5. Stormwater Management & Erosion Control

Agricultural Practices (A)	Development (D)	On-site Wastewater Systems (O)	Stormwater Runoff (SR)	Wastewater Treatment (WW)			
Drinking Water (DW)	Tourism and Other Economic Development (T)	Water Quality Standards (WQS)					
Water Quality (WQ)	Exotic species (ES)	Fertilizers and Pesticides (F)	Heavy metals (H)	Phosphorus and Nutrient Loading (N)	Organic compounds (OC)	Pathogens (P)	Sediment (S)
Comprehensive Planning (C)	Education (E)	Economic Revitalization & Sustainability (ER)	Infrastructure (I)				

Introduction

Stormwater runoff is a major pathway for transporting sediment and other materials from the watershed to the surface water network. The porous and varied terrain of natural landscapes like forests, wetlands, and grasslands trap rainwater and snowmelt and allow it to slowly filter into the ground. Runoff tends to reach receiving waters gradually. In contrast, nonporous developed landscapes like roads, bridges, parking lots, and buildings don't let runoff slowly percolate into the ground. Water remains above the surface, accumulates, and runs off in large amounts.

Municipalities install storm sewer systems designed to quickly channel runoff from roads and other impervious surfaces. These engineered solutions are important to control high flows that may be a threat to public safety. Unfortunately, there are adverse ecological consequences to traditional stormwater management.

Runoff gathers speed once it enters the storm sewer system. When the water leaves the sewer system and empties into a stream, large volumes of high velocity runoff can erode streambanks, damage streamside vegetation, and widen stream channels. In turn, this will result in lower water depths during non-storm periods, higher than normal water levels during wet weather periods, increased sediment loads, and higher water temperatures.

Runoff from roads can contribute to water quality and habitat degradation of streams and lakes. Sediment and chemicals originate from winter deicing agents, shoulder ditching practices to maintain swales, and storm drains with inadequate provision for sediment removal (see Appendix I - Pollution Concentration in Highway Runoff).

Development activities can also increase the variety and amount of pollutants transported to receiving waters. Sediment from development and new construction; oil, grease, and toxic chemicals from automobiles; nutrients and pesticides from turf management and gardening; viruses and bacteria from failing septic systems and pet waste; road salts; and heavy metals are examples of pollutants generated in urban areas. Sediments and solids constitute the largest volume of pollutant loads to receiving waters in urban areas.

Conditions in the Cayuga Watershed

As discussed in Chapter II, sedimentation is the major water quality issue in Cayuga Lake. New York State considers urban runoff and/or streambank erosion to be the primary cause of water quality and habitat degradation in the southern basin of Cayuga Lake and three southern tributaries (Fall Creek, Six Mile Creek and Cascadilla Creek). These stream and lake segments are included on the State's Priority Waterbodies List (PWL) (see Appendix L). Streambank erosion is considered a secondary source of water quality impairment in three other streams: Salmon Creek, Yawger Creek, and Cayuga Inlet.

As part of the RPP process, Streambank & Roadbank Inventory was conducted in the summer of 2000 (see *Cayuga Lake Preliminary Watershed Characterization*). Stream

segments and roadbank/road ditch sites were ranked by severity based on erosion potential. Very severe streambank segments (see Appendix S) and roadbank/road ditch sites (see Appendix I) are now being recommended as the highest priority for implementation.

The initial construction phase when land is cleared of vegetation and graded to create a proper surface for construction is one of the largest potential sources of erosion and sedimentation. When natural vegetation and topsoil are removed, the exposed area is particularly susceptible to erosion, causing transformation of existing drainage areas and disturbance of sensitive areas. Sediment loss from developed areas is potentially significant in the Cayuga watershed.

Deicing material, primarily sodium chloride, is used by area highway departments to help de-ice road surfaces during the colder months of the year. Each highway department has individual policies and procedures regarding salt application, salt/sand mixtures and storage.

There are several environmental concerns regarding the use of deicing salts. After application, salts are highly soluble in water. They easily wash off pavement into surface waters and leach into soil and groundwater. High concentrations of salt can damage and kill vegetation, disrupt fish spawning in streams, reduce oxygen solubility in surface water, interfere with the chemical and physical characteristics of a lake, pollute groundwater making well water undrinkable, disintegrate pavement, and cause metal corrosion of bridges, cars and plumbing.

As part of the *RPP*, a road deicing and storage survey (see Appendix E) was conducted throughout the Cayuga Lake watershed. This dataset shows that there are 49 state, county and municipal salt storage pile sites within the Cayuga Lake Watershed. Twenty-one (42%) are exposed directly to the weather and many are significantly close to a stream or the lake itself. The average total amount of deicing material spread in the watershed exceeds 30,000 tons per year.

Goals

- Protect or restore natural hydrology of streams in the Cayuga Lake watershed (see Wetlands, Shoreline, & Riparian Corridor Management Section)
- Reduce frequency of bank-full or flood stages of streams (see Appendix S - Return Frequency of Flood Events in Cayuga Lake Tributaries)
- Keep baseflow conditions as close to natural as possible
- Prevent or reverse habitat and water quality degradation in streams
- Reduce transport of sediment, nutrients, pathogens and other pollutants to Cayuga Lake

Existing measures

A. Compendia of Technical Solutions

Federal guidance: EPA has published a "Handbook on Urban Runoff Pollution Prevention and Control Planning" (see http://www.epa.gov/ttbnrmrl/625/R-93/004.htm

The Natural Resources Conservation Service has developed manuals for stream restoration at http://www.usda.gov/stream_restoration/

State guidance: New York DEC has recently issued a compilation of Best Management Practices (BMPs) for urban and stormwater management (NYSDEC Urban/Stormwater Runoff Management Practices Catalogue for Nonpoint Source Pollution Prevention in New York State, June 2000). NYSDEC also published Reducing the Impacts of Stormwater Runoff from New Development in 1992. NYSDEC has issued a compendium of BMPs for preventing nonpoint source pollution during construction (NYSDEC Construction Management Practices Catalogue for Nonpoint Source Pollution Prevention in New York State, June 2000).

Other resources: There are many university and private organizations focused on technical and regulatory approaches to stormwater management. One example is the Center for Watershed Protection. This organization maintains a highly informative web site of technical information and educational resources <http://www.cwp.org> and <http://www.stormwatercenter.net>.

B. Regulatory Approaches

Federal: The Clean Water Act includes provisions for regulating stormwater discharges from urban and developing areas (see Appendix I - Stormwater Management Regulations).

State: New York administers provisions of the Federal Clean Water Act through the State Pollution Discharge Elimination System (SPDES) (see Appendix I - Stormwater Management Regulations). Planning and permitting of stormwater falls under this state program.

Local: Several municipalities have created committees or boards to address stormwater issues within their local land use regulation and control structure (see Appendix T). The City of Ithaca has taken an active role in stream restoration along Six Mile Creek, the City's drinking water supply.

No. 5	Stormwater Management & Erosion Control Recommendations	Related Issue(s)	Potential Resp Org(s)	Measure/ Target	Approx Cost
A	**Prevent adverse water quality and hydrologic effects of runoff from new development**				
A1	1) Require new developments to maintain the volume of runoff at predevelopment levels by using structural controls and pollution prevention strategies. This can be done with the adoption of a Stormwater Management & Erosion Control Local Law (see A3 below) and the enforcement of performance standards (see Appendix I - Performance Standards). Municipalities that presently require these controls include City of Ithaca, Town of Caroline, Town of Cortlandville, Town of Covert, Town of Danby, Town of Lansing, Village of Lansing. 2) Integrate into all zoning, subdivision, and/or site plan review controls. 3) If municipality does not have planning board or zoning, subdivision, and/or site plan review controls encourage them to institute Step 1. List of municipalities with controls and description of controls (see Appendix T - Municipal Regulatory Stormwater Management & Erosion Control	D, SR, DW, WQ, C	M	20% in 5 years of ones that presently do not have controls	Cost of training. Cost of implementation covered by developer
A2	Provide education and training of local officials on erosion controls and stormwater management	SR, WQ, E	RPB, C, M, SWCD, NYSDEC, NYSDOS	*see Watershed Education section*	
A3	Adopt Stormwater Management and Erosion Control (Local Law) (see Appendix I) for local stormwater management and erosion control that guide communities through the process in order to protect, maintain and enhance water quality in the watershed.	C	M	*see Regulatory Management section*	
B	**Restore eroding streambanks** (see Wetlands, Shoreline, & Riparian Corridor Management Section)				
B1	Restoration - restore very severe streambank segments (see Appendix S) using Watershed Stream Restoration Method (see Appendix S) based on Cayuga Lake Watershed Streambank Inventory (see *Cayuga Lake Preliminary Watershed Characterization*, 2000). Concentration is on segments of Big Salmon Creek, Cayuga Inlet, and Fall Creek.	A, D, SR, DW, WQ, F, H, N, OC, P, S	SWCD, C, M, NYSDEC, City of Ithaca,	3 miles/year for 10 years	$50/foot
B2	Integrate agricultural BMPs such as riparian buffer zones and fencing to prevent livestock access to	A, SR, WQ	NRCS,	*see Agricultural*	

	streams.		SWCD	*Practices section*	
B3	Continue and expand the program of streambank inventories throughout the watershed to identify priority segments in need of restoration. Use existing streambank inventory (see *Cayuga Lake Preliminary Watershed Characterization*, 2000) to target implementation.	SR	RPB, C, SWCD, AI	Full inventory of 6 streams/year	$15,000/year
C	**Reduce delivery of sediment and other pollutants from roadways**.				
C1	Require special vegetative measures such as hydroseeding and mulching of roadside swales based on purchasing and sharing of hydroseeder and training and education of municipal, county and state highway departments. Initial hydroseeding should occur on the very severe sites (see Appendix I) based on the Cayuga Lake Watershed Roadbank Inventory ((see *Cayuga Lake Preliminary Watershed Characterization*, 2000) with concentration in the Towns of Caroline, Danby, Enfield, Genoa, Hector, Lansing, Ledyard, Newfield, and Summerhill.	D, SR, DW, WQ, S, C	NYSDOT, C, M	20% of very severe ditches/year	$100,000
C2	Increase training for highway officials in erosion control, roadbank ditch construction and maintenance, hydroseeding, and road deicing	E	RPB, C, M	*see Watershed Education section*	
C3	Require structural measures in all municipalities to control sediment in steep roads, roadbanks and high flow ditches (*see Existing Measures above*). List of municipalities that have Regulatory Management for Steep Slope & Structural Measures (see Appendix I- Regulatory Management for Steep Slope & Structural Measures)	D, SR, DW, WQ, S, C	NYSDOT, C, M	10%/year	$100,000
C4	Support communities in purchasing and sharing equipment for street sweeping.		IO	1 unit within 1 year	$100,000
C5	Minimize the impact of deicing material on Cayuga Lake and its tributaries	SR, DW, WQ	M, C, NYSDOT		
C5a	• Store material in permanently roofed structures, on impermeable surface. There are eight unenclosed municipal deicing storage facilities (see Appendix E - Deicing Material Storage that are in close proximity to the lake or tributaries).	SR, DW, WQ	M, C, NYSDOT, NYSDEC	Enclose all unenclosed facilities within 5 years	$250,000
C5b	• Develop containment area from mixing and loading of material. Use existing facility, or extension of existing facility, if possible.	SR, DW, WQ	M, C, NYSDOT, NYSDEC	2/year	$200,000

C5c	• Use sensible material application procedure (e.g. intersections, posting of signs, driver education). Develop guidelines and implement sensible deicing procedures.	SR, DW, WQ	M, C, NYSDOT	10%/year	$250,000
C5d	• Continue regular survey of deicing material usage (see Appendix E)	SR, DW, WQ	IO	Yearly	$5,000/yr
C5e	• Monitor deicing material concentrations during winter runoff events	SR, DW, WQ	NYSDEC, USGS, AI	10 sites per year	$100,000
C5f	Discourage the use of products, such as IceBan, that reduce dissolved oxygen. Six entities report the use of such products (see Appendix E - Oxygen Demanding Material Used for Road Deicing)	SR, DW, WQ	M, C, NYSDOT, NYSDEC	All within 5 years	-
C6	Design and develop a regional stormwater management strategy	A, D, SR, WW, DW, WQ, C, I	M, C, WQCC, NYSDEC	Within 2 years	$25,000
D	**Prevent pollution from the developed landscape from reaching surface and groundwater**				
D1	Increase public awareness of the need to control litter and pet waste in urban and developing areas.	A, D, SR, DW, WQ, N, P, S, E	IO, C, M	*see Watershed Education section*	
D2	Support community or youth projects to mark storm drains		IO, CCE, CLWN	10%/year	$1,000