectiveness of streambank and shoreline protection will vary based on the component practices installed. In general, the practice will decrease the bed load of the stream, reduce soil erosion, and decrease sediment and nutrient delivery to waterbodies. Vegetative practices lower stream temperature by shading streams. (Removal of existing riparian vegetation can raise summer water temperatures 6°-11°C.)A combination of component practices may be required to effectively protect streambanks and shorelines.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Vegetatively stabilized streambanks and shorelines can provide wildlife cover. *Some sites can provide fishing access to anglers. *Vegetative treatments may have secondary benefits of filtering pollutants. *Mature woody vegetation may lower stream temperatures by shading stream segments, thereby improving fishery habitat. *Stabilized areas reduce sediment entering waterbodies, thereby reducing downstream flooding hazards.

**DISADVANTAGES**

*Installation of practice components may result in a temporary increase of sediment and nutrients delivered to the stream. *This practice may result in a temporary loss of wildlife habitat during implementation of the practice.

**PRACTICE LIFESPAN**

Ranges from 5 years to over 25 years, depending upon component selected.

**COST**

Ranges from low cost for biotechnical components to high cost for structural designs.

**OPERATION AND MAINTENANCE**

Varies with design or component selected. Debris and sediment should be removed from the stabilized streambank or shoreline periodically. Structural practices should be inspected for damage and displacement after storm events. Foot traffic should be considered during the design phase and monitored during the O&M phase.

**MISCELLANEOUS COMMENTS**

The use of heavy equipment directly in streams or waterbodies and the installation of practice components during periods of high water should be avoided when possible. All parties are alerted to the legal requirements affecting protected streams. Individuals wishing to undertake streambank and shoreline protection work that could disturb a protected stream are required to obtain a Protection of Waters permit (Article 15) from their Regional Office of the Department of Environmental Conservation. The Regional Office can tell you if the stream segment to be affected is on the protected list. The Regional Office also can advise you whether or not other permits may be required, for example, Article 24-Freshwater Wetlands Permits; Article 25-Tidal Wetlands Permits; Article 36-Floodplain Permits (whether administered by local government or DEC); as well as possible requirements for work proposed along a stream or river protected under the Wild, Scenic and Recreational Rivers Act. The Regional DEC Office will advise you of Section 404 and Section 10 federal permits which might be required. By becoming a "party-in-interest", the public has the opportunity to review and comment, and thus to influence the issuance of permits under the above programs. This is a practice which normally continues to function beyond the period of construction.

**REFERENCES**


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Gray, D. Soil Stabilization with Vegetation/Structures. pgs. 112-126 of Seminar Proceedings: Sedimentation and Erosion Control Conference. Connecticut Association of Soil and Water Conservation Districts. 2/29/84-3/1/84.

Metropolitan Washington Council of Governments. Thermal Impacts Associated with Urbanization and Stormwater Management Best Management Practices. December 1990.

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USDA. Soil Conservation Service. National Handbook of Conservation Practices. Streambank and Shoreline Protection. Syracuse, NY. February 1982. (Management Practice Design Standard and Specification)

# MANAGEMENT PRACTICE SUMMARY SHEET

## DIVERSION

***DEFINITION***

An earthen drainageway of parabolic or trapezoidal cross-section with a supporting ridge on the lower side. Diversions are constructed across the slope and are stabilized using appropriate vegetation.

***WATER QUALITY PURPOSE***

To intercept and re-route runoff away from areas of high pollution potential, and to reduce erosion.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Diversions indirectly control sediment, nutrients, pesticides, pathogens and organics by controlling stormwater runoff.

***WHERE USED***

Generally installed above construction sites where runoff from higher areas has the potential to cause soil erosion, to transport pollutants towards waterbodies, or to prevent vegetative establishment. Avoid use on slopes steeper than 15 percent.

***PRACTICE DESCRIPTION***

Diversions control runoff water by safely conveying surface and shallow subsurface flows across slopes to stable outlets. Diversions are constructed close to the contour and control soil erosion by shortening slope length. Diversions are designed to carry as a minimum the peak discharge for a 10-year frequency, 24-hour duration storm plus freeboard. Design storm frequency is increased according to the degree of hazard. Grasses and legumes are seeded to stabilize the slopes and banks of the diversion.

***PRACTICE EFFECTIVENESS***

Effective practice for controlling sheet and rill erosion and for conveying runoff to other management practices for treatment. One study using computer modelling indicated that diversions could reduce soil loss by about 40%, total nitrogen loss by about 20%, and total phosphorus loss by about 45% by diverting runoff from pollution sites.

***IMPACT ON SURFACE WATER***

Beneficial. Greater benefits when incorporated with an overland flow treatment system (Level Spreader and Filter Strip).

***IMPACT ON GROUNDWATER***

Slight. Practice may increase infiltration and downward movement of soluble pollutants.

***ADVANTAGES***

*Diversions provide a positive means of directing runoff water away from potential sources of pollution. *When surface runoff the channel is shallow, diversions can function like filter strips and produce the same benefits.

| | |
|---|---|
| ***DISADVANTAGES*** | *Diversions below high sediment-producing areas will trap sediment, shortening their lifespan. *Diversions may be difficult to install where space is limited. *Short-term downstream sedimentation could result during practice installation. *Can increase erosion if not installed correctly and given a proper outlet. |
| ***PRACTICE LIFESPAN*** | Ten years or longer, depending upon design and hazard involved. |
| ***COST*** | Moderate. Varies according to need for subsurface drainage, outlet protection, and other components. |
| ***OPERATION AND MAINTENANCE*** | Inspect after storm events for stable side slopes, scouring, sediment deposition, and other obstructions. Check outlets for adequacy and stability. Mow twice annually to maintain vigorous sod growth and to control woody vegetation. Protect from vehicle traffic. |
| **MISCELLANEOUS COMMENTS** | Diversions should be stabilized immediately after construction according to appropriate vegetative standards and specifications. Jute netting or anchored mulch may be required to ensure stability until grass cover is established, particularly on erodible soils. Use diversions with cautions on slopes subject to slippage. Consider installing subsurface drainage along upper edge of diversions where seepage exists. Consider ridge settlement during design of diversions. Construction of diversions shall be in compliance with state drainage and water laws. This is a practice which normally continues to function beyond the period of construction. |

***REFERENCES***

NYS Department of Environmental Conservation. DeGaetano, P., Erosion and Sediment Control Guidelines for New Development. Division of Water Technical and Operation Guidance Series. Albany, NY. April 1991.

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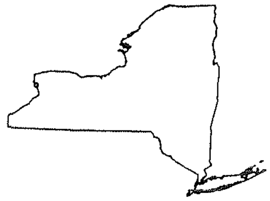

# MANAGEMENT PRACTICE SUMMARY SHEET

## DUST CONTROL

***DEFINITION***

Methods controlling the movement of airborne pollutants from land-disturbing activities.

***WATER QUALITY PURPOSE***

To minimize the generation of dust and its delivery to waterbodies.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment and related airborne pollutants.

***WHERE USED***

On construction roads, access points, and other disturbed areas subject to dust movement where off-site damage could occur.

***PRACTICE DESCRIPTION***

Dust control includes a variety of measures which reduce the detachment and/or transport of airborne sediments. The amount of land disturbed at one time and the length of time the soil is exposed is minimized. Approved dust suppressant materials, including water, may be applied to the disturbed areas at controlled rates. Wind barriers, such as fences and hay bales, may be placed perpendicular to the prevailing winds and spaced at intervals equal to ten times the barrier's height. Soil surface roughening is sometimes used for short-term control.Other management practices having dust control benefits are Permanent Vegetative Cover, Temporary Vegetative Cover, Mulching, Construction Road Stabilization and Stabilized Construction Entrance.

***PRACTICE EFFECTIVENESS***

Research indicates that the average dust emission rate on active construction sites is 1.2 tons/acre/month. Effectiveness of controls is dependent upon the specific measure used. Vegetative cover and mulches are very effective dust controls. Dust suppressants are effective on mineral soils if applied at the proper rates and frequency. Construction traffic limits the effectiveness of dust suppressants and vegetative controls.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Certain dust control measures may also control the erosion of soil by water. *Improves traffic safety. *Reduces health hazards associated with dust. *Can reduce abrasive damages to vehicles and buildings.

| | |
|---|---|
| ***DISADVANTAGES*** | *Water needs to be applied often. *Over-application of water can cause runoff problems. *Other dust suppressants can cause health problems if in contact with eyes, skin or respiratory tract. *Calcium chloride is a salt and can kill vegetation. *Surface roughening has a very short-term impact. |
| ***PRACTICE LIFESPAN*** | Normally short-term. Vegetative controls last longer. |
| ***COST*** | Varies. Low for vegetative controls and water. Higher for other measures. |
| ***OPERATION AND MAINTENANCE*** | Storage structures for dust suppressants should be water-tight. Spreader trucks and hand spray equipment need to be properly calibrated. Labelled instructions on dust suppressant materials need to be followed. On-site traffic control should be coordinated with all dust control measures. |
| ***MISCELLANEOUS COMMENTS*** | Use of waste oil for dust control is prohibited. The use or storage of brine, ligninsulfonate, and asphalt materials could have detrimental effects on water quality. The 1991 NYS Department of Transportation Approved Materials List includes water, calcium chloride, and an acrylic polymer as dust control materials. These materials have been reviewed by NYS Department of Environmental Conservation for environmental compatibility. |

***REFERENCES***

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# FILTER STRIP

**DEFINITION**

A strip of perennial grasses, legumes, or shrubs and trees established or maintained across the slope and managed for pollutant removal by overland flow.

**WATER QUALITY PURPOSE**

To reduce velocity and increase infiltration of runoff water so that sediment, nutrients and organic matter can be retained, and utilized by the vegetation.

**SOURCE CATEGORY**

Construction.

**POLLUTANTS CONTROLLED**

Sediment, nutrients, thermal stress, organics, some heavy metals and pathogens.

**WHERE USED**

Riparian zones, road corridors and in conjunction with other management practices that convey surface runoff and control erosion.

**PRACTICE DESCRIPTION**

Filter strips are seeded to grasses, legumes, or a mixture of both. Occasionally existing stands of trees, or shrubs can be used for their filtering ability. New plantings of trees and shrubs as filter strips require temporary cover to be effective. Designed filter strip widths vary with land slope, type of vegetative cover, watershed area, soil suitability and type of pollutant to be filtered. Filter strips reduce the delivery of pollutants from runoff water by filtration, deposition, infiltration, absorption, adsorption, decomposition and volatilization.

**PRACTICE EFFECTIVENESS**

Filter strips are most effective in conjunction with erosion-reducing management practices. Pollutant removal effectiveness is directly related to filter strip width. Filter strips are very effective for sediment and sediment-bound pollutant removal. Research on construction sites for erosion control has shown that grass strips can remove 85% or more of the sediment from runoff. Filter strips do not remove soluble phosphorus or nitrates effectively, and total phosphorus is not removed as effectively as sediment.

**IMPACT ON SURFACE WATER**

Beneficial.

| | |
|---|---|
| **PACT ON GROUNDWATER** | Slight. Practice may increase infiltration and downward movement of soluble pollutants. |
| **ADVANTAGES** | *Filter strips are inexpensive, easy to install and maintain. *Unobtrusive. *Benefits for wildlife. *Filter strips reduce surface runoff volumes. *Filter strips adjacent to watercourses can provide shade which benefits aquatic life. |
| **DISADVANTAGES** | *Filter strips do not reduce pollutant generation. *Filter strips are ineffective in hilly areas, in areas receiving concentrated flows, during larger runoff-producing storms, and during colder winter months. *Filter strips lose effectiveness when sediment accumulates in the filter. |
| **PRACTICE LIFESPAN** | Short. Estimated at 5 years or less. Woody filter strips last longer |
| **COST** | Relatively inexpensive for herbaceous filter strips. Slightly higher costs for trees and shrubs. |
| **OPERATION AND MAINTENANCE** | Removal of trapped sediment every year, or after larger runoff-producing storms. Herbaceous vegetation should be mowed and removed each year. Vehicle traffic should be restricted. |
| **MISCELLANEOUS COMMENTS** | Selection of appropriate plant materials and filter strip widths should be guided by references cited. Nutrients applied during vegetation establishment should be guided by soil test results. |

**REFERENCES**


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# GRADE STABILIZATION STRUCTURE

***DEFINITION***

A structure for controlling the grade and gully erosion in natural or artificial channels.

***WATER QUALITY PURPOSE***

To control soil erosion by reducing the grade and runoff velocity in channels, or by providing a structure which withstands high runoff velocities.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where gully erosion is occurring or is anticipated in a channel. Often utilized to convey runoff in one drainageway to a lower elevation receiving channel.

***PRACTICE DESCRIPTION***

Grade stabilization structures include open drop spillways, pipe drop spillways, drop inlet structures with a pipe outlet, and chute spillways. Concrete, asphalt, metal, rock rip-rap, or other suitable materials may be used. Foundation material has adequate supporting strength and resistance to piping. Seepage is controlled. Aprons, cutoff walls, energy dissipators, and other appropriate measures are used to prevent scouring and undercutting. Disturbed areas are seeded. Overfall structures are located on sections of channel which are straight 100 feet or more each way. Structures are normally designed for the peak flow from a 10-year, 24-hour storm or bankfull flow, whichever is greater. Larger design storms are used as the degree of hazard increases.

Grade stabilization structures reduce velocities of concentrated flow, thereby preventing detachment of sediment and reducing transport capacity of the runoff.

***PRACTICE EFFECTIVENESS***

A very effective practice for controlling gully erosion and resulting sedimentation problems.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None to slight. Designed ponding areas could increase avail-ability of water soluble pollutants to groundwater.

***ADVANTAGES***

*The variety of structures makes this practice adaptable to many gully erosion or grade control situations. *The structure may also trap sediment and related pollutants where ponding areas are created.

***DISADVANTAGES***

*Often costly. *Site conditions may make design or installation difficult.

***PRACTICE LIFESPAN***

Ten (10) years or more.

***COST***

Medium to high.

***OPERATION AND MAINTENANCE***

Inspect for piping or settlement periodically and after major storms. Maintain good grass cover around structure. Make repairs immediately.

***MISCELLANEOUS COMMENTS***

Designs and specifications are often prepared for each structure according to its specific purpose and site characteristics. Grade stabilization structures should be included with other management practices as part of an overall water management system. Where ponding areas are to be created, safety features such as fences and signs should be considered during the design of the structure. This is a practice which normally continues to function beyond the period of construction.

***REFERENCES***


Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

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# GRASSED WATERWAY

***DEFINITION***

A natural or constructed channel of parabolic or trapezoidal cross-section that is below ground level and is established in suitable vegetation for the stable conveyance of runoff.

***WATER QUALITY PURPOSE***

To control erosion and convey stormwater runoff.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment and nutrients.

***WHERE USED***

On or adjacent to construction sites where concentrated runoff could cause erosion.

***PRACTICE DESCRIPTION***

Grassed waterways control surface runoff by safely conveying concentrated flows to protected outlets, thereby preventing gully erosion. Grassed waterways are designed to confine and carry the peak rate of runoff from a 10-year frequency, 24-hour duration storm, as a minimum. Design storm frequency is increased according to the degree of hazard. Waterways are constructed with stone center or subsurface drainage where base flow or seepage exists.

***PRACTICE EFFECTIVENESS***

Effective practice for preventing gully formation. Grass reduces runoff velocity and can entrap sediment and associated pollutants. Little documentation is available on the effects of grassed waterways on nutrient movement.

***IMPACT ON SURFACE WATER***

Beneficial. Improper design could increase pollutant delivery from upland sources. Greater benefits when incorporated with an overland flow treatment system (*Level Spreader and Filter Strip*).

***IMPACT ON GROUNDWATER***

None to slight. Practice may increase infiltration and downward movement of soluble pollutants.

***ADVANTAGES***

*When surface runoff flow in the channel is shallow, waterways can function like filter strips and produce the same benefits.

***DISADVANTAGES***

Grassed waterways below high sediment-producing areas will trap sediment, shortening their lifespan. *Waterways may be difficult to install where space is limited. *Short-term downstream sedimentation could result during practice installation.

***PRACTICE LIFESPAN***

Ten years or longer, depending upon design and hazard involved.

*COST*

Moderate. Varies according to need for stone center, subsurface drainage, and other components.

*OPERATION AND MAINTENANCE*

Inspect after storm events for stable side slopes, scouring, sediment deposition, and other obstructions. Check outlets for adequacy and stability. Mow twice annually to maintain vigorous sod growth and to control woody vegetation. Protect from vehicle traffic.

*MISCELLANEOUS COMMENTS*

Capacity requirements may be reduced where slopes are less than one percent and out-of-bank flow will not cause erosion or property damage. Waterways should be stabilized immediately after construction according to appropriate vegetative standards and specifications. Jute netting or anchored mulch may be required to ensure stability until grass cover is established, particularly on erodible soils. Diversions or other sources of runoff should not be outletted into waterways until grass is well established. Grassed waterways normally continue to function beyond the period of construction.

*REFERENCES*

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USDA. Soil Conservation Service. Effects of Conservation Practices on Water Quantity and Quality. Washington, DC. October 1988.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Grassed Waterway. Syracuse, NY. June 1985. **(Management Practice Design Standard and Specification)**

USEPA. The Lake and Reservoir Restoration Guidance Manual. Washington, DC.

# MANAGEMENT PRACTICE SUMMARY SHEET

## HAZARDOUS MATERIAL MANAGEMENT

**DEFINITION**

The proper storage, handling, and application of materials defined as hazardous in the Department of Transportation Code of Federal Regulations, Title 49 or in NYS Rules and Regulations, Part 371.

***WATER QUALITY PURPOSE***

To minimize the opportunity for hazardous materials to contaminate surface or ground waters.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Toxics, nutrients and pesticides.

***WHERE USED***

All construction sites using hazardous products.

***PRACTICE DESCRIPTION***

Hazardous material management involves the control of pesticides, fertilizers, paints, petrochemicals, salts, cleaning solvents, dust palliatives, sandblasting grits, concrete curing compounds, and other potential chemical pollutants. These products are used only when deemed necessary and only according to the amount required. Less hazardous products are substituted whenever possible. Pesticides and fertilizers are applied according to their label, and restricted pesticides are only applied by certified applicators. To the extent possible, the contact between materials and surface or ground waters is limited. Applications are not made when wind or expected runoff conditions could cause drift or contamination. An anti-siphon device is used when surface waters are used to fill application equipment. Surface waters are protected from bridge cleaning and painting operations by suspended collectors and floating booms. Materials are stored where flooding is unlikely, soils are well-drained, and surface runoff is controlled with a drainage system. Appropriate erosion, sediment, and stormwater controls are in place.

Fertilizers are applied at the proper time and according to soil test results. Split applications and soil incorporation is used where applicable. Phosphorus application may be limited when sensitive waters could be affected. Importation of topsoil may be substituted for heavy lime and fertilizer application rates on some construction sites.

All federal, state and local rules and regulations are followed regarding the use, transport, storage, spillage and disposal of these materials, their containers, and their wash water.

***PRACTICE EFFECTIVENESS***

"Good housekeeping" is the most effective and economical means of controlling pollutants other than sediment. Good erosion and sediment control improves effectiveness against the movement of phosphorus, certain pesticides, petroleum products, and other soil-attached pollutants.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

Beneficial.

***ADVANTAGES***

*Encourages efficient and cost-effective use of materials. *Benefits fish, wildlife, soil and air resources. *Supported by existing regulations.

***DISADVANTAGES***

*Requires continuous attention while products are on the construction site.

***PRACTICE LIFESPAN***

Duration of the construction project.

***COST***

Normally low. Can be high if hazardous waste disposal is required.

***OPERATION AND MAINTENANCE***

Check storage facilities and containers for leaks, corrosion and other dangerous conditions. Check application equipment for proper calibration. Inspect daily when in use.

***MISCELLANEOUS COMMENTS***

Attention must be given to the safety and health of the public and construction workers -- follow appropriate federal, state and local rules and regulations. Refer also to the Construction Waste Management, Topsoiling and Dust Control management practices, as appropriate.

***REFERENCES***

Cornell Cooperative Extension. The Transportation of Pesticides as Hazardous Materials by Highway: A Guide to the Rules and Regulations. Ithaca, NY. June 1986.

NYS Department of Environmental Conservation. DeGaetano, P. Erosion and Sediment Control Guidelines for New Development. Division of Water Technical and Operation Guidance Series. Albany, NY. April 1991.

Federal Highway Administration. Management Practices for Mitigation of Highway Stormwater Runoff Pollution. McClean, VA. September 1985.

NYS Department of Environmental Conservation. Morton, W. Stream Corridor Management: A Basic Reference Manual. Albany, NY. January 1986.

NYS Department of State. Official Compilation of Codes, Rules and Regulations of the State of New York. Albany, NY. (Title 6-Parts 325, 326: Pesticides. -- Parts 371, 373, 374: Hazardous Waste Management)

NYS Department of Transportation. Standard Specifications. January 1990. **(Management Practice Design Standard and Specification)**

Northeast Regional Pesticide Coordinators. Pesticide Applicators Training Manual. February 1983.

State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June, 1991.

USDA. Soil Conservation Service. National Engineering Handbook. Washington, DC. October 1986.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Nutrient Management. Pest Management. Washington, DC. August 1990. **(Management Practice Design Standard and Specification)**

# LEVEL SPREADER

***DEFINITION***

A non-erosive outlet constructed to disperse concentrated flows uniformly across a slope.

***WATER QUALITY PURPOSE***

To prevent soil erosion by converting concentrated runoff to sheet flow on an area stabilized with vegetation.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Generally constructed on undisturbed soils at the outlets of diversions, dikes, swales, waterways, or other stable channels.

***PRACTICE DESCRIPTION***

Level spreaders control soil erosion by dispersing the energy of concentrated flows across a well-stabilized slope. Level spreaders are excavated channels constructed at zero grade in undisturbed soils. The design depth of the channel is usually between six and eight inches. A gently-sloped transition section 20 feet or more in length delivers runoff to the spreader. Runoff exits the spreader across a level lip which is normally ten feet or more in length. The entire lip is well-stabilized with jute, mats, or other erosion resistant material.

Outlet slopes are usually 10 percent or flatter and should be well-vegetated. Level spreaders are normally designed to handle peak flows from a 10-year, 24-hour storm, as a minimum.

***PRACTICE EFFECTIVENESS***

Effective practice for preventing gully formation. Vegetation in and below the practice can entrap small amounts of sediment and associated pollutants. Effectiveness is reduced by heavy sediment loads from the contributing drainage area.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None to Slight. Practice may increase infiltration and downward movement of soluble pollutants.

***ADVANTAGES***

*Provides method of delivering concentrated flows to filter strips.
*Reduces runoff velocities and encourages sedimentation in and below the spreader.

***DISADVANTAGES***

*Care is required during construction of the practice to avoid low spots along the lip. *Low spots can render the practice ineffective. *Not suited to steep or disturbed sites.

***PRACTICE LIFESPAN***

Normally one year. More if maintenance is performed regularly and the contributing drainage area remains well-stabilized.

***COST***

Normally low.

***OPERATION AND MAINTENANCE***

Inspect after storm events for sediment accumulation and soundness of the level lip. Remove sediment and repair damaged areas immediately. Prohibit vehicle traffic.

***MISCELLANEOUS COMMENTS***

Consideration may need to be given to limiting the size of the contributing drainage area or the peak rate of runoff reaching the spreader site. All upstream sources of sediment should be stabilized. Disturbed areas should be immediately seeded and mulched after construction of the level spreader.

***REFERENCES***

Dutchess County Soil and Water Conservation District. Dutchess County Soil and Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989.

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. (Management Practice Design Standard and Specification)

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State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June, 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# LINED WATERWAY OR OUTLET

***DEFINITION***

A channel or outlet permanently protected with rock, concrete, or other erosion-resistant material for its entire design depth.

***WATER QUALITY PURPOSE***

To control erosion and safely convey stormwater runoff.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

On or adjacent to construction sites where concentrated flows would cause erosion and high runoff velocities. Often used where space limitations, or other problems prevent the use of vegetative linings.

***PRACTICE DESCRIPTION***

Lined waterways or outlets control surface runoff by conveying concentrated flows through a stable channel, thereby preventing gully erosion. The channel or outlet may be lined with concrete, gabions, riprap, mortared flagstone or similar materials. The cross-section may be triangular, parabolic, trapezoidal, or rectangular. Cut-off walls are used at the lower end of pipe outlet aprons and at both ends of channel linings. Filters, bedding, drains, and/or weep holes are important components of this practice. Energy dissipators may be needed at the outlet to reduce velocities to non-erosive levels. Lined waterways or outlets are designed to confine and carry the peak rate of runoff from a 10-year, 24-hour storm, as a minimum. Freeboard is often required unless good vegetation is established adjacent to the lining.

***PRACTICE EFFECTIVENESS***

Effective long-term practice for preventing gully erosion where runoff velocities are high. Sediment load reductions can be significant.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Provides immediate control of concentrated flows. *Can control seepage, base flows, and sloughing problems. *Requires less space than comparable grassed waterways.

***DISADVANTAGES***

*Rock linings adjacent to highways may constitute a safety hazard. *When used as a stable outlet for another practice, lined waterways could increase the delivery of dissolved or suspended substances to surface waters due to high flow velocities. *Soils with high shrink-swell potential or poor drainage may limit the use of concrete and mortar as lining materials. *Paved channels also restrict stormwater infiltration.

***PRACTICE LIFESPAN***

Ten years or longer.

***COST***

Moderate to high. Varies with lining material and with components required by soil conditions.

***OPERATION AND MAINTENANCE***

Inspect after storm events for scouring or undermining, and repair immediately. Remove debris from channel. Control woody growth, particularly adjacent to paved linings.

***MISCELLANEOUS COMMENTS***

Stone-centered waterways are included in the Grassed Waterway management practice. Soil changes along the channel need to be accounted for during the design of a lined waterway or outlet. Following installation of this practice, all unlined areas should be stabilized according to appropriate vegetative standards and specifications. This is a practice which normally continues to function beyond the period of construction.

***REFERENCES***

Dutchess County Soil and Water Conservation District. Dutchess County Soil Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989.

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. (Management Practice Design Standard and Specification)

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NYS Department of Transportation. Highway Design Manual. December 1986.

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USDA. Soil Conservation Service. National Handbook of Conservation Practices. Syracuse, NY. February 1981. (Management Practice Design Standard and Specification)

USDA. Soil Conservation Service. Erosion and Sediment Control in Site Development. Amherst, MA. September 1983.

## MANAGEMENT PRACTICE SUMMARY SHEET

# PAVED FLUME

***DEFINITION***

A small concrete-lined channel used to convey water on a relatively steep slope.

***WATER QUALITY PURPOSE***

To control erosion and safely convey stormwater runoff.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where concentrated flows need to be conveyed down slopes as part of a permanent erosion control system. Slopes are 1½:1 or flatter.

PRACTICE DESCRIPTION

Paved flumes control surface runoff by conveying concentrated flows through a stable channel, thereby preventing gully erosion. Reinforced concrete is used to line the channel. Cutoff walls, drainage filters, and anchor lugs are used to prevent undermining and piping. Special energy dissipators are included to protect the outlet end of the flume. Paved flumes often serve as outlets for diversions, drainage channels or natural drainageways located above relatively steep slopes. They are designed to confine and carry the peak rate of runoff from a 10-year, 24-hour storm, as a minimum. Freeboard is often required.

***PRACTICE EFFECTIVENESS***

Effective practice for preventing gully erosion on cut or fill slopes. Sediment load reductions can be significant.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Provides a stable outlet for diversions and other concentrated flow channels along the top of a slope. *Provides immediate control of concentrated flows. *Requires less space than comparable grassed waterways.

***DISADVANTAGES***

*When used as a stable outlet for another practice, paved flumes could increase the delivery of dissolved or suspended substances to surface waters due to high flow velocities. *Soils with high shrink/swell potential or poor drainage limit the use of the practice. *Paved channels restrict stormwater infiltration.

***PRACTICE LIFESPAN***

Approximately 10 years.

***COST***

Moderate to high. Varies according to design capacity and soil conditions.

***OPERATION AND MAINTENANCE***

Inspect after storm events for scouring and undermining, and repair immediately. Inspect outlet and inlet of flume for stability and debris. Maintain good vegetative growth on adjoining areas.

***MISCELLANEOUS COMMENTS***

Soil changes along the flume need to be accounted for during the design phase. Compaction requirements are particularly important in fill material. Freeboard is especially critical where changes in horizontal alignment occur. This is a practice which normally continues to function beyond the period of construction.

***REFERENCES***

Connecticut Council on Soil and Water Conservation. Guidelines for Soil Erosion and Sediment Control, Connecticut. Hartford, CT. January 1985.

Dutchess County Soil and Water Conservation District. Dutchess County Soil Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989.

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. (Management Practice Design Standard and Specification)

New Jersey State Soil Conservation Committee. Standards for Soil Erosion and Sediment Control in New Jersey. April 1987.

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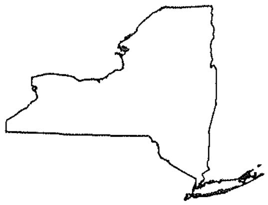

## MANAGEMENT PRACTICE SUMMARY SHEET

# PIPE SLOPE DRAIN

***DEFINITION***

A closed drain installed from the top to the bottom of a slope.

***WATER QUALITY PURPOSE***

To control erosion and safely convey stormwater runoff down steep slopes.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where concentrated flows are causing erosion problems on slopes, or where erosion problems on slopes are anticipated during construction.

***PRACTICE DESCRIPTION***

Pipe slope drains control surface runoff by conveying construction flows through a closed conduit, thereby preventing gully erosion. Flexible tubing, corrugated metal pipe, or the equivalent is used. Connections are watertight. Flexible tubing is securely anchored. Flared end sections are used at the inlet end. A temporary dike/swale is often used to direct runoff at the top of the slope to the drain. Care is taken to properly compact soil around the pipe and on the dike adjacent to the inlet. The dike is at least 12 inches higher than the top of the inlet. The outlet is protected with riprap or, if the drainage area is disturbed, a sediment trap. Disturbed areas are seeded and mulched. Pipe diameter is determined by drainage area. Maximum drainage area is 5 acres.

***PRACTICE EFFECTIVENESS***

A potentially effective means of controlling soil erosion on slopes. Care is essential during design and installation.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Valuable for quick temporary control of runoff water on slopes. *Useful as an outlet for a temporary dike/swale along the top of a slope. *More economical than paved flumes and lined waterways.

***DISADVANTAGES***

*Limited to use with small drainage areas. *Piping problems can occur around the drain. *Failure of this practice can worsen water quality conditions.

***PRACTICE LIFESPAN***

One (1) year or less.

***COST***

Low to moderate.

***OPERATION AND MAINTENANCE***

Inspect for stability at the inlet, the outlet, and along the length of the drain. Check for clogging or debris at the inlet. Material is not placed on the pipe and it is not crossed with equipment. Inspect weekly and after every storm.

***MISCELLANEOUS COMMENTS***

Pipe grades should be no flatter than 3 percent. Settlement of the dike at the inlet of the pipe needs to be anticipated. Refer to Temporary Dike/Swale, where appropriate.

***REFERENCES***

Connecticut Council on Soil and Water Conservation Guidelines for Soil Erosion and Sediment Control, Connecticut. Hartford, CT. January 1985.

Dutchess County Soil and Water Conservation District. Dutch-ess County Soil Erosion and Sediment Control Guidebook. Millbrook, NY. June 1989.

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NYS Department of Transportation. Soil Mechanics Bureau. 1974 Construction Experience with Item 900 or Item 209. Albany, NY. January 1975.

State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# PLANNED LAND GRADING

***DEFINITION***

Reshaping the land surface to planned erosion-resistant grades as determined by engineering survey and layout.

***WATER QUALITY PURPOSE***

To control water movement, reduce soil erosion, and facilitate the establishment of vegetative cover.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where earth moving is necessary and practical. Most applicable on sloping or rolling topography where cuts and fills are required. Slope stability and soil depth must be suitable.

***PRACTICE DESCRIPTION***

Land grading controls water movement and soil erosion by limiting slope steepness and length, and by directing runoff water to stable outlets. The land grading plan is normally integrated with a comprehensive erosion and sediment control plan for the construction site. Grading plans include existing and proposed contours, drainage and erosion control practices, and the timing of all land disturbance activities. Planned slopes are generally 2:1 or flatter, and 4:1 or flatter where mowing will be required. Long slopes often require a properly designed bench system. Stair-step grading may be used on slopes of 3:1 or steeper. Topsoil is usually stockpiled to complete finished grading. Stockpiles, borrow areas, and spoil are also incorporated into land grading plans.

***PRACTICE EFFECTIVENESS***

Effectiveness depends on slope steepness and soil erodibility. House lot benching on 6% slopes with slope lengths of 150 feet can reduce erosion rates by 85%. Quick establishment of temporary or permanent cover on graded areas is critical.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Rough grading can be incorporated into the land clearing operation if properly planned. *Can improve drainage conditions on the construction site. *Provides better conditions for establishing vegetation.

***DISADVANTAGES***

*Can create new slopes and resulting erosion problems unless soil stabilization is properly planned and implemented. *Potential for earth moving to uncover and redistribute toxic materials.

***PRACTICE LIFESPAN***

Normally long-term.

***COST***

Varies greatly with topography and soil conditions.

***OPERATION AND MAINTENANCE***

Sediment which accumulates prior to soil stabilization should be redistributed. Top of cut and toe of fill should be rounded for mowing permanent vegetation.

***MISCELLANEOUS COMMENTS***

Fills should be properly compacted and should not normally include brush, stumps, building debris, or other objectionable material. Fill should not be placed near waterbodies unless special provisions are made to protect them. Grading operations which disturb vegetation over large areas should be avoided. Land grading should be properly phased with other management practices (refer to the *Staged Clearing and Grading* management practice). Adjoining properties should not be endangered by land grading activities.

***REFERENCES***

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

Irondequoit Bay Coordinating Committee. Best Management Practices for Stormwater Runoff Management. May 1985.

Minnesota Pollution Control Agency. Protecting Water Quality in Urban Areas, Best Management Practices for Minnesota. October 1989.

New Jersey State Soil Conservation Committee. Standards for Soil Erosion and Sediment Control in New Jersey. April 1987.

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NYS Department of Transportation. Standard Specifications. January 1990. **(Management Practice Design Standard and Specification)**

USDA. Soil Conservation Service. Effects of Conservation Practices on Water Quantity and Quality. Washington, DC. October 1988.

USDA. Soil Conservation Service. National Handbook of Conservation Practices. Precision Land Forming. Washington, DC. October 1980. **(Management Practice Design Standard and Specification)**

## MANAGEMENT PRACTICE SUMMARY SHEET

# SILT FENCE

***DEFINITION***

A temporary barrier of geotextile fabric supported by posts and entrenched in the soil.

***WATER QUALITY PURPOSE***

To intercept and detain small amounts of sediment from disturbed areas during sheet flow.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used to trap sediment from small drainage areas (1/2 acre per 100 linear feet, or less). Placed away from the toe of the slope where possible. Sometimes used as a perimeter sediment control system.

***PRACTICE DESCRIPTION***

Silt fences are constructed of filter fabric, steel or wooden posts, and sometimes wire fence. Pre-fabricated units are often used. Slope steepness determines the maximum length of slope to be controlled. The fence is installed as close to the contour as possible with the ends flared upslope. The fence is 2 to 3 feet high with 6 to 8 inches embedded in the soil. Posts are spaced no more than 10 feet apart. Woven wire fencing is secured to the posts to support the fabric, unless pre-fabricated units are used. Geotextile materials must meet established specifications for strength, elongation, slurry flow rate, equivalent opening size, and ultraviolet resistance.

Silt fences reduce the velocity of sheet flow thereby limiting its capacity to transport sediment.

***PRACTICE EFFECTIVENESS***

The effectiveness of silt fence for trapping sediment is a function of the equivalent opening size of the fabric in relation to the soil particle size. The opening size must be small enough to trap sediment but large enough to prevent clogging. For most soils an equivalent opening size of 70 will trap 90% or more of the sediment in runoff.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Easy to install. *May be re-used. *Silt fences have been shown to trap a higher percentage of suspended sediments than straw bale dikes.

***DISADVANTAGES***

*Not practical where large drainage areas are involved. *Not suited for channel flow. *Ultraviolet radiation may affect the stability of geotextiles over time.

***PRACTICE LIFESPAN***

One year or less.

***COST***

Relatively inexpensive.

***OPERATION AND MAINTENANCE***

Routine maintenance is required to preserve effectiveness. Inspect after each runoff event and daily during prolonged rainfall. Check for breaks, bulges, overtopping, and undermining. Repair immediately. Sediment should normally be removed when it approaches one-half the height of the fence.

***MISCELLANEOUS COMMENTS***

Within 30 days following permanent stabilization of the contributing drainage area, the silt fence should be removed and the area around it graded and seeded. Consideration should be given to constructing long sections of silt fence in independent units of 600 feet or less. Do not install silt fence where ponding behind the fence will cause property damage or a safety hazard.

***REFERENCES***

Connecticut Council on Soil and Water Conservation. Guidelines for Soil Erosion and Sediment Control, Connecticut. Hartford, CT. January 1985.

NYS Department of Environmental Conservation. DeGaetano, P. Erosion and Sediment Control Guidelines for New Development. Division of Water Technical and Operation Guidance Series. Albany, NY. April 1991.

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Long, R. Technical Specifications for Geotextiles. pgs. 8-28 of Seminar Proceedings: Sediment and Erosion Control Conference. Connecticut Association of Soil and Water Conservation Districts. February 29 to March 1, 1984.

Minnesota Pollution Control Agency. Protecting Water Quality in Urban Areas, Best Management Practices for Minnesota. October 1989.

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State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June, 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# STABILIZED CONSTRUCTION ENTRANCE

***DEFINITION***

A stable pad of coarse aggregate underlain with filter cloth located at points of construction ingress and egress.

***WATER QUALITY PURPOSE***

To control the tracking or flowing of sediment from construction sites to public rights-of-way and associated drainage facilities.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used to stabilize all points of ingress and egress to streets, alleys, sidewalks, parking areas or other public rights-of-way.

***PRACTICE DESCRIPTION***

Stabilized construction entrances are lined with at least six inches of 2-inch diameter stone, or reclaimed concrete equivalent. Filter fabric is placed beneath the stone. The minimum width of the pad is 12 feet, but it is often wider. Its length is normally 50 feet or longer. Design parameters vary according to the type of traffic expected, the number of entrances to the site, and the sóil conditions. Fine-textured soils may require longer pads. Wash racks may be installed to facilitate vehicle washing where stone alone does not perform adequately. Wash water drains into an approved sediment trapping device. Surface water is piped beneath the entrance where needed. If a pipe is not feasible a gentle berm is constructed across the entrance to divert runoff from the public right-of-way.

Stabilized construction entrances remove mud from tires through the abrasive action of the stone surface. Sediment is trapped in the void space of the aggregate layer.

***PRACTICE EFFECTIVENESS***

The length of the stabilized entrance, the depth of the stone, and the quality of maintenance largely determines

the effectiveness of this practice. A newly installed entrance is relatively effective for removing mud from vehicle tires. Pressurized washing on a wash rack improves mud removal. Once the void spaces between the stone becomes clogged with sediment, the practice is no longer effective.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Safety conditions are improved on adjacent public rights-of-way. *Re-use of aggregate on the construction site is possible.

***DISADVANTAGES***

*Continual monitoring and frequent maintenance is often required.

***PRACTICE LIFESPAN***

Two (2) years or less.

***COST***

Low to moderate.

***OPERATION AND MAINTENANCE***

Entrances must be topdressed with aggregate periodically to function properly. Sediment reaching public rights-of-way or storm drains must be immediately removed and stabilized. Associated sediment traps must be properly maintained.

***MISCELLANEOUS COMMENTS***

Stabilized construction entrances should be used in conjunction with Construction Road Stabilization and other sediment control management practices. Entrances should be located for maximum utilization by all construction vehicles. Disturbed areas adjacent to the entrance should be seeded and mulched.

***REFERENCES***

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MANAGEMENT PRACTICE SUMMARY SHEET

# STAGED CLEARING AND GRADING

***DEFINITION***

Scheduled or phased land disturbances, each phase being limited to what is required for immediate construction activity.

***WATER QUALITY PURPOSE***

To limit the duration and extent of soil exposure to wind or water erosion.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used in connection with phased subdivision plans, large land disturbances, or multi-structure developments.

***PRACTICE DESCRIPTION***

Staged clearing and grading provides optimum coordination of land disturbances with subsequent construction activities. It is part of a comprehensive land development plan which considers water resources, soil characteristics, drainage patterns, erosion and sediment control. Special consideration is given to steep areas, erodible soils, wetlands, and riparian areas.

The clearing and grading schedule is reviewed with equipment operators and the limits of disturbance are clearly marked with ribbon, flagging, or paint. Wherever possible, erosion and sediment control practices are installed prior to land-disturbing activities. Only those areas which are being actively developed are exposed. No more than 5 acres of unprotected soil should be exposed at any one time. Disturbed areas are restabilized within 15 days of final grading and often prior to clearing other sections of the project site.

Staged clearing and grading controls sedimentation by reducing the amount of soil exposed to the erosive forces of wind and water.

**PRACTICE EFFECTIVENESS**

Staged clearing and grading is a preventive practice which can result in significant reductions in soil erosion and sedimentation.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

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|---|---|
| ***VANTAGES*** | *Avoids re-grading eroded areas associated with massive clearing and grading. *Reduces maintenance needs of structural erosion and sediment control practices.<br>*Allows more intensive inspection of erosion and sediment control measures during each phase. |
| ***DISADVANTAGES*** | *Mobilization of equipment may need to be repeated at different stages. |
| ***PRACTICE LIFESPAN*** | Varies according to the specific land development plan and construction schedule. |
| ***COST*** | Relatively inexpensive. |
| ***OPERATION AND MAINTENANCE*** | Review schedule and limits of land-disturbing activities with equipment operators prior to each stage. Monitor periodically during clearing operations. |
| ***MISCELLANEOUS COMMENTS*** | Refer also to the Construction Waste Management and Planned Land Grading management practices. |

***REFERENCES***


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## MANAGEMENT PRACTICE SUMMARY SHEET

# STORM DRAIN INLET PROTECTION

***DEFINITION***

A sediment barrier installed around a storm drain inlet.

***WATER QUALITY PURPOSE***

To prevent sediment from entering storm drainage systems.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where drainage areas are under construction and less than 2 acres, where sediment-laden runoff cannot be diverted to a larger trapping device, and where temporary ponding will not cause a safety hazard or property damage. (For larger drainage areas see Temporary Sediment Trap or Temporary Sediment Basin.)

***PRACTICE DESCRIPTION***

Storm drain inlet protection is designed according to location, drainage area, the type of inlet, and the availability of materials. Barriers may be filter fabric supported by stakes, stone with concrete block, stone with wire mesh, or stone and gravel alone. Sod mats and shallow excavated areas are also utilized to trap sediment. Heights of the barriers are limited to prevent excess ponding and to prevent bypass flow to unprotected lower areas.

Storm drain inlet protection reduces the transport capacity of flow by decreasing runoff velocities and collecting sediment.

***PRACTICE EFFECTIVENESS***

Storm drain inlet protection provides relatively good removal of coarse-grained and medium-grained sediment. The use of filter fabric is necessary for good control of fine-grained sediment. To be effective, this practice needs to be installed concurrently with the inlet or prior to land disturbing activities.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Prevents clogging of stormwater drainage systems and resulting losses of drainage capacity.

***DISADVANTAGES***

*Practice effectiveness can be quickly reduced by large storm events unless maintenance is performed immediately.
*Not suited to large drainage areas.

***PRACTICE LIFESPAN***

Normally less than one year.

***COST***

Relatively inexpensive.

***OPERATION AND MAINTENANCE***

Inspect the practice after each rainfall, remove accumulated sediment, and make necessary repairs. Clogged fabric or stone may need to be removed and replaced.

***MISCELLANEOUS COMMENTS***

The areas above this practice should be quickly stabilized to avoid erosion and sedimentation. Within 30 days following permanent stabilization of the contributing drainage area, inlet protection should be removed and the surrounding area graded, compacted and stabilized.

***REFERENCES***

Connecticut Council on Soil and Water Conservation. Guidelines for Soil Erosion and Sediment Control, Connecticut. Hartford, CT. January 1985.

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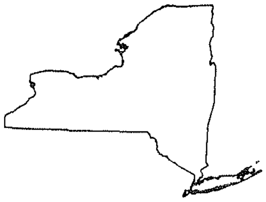



# STRAW BALE DIKE

***DEFINITION***

A temporary barrier of straw or hay bales which are staked and entrenched in the soil.

***WATER QUALITY PURPOSE***

To intercept and detain small amounts of sediment from disturbed areas during sheet flow.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used to trap sediment from small drainage areas (generally ¼ acre per 100 linear feet, or less). Used where slopes are no steeper than 2:1. Placed away from the toe of the slope where possible.

***PRACTICE DESCRIPTION***

Straw bale dikes consist of bound bales of hay or straw which are tightly abutted to each other and placed along the contour or at the base of a short slope. The wire or string binding is not in contact with the ground. Bales are embedded in 4 inches of soil and are staked with re-bar or 2" x 2" stakes. Loose straw is wedged between bales and is often scattered above them to improve trapping efficiency. End bales may be flared upslope and dike lengths are sometimes limited to prevent the diversion or increased concentration of stormwater runoff.

Straw bale dikes reduce the velocity of sheet flow thereby limiting its capacity to transport sediment.

***PRACTICE EFFECTIVENESS***

If properly installed and maintained, straw bale dikes provide good control of coarse-textured sediment. They are less effective for trapping fine silts and clays. A Transportation Research Board study indicated that, under controlled conditions, trapping efficiencies of straw bale dikes ranged from 46% to 88% and averaged 68%. A Virginia study showed a drop in trapping efficiency from 57% to 16% due to a lack of maintenance over a one-month period.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Easy to construct. *Materials are often readily available.

***DISADVANTAGES***

*Studies have indicated a high percentage of failures in the field due to undercutting, end flow, and washouts. *This practice is not suited to large drainage areas, long slopes, or channel flow.

***PRACTICE LIFESPAN***

Three months or less.

***COST***

Low cost.

***OPERATION AND MAINTENANCE***

Routine maintenance is required to preserve effectiveness. Inspect after each rainfall event and daily during prolonged rainfall. Check for damaged bales, end flow, and undercutting beneath bales. Repair immediately. Sediment should normally be removed when it approaches ½ the height of the dike.

***MISCELLANEOUS COMMENTS***

Within 30 days following permanent stabilization of the contributing drainage area the straw bale dike should be removed and the area around it graded and seeded. Do not install this practice where ponding behind the dike will cause property damage or a safety hazard.

***REFERENCES***

NYS Department of Environmental Conservation. DeGaetano, P. Erosion and Sediment Control Guidelines for New Development. Division of Technical and Operational Guidance Series. Albany, NY. April 1991.

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State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# STREAM SEDIMENT MAT

***DEFINITION***

A sediment-absorbing mat made of burlap, jute and excelsior, temporarily placed in a streambed, ditch or other watercourse during construction and anchored with stones or stakes.

***WATER QUALITY PURPOSE***

To intercept and detain bedload sediments disturbed by instream/watercourse construction activities.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used immediately downstream of sections of stream or watercourse being disturbed by construction activities. Should be used in conjunction with other management practices. May also have application in ditches and rock-lined channels to protect them from sedimentation associated with ditch cleaning or upstream construction.

***PRACTICE DESCRIPTION***

Stream sediment mats are a lower layer of burlap, a center of excelsior and an upper layer of jute mesh. They are affixed flat on the streambed with either stones or stakes. The number of 10' by 4' mats required to provide downstream protection will vary with water velocity and depth, the expected sediment volume and particle size distribution. The mats are usually installed as close to the disturbance area as possible. The upstream edge of the mat is held tight to the streambed with stones, and the downstream edge of the mat is lapped over the next downstream mat. Immediately after construction is completed, the biodegradable, sediment-laden mats are removed from the stream. Where appropriate they may be staked to disturbed streambanks, seeded, mulched and left to provide bank stabilization.

***PRACTICE EFFECTIVENESS***

Field trials indicate that under certain specific conditions, sediment mats can trap and remove 80% of sediments disturbed by construction activities in small, coarse-bottomed streams in New York State. The mats do not trap clay and fine silts effectively.

***IMPACT ON SURFACE WATER***

Beneficial.

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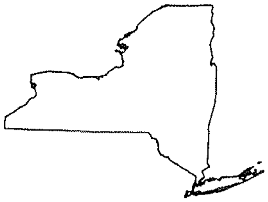
|---|---|
| ***IMPACT ON GROUNDWATER*** | None. |
| ***ADVANTAGES*** | *Inexpensive. *Easy to install and remove with low labor and equipment requirements. *Mat layout can be changed as conditions warrant. *Will not flood work area and not affected by changes in streamflow. *Mats can trap over 500 lbs. of sediment each. *No disposal problem, mats can be beneficially reused for bank stabilization and revegetation. |
| ***DISADVANTAGES*** | *Does not control turbidity. *Equipment required to remove heavily laden mats. *Difficult to install in water more than three feet deep. *Other practices are also usually required to adequately protect water resources. |
| ***PRACTICE LIFESPAN*** | One month or less. |
| ***COST*** | Low cost. |
| ***OPERATION AND MAINTENANCE*** | Inspect mats regularly during instream activities and replace fully laden mats as needed or add new mats downstream. |
| ***MISCELLANEOUS COMMENTS*** | Where water velocities are less than 3 feet per second, sand bars may form on top of fully laden mats.<br><br>When water velocities exceed 2.5 feet per second, it is recommended that the mats be staked in place.<br><br>Sediment-laden mats should not be used to stabilize streambanks subject to attach velocities.<br><br>May be used in conjunction with Turbidity Curtain where currents are gentle and water is relatively shallow. |
| ***REFERENCES*** | NYS Electric and Gas Corporation. Sediment Mat Effectiveness. Research and Development Project Final Report. August 1993. |



## MANAGEMENT PRACTICE SUMMARY SHEET

# SUB-SURFACE DRAIN

**DEFINITION**

A conduit installed beneath the ground to collect and/or convey drainage water.

***WATER QUALITY PURPOSE***

To stabilize soils by controlling excessive wetness or runoff.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used to improve the performance or stability of other management practices such as Permanent Vegetative Cover, Structural Slope Protection, Sediment Basin, Grassed Waterway; used on sloping soils to intercept seeps; used to relieve artisan pressure and control the water table.

***PRACTICE DESCRIPTION***

Sub-surface drains are normally perforated polyethylene tubing, corrugated metal, polyvinyl chloride, or clay tile with a diameter of 4 inches or more. They generally have at least 2 feet of cover and a gravel or filter fabric envelope for bedding and inflow control. The upper end is capped and the lower end consists of a 10-foot section of solid pipe with an animal guard. The design is based on a field survey and soil investigations. Random or pattern systems are used. Sub-surface water moves through the drainage system by gravity or pump. Design considerations include allowable velocities, anticipated loadings, and the direct introduction of surface water. Special precautions are taken beneath vehicle traffic areas and near woody vegetation. Debris and sediment are prevented from entering the drains. The outlet area is adequately protected from the force of outflow waters. Sub-surface drains control the movement of water where, uncontrolled, it could hamper soil stabilization efforts.

***PRACTICE EFFECTIVENESS***

The effectiveness of sub-surface drainage as a water quality management practice is difficult to quantify. It is most effective as a means of improving the performance of other management practices.

***IMPACT ON SURFACE WATER***

Normally Beneficial. (Could increase delivery of soluble pollutants to outlet waters if they are present in free sub-surface water.)

***IMPACT ON GROUNDWATER***

Normally none. (Could decrease delivery of soluble pollutants to groundwater if they are present in free sub-surface water.)

***ADVANTAGES***

*Can reduce stormwater runoff and associated runoff of pollutants. *May improve workability of construction sites.

***DISADVANTAGES***

*Not well suited to shallow soils. *Roots of woody vegetation may clog drains. *Sometimes mis-used to drain valuable wetland areas.

***PRACTICE LIFESPAN***

Ten (10) years.

***COST***

Moderate.

***OPERATION AND MAINTENANCE***

Outlet needs to be checked periodically for stability and debris. Debris and sediment should be kept away from any surface inlets. Control woody growth and vehicle traffic near drains unless adequate precautions have been taken.

***MISCELLANEOUS COMMENTS***

Care should be taken to comply with all appropriate federal, state, and local laws, such as those involved with drainage, the diversion of water, or wetland protection. This is a practice which normally continues to function beyond the period of construction. Small, isolated drainage problems which are not suited to subsurface drains may sometimes be relieved with shallow, stone-filled, fabric-lined trenches.

***REFERENCES***

Empire State Chapter, Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specifications)**

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## MANAGEMENT PRACTICE SUMMARY SHEET

# SUMP PIT

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|---|---|
| **DEFINITION** | A small basin constructed to collect excess water and sediment from excavations. |
| ***WATER QUALITY PURPOSE*** | Sump pits trap sediment before drainage water is discharged from excavation sites. |
| ***SOURCE CATEGORY*** | Construction. |
| ***POLLUTANTS CONTROLLED*** | Sediment. |
| ***WHERE USED*** | Installed during excavation phase of construction where seepage or stormwater accumulates. Well-adapted to building foundation excavations. |
| ***PRACTICE DESCRIPTION*** | Sump pits are temporary structures installed at low sites within an excavation. A perforated standpipe is located in the center of a constructed basin. The basin is backfilled with crushed stone. Filter fabric and hardware cloth are wrapped around the stand-pipe unless water from the sump pit is to be pumped directly to a sediment trap or sediment basin. The required number and specific dimensions of pits are site-dependant.<br><br>Sump pits remove sediment from drainage water by reducing runoff velocities and by direct filtration. |
| ***PRACTICE EFFECTIVENESS*** | Sump pits can be expected to provide good sediment control under the specific conditions for which they are intended. Coarse-grained sediment is more effectively controlled than fine-grained sediment. Use of filter fabric increases sump pit effectiveness. |
| ***IMPACT ON SURFACE WATER*** | Beneficial. Dependent upon the ability of the filter fabric and/or the sediment trap at the outlet to function at the time the sump pit is pumped. |
| ***IMPACT ON GROUNDWATER*** | None. |
| ***ADVANTAGES*** | *Easy to install. *May reduce construction time by helping to improve drainage conditions at the work site. |
| ***DISADVANTAGES*** | *Proper sizing requires good judgment by the designer. *Not suited to handling runoff and sediment originating beyond the limits of excavation. *Large sediment loads can quickly affect the ability of the practice to function properly. |
| ***PRACTICE LIFESPAN*** | Short. Six months to one year. |

***COST***

Relatively inexpensive.

***OPERATION AND MAINTENANCE***

Sediment sealing the surface of the stone should be immediately removed. Remove and replace sump pits as necessary.

***MISCELLANEOUS COMMENTS***

Inlet protection management practices can extend the lifespan of sump pits. Outlets for discharged water should be carefully located and stabilized. Properly designed sediment traps or sediment basins are preferred outlet sites. Adequately sized portable sediment tanks may also be used. Well-established filter strips may be used as outlet sites provided (1) filter fabric is wrapped around the standpipe, (2) a device is installed to convert the discharge to sheet flow, and (3) discharges do not overtax the filter strip and affect adjacent properties or water-bodies.

***REFERENCES***

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. **(Management Practice Design Standard and Specification)**

Maryland Water Resources Administration. USDA-Soil Conservation Service. State Soil Conservation Committee. Maryland Standards and Specifications for Soil Erosion and Sediment Control. Annapolis MD. 1983.

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State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Pubic Review Draft). Olympia, WA. June 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# TEMPORARY DIKE/SWALE

**DEFINITION**

A temporary berm and/or excavated channel constructed to direct water to a desired location and stabilized with appropriate materials.

***WATER QUALITY PURPOSE***

To divert runoff water away from disturbed areas or to direct sediment-laden water to a sediment trapping device.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

On or adjacent to construction sites where runoff and sediment could affect surface water quality. Used where permanent waterways or diversions are not needed.

***PRACTICE DESCRIPTION***

A temporary dike/swale collects runoff water and conveys it safely to a stable outlet. The dimensions of the dike/swale will vary according to its slope and drainage area. The contributing drainage area is normally less than 10 acres. Side slopes of the dike/swale are 2:1 or flatter. Runoff from stabilized watersheds is directed to undisturbed protected outlets. Runoff from exposed areas is conveyed to a properly designed sediment trap or sediment basin. Within 10 days of construction, the dike/swale is stabilized with an appropriate seed mixture, mulch, and/or stone.

**PRACTICE EFFECTIVENESS**

Effective practice for short-term control of sheet, rill, or gully erosion.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None to slight. Practice may increase infiltration and downward movement of soluble pollutants.

***ADVANTAGES***

*Provides a positive means of directing runoff water away from potential sources of pollution. *Can increase the size of disturbed areas served by sediment trapping devices. *More easily constructed than permanent runoff conveyance practices.

***DISADVANTAGES***

*Short-term downstream sedimentation could result during practice installation. *Can increase erosion if not installed correctly and given a proper outlet. *Not suited to large drainage areas.

***PRACTICE LIFESPAN***

Short. Normally one year or less.

***COST***

Low to moderate. Varies according to need for stone lining, outlet protection, or other components.

***OPERATION AND MAINTENANCE***

Check for stability and sediment after each storm event. Protect from vehicle traffic. Temporary dike/swales shall remain in place until the disturbed areas are permanently stabilized.

***MISCELLANEOUS COMMENTS***

Compact dikes with earth-moving equipment during construction. Installation of dikes and diversion practices shall be in compliance with state drainage and water laws. Consider incorporating swale sediment traps into the design of temporary dike/swales when downstream water resources may be impacted during construction. Refer to appropriate vegetative and mulching standards and specifications for stabilizing temporary dike/swales.

***REFERENCES***

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State of Washington Department of Ecology. Stormwater Management Manual for the Puget Sound Basin (Public Review Draft). Olympia, WA. June 1991.

## MANAGEMENT PRACTICE SUMMARY SHEET

# TEMPORARY SEDIMENT BASIN

***DEFINITION***

An earthen basin constructed to intercept sediment-laden runoff and to trap and retain the sediment and water-borne drbris..

***WATER QUALITY PURPOSE***

Sediment basins provide temporary storage of sediment from disturbed areas.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Primarily sediment. To a limited extent, some nutrients and heavy metals are trapped.

***WHERE USED***

On and below construction sites where other management practices, alone, cannot effectively control sediment. Avoid siting on steep slopes or within streams. Normally used for drainage areas of less than 200 acres and more than 15 acres.

***PRACTICE DESCRIPTION***

Sediment basins are temporary structures designed to trap at least ½ inch of sediment per acre of contributing drainage area. The pool area of the basin is often dry, an embankment is usually constructed on the downhill side, and the slopes are stabilized with vegetation. A principal spillway constructed of corrugated metal or PVC pipe usually serves as the primary outlet for detained runoff. An emergency spillway is constructed for safe disposal of runoff from large storm events. The combined capacities of the spillways are designed to pass the peak rate of runoff from a 10-year frequency, 24-hour storm as a minimum. 25-year frequency design storms are used where contributing drainage areas are larger than 20 acres. Design storm frequency increases with the degree of hazard. Under special circumstances a rock dam can be constructed to create a sediment basin and to serve as both principal and emergency spillway. Sediment basins reduce the transport capacity of flow by decreasing runoff velocities and trapping sediment and debris.

***PRACTICE EFFECTIVENESS***

Sediment basins with slow release rates can trap up to 65% of sediment, up to 30% of particulate organic nitrogen, up to 30% of chemical oxygen demand, up to 55% of particulate zinc, and up to 85% of particulate lead found in stormwater. Clay and fine silts are less likely to be trapped than larger soil particles. Soluble pollutant removal is generally poor with less than 15% of total incoming dissolved nitrogen and dissolved phosphorus being removed. Sediment basin efficiency varies with storage time and basin design. Higher length to width ratios (2:1 or greater) and a wedge shape (with the inlet at the narrow end) improves sediment removal.

***IMPACT ON SURFACE WATER***

Beneficial. Additional management practices may be necessary to ensure more effective removal of dissolved nutrients discharged from the principal spillway.

**IMPACT ON GROUNDWATER**

None to slight. Recent studies indicate no significant increases in pollutant levels beneath stormwater retention basins. More research may be required to fully understand downward movement of soluble pollutants beneath sediment basins and infiltration practices, particularly in coarse soils.

**ADVANTAGES**

*Sediment basins can function through more phases of construction and have higher trapping efficiencies than other sediment control practices. *Relatively easy to design and construct. *Sediment basins reduce the velocity and increase the travel time of stormwater runoff.

**DISADVANTAGES**

*Practice lifespan can be shortened considerably if the sediment basin receives large deposits of sediment without receiving the required maintenance. *Little or no impact on dissolved nutrients. *Pollutants deposited by runoff can be re-suspended and discharged during subsequent events. *Potential thermal impacts on receiving waters if permanent pool is maintained.

**PRACTICE LIFESPAN**

Temporary sediment basins have a lifespan of 3 years or less.

**COST**

Often high. Varies with design requirements.

**OPERATION AND MAINTENANCE**

Sediment removal should be performed when the basin is 60% full. Sediment removed from the basin should be stabilized and placed where pollutants will not come in contact with a waterbody. Debris should be removed from the sediment basin to ensure proper functioning of the outlet structure.

**MISCELLANEOUS COMMENTS**

Sediment basins should be constructed prior to land disturbance activities. They are important as a secondary line of defense-erosion control practices should be considered first. Points of inflow and outflow need to be well stabilized. Baffles can be installed in the basin to increase storage time and sediment deposition. Fencing, warning signs, and other safety features should be considered during design. Sediment basins can be converted to permanent debris basins or stormwater retention ponds following construction, if properly designed. Within 30 days following permanent stabilization of the contributing drainage area, the basin should be converted to its permanent configuration and stabilized. If the designed embankment is more than 10 feet high, if the drainage area is over 1 square mile, or if more than 1 million gallons of water will be impounded, a NYS Department of Environmental Conservation permit is required.

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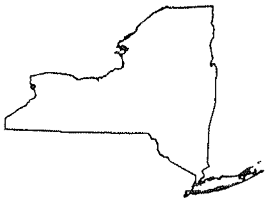

## MANAGEMENT PRACTICE SUMMARY SHEET

# TEMPORARY SEDIMENT TRAP

***DEFINITION***

A small ponding area or trapping device constructed to intercept sediment-laden runoff and retain the sediment.

***WATER QUALITY PURPOSE***

Sediment traps provide temporary storage of sediment from small disturbed areas.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Primarily sediment. To a limited extent, some adsorbed nutrients and heavy metals are trapped.

***WHERE USED***

Usually installed in a drainageway, at a storm drain inlet, or other points of discharge from construction sites. Used where drainage areas are 15 acres or less. (For larger areas, see "Temporary Sediment Basin".)

***PRACTICE DESCRIPTION***

Sediment traps are temporary structures designed to trap at least ½ inch of sediment per acre of contributing drainage area. They may be formed by excavation and/or embankment. Embankments are normally less than 5 feet. Slopes are stabilized with vegetation. Sediment trap design varies according to the drainage area and the location of the practice. Pipe, grass, stone or rock outlets are used. Due to the limited drainage area and temporary nature of sediment traps, standard drawings are often used for design purposes. Geotextile trapping devices are sometimes installed to capture sediment from smaller volumes of water.

Sediment traps reduce the transport capacity of flow by decreasing runoff velocities and collecting sediment.

***PRACTICE EFFECTIVENESS***

Sediment traps provide good control of coarse- and medium-sized sediment particles, especially during small storms. As with sediment basins, clay and fine silts are less likely to be trapped. A study of two sediment traps in Maryland indicated a 58% sediment removal rate for storms of less than 0.8 inches. Larger storms rendered these traps ineffective at sediment removal. Sediment trap performance varies greatly from storm to storm and from site to site. Trapping efficiency can be expected to be good for heavy metals and poor for dissolved nutrients. Sediment trap effectiveness increases with storage time. Sediment traps are often ineffective when constructed in swales or ditches.

***IMPACT ON SURFACE WATER***

Beneficial

***IMPACT ON GROUNDWATER***

None to slight. Recent studies indicate no significant increases in pollutant levels beneath stormwater retention basins. More research may be required to fully understand downward movement of soluble pollutants beneath sediment traps and infiltration practices, particularly in coarse soils.

***ADVANTAGES***

*If properly located, sediment traps can function through most phases of construction. *Relatively easy to design and construct. *Sediment traps reduce the velocity and increase the travel time of stormwater runoff.

***DISADVANTAGES***

*Practice effectiveness can be quickly reduced by large storm events unless maintenance is performed immediately. *Little or no impact on dissolved nutrients. *Pollutants deposited by runoff can be re-suspended and discharged during subsequent events.

***PRACTICE LIFESPAN***

Temporary sediment traps have a lifespan of one to two years. The lifespan for geotextile trapping devices is considerably less.

***COST***

Moderate. Can vary substantially depending upon design requirements and drainage area.

***OPERATION AND MAINTENANCE***

Sediment removal should be performed when the trap is 50% full. Sediment removed from the trap should be stabilized and placed where pollutants will not come in contact with a waterbody. Debris should be removed from the sediment trap to ensure proper functioning of the outlet structure.

***MISCELLANEOUS COMMENTS***

Sediment traps should be installed prior to land disturbance activities whenever possible. They are important as a secondary line of defense -- erosion control practices should be considered first. Points of inflow and outflow need to be well stabilized. Fencing, warning signs, and other safety features should be considered for larger sediment traps. Within 30 days following permanent stabilization of the contributing drainage area, the sediment trap should be converted to its permanent configuration and stabilized.

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MANAGEMENT PRACTICE SUMMARY SHEET

# TEMPORARY STORM DRAIN DIVERSION

**DEFINITION**

A re-directed stormwater conveyance which discharges into a sediment trapping device.

***WATER QUALITY PURPOSE***

To prevent the discharge of sediment-laden runoff directly into a watercourse or a stormwater drainage system.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used on construction sites where components of a stormwater drainage system have been installed. Normally used where the off-site drainage area is less than 50% of the total drainage area to the system.

***PRACTICE DESCRIPTION***

A temporary storm drain diversion may be a Temporary Dike/Swale, a Diversion, or a closed conduit. It may be installed below the storm drain outlet or as a temporary connector pipe in a storm drain inlet, or manhole. When installed in an inlet structure, or manhole, the permanent outlet pipe is temporarily plugged or its installation is postponed until the drainage area is stabilized. The temporary storm drain diversion serves to deliver sediment-laden runoff directly to a Temporary Sediment Trap or to a Temporary Sediment Basin.

***PRACTICE EFFECTIVENESS***

This practice is an effective means of temporarily conveying sediment-laden runoff to other practices for sediment deposition. Quantitative information is unavailable.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

* Avoids construction of new water diversion practices where existing stormwater facilities can serve the same purpose. *Can reduce sediment removal and maintenance costs for stormwater drainage systems. *Can increase the size of disturbed areas served by sediment trapping devices.

***DISADVANTAGES***

*Not suited to drainage areas with large amounts of off-site runoff. *Requires suitable site for sediment trapping device within close proximity to stormwater drainage system.

***PRACTICE LIFESPAN***

Approximately 1 year.

***COST***

Low to moderate. Varies according to site conditions and the type of diversion method used.

***OPERATION AND MAINTENANCE***

Check for stability and blockages after each storm event. After the contributing drainage area has been stabilized, flush the storm drainage system to remove any accumulated sediment, restore modified inlets to their permanent design condition, restore temporarily disturbed or channelled areas and stabilize them with pavement or vegetation, and establish the permanent stabilized outfall channel according to design.

***MISCELLANEOUS COMMENTS***

Stormwater management basins may also be temporarily modified to trap sediment, if the modifications are properly carried out early in the construction sequence. In these cases, storm drain diversion is usually not necessary since runoff is already directed to these basins.

***REFERENCES***

Empire State Chapter. Soil and Water Conservation Society. New York Guidelines for Urban Erosion and Sediment Control. Syracuse, NY. October 1991. (Management Practice Design Standard and Specification)

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MANAGEMENT PRACTICE SUMMARY SHEET

# TEMPORARY WATERCOURSE CROSSING

**DEFINITION**

A stable structure installed across a watercourse to provide short-term access for construction traffic.

***WATER QUALITY PURPOSE***

To prevent construction equipment from damaging the bed and banks of waterways, and to control the tracking of sediment and other pollutants into waterways.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment, fuels and lubricants.

***WHERE USED***

Used to cross small non-tidal watercourses where the banks are low and stable, the bed is firm, and there is minimal surface runoff. Used only when crossing a waterway is absolutely necessary.

***PRACTICE DESCRIPTION***

Temporary watercourse crossings may be bridges, culverts, or fords. In-stream excavation is limited to that which is necessary for installation of the practice. Crossings are from 12 feet to 20 feet wide and allow for one lane of traffic. Crossings are perpendicular to the watercourse. Roadway approaches are straight for 50 feet on each side of the crossing. Roadway runoff is diverted away from the crossing and the watercourse with a Waterbar or similar structure. Fill on the roadway approach is limited to 2 feet above floodplain elevation. No earth or soil material is used for construction within the waterway channel - the minimum aggregate size for this use is 3/4 inch. All disturbed areas are stabilized immediately after installation.

Temporary watercourse crossings control sedimentation by restricting equipment operation in the vicinity of the watercourse and by stabilizing the sites where crossings must be made.

***PRACTICE EFFECTIVENESS***

Temporary watercourse crossings can prevent turbidity, streambed disturbances, and pollution resulting from construction equipment. Bridges are normally the most effective means of crossing because channel disturbances are limited and vehicles are kept out of the watercourse. Improper design or installation of temporary watercourse crossings can actually increase sedimentation problems.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Bridge crossings are usually removed easily and are often portable and re-usable.

***DISADVANTAGES***

*Fords and culvert crossings may interfere with fish migration and spawning during certain times of the year. *Flooding and channel erosion can result from constrictions in the watercourse.

***PRACTICE LIFESPAN***

Two years or less.

***COST***

Moderate to high.

***OPERATION AND MAINTENANCE***

Trapped sediment and debris is removed periodically. Periodic inspections are also performed for the stability of the crossing and the watercourse. Bridges normally require the least amount of maintenance. Fords usually require the most mainte

nance. In all cases maintenance, removal and cleanup should be accomplished without construction equipment working in the waterway. Required removal work should be completed within 14 days of the crossing's last day of use. All disturbed areas should be stabilized immediately after the crossing's removal.

***MISCELLANEOUS COMMENTS***

Watercourse crossings should be avoided whenever possible. They should be in service for the shortest practical time period and removed as soon as their use ends. Loading, structural utility, and safety must all be considered during design. Temporary watercourse crossings are not intended for use by the general public. Natural drainage channels should not be altered without proper approvals from local, state and federal authorities.

***REFERENCES***


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## MANAGEMENT PRACTICE SUMMARY SHEET

# TOPSOILING

***DEFINITION***

Conserving and utilizing a specified quality and quantity of topsoil on disturbed areas.

***WATER QUALITY PURPOSE***

To provide an acceptable growth medium for vegetative cover and to, thereby, help stabilize potential sources of sediment.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where the existing or regraded soil material is unsuitable for plant growth or where applications of lime, fertilizer, and mulch alone will not result in adequate vegetative cover.

***PRACTICE DESCRIPTION***

Topsoiling is an essential companion practice to Permanent Vegetative Cover where an unsuitable growth medium for plants exists. Topsoil is characterized by desirable texture, organic content, and pH. It is normally free of herbicides, soil sterilants, large stones, high concentrations of soluble salts, and large quantities of noxious weeds. Erosion and sediment control practices should be installed before topsoiling occurs. Topsoil can be preserved in place, or stripped and stockpiled on-site. Topsoil stripping is confined to the immediate construction site. Stockpiles are located away from drainageways and waterbodies, and have sediment barriers (Silt Fence or Straw Bale Dike) placed around their perimeter. Prior to the distribution of topsoil, the subsoil is scarified at right angles to the slope direction. It is not placed on frozen or muddy soils, or over ice, snow or standing water. Topsoil is spread to a depth specified for its intended use and subsoil conditions - normally 2" to 6". When placed on moderate or steep slopes it is immediately fertilized, seeded, mulched, and stabilized by "tracking" with suitable equipment.

***PRACTICE EFFECTIVENESS***

Promotes establishment of vegetative cover, thereby indirectly contributing to a reduction in sediment movement. A study of various revegetation treatments on denuded construction sites indicated that additions of topsoil with surface mulch were the most effective means of establishing vegetation and controlling soil erosion.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Improves success of permanent vegetative cover establishment. *Topsoil stockpiles can be used as sound or visual barriers during construction.

***DISADVANTAGES***

*May delay seeding/sodding operations and increase exposure time of critical areas. *Topsoil stockpiles can interfere with construction activities.

***PRACTICE LIFESPAN***

Permanent.

***COST***

Moderate.

***OPERATION AND MAINTENANCE***

Stockpiles should be temporarily protected with vegetation or artificial coverings if left exposed for long periods of time. Maintain sediment barriers around stockpiles.

***MISCELLANEOUS COMMENTS***

Topsoil placed over unscarified, compacted subsoils can result in seepage and sloughing problems - particularly on steeper slopes. Used stockpile sites and excess topsoil should be graded and seeded.

***REFERENCES***

Connecticut Council on Soil and Water Conservation. Guidelines for Soil Erosion and Sediment Control, Connecticut. Hartford, CT. January 1985.

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## MANAGEMENT PRACTICE SUMMARY SHEET

# TURBIDITY CURTAIN

***DEFINITION***

A flexible barrier used to trap sediment in water bodies.

***WATER QUALITY PURPOSE***

To isolate soil disturbing activities and contain sediment within small sections of a water body; To divert sediment laden water from sensitive areas.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used where it is necessary to disturb shorelines or streambanks, or to undertake construction activities within water. May also be used within waterbodies to divert sediment laden tributary flows away from drinking water intakes.

***PRACTICE DESCRIPTION***

A turbidity curtain is a fabric barrier weighted at the bottom, attached to a floatation device at the top, and anchored to the shore at both ends; or it may be a self-contained water-filled barrier. The flexible curtain is designed to have sufficient slack to rise with increasing water levels yet remain in place at the bottom. The geotextile fabric must be of adequate strength, durability, and equivalent opening size. The curtain is weighted with a chain or cable attached to its bottom edge. Supplemental anchors are sometimes used. Floatation is provided by foam-filled plastic tubes or a similar system which will float when cut or punctured. The floatation system is often supplemented with steel cable for strength. The water-filled barrier extends above the water surface and is anchored at shore locations beyond the work area.

Where shoreline disturbances are minimal, water flows are still, and water depths are shallow, it is possible to stake the curtain rather than using a floatation system. Proper anchoring methods must still be utilized.

***PRACTICE EFFECTIVENESS***

Observed to effectively limit the migration of suspended sediment from active construction sites along water bodies. In-water filtering capability of geotextiles needs to be tested. This practice does not control the amount of sediment produced but does limit its movement and its effect on surrounding and downstream waters.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

*Protects fish spawning areas. *Curtains and barriers are re-usable.

***ADVANTAGES***

None.

***DISADVANTAGES***

*Not normally suited to spanning streams. *Not used where currents are strong. *Not suited to frozen conditions.

***PRACTICE LIFESPAN***

Short. Normally 6 months or less. Depending on manufacturer's specifications and the application, curtains may last several years. Repair tears and cables as needed to extend life.

***COST***

Low to moderate.

***OPERATION AND MAINTENANCE***

Inspect daily and repair immediately. It is not normally necessary to remove sediment deposited behind the curtain. When removal is necessary it is done by hand wherever possible and prior to removal of the barrier. Removed silt is stabilized away from the waterbody. The barrier is removed carefully and pulled toward the construction site to minimize the release of attached sediment.

***MISCELLANEOUS COMMENTS***

All applicable permits and approvals must be obtained from local, state and federal authorities. Turbidity curtains are used only when construction activity within a waterbody or along its shoreline cannot be avoided. They are often used in conjunction with Temporary Watercourse Crossings and Critical Area Protection: Streambank and Shoreline Protection. If the turbidity curtain is used to divert sediment laden flows or extend the flow path away from water intakes, the curtain would only be anchored at its nearshore end. It should never be installed as a barrier to flow from a stream or culvert. This will result in unequal water pressure forcing out the toe of the curtain causing scour as well as releasing sediment.

***REFERENCES***


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# MANAGEMENT PRACTICE SUMMARY SHEET

## WATERBAR

***DEFINITION***

A ridge, or ridge and channel, constructed across sloping roads, rights-of-way, or other narrow disturbed areas.

***WATER QUALITY PURPOSE***

To limit the accumulation of erosive volumes of water by diverting surface runoff to protected outlets.

***SOURCE CATEGORY***

Construction.

***POLLUTANTS CONTROLLED***

Sediment.

***WHERE USED***

Used at predesigned intervals on construction roads, rights-of-way, and other strips of disturbed land less than 100 feet wide. Also used to keep surface runoff from reaching a Temporary Watercourse Crossing.

***PRACTICE DESCRIPTION***

A waterbar is a short water diversion structure constructed at an oblique angle across the slope. It is at least 18 inches high and its ridge is 6 feet wide or more. Wider waterbars are used where regular vehicle traffic is anticipated. The grade of the waterbar channel does not exceed 2 percent. Waterbars are spaced according to the slope of the disturbed area, the erodibility of the soil, and the availability of stable outlet sites. Level Spreaders are used for outlets on steep slopes. Sediment-laden water is not discharged directly into streams, stormwater facilities, or waterbodies. Vehicle crossings are stabilized with gravel and other exposed areas are immediately seeded and mulched.

***PRACTICE EFFECTIVENESS***

Normally provides good control of rill and gully erosion. Timely implementation is important to prevent concentrated flows from eroding newly constructed roads and rights-of-way.

***IMPACT ON SURFACE WATER***

Beneficial.

***IMPACT ON GROUNDWATER***

None.

***ADVANTAGES***

*Easily adapted to a variety of site conditions. *Easily constructed - layout can be done alone with a hand level by vertically spacing waterbars using the elevation of the technician's eye.

***DISADVANTAGES***

*Can cause a safety hazard if vehicle needs are not accounted for during design. *Frequent maintenance may be required.

***PRACTICE LIFESPAN***

Normally 2 years or less.

***COST***

Low.

***OPERATION AND MAINTENANCE***

Check waterbars and outlet areas periodically for erosion damage and sediment. The volume of traffic over the waterbars will strongly influence the amount of maintenance required.

***MISCELLANEOUS COMMENTS***

Good planning reduces the incidence of sites which require waterbars. Avoid locating accessways on slopes whenever possible, and surface when necessary. (see Construction Road Stabilization management practice.) The long-term fate of a waterbar will depend upon the ultimate use of the site on which it is constructed. It is often desirable to permanently seed the entire accessway, including the waterbars, once construction activities are completed.

***REFERENCES***

Dutchess County Soil and Water Conservation District. Dutchess County Soil Erosion and Sediment Control Guidebook. Trail and Access Road Construction and Stabilization. Millbrook, NY. June 1989.

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