



Highway and Right of Way Maintenance Tier 2 Worksheet



Community Environmental Management

Acknowledgements

**The New York State Soil and Water Conservation Committee
and Department of Environmental Conservation
are grateful to the following people and organizations
for their assistance with this project:**

Thanks go to Ed Hoxsie and Julie Melançon who conducted the original Dutchess County pilot upon which this worksheet was based. Thanks also go to Cally Miklasz and Joe Ghosen who field-tested the worksheet with the Town of Eden in Erie County.

We also would like to thank our County Soil and Water Conservation District colleagues Jeff Parker, Les Travis and Brian Scoralick for their review and comments.

Additionally we appreciate the knowledge and feedback we received from David Graves.

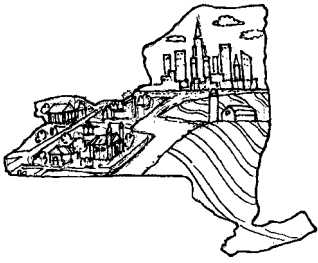
Photo credits go to Dutchess County Soil and Water Conservation District. The CEM Logo was designed by Oan Somboonlakana. Additional thanks go to Barbara Silvestri for her assistance in design.

We also appreciate the support from the New York State Departments of Agriculture and Markets, State and Health.

Special thanks go to Donna Somboonlakana and the US Environmental Protection Agency for Clean Water Act – Section 319 funding support.

Unending gratitude goes to Phil DeGaetano, Lois New, Gerry Chartier, Bill Morton, Rich Lewis, John Wildeman and Ron Kaplewicz without whom CEM would never have become a reality.





Community Environmental Management

Highway and Right-of-Way Maintenance Tier 2 Worksheet

CEM

Overview

Highways are the lifeblood of commerce. Our economy relies on effective transportation of goods and people along safe and convenient roads. Unfortunately, roads are often significant contributors to poor water quality. Runoff from natural rain events and melting snow washes over the landscape and picks up material as it travels along. As runoff flows over roadways, road construction sites, highway maintenance garages and road maintenance operations, it picks up sediment, heavy metals, oils, pesticides, herbicides, fertilizer, road salt and debris. These contaminants are transported into our streams, lakes, wetlands and rivers, impairing their water quality and decreasing their aesthetic value. This in turn can lead to a negative effect on tourism and the economy.

Either through ignorance of ecosystem functions, poor planning, or just plain indifference to natural stormwater runoff processes, humans, through construction and development activities, have created a number of problems for themselves and nature. Through their planning and regulatory functions, local governments have the responsibility for controlling how these activities are undertaken in New York State. This role carries with it the responsibility for ensuring that they are done with the safety of future inhabitants in mind, and in a manner that is compatible with the protection and enhancement of natural resources, including water resources.

The purpose of the highway and right-of-way maintenance worksheet is to assess the nature of their associated problems in the community and to evaluate the capacity of the community to remediate existing stormwater runoff problems as they relate to highway and right-of-way maintenance activities and to prevent their reoccurrence. The following is intended to provide insight into the evolving subject of highway and right-of-way maintenance.

Highway and right-of-way management is a complex issue, with many factors potentially contributing to the problem. This strategy list, taken from the Roadway and Right-of-Way Maintenance Management Practices Catalogue developed by the NYS NPS Management Practices Task Force (1994) outlines four strategies communities can use to manage the impacts of roadways and right-of-ways in their communities.

Enhance the Quality of Stormwater Runoff to Surface and Groundwater

This strategy mainly focuses on physical barriers and operational changes that would keep pollution from salt storage, equipment maintenance activities, vegetation maintenance, construction, and roadway maintenance activities. It also brings out the importance of identifying existing ground and surface water resources in site plans, designing and implementing SMPs to treat runoff, and evaluating the effectiveness of SMP's to be implemented for potential impacts to groundwater as well as surface water

Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations

This strategy highlights the importance of effective maintenance, proper sizing and selection of SMPs, and how policy can be used to protect resources that help manage stormwater flows. It also mentions that an intermunicipal approach to managing these issues, which can be more effective and cost-efficient.

Address Stormwater Management for Construction Site Runoff

Construction site runoff is the most significant source of most sediment loading. Effective planning of construction sites, as well as proper selection, installation and maintenance of SMPs is the key to achieving this goal. Understanding and using the NYSDEC Stormwater Design Manual is an essential part of success.

Preserve and Utilize Natural Features and Processes

There are many natural features, such as wetlands and floodplains, which, if preserved can play a large role in mitigating the detrimental aspects of increased flows due to highway maintenance activities. It is beneficial to use them to your advantage, but be wary of overloading them and creating more problems that you started with.

How This Worksheet Can Assist Your Community in Protecting Public Safety and Natural Resources

This worksheet can be used to help your community to:

1. More fully understand highway and right-of-way management concepts,
2. Assess how your community selects, implements and monitors best management practices (BMPs) for highway and right-of-way maintenance
3. Identify wastewater highway and right-of-way maintenance and operational management needs, and
4. Begin to map out a highway and right-of-way maintenance management strategy for the future.

For help in filling out this worksheet and technical assistance on onsite wastewater management, it is recommended that your County Soil and Water Conservation District or County Department of Public Works be contacted. Most communities do not have a set highway and right-of-way maintenance management plan. This worksheet can help your community determine its management needs.

Technical references available for communities in New York State to learn more about highway and right-of-way maintenance are listed below:

- Environmental Handbook for Transportation Operations: A Summary of the Environmental Requirements for Maintaining Highways and Transportation Systems. Prepared in July 2001 by the New York State Department of Transportation's Environmental Analysis Bureau. You can download a copy off the internet at: <http://www.dot.state.ny.us/eab/manual/oprhbook.pdf>, or you can contact them directly at (518) 457-5672.
- Roadway and Right-of-Way Maintenance Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection in New York State. Prepared by the Roadway and Right-of-Way Maintenance Management Practices Subcommittee of the New York State Nonpoint Source Management Practices Task Force. June 1994
- Cornell Local Roads Program. For information, visit <http://www.clrp.cornell.edu/>. Additional information can be obtained by contacting them at 416 Riley-Robb Hall, Ithaca, NY 14853-5701, ph: (607) 255-8033, fax: (607) 255-4080
- Camp Road Maintenance Manual: A Guide for Landowners. Kennebec County Soil and Water Conservation District, with assistance from the Maine Department of Environmental Protection's Bureau of Land and Water Quality. Revised 2000





Community Environmental Management

– Highway and Right of Way Maintenance – Tier II Worksheet

Part 1- Community Risk Assessment Factors

The following is a list of strategies many communities have used to improve their highway maintenance techniques and minimize pollution and other negative impacts such as salt and de-icing materials entering surface and groundwater supplies. The more factors that apply to your community, the less likely you are to have adverse water quality impacts. Please check all of those that pertain to your community.

Please check all that pertain to your community:

- The highway maintenance employees are informed about the impacts polluted runoff can have on water quality, and what they can do to prevent it.
- Design, construct and maintain shelters that prevent runoff from salt and de-icing materials from entering surface or groundwater
- Implement operations plans that minimize potential for hazardous materials from equipment repair and maintenance from entering surface and groundwater
- Develop and implement an operation and maintenance plan for preventing or reducing stormwater pollution from municipal facilities and stormwater infrastructure
- Develop and implemented a program to detect and eliminate illicit discharges and connections to the storm sewer system
- Develop and implement erosion and sediment control (E&S) plans for highway construction activities that disturb 1 or more acres.
- Conduct inspections on all highway construction sites to ensure E&S plans are properly implemented.
- Use reliable and accurate methods to properly size and construct bridges, ditches and culverts to prevent erosion, sedimentation and blowouts.
- After cleaning out ditches, make sure banks are stabilized and re-seeded to prevent erosion
- Prevent runoff from moving across roads, creating black ice and depositing sediment
- Work with highway and municipal officials to discuss ways to reduce the amount of paved area, thereby cutting maintenance costs (e.g. decreasing road widths in subdivisions without sacrificing safety, make curb cuts, pervious pavers for overflow parking surfaces, bioretention in parking lots, opening the center of cul-de-sacs and use them to manage stormwater)
- Require evaluation of soils before installing stormwater conduits to see if infiltration is an option
- Establish maximum road and driveway slopes
- Perform soil tests before applying fertilizer on municipal grounds
- Use pesticides and herbicides by certified applicators only when application is necessary, and according to the label on municipal grounds



Part 2- Community Problem & Needs Assessment

Part 2 of this assessment will help to determine how extensive flooding is in your community and what is your community's capacity for addressing flooding issues.

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>Streams flood over the road and/or flooding has removed road</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Locations (List):</p> <hr/> <hr/>	<p>1. Increase in rate and volume of runoff due to increased per cent of impermeable surface area in watershed from development</p> <p>2. Loss of wetlands that function to receive excess rainfall and release it slowly</p> <p>3. Improper sizing of bridges and culverts</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased flooding and flood damages, including increased costs of repairing infrastructure, and possible loss of human life</p> <p><input type="checkbox"/> Expansion of the floodplain</p> <p>Magnitude and duration of the flooding (Explain):</p> <hr/> <hr/>	<p>Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations</p> <hr/> <p>Strategy: Preserve and Utilize Natural Features and Processes</p>

<p>Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)</p>	<p>Barriers To Implementation</p>	<p>Community Assistance Needs¹</p>
<p>Options:</p> <ul style="list-style-type: none"> ___ Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention) ___ Retain existing wetlands, riparian forest buffers and environmentally sensitive areas in their right of ways to provide flood retention and water quality benefits ___ Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods ___ Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual ___ Retrofit existing stormwater management system ___ Use maximum extent practicable (MEP) standards ___ Implement flood mitigation plan to reduce damages when developing roadways 		
<p>Options:</p> <ul style="list-style-type: none"> ___ Retain existing wetlands, riparian forest buffers and environmentally sensitive areas in their right of ways to provide flood retention and water quality benefits ___ Provide means for passing the floodplain flow when constructing bridges 		
<p>There are other factors that influence flooding, including stormwater and stream corridor management. If you have issues with flooding, we suggest you complete the Tier II Flood Management Worksheet to further assess your situation.</p>		

¹ List type of assistance needed: information/education; assessment/planning; BMP design/implementation; regulatory options; project funding; etc.

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>Water overflows road at culvert or catch basins are backing up</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Locations (List):</p> <hr/> <hr/>	<p>1. Increase in rate and volume of runoff due to increased per cent of impermeable surface area in watershed from development</p> <p>2. Improper sizing of stormwater conveyance system</p> <p>3. Lack of maintenance of stormwater conveyance system</p> <p>4. Loss of capacity of catch basins and culverts due to sediment deposition</p> <p>5. Beaver dams</p> <p>6. Landowner adjacent to right of way has modified the conveyance system.</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased flooding and flood damages, including increased costs of repairing infrastructure</p> <p><input type="checkbox"/> Increased sediment loading in catch basins and conveyance system</p> <p>Magnitude and duration of the flooding (Explain):</p> <hr/> <hr/>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p> <hr/> <p>Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations</p>

<p align="center">Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)</p>	<p align="center">Barriers to Implementation</p>	<p align="center">Community Assistance Needs</p>
<p>Options:</p> <ul style="list-style-type: none"> ___ Develop, implement and enforce buffer restrictions that reduces the amount of sediment entering surface waters ___ Ensure that work sites are planned, developed and maintained according to applicable State and Federal regulations ___ Design and implement SMPs to treat runoff ___ Design and implement an erosion and sediment control plan ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function and prevent loading of pollutants into the stormwater system ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. 		
<p>Options:</p> <ul style="list-style-type: none"> ___ Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention) ___ Implement low-impact SMPs that induce infiltration ___ Retain existing wetlands, riparian forest buffers and environmentally sensitive areas in their right of ways to provide flood retention and water quality benefits ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Develop, implement and enforce intermunicipal agreements to reduce or eliminate factors that increase erosion and sedimentation in the watershed ___ Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods ___ Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual ___ Retrofit existing stormwater management system ___ Use maximum extent practicable (MEP) standards ___ Implement flood mitigation plan to reduce damages when developing roadways ___ Develop, implement and enforce buffer restrictions that slow stormwater flows 		

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>Erosion is occurring around culverts, or there has been culvert blowouts</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Locations (List):</p> <hr/> <hr/>	<p>1. Increase in rate and volume of runoff due to increased percent of impermeable surface area in watershed from development</p> <p>2. Improper sizing of stormwater conveyance system</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased flooding and flood damages, including increased costs of repairing infrastructure</p> <p><input type="checkbox"/> Increased sediment loading from erosion</p> <p>Magnitude and duration of the flooding (Explain):</p> <hr/> <hr/>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p> <hr/> <p>Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations</p>

<p align="center">Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)</p>	<p align="center">Barriers to Implementation</p>	<p align="center">Community Assistance Needs</p>
<p>Options:</p> <ul style="list-style-type: none"> ___ Develop, implement and enforce buffer restrictions that prevent sediment from entering surface waters 		
<p>Options:</p> <ul style="list-style-type: none"> ___ Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention) ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function ___ Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods ___ Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Develop, implement and enforce intermunicipal agreements to reduce or eliminate factors that increase erosion and sedimentation in the watershed ___ Retrofit existing stormwater management system ___ Develop, implement and enforce buffer restrictions that slow stormwater flows 		

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>The bottom and/or sides of ditches are eroding or slumping</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Locations (List):</p> <p>_____</p> <p>_____</p>	<p>1. Soils that ditches are located in are inappropriate</p> <p>2. Increase in rate and volume of runoff due to increased per cent of impermeable surface area in watershed from development</p> <p>3. Improper sizing of stormwater conveyance system</p> <p>4. Improper maintenance of stormwater conveyance system</p> <p>5. Improper slope stabilization</p> <p>6. Ditch is an improper practice selection for drainage area size</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased sediment loading from erosion</p> <p><input type="checkbox"/> Erosion impacting homeowners' property</p> <p><input type="checkbox"/> Safety in and around the road ditch</p>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p> <hr/> <p>Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations</p>

<p align="center">Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)</p>	<p align="center">Barriers to Implementation</p>	<p align="center">Community Assistance Needs</p>
<p>Options:</p> <ul style="list-style-type: none"> ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function and prevent loading of pollutants into the stormwater system ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Review soil characteristics before planning and constructing roads and their stormwater conveyance systems 		
<p>Options:</p> <ul style="list-style-type: none"> ___ Reshape ditches after cleanout to preserve capacity ___ Assess ditches and analyze ditch geometry and drainage area size for compatibility ___ Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention) ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function ___ Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods ___ Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Develop, implement and enforce intermunicipal agreements to reduce or eliminate factors that increase erosion and sedimentation in the watershed ___ Retrofit existing stormwater management system ___ Use maximum extent practicable (MEP) standards ___ Develop, implement and enforce buffer restrictions that slow stormwater flows 		

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>We have mud flows and/or chronic black ice on roadways</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Extent (describe): _____</p> <p>Locations (list): _____</p>	<p>1. Nearby slopes are not protected against slumping and lead to mud flows.</p> <p>2. Soils that ditches are located in are inappropriate</p> <p>3. High water table or subsurface flows</p> <p>3. Improper maintenance of stormwater conveyance system.</p> <p>4. Improper sizing of stormwater conveyance system</p> <p>4. Increase in rate and volume of runoff due to increased per cent of impermeable surface area in watershed from development forces runoff and mud flows across streets</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased damages, including increased costs of repairing infrastructure, and possible loss of human life</p> <p><input type="checkbox"/> Increased sediment loading from erosion</p> <p><input type="checkbox"/> Erosion impacting homeowners' property</p> <p><input type="checkbox"/> Increased sediment loading from erosion</p> <p><input type="checkbox"/> Safety and road closure issues</p>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p> <hr/> <p>Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations</p>

Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)	Barriers to Implementation	Community Assistance Needs
<p>Options:</p> <ul style="list-style-type: none"> ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Develop, implement and enforce buffer restrictions that prevent sediment from entering surface waters ___ Review soil characteristics before planning and constructing roads and their stormwater conveyance systems 		
<p>Options:</p> <ul style="list-style-type: none"> ___ Increase the subsurface drainage to minimize high water table or subsurface flows ___ Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention) ___ Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods ___ Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual ___ Hydroseed or use other method to seed exposed soil in ditches after cleanout. ___ Develop, implement and enforce intermunicipal agreements to reduce or eliminate factors that increase erosion and sedimentation in the watershed ___ Develop, implement and enforce buffer restrictions that slow stormwater flows ___ Review soil characteristics before planning and constructing roads and their stormwater conveyance systems ___ Implement low-impact SMPs that induce infiltration 		

Issues Associated with Highway Maintenance Activities	Causes	Impacts	Remedial & Preventative Strategies
<p>Muddy water is running off highway construction and/or maintenance sites</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Locations (List):</p> <hr/> <hr/>	<p>1. Improper planning, installation and/or maintenance of SMPs</p> <p>2. Lack of erosion and sediment control regulations and/or inspections at the local level</p>	<p>Check those impacts that apply:</p> <p><input type="checkbox"/> Increased sediment loading from erosion to receiving waterbody</p> <p><input type="checkbox"/> Increased nutrient loading to receiving waterbody</p>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p> <hr/> <p>Strategy: Address Stormwater Management for Construction Site Runoff</p>

<p align="center">Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)</p>	<p align="center">Barriers to Implementation</p>	<p align="center">Community Assistance Needs</p>
<p>Options:</p> <ul style="list-style-type: none"> — Ensure that work sites are planned, developed and maintained according to applicable state and Federal regulations — Design and implement and inspect SMPs to treat runoff — Evaluate effectiveness of SMP's to be implemented for potential impacts to groundwater as well as surface water — Hydroseed or use other method to seed exposed soil in ditches after cleanout. — Develop, implement and enforce buffer restrictions that prevent sediment from entering surface waters <p>Review soil characteristics before planning and constructing roads and their stormwater conveyance systems</p>		
<p>Options:</p> <ul style="list-style-type: none"> — Conduct site inspections during construction to ensure erosion and sedimentation practices are installed and being properly maintained on public and private roadways — Expand local subdivision regulations to cover erosion and sedimentation control — Review soil characteristics before planning and constructing roads and their stormwater conveyance systems — Implement low-impact SMPs that induce infiltration — Use maximum extent practicable (MEP) standards — Hydroseed or use other method to seed exposed soil (e.g. on construction sites or in ditches after cleanout) — Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods — Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual — Post bonds to ensure compliance by developers and contractors on private roadways 		

Target Highway Maintenance Activities	Concerns	Impacts	Remedial & Preventative Strategies
<p>Our municipality is concerned about how best to manage winter weather operations</p> <p>___ Proper storage and maintenance of salt and other de-icing materials to prevent losses to runoff</p> <p>___ Make roads safe without overusing or wasting salt and de-icing materials</p> <p>___ Proper disposal of snow after plowing</p> <p>___ Management of excess sediment left behind after spring snowmelt</p>	<p>1. Wasted materials cost taxpayers money</p> <p>2. Health and human safety (e.g. clean drinking water, safe roads during winter conditions)</p> <p>3. Pollution impacts healthy aquatic ecosystems and can have an impact on tourism and biodiversity</p>	<p>Check those impacts that apply:</p> <p>___ When salt enters groundwater, it can migrate into drinking water wells and contaminate them</p> <p>___ When salt and de-icing materials enter surface water, it can be toxic to plants and animals, which can have an adverse impact on tourism, recreation and property values.</p> <p>___ When sand and grit enter surface water bodies, it contributes to turbidity and raises the bottom of the stream bed, both of which have an adverse impact on plants and animals.</p> <p>___ If snow is deposited into surface water bodies, it can lower the temperature of the water to the point where it kills plants and animals; and the salt and sand in the plowed snow can be toxic to plants and animals</p>	<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p>

Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)	Barriers to Implementation	Community Assistance Needs
<p>Options:</p> <ul style="list-style-type: none"> ___ Make sure salt and de-icing materials are sheltered from the elements ___ Make sure drainage from de-icing materials shelters are collected and treated before entering surface or groundwater ___ Develop, implement and enforce buffer restrictions that prevent placement of salt and de-icing materials where they may enter surface water ___ Develop and implement an operations plan for proper storage, handling and transfer of salt and de-icing materials ___ Calibrate the distribution system on spreading equipment to make sure only the proper amount of salt and/or de-icing material is placed on road surfaces ___ Develop and implement an operations plan that ensures salt and de-icing materials are spread only when needed ___ Identify existing ground and surface water resources in site plans ___ Make sure snow from plowing activities is not placed in streams, lakes, wetlands or any other sensitive area. ___ Make sure snowmelt from snow stockpiles is treated before it enters streams, lakes, wetlands or any other sensitive area ___ Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function and prevent loading of pollutants into the stormwater system 		

Target Highway Maintenance Activities	Concerns	Impacts
<p>Our municipality is concerned about how best to manage vegetation along roadways</p> <p>___ Proper use and distribution of pesticides, herbicides and fertilizers</p> <p>___ Make roads safe without overusing or wasting pesticides, herbicides and fertilizers</p>	<ol style="list-style-type: none"> 1. Wasted materials cost taxpayers money 2. Health and human safety (e.g. safe views and maneuvering along roads, clean drinking water) 3. Pollution impacts healthy aquatic ecosystems and can have an impact on tourism and biodiversity 	<p>Check those impacts that apply:</p> <p>___ Pesticides, herbicides and fertilizer enter groundwater, and migrate into drinking water wells, contaminating them</p> <p>___ Pesticides and herbicides enter surface water and are toxic to plants and animals</p> <p>___ Fertilizers enter surface water and cause increased plant and algae growth, which can have an adverse impact on tourism, recreation and property values</p> <p>___ Excess vegetation from clearing and mowing enter the stormwater system and are deposited into surface waters, contributing to BOD</p>
<p>Our municipality is concerned about how best to manage vehicle and equipment maintenance activities</p> <p>___ Proper disposal of waste and used engine fluids</p> <p>___ Preventing polluted runoff from equipment maintenance facilities entering surface or groundwater</p> <p>___ Perform site inspections to ensure proper storage of petroleum products and chemicals and prevent these compounds from entering surface and groundwater</p> <p>___ Ensure equipment breakdowns and emergency repairs made away from maintenance facilities are performed in a manner that prevents pollution from entering surface and groundwater</p>	<ol style="list-style-type: none"> 1. It costs more to remediate contaminated soil and water than to prevent contamination in the first place 2. Wasted materials cost taxpayers money 3. Health and human safety (e.g. safe working conditions for employees, clean drinking water) 4. Pollution impacts healthy aquatic ecosystems and can have an impact on tourism and biodiversity 	<p>Check those impacts that apply:</p> <p>___ Toxic and hazardous materials enter groundwater, and migrate into drinking water wells, contaminating them</p> <p>___ Toxic and hazardous materials enter surface water and are toxic to plants and animals, which can have an adverse impact on tourism, recreation and property values.</p> <p>___ Excess vegetation from clearing and mowing enter the stormwater system and are deposited into surface waters, contributing to BOD</p>

Remedial & Preventative Strategies	Management Options (Indicate with a "√" if community has implemented or use a "?" if community is interested)	Barriers to Implementation	Community Assistance Needs
<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p>	<ul style="list-style-type: none"> — Use pesticides, herbicides, fertilizers only when necessary, and never immediately before a rain event — Make sure highway maintenance personnel maintains certification for pesticide and herbicide application and attend the appropriate refresher courses — Make sure vegetation that is removed does not enter the stormwater conveyance system (e.g. wood chips from downed branches placed in ditches or left along roadways) 		
<p>Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater</p>	<ul style="list-style-type: none"> — Ensure implementation of stormwater pollution prevention plans at municipal equipment repair facilities (e.g. compliance checks, emergency spill response plan) — Develop and implement an operations plan for proper storage and transfer of hazardous materials — Identify existing ground and surface water resources in site plans — Make sure drainage from vehicle maintenance areas are collected and treated before entering surface or groundwater — Develop, implement and enforce buffer restrictions that prevent placement of toxic and hazardous materials where they may enter surface water 		
<p>Strategy: Preserve and Utilize Natural Features and Processes</p>	<ul style="list-style-type: none"> — Protect sensitive areas near highways and in right of ways 		

Community Environmental Management TIER III: HIGHWAY AND RIGHT-OF-WAY MANAGEMENT STRATEGY DEVELOPMENT

Highway and right-of-way management is a complex issue, with many factors potentially contributing to the problem. This strategy list, taken from the Roadway And Right Of Way Maintenance Management Practices Catalogue developed by the NYS NPS Management Practices Task Force (1994) outlines three strategies communities can use to manage the impacts of roadways and right of ways in their communities.

Strategy: Enhance the Quality of Stormwater Runoff to Surface and Groundwater

- Make sure salt and de-icing materials are sheltered from the elements
- Make sure drainage from de-icing materials shelters are collected and treated before entering surface or groundwater
- Develop, implement and enforce buffer restrictions that prevent placement of salt and de-icing materials where they may enter surface water
- Develop and implement an operations plan for proper storage and transfer of salt and de-icing materials
- Calibrate the distribution system on spreading equipment to make sure only the proper amount of salt and/or de-icing material is placed on road surfaces
- Develop and implement an operations plan that ensured salt and de-icing materials are spread only when needed
- Ensure implementation of stormwater pollution prevention plans at municipal equipment repair facilities (e.g. compliance checks and emergency spill plans)
- Develop and implement an operations plan for proper storage and transfer of hazardous materials
- Make sure drainage from vehicle maintenance areas are collected and treated before entering surface or groundwater
- Develop, implement and enforce buffer restrictions that prevent placement of toxic and hazardous materials where they may enter surface water
- Ensure that work sites are planned, developed and maintained according to applicable state and Federal regulations
- Use pesticides, herbicides, fertilizers only when necessary, and never immediately before a rain event
- Make sure highway maintenance personnel maintains certification for pesticide and herbicide application and attend the appropriate refresher courses
- Make sure vegetation that is removed does not enter the stormwater conveyance system (e.g. wood chips from downed branches placed in ditches or left along roadways)
- Identify existing ground and surface water resources in site plans
- Design and implement SMPs to treat runoff
- Evaluate effectiveness of SMP's to be implemented for potential impacts to groundwater as well as surface water
- Make sure snow from plowing activities is not placed in streams, lakes, wetlands or any other sensitive area.
- Make sure snowmelt from snow stockpiles is treated before it enters streams, lakes, wetlands or any other sensitive area
- Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function and prevent loading of pollutants into the stormwater system
- Hydroseed or use other method to seed exposed soil (e.g. on construction sites or in ditches after cleanout)
- Develop, implement and enforce buffer restrictions that prevent sediment from entering surface waters
- Review soil characteristics before planning and constructing roads and their stormwater conveyance systems

Strategy: Reduce the Impacts of Increased Stormwater Flow and Volume from Highway Operations

- Implement low-impact SMPs that induce infiltration
- Minimize percent of imperviousness allowed within the watershed or per site (e.g. work with emergency services, the Planning Board and Town Board to reduce allowable road widths and paved overflow parking areas, as well as encourage curb cuts and bioretention)
- Retain existing wetlands, riparian forest buffers and environmentally sensitive areas in their right of ways to provide flood retention and water quality benefits
- Implement public infrastructure maintenance program (e.g. street sweeping, catch basin and ditch cleanout) to maintain proper function
- Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods
- Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual
- Hydroseed or use other method to seed exposed soil (e.g. on construction sites or in ditches after cleanout)
- Develop, implement and enforce intermunicipal agreements to reduce or eliminate factors that increase erosion and sedimentation in the watershed
- Retrofit existing stormwater management system
- Implement flood mitigation plan to reduce damages when developing roadways
- Develop, implement and enforce buffer restrictions that slow stormwater flows
- Review soil characteristics before planning and constructing roads and their stormwater conveyance systems

Strategy: Address Stormwater Management for Construction Site Runoff

- Implement low-impact SMPs that induce infiltration
- Use maximum extent practicable (MEP) standards
- Hydroseed or use other method to seed exposed soil (e.g. on construction sites or in ditches after cleanout)
- Require all new and retrofit components of the public stormwater system be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual to reduce channel erosion, prevent over bank flooding and help control extreme floods
- Require all new and retrofit components of stormwater systems on private lands that empty into surface water or municipal stormwater systems be designed, constructed and maintained as per the NYSDEC Stormwater Design Manual
- Post bonds to ensure compliance by developers and contractors on private roadways
- Conduct site inspections during construction to ensure erosion and sedimentation practices are installed and being properly maintained on public and private roadways
- Expand local subdivision regulations to cover erosion and sedimentation control
- Review soil characteristics before planning and constructing roads and their stormwater conveyance systems

Strategy: Preserve and Utilize Natural Features and Processes

- Retain existing wetlands, riparian forest buffers and environmentally sensitive areas in their right of ways to provide flood retention and water quality benefits
- Protect sensitive areas near highways and in right of ways
- Provide means for passing the floodplain flow when constructing bridges

**If you have any questions or comments on this
draft worksheet, please contact:**

Julie Melançon
Community Environmental Management Coordinator
Dutchess County Soil and Water Conservation District
2715 Route 44
Suite 3
Millbrook, NY 12545
(845) 677-8011 ext. 3
julie-melancon@ny.nacdnet.org
<http://dutchess.ny.nacdnet.org/>