

Water Quality Strategy for Highway Operations

Schuyler County

January 2007

Schuyler County
Water Quality Coordinating Committee

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Water Quality Strategy for Highway Operations Schuyler County

INTRODUCTION

Schuyler County is a small, rural county covering 330 square miles. The county has 12 state highways, 31 county routes, numerous municipal roads, and many private drives and roads. It is possible that the county has more miles of roadside drainage than miles of stream. This extensive roadway and roadside drainage system has the potential to deliver sediment and other pollutants directly into streams. In addition to the water quality impacts, roadway erosion contributes to maintenance headaches for the responsible highway department.

Public roadway maintenance in Schuyler County is conducted by 14 separate entities: the County Highway Department, 8 town highway departments, 4 village public works departments, and a state maintenance office. Numerous official and un-official intermunicipal agreements exist among these departments for shared roadway and bridge maintenance. All of these departments have similar needs for improved management practices along road corridors and at highway garages. An additional concern is runoff from private drives and roads, which are maintained by property owners, homeowner associations, and other entities.

The Schuyler County Water Quality Coordinating Committee (WQCC) has developed this strategy to promote and facilitate the use of erosion control and maintenance techniques that save money while protecting and enhancing the county's lakes and streams. It will be implemented by the highway and public works departments operating throughout the county, with technical support and assistance from the Schuyler County Soil and Water Conservation District (SWCD) and other members of the Water Quality Coordinating Committee.

CURRENT MANAGEMENT PRACTICES

Municipal and county highway departments were surveyed to document current implementation practices, problem areas, funding needs, and training needs. Surveys were sent to 13 local highway departments (county, town, and village). Responses were obtained (written or by telephone) from 8 departments (62% return).

The 8 highway departments responding to the survey maintain a total of 2,801 miles of paved road and 214 miles of unpaved road. The current practices documented by the survey are presented in Appendix A and summarized below:

Snow and ice control

- All of the respondents reported using salt/sand mixture for snow and ice control. Many use more than one type of deicing material. These include:

Salt and sand – 8 departments (100%)
Cinders – 3 departments (38%)
Salt – 2 departments (25%)
Sand – 2 departments (25%)
Calcium chloride – 1 department (13%)

- Total reported salt use was 3,797 tons in the 2004-05 winter season and 4,332 in 2003-04.
- The average annual rate of salt use per road mile (for the 2003-04 and 2004-05 winter seasons) was: 8.5 tons/mile/year. This ranged from a low application rate of 2 tons of salt/mile/year (T. Hector, T. Orange) to a high of 22 tons of salt/mile/year (County Highway Department).
- A prior survey conducted by the Seneca Lake Area Partners in Five Counties (SLAP-5) for the 1996-97 winter season indicated an average rate of salt use in Schuyler County of 7.2 tons/mile/year. This ranged from a low application rate of less than 1 ton of salt/mile/year (T. Hector, T. Orange) to a high of 29 tons of salt/mile/year (V. Montour Falls).
- Three highway departments reported storing salt in uncovered locations on gravel or dirt.

Road surfaces

- Of the 214 miles of unpaved road covered by the survey, dust control was applied to 106 miles (50%).
- Dust control materials used include: dust oil, salt brine, and dust pads/road stabilizer.
- More than half of the highway departments (5) report sweeping at least some of their roads.
- Of the 280 miles of paved road covered by the survey, 116 miles of road are swept (41%).
- The departments that report road sweeping do it once per year.
- None monitor the amount of material removed by sweeping.

Road ditches and banks

- Respondents report a total of 15 miles of road ditch that are protected with rock lining.
- Respondents reported cleaning 28 miles of road ditch in 2005.
- 15 miles of cleaned ditches (54%) were stabilized with seed (10 miles) or seed and mulch (6 miles).
 - 6 departments seeded all of the ditches that had been cleaned
 - 1 department indicated that they never seed
 - 1 department seeded 20% of the ditch cleaned (with more ditch cleaning than usual in 2005 due to flood cleanup)
- In response to the question, “Would you do more seeding and mulching if resources were provided?” 7 highway departments answered yes and one left this question blank. Types of assistance desired include: funding for seed/mulch and manpower.

- Two highway departments reported undertaking 4 road ditch/roadbank stabilization and drainage projects in 2005. The average cost for these projects was about \$30,000 (range from \$18,862 to \$49,000). Reported funding sources included the Soil and Water Conservation District (part or all of 2 projects) and CHIPS (2 projects).

Culverts and streams

- Six highway departments reported installing, replacing, or repairing culverts in 2005 (11 culverts in 5 towns and “many” in another town). Of those reporting costs by project, the average cost per culvert/project was about \$4,800 (range from \$1,200 to \$20,000). All of these projects were paid for with local funding sources.
- One highway department reported undertaking a stream project in 2005 as part of the county’s Streambank Stabilization Program (project cost \$10,000).

EXISTING CONDITION OF ROAD DITCHES AND BANKS

Roadside drainage systems are designed to remove excess water from the road corridor. In the process, they frequently serve as conduits conveying sediment and other pollutants directly into streams. Water quality impacts are most pronounced when unstable slopes and exposed soils result in significant erosion of sediment from the ditches themselves and adjacent roadbanks.

In 1999, the Seneca Lake Area Partners in Five Counties (SLAP-5) evaluated public roadbank conditions in the Seneca Lake Watershed. Erosion of ditches and banks was categorized as moderate, severe, or very severe. In Schuyler County, erosion was documented along 51 miles of road bank or ditch. Less than 2 miles (3%) of this erosion was classified as very severe (42% was severe; 54% was moderate). These findings are summarized below by Town.

Town	Moderate Erosion (miles)	Severe Erosion (miles)	Very Severe Erosion (miles)
Catharine	1.20	0.25	0
Cayuta	0.35	0.20	0
Dix	7.50	1.75	0
Hector	7.38	5.24	0.40
Montour	2.55	4.65	0.35
Orange	0	0.60	0
Reading	6.62	4.39	0.68
Tyrone	2.15	4.50	0.30
TOTAL	27.75	21.58	1.73

Source: *Setting a Course for Seneca Lake – The State of the Seneca Lake Watershed, 1999.*

In 2002, the Upper Susquehanna Coalition conducted a Road Ditch and Roadbank Inventory (throughout Schuyler County portion of the Susquehanna River Basin). Ditch and roadbank

conditions were evaluated separately and classified as: stable, fair, good, or unstable. These data are summarized below by sub-watershed.

Watershed	Road Ditch Assessment				Roadbank Assessment			
	Stable (ft)	Fair (ft)	Poor (ft)	Unstable (ft)	Stable (ft)	Fair (ft)	Poor (ft)	Unstable (ft)
Mud Creek	0	2,210	4,171	4,224	0	1,590	528	0
Meads Creek	0	1,441	4,476	980	0	743	1,660	0
Post Creek	0	1,455	0	145	0	0	0	0
Cayuta Creek	0	7,671	4,866	58	0	528	3,841	225
TOTAL	0	12,777	13,513	5,407	0	2,861	6,029	225

- Of the 6.0 miles of road ditch assessed:
 - 0% was stable,
 - 40% was fair,
 - 43% was poor, and
 - 17% was unstable
- Of the 1.7 miles of roadbank assessed:
 - 0% was stable,
 - 31% was fair,
 - 66% was poor, and
 - 3% was unstable

It should be noted that these inventories provide a snap shot assessment of road ditch and bank conditions and may no longer be applicable to the current circumstances. In some cases, the stability will have improved due to implementation of stabilization measures or vegetative growth (particularly for the ditches assessed soon after cleaning). In other cases, subsequent high flows or other circumstances may have had a detrimental impact on the observed stability. The Schuyler County SWCD recommends that the stability of road ditches and banks be resurveyed about every three years.

RECOMMENDED MANAGEMENT PRACTICES

The recommended management practices for reducing the water quality impacts of highway operations in Schuyler County are summarized below. Additional resources for implementing these practices are included in the *Highway Superintendent Roads & Water Quality Handbook, Edition III*. A copy of this handbook has been provided to each municipal highway department. The updated third edition includes additional information, updated resources, and organizational changes to facilitate access to relevant material. The Handbook sections applicable to the following recommendations are indicated in parentheses.

Plan your project (Handbook section: Project Planning)

Good design saves money: Properly designed and constructed road/stream crossings and roadways will lead to long-term savings by decreasing the amount of repairs and replacements that will be required “down the road.”

- Document the problem and determine the underlying causes.
- Evaluate alternatives and prepare a conceptual plan.
- Protect stream corridors, wetlands, and other areas that provide water quality benefits.
- Limit land disturbance and reduce erosion and sediment loss.
- Limit disturbance of natural drainage features and vegetation.
- Prepare a detailed plan, final budget, implementation schedule, and maintenance plan.

Obtain any necessary permits (Handbook section: Permits)

Even if no permit is required, you may still be responsible for a water quality violation. The state water quality standard for turbidity is “No increase that will cause a substantial visible contrast to natural conditions.”

- Maintain a record of permit applications and activities (Permit Log).
- Allow sufficient time for obtaining permits.
- The County Soil and Water Conservation District provides assistance with environmental permits.

Manage road and right-of-way drainage (Handbook section: Road Drainage)

The three most important considerations in road construction and maintenance are: drainage, drainage, and drainage. Problems caused by poor drainage include rutting, cracking, potholes, erosion, washouts, heaving, flooding, and premature failure of roadway.

Land use changes anywhere in the watershed may alter drainage onto the road.

- Use high quality road materials to promote good drainage.
- Move water off road surfaces as soon as possible.
- Promote good subsurface drainage.
- Make sure that culverts are appropriately sized (the County Soil and Water Conservation District can help with calculating the amount of runoff).
- Use appropriate culvert type, alignment, and end treatments.
- Ditches are important: pay attention to the shape, side slope, fall, lining materials, capacity, and depth.
- Direct runoff into vegetated filter areas or rock-lined turnouts.

- Manage water entering the roadway (use bank benches; look beyond the right-of-way).
- Monitor and maintain all drainage ditches and structures.

Prevent erosion (Handbook sections: Project Planning; Erosion & Sediment Control; *Roadway and Roadside Drainage* manual in Road Drainage section)

Approximately 30 tons of material can be eroded from a mile of ditches before you can see the damage! To remove and replace 30 tons of material is a lot of work.

Timely re-vegetation of road ditches and banks is the single most effective deterrent to water pollution originating from roads and road ditches. Vegetation slows the flow of water, consumes water, encourages infiltration, and anchors the soil.

- Minimize areas of disturbance.
- Avoid concentrating runoff.
- Stabilize ditches and other disturbed areas as soon as possible.
- Keep runoff velocities low.
- Inspect and maintain erosion and sediment control practices.

Stabilize roadbanks (Handbook section: Bank Stabilization; consult with the County Soil and Water Conservation District)

To determine a stable slope angle, look at stable slopes nearby that have the same soil and cover.

Roots of established vegetative cover are “Mother Nature’s rebar.”

- If the bank is stable, don’t fool with it.
- Identify the cause(s) of unstable banks (bank material, slope, hydrology, vegetation, inappropriate maintenance practices, etc.).
- Select appropriate stabilization techniques, utilizing living plants whenever possible.
- Inspect and maintain new stabilization projects.

Manage chemicals on the roadway and in the garage (Handbook sections: Dust Control; Road Salt Management; Chemical Management; *Roadway and Right-of-Way Maintenance* catalogue in Maintenance section)

- Avoid over-application of dust control and deicing chemicals.
- Do not use waste products (such as crank case drain oil from engines) for dust control.
- Store road salt in a covered area.
- Wash vehicles in cold water without any additives. This can be done outside if the site is located away from streams, wetlands, storm sewers, or drainageways. If soap, detergents, or degreasing agents are used, wash water should be treated.
- Conduct vehicle maintenance inside, in an area without floor drains.
- Vehicle fueling areas should be designed to prevent stormwater runoff and spills (paved, covered, and located away from drainageways).
- Conduct a self-audit to confirm that fuel, used oil, and other materials are stored in compliance with Petroleum Bulk Storage Regulations.
- Spills should be cleaned up **immediately**. Dry clean up is almost always the best option. Report spills to DEC: 1-800-457-7362.

Protect streams and wetlands (Handbook sections: Streams and Wetlands; Beaver Control)

It is not unusual for human actions to disturb the balance between a stream's energy and its sediment load, resulting in increased erosion and/or increased deposition.

The easiest, most effective way to protect a stream is to maintain a strip of plants along the bank.

- Avoid directing runoff into surface waters. Consider re-profiling road ditches to direct water away from the stream crossing and into stable vegetated buffers (see technical bulletin for "Corman" Clearwater Crossings).
- Do not encroach on the stream channel or wetland.
- Minimize encroachment onto the floodplain. Consider using floodplain culverts or a high water bypass to provide a stable overflow area during extreme flow events.
- Avoid dredging, filling, channel straightening, or relocation.
- Remove garbage from streams. Remove natural debris when necessary to protect bridges or prevent flooding. Stream cleaning should be selective to retain the natural benefits of woody debris, which slows stream velocities, breaks up flow, and provides habitat.
- When dealing with a stream problem, identify the underlying causes. Treating the symptoms may only yield short-term benefits and may even cause more problems than it solves.
- Keep in mind that streams are complex systems. Consult with the County Soil and Water Conservation District before undertaking streambank protection, sediment removal, or other stream projects.
- Evaluate alternative techniques for managing beaver problems along roadsides. Trapping is not the only solution.

Inspect and maintain the road system (Handbook sections: Maintenance; *Roadway and Roadside Drainage* manual in Road Drainage section)

Proper maintenance and rehabilitation of existing culverts can be much more economical than replacement.

Any ditch work does two undesirable things if not managed and repaired. It exposes soil to erosion. And it may change the depth or shape of the ditch to an undesirable condition.

- Mark or inventory culverts so they do not get missed during inspections.
- Inspect culverts and stream crossings every year (at least every two years) and after high flow events. (Information about what to look for and a culvert inspection form are in the *Roadway and Roadside Drainage* manual.)
- Conduct ditch maintenance during dry conditions (late summer or early fall is usually best).
- When maintaining a ditch, determine if it needs cleaning (removal of small amounts of sediment and vegetation from the bottom) or reshaping (removal of large amounts of material to widen or deepen the ditch). Be sure to do the right maintenance.
- Clean or reshape only a section of ditch at a time, leaving intact vegetation in the downhill part of the ditch to capture sediment.
- When maintaining a ditch, place erosion protection or seeding every day and before any rain. (Have the erosion material ready before starting the job.) **Do not leave exposed substrates to wash downstream.**
- Unpaved road surfaces require periodic re-shaping to re-establish the crown and cross-slope and incorporate loose stones back into the road surface.
- Sweep paved roads and parking lots to remove pollutants.
- Clean storm drain systems regularly to reduce the amount of pollutants, trash, and debris in both the storm sewer system and in receiving waters.
- Roadside vegetation management should utilize techniques that maintain stabilizing root systems, preserve climax tree species (which are structurally strong), and establish low maintenance plants (selective thinning, selective mowing, seeding, pruning).

RECOMMENDED TASKS

Train highway department staff

In order to implement the recommendations in this strategy, highway superintendents and equipment operators need periodic training in the proposed management practices. Many highway departments send staff to the Highway School offered by the Cornell Local Roads

Program each June. In addition, the Southern Tier Central Regional Leadership Conference provides local training opportunities. This is an annual one-day training program for municipal staff and officials, which includes a series of 4 workshops targeting issues of interest to highway departments. It is recommended that each conference include at least one workshop on an issue impacting water quality. In addition, the Water Quality Coordination Committee recommends that at least one longer training session be offered locally each year to provide more in-depth training. Training topics should include:

- Dirt and gravel road maintenance
- Roadway and roadside drainage (1-day workshop offered by Cornell Local Roads Program)
- Off-right-of way issues (what municipalities can do to manage water entering and leaving the right-of-way)
- Drainage law
- Erosion and sediment control (including bank stabilization)
- Stream management
- Deicing practices
- Environmentally sound dust control practices (example: driving surface aggregate recommended for unpaved roads in Pennsylvania)
- Chemical management

Implement demonstration projects

Demonstration projects utilizing new or innovative management practices provide local examples of both the benefits and limitations of those practices. The Soil and Water Conservation District will continue to look for opportunities to demonstrate recommended practices within Schuylers County. Recommended demonstration projects include:

- Replace single cross culvert with a series of culverts that disperse flow
- Proper spacing and construction of check dams
- High-water bypass (low section of road designed to serve as a stable overflow area during high flows)
- Diversion of ditch drainage away from the creek (re-profile road ditches to direct water away from the stream crossing and into stable vegetated buffers)
- Driving surface aggregate with the particle size distribution developed by Penn State's Center for Dirt and Gravel Road Studies (recommended for use on unpaved roads in Pennsylvania) – In addition to evaluating the local cost and effectiveness of this product, this demonstration project would involve working with local gravel companies to provide it.
- Stream stabilization techniques

Routine inspection of roadbanks and road ditches

Schuyler County has a history of road and shoulder damage due to failure of roadbanks and erosion of roadside ditches. Unstable sites are also significant sources of sediment pollution in local streams and lakes. In order to identify, prioritize, and remediate unstable sites, the SWCD recommends that all roads in the county be inspected every three years. This can be done by municipal highway departments and/or the SWCD, but it is recommended that a consistent methodology and reporting system be used.

Lakeshore development in Schuyler County has resulted in the construction of numerous private roads to access shoreline cottages and property. Many of these private roads are located on steep slopes where it is difficult to manage runoff and prevent erosion. When erosion occurs, it can have a direct impact on water quality in the adjacent lake. Unlike public roads, which are maintained by trained staff, the private roads remain the responsibility of property owners, homeowners' associations, and other entities. It is particularly important that these private roads be inspected routinely and the responsible parties be notified of any identified problems and the potential for water quality violations.

Roadbank/ditch assessments are out of date for public roads in the county and have not been conducted on private roads. (Public road assessments were done in the Seneca Lake Watershed in 1999 and the Chemung and Susquehanna Watersheds in 2002.) In addition to private drives, a high priority for inspection is the Mud Creek Watershed, which has been requested by the Waneta-Lamoka Lakes Association in order to identify and correct potential erosion problems that may impact the lakes.

Implementation requires:

- Funding to hire interns to conduct roadbank and road ditch assessments
- Training for highway department staff and interns (on assessment methodology and documentation procedures).

Map and inventory highway infrastructure

An accurate map of the highway system helps the responsible department ensure that all culverts and other drainage structures are included in routine inspection (and thus receive any needed maintenance and repairs). To assist with this effort the SWCD has offered to utilize GPS (global positioning system) and GIS (geographic information system) technology to work with interested highway departments to develop a computer map and database of each municipal highway system. This could include road type (paved, dirt, gravel, seasonal, etc.), culverts (location, material, size, etc.), and other infrastructure components (drywells, signs, etc.). In response to a question on the highway department survey, five departments expressed definite interest in this assistance (County Highway, Towns of Hector, Montour, Orange, and Reading) and one expressed possible interest (Town of Dix).

Implementation requires:

- Funding to enable the SWCD to fulfill all requests for assistance.

- Equipment (additional GPS unit, GIS capability at highway departments)

Implement drainage improvements and roadbank/road ditch stabilization

Stabilizing soils and banks within road corridors is a high priority for implementation throughout Schuyler County. In the past, some of these problem areas have been addressed when flooding resulted in catastrophic failure. However, the preferred approach is to identify and remediate drainage problems and unstable sites before the next flood.

Increased implementation of drainage improvements and roadbank/road ditch stabilization requires a commitment of financial resources. State funding from the Consolidated Highway Improvement Project System (CHIPS) is an important source of funding for these projects. Each highway department that listed priority problem areas on the survey also indicated that “inadequate funding” is an impediment to resolution. Additional impediments include time constraints, staffing, and design difficulties. Technical and design assistance is provided by the SWCD. In the past, the Natural Resources Conservation Service provided engineering support for the design of difficult projects. However, this assistance has become more limited and an alternate source of engineering support is needed.

A partial list of sites that may require drainage improvements or stabilization (based on highway department surveys and roadbank/road ditch assessments) is presented below. It should be noted that this list is likely incomplete and may include sites that no longer represent problems.

Municipality	Location	Problem	Estimated Cost
Schuyler County	CR 16	Ditch erosion	\$85,000
	CR 13	Road bank erosion from Jackson Creek	\$40,000
	CR 21	4 culverts, outlet stabilization	\$35,000
T. Cayuta	Chapman Rd.	58 feet unstable ditch, 2002	
	Hosenfield Rd.	96 feet unstable bank, 2002	
	Swan Hill Rd.	129 feet unstable bank, 2002	

Municipality	Location	Problem	Estimated Cost
T. Hector	Numerous locations: Roads in and around Finger Lakes National Forest, Satterly Hill, Mathews Rd., Burr Rd., Valois area, Cass Road, Serrine Rd., Bower Rd., Shumway Rd., Seneca Rd., Voorheis Rd., Covert Rd., Middle Rd., Chicken Coop Hill, Rose Ln., Jolley Rd., Tuttle Rd., Shuler Rd., Dolphsburg Rd.	All have various states of inadequate ditching and stabilization	
	Dean Rd.	0.1 mi very severe erosion, 1999	
	Mathews Rd.	0.15 mi very severe erosion, 1999	
	Wycoff Rd.	0.15 mi very severe erosion, 1999	
T. Montour	Cass Rd.	0.1 mi very severe erosion, 1999	
	Crans Rd.	0.15 mi very severe erosion, 1999	
	S. Genesee St.	0.1 mi very severe erosion, 1999	
T. Orange	Beaver Dams Hill (planned for 2006)	Ditch stabilization	\$50,000
	Sugar Hill Road (planned for 2006)	Road banks/culverts	\$25,000
	Grandview (planned for 2006)	Road banks/culverts	\$20,000
	Coon Hollow Road (planned for 2006)	Road banks/culverts	\$25,000
	Chambers Road (planned for 2006)	Road banks/culverts (145 feet unstable ditch in 2002)	\$10,000
	Evergreen Hill (planned for 2006)	Ditch stabilization	\$20,000
	Hornby Rd.	980 feet unstable ditch (2 sections), 2002	
	Barkley Hill Rd.	1,848 feet unstable ditch, 2002	
T. Reading	Beach Road stream crossing	Ditch area west of culvert intake is eroded, insufficient pond outlet	\$3,600
	Lovers Lane Rd.	0.02 mi very severe erosion, 1999	
	Oak Cliff Rd.	0.01 mi very severe erosion, 1999	
	Spencer Rd.	0.15 mi very severe erosion, 1999	
	Weller Rd.	0.5 mi very severe erosion, 1999	
T. Tyrone	Wollock Rd.	264 feet unstable ditch, 2002	
	Pulver Rd.	792 feet unstable ditch, 2002	
	Audrey Rd.	0.3 mi very severe erosion, 1999	

Implementation requires:

- Project funding for larger stabilization projects
- Continued state funding of CHIPS at current or higher levels
- Training of municipal highway staff
- Continued training of SWCD staff (for design assistance)
- Engineering backup to assist SWCD with designing difficult projects

Obtain funding for salt barns

The Schuyler County Highway Department and many municipalities have constructed salt barns for protected storage of deicing materials. However, other departments still utilize open storage locations, where soluble salts come in contact with stormwater and can contaminate groundwater and surface waters. Funding is needed to enable these highway departments to construct enclosed storage facilities.

Provide municipalities with seeding and mulching assistance

Timely seeding and mulching of disturbed soils are strongly recommended to reestablish protective vegetation, and thus prevent the sediment pollution and erosion damage that can result from exposed soils. In recent years, highway departments in Schuyler County have increased their utilization of these techniques. Additional effort is needed to apply the seed as soon as possible after disturbance. Most of the survey respondents indicated that they would do more seeding and mulching if resources were provided, citing a need for funding and manpower.

Various types of assistance are available to municipal highway departments: The Schuyler County SWCD has provided each municipality with a broadcast seeder and sells seed to municipalities at a discounted price (below cost). Municipalities can borrow a mulcher from the SWCD or County Highway Department and request assistance with application of seed/mulch.

In August 2006, Schuyler County was awarded member item funding for a hydro-seeder (\$36,000). When purchased, it will be available for use on highway projects (to be operated jointly by the County Highway Department and SWCD).

Implementation requires:

- Training of municipal highway staff
- Resources for the SWCD and County Highway Department to continue this assistance

Implement stream stabilization projects

The erosion and sediment deposition associated with unstable stream systems poses numerous threats to the county's road infrastructure. Some attempts to address these problems (by dredging, channel straightening, or other interventions) have further destabilized stream systems, contributing to even more problems. In addition, land use practices (that alter the amount and

timing of runoff draining into the streams) can lead to channel adjustments that threaten infrastructure.

Schuyler County established a County Stream Maintenance Program in 1997 to provide municipalities and landowners with technical and financial assistance for maintaining and repairing damage to streambanks. For municipal projects, the County provides 50% of the project funding. The SWCD provides technical assistance with project design and implementation.

A partial list of sites where roads and bridges are threatened by stream instability (based on highway department surveys) is presented below. Some locations require additional assessment to determine the underlying causes and select appropriate interventions.

Municipality	Location	Problem
Schuyler County	CR 16	Meads Creek has large volumes of debris buildup
	CR 13	Jackson Creek has sediment deposition problems
	CR 14	Continuous erosion at culvert
T. Hector	Buck Hill Road	Creek cutting into road
	Stillwell Road	Small stream, deposits of gravel
	Mount Road	Build-up of debris
	Peach Orchard	Retaining wall undermining
	Spaulding	Stream cutting into road
	Heverly/Mott Evans Road	Poor flow
	Potomac	Bank slough
T. Orange	Coon Hollow Road	Debris and heavy build up of gravel bars
	Sexton Hollow Road	Debris and heavy build up of gravel bars
	Donovan Hill Road	Culvert replacement/stream bank stabilization
	Sugar Hill Road	Removal of old debris that impedes stream flow

Implementation requires:

- Continued funding of the Schuyler County Stream Maintenance Program
- Project funding for large-scale restoration needs
- Training of municipal highway staff
- Additional training for SWCD staff to develop improved stream management expertise
- Engineering backup to assist SWCD with design for difficult projects

Reduce drainage impacts from off right-of-way land uses

Drainage alterations and land use changes outside of the road right-of-way can have detrimental impacts on the roadway drainage system. The highway department survey asked if timber harvesting or development activities have had a negative impact on the roads. (Responses are

given in Appendix A.) Respondents reported numerous cases of damage from timber harvesting (13 roads), gas wells (multiple existing wells; more proposed), and development (3 roads). Most of the damages from these off-site activities have not been fixed, with the cost of repairs generally falling to the local highway department. One respondent stated: “Gas drilling operations within the town have had a significant detrimental impact and getting the operators to pony up the cost of repairs has been all but impossible.” Another said: “The magnitude of flood repairs, timber harvesting, and natural gas exploration has placed a tremendous burden on our local taxpayers.” Among the reasons cited for not repairing damage from timber harvesting was: “Landowner responsibility. Need timber harvesting guidelines that are enforced.”

In order to promote more responsible land use practices that minimize the potential for drainage impacts on the roads, streams, and neighboring properties, the WQCC proposes the following:

Gas drilling and pipelines:

- Invite the NYS Department of Environmental Conservation and NYS Public Service Commission to come Schuyler County to address questions associated with the impacts of gas drilling and pipelines on floodplains and roads.
- Provide municipalities with additional information and assistance, as needed, related to collection of bonds, lease procedures on state land, mitigating floodplain impacts, etc.

Timber harvesting:

- Establish a subcommittee of the Schuyler County Water Quality Coordinating Committee with the objective of developing a strategy for improving the implementation of timber harvesting practices. Options to be evaluated include: timber harvesting registration/notification, regulation of timber harvesting practices, education, and training.

Drainage from development:

- Establish a subcommittee of the Schuyler County Water Quality Coordinating Committee with the objective of developing a strategy for improving the implementation of stormwater management practices. In addition to addressing stormwater management during project design and construction, the committee will also evaluate mechanisms for ensuring adequate maintenance of privately owned stormwater drainage systems.
- Conduct local stormwater management training for developers, construction personnel, municipal planning boards, and code enforcement officers.
- Encourage municipal adoption of driveway specifications that require diversion or interception of driveway drainage.
- Provide technical support and funding (where appropriate) for voluntary implementation of wetland creation/restoration and other practices that retain runoff.

Stream corridor management:

- Encourage municipal adoption of stream setback requirements that prevent development within stream corridors and thus reduce the potential for disrupting stream systems.

- Provide municipalities with training and technical support for enforcing floodplain development standards.

Obtain funding for equipment needs

Some departments have identified equipment needs that would facilitate improved implementation of the recommendations in this strategy:

- Schuyler County Soil and Water Conservation District – field vehicles (pickup trucks)
- Town of Orange – small dozer and tag along trailer; assistance from Schuyler Co. SWCD for a trac-hoe

Support the Chesapeake Bay Program pollution reduction efforts

About a third of Schuyler County is in the Chesapeake Bay Watershed. Because water quality in the Bay is impaired, New York (along with other states in the watershed) is developing Tributary Strategy for reducing the delivery of sediment, nitrogen, and phosphorus to the Chesapeake Bay. This strategy recommends implementation of improved management practices for a variety of activities, including highway management. Documentation of “best management practices” provides “credit” in the Chesapeake Bay watershed model toward New York’s pollution reduction goals. Because of the large number of highway departments operating in the watershed, the Tributary Strategy does not currently recommended that individual departments provide documentation of highway management practices. However, it should be noted that the Chesapeake Bay is a candidate for Total Maximum Daily Load (TMDL) limits to be applied throughout the watershed in 2011. If this occurs increased implementation and documentation may be required. In particular, documentation of street sweeping activities (including the amount of material removed) could be requested.

It is recommended that highway departments in Schuyler County support the efforts of the Chesapeake Bay program (while protecting their roads and local water quality) by:

- Learning about New York’s Chesapeake Bay Tributary Strategy and how it may impact Schuyler County; and
- Implementing the water quality protection recommendations in this strategy.

REFERENCES

Highway Superintendent Road & Water Quality Handbook, Edition III

DRAFT *Water Resources Strategy for Schuyler County* (under development by the Water Quality Coordinating Committee, to replace/update *Schuyler County’s Water Quality Strategy Plan*, 1996)

Hazardous Materials Plan, Annex 1 of Schuyler County Comprehensive Emergency Management Plan

APPENDIX A: HIGHWAY DEPARTMENT SURVEY RESULTS

- **Current Practices – Snow and Ice Control**
- **Current Practices – Road Surfaces**
- **Current Practices – Road Ditches and Banks**
- **Current Practices – 2005 Projects**
- **Areas Where Timber Harvesting Has Had A Negative Impact On Roads**
- **Areas Where Development Projects Have Had A Negative Impact On Roads**

Current Practices – Snow and Ice Control
 Reported on Water Quality Survey for Highway Departments in Schuyler County

Municipality	Road Miles paved	Road Miles unpaved	Miles Plowed paved	Miles Plowed unpaved	Deicing Material	Salt Applied 2004-05 tons	Salt Applied 2003-04 tons	Salt Use ton/mi/yr	Salt Storage
Schuyler County	122	0	106	0	salt, salt and sand	2,222	2,346	22	closed storage area, on concrete floor
T. Catharine	15	15	15	15	salt and sand	100	100	3	in the open, on gravel/dirt
T. Cayuta	6	9	21	7.75	salt and sand	120	180	5	in the open, on gravel/dirt
T. Dix	40.8	11	40.8	8.5	salt and sand, coal cinders	600	800	14	closed storage area, on pavement
T. Hector	35	115	34	103.5	sand, salt and sand	240	356	2	uncovered bunker, on gravel/dirt
T. Montour	15.67	9	15.67	7	salt and sand, coal cinders	120	180	7	closed storage area, on pavement
T. Orange	18.4	44.8	61.2	2	salt and sand, calcium chloride, cinders	161	145	2	closed storage area, on pavement
T. Reading	26.9	10	30.9	10	salt, sand, salt and sand	234	225	6	closed storage area, on pavement
TOTALS	280	214	325	154		3,797	4,332	8.5 (avg)	

Current Practices – Road Surfaces
 Reported on Water Quality Survey for Highway Departments in Schuyler County

Municipality	Dust Control miles	Dust Control material	Road Sweeping miles	Road Sweeping times per year	Road Sweeping amount removed
Schuyler County	0		10	1	not monitored
T. Catharine	10	dust oil	0		
T. Cayuta	0.55	dust oil	4	1	not monitored
T. Dix	1	salt brine	40.8	1	not monitored
T. Hector	39	dust oil, applied in front of houses only	34	1	not monitored
T. Montour	1	salt brine			
T. Orange	44.8	dust pads/road stabilizer	0		
T. Reading	10	salt brine, dust oil	26.9	1	not monitored
TOTALS	106		116		

Current Practices – Road Ditches and Banks
 Reported on Water Quality Survey for Highway Departments in Schuyler County

Municipality	Rock Lining	Ditches Cleaned	Seed & Mulch	Mulch Only	Seed Only	Seeding/Mulching Comments
	miles of ditch	miles in 2005	miles of ditch in 2005	miles of ditch in 2005	miles of ditch in 2005	
Schuyler County	5	4	2	0	2	Would do more if labor (manpower) were provided
T. Catharine	0.5	1	0	0	0	Never seed. Would do more if funding/seed/mulch were provided
T. Cayuta	0.75	2	0	0	2	Would do more if funding for mulch were provided
T. Dix	1	3	3	0	0	Would do more if funding for seed/mulch were provided
T. Hector		2	0	0	2	Would do more if manpower were provided
T. Montour	1	0.5	0.5	0	0	Would do more if funding for seed/mulch were provided
T. Orange	1.7	15	0	0	3	Additional ditch cleaning in 2005 due to flood related cleanup. Would do more seeding/mulching if resources were provided. Will work with SWCD.
T. Reading	5	0.85	0	0	0.85	Mulch as weather dictates
TOTALS	15	28	6	0	10	

Current Practices – 2005 Projects
 Reported on Water Quality Survey for Highway Departments in Schuyler County

Municipality	Ditch/Roadbank/Drainage Projects 2005	Culvert Projects 2005	Stream Projects 2005
Schuyler County	CR 23 - bank stabilization \$4,763 (fully funded by SWCD) CR 14 - bank stabilization \$18,862 (partially funded by SWCD)		
T. Catharine			
T. Cayuta		Burlingame Rd. - replacement \$8,000 (local funding)	
T. Dix		Townsend Rd. - headwall replacement \$20,000 (local funding)	
T. Hector	Drew Rd - road reconstruction \$49,000 (CHIPS funding) Bower Rd - road reconstruction \$49,000 (CHIPS funding)	Townwide - many culvert replacements \$20,000 (general repair funds)	
T. Montour		Fitzpatrick Hill Rd. - culvert replacement \$6,000 (local funding)	
T. Orange	none (too busy with flood related cleanup)	Donovan Hill - replacement \$2,900 Kelly Hill - replacement \$1,450 Grandview - installation \$1,450 Switzer Hill - replacement \$5,800 (all funded by local taxes)	Sexton Hollow - stream stabilization \$10,000 (County Stream Program)
T. Reading		Church Rd. \$1,200 Chase Rd. \$1,600 Nye Rd. \$2,400 Spencer Rd. \$2,400 (all funded by EOG/Town)	

Areas Where Timber Harvesting Has Had A Negative Impact On Roads
 (Reported on Water Quality Survey for Highway Departments in Schuyler County)

Municipality	Location	Drainage Problem?	Road damage?	Problem fixed?	Reason for not fixing
Schuyler County	CR 19	Various locations	Continuous	No	Landowner responsibility. Need timber harvesting guidelines that are enforced.
	CR 16	Various locations	Continuous	No	
	CR 25	Various locations N.E. of road	Continuous	No	
	CR 22	Various locations	Continuous	No	
	CR 21	Various locations	Continuous	No	
T. Hector	Texas Hollow	Frequently changing drainage	Road posted		Water runoff from private land, springs. Inadequate drainage system.
T. Montour	Wicks Road	Some	No	Maybe	
T. Orange	Coon Hollow Road	Yes	Yes	No	Timber harvesting never stops in the Town of Orange. We are blessed with far too much NYS forests and no real solution to our problem.
	Hornby/Cummings Rd.	Yes	Yes	No	
	Chambers Road	Yes	Yes	No	
	Donovan Hill Road	Yes	Yes	No	
	Maple Lane Road	Yes	Yes	No	
T. Reading	Altay Road	Siltation from disturbed soils	Rutting leading to road	Ditched and smoothed, no vegetation yet	Fall harvest impeded vegetation growth.

Areas Where Development Projects Have Had A Negative Impact On Roads
(Reported on Water Quality Survey for Highway Departments in Schuyler County)

Municipality	Location	Drainage Problem?	Road damage?	Problem fixed?	Reason for not fixing
T. Dix	Multiple gas wells	Yes	Yes	None	Still drilling
T. Montour	Multiple gas wells	Yes	Yes	Yes - \$48,000	
T. Hector	Bergen Road	Yes	Yes	No	Unregulated growth, inadequate funding, time constraints, staffing.
	Bergen Farms	Yes	Yes	No	
	Havens Road	Yes	Yes	No	
T. Orange*	Gas drilling				
T. Reading**	Gas drilling, multiple locations	Yes	Yes	Some	Delayed repairs until all signs of ongoing operations have halted.

* “The magnitude of flood repairs, timber harvesting, and natural gas exploration has placed a tremendous burden on our local taxpayers.”

** “Gas drilling operations within the town have had a significant detrimental impact and getting the operators to pony up the cost of repairs has been all but impossible.”