United States Department of Agriculture **OMB No. 0578-0030**
Natural Resources Conservation Service **NRCS-PDM-20**

DAMAGE SURVEY REPORT (DSR)
Emergency Watershed Protection Program – Recovery

Section 1A

Date of Report: 03/06/2012

DSR Number: S-TM-10 Project Number: 10

NRCS Entry Only
Eligible: YES ☑ NO ☐
Approved: YES ☑ NO ☐
Funding Priority Number (from Section 4) 2
Limited Resource Area: YES ☐ NO ☑

Section 1B Sponsor Information

Sponsor Name: Schoharie County, Harold Vroman, Chairman, Schoharie County Board of Supervisors

Address: P.O. Box 429

City/State/Zip: Schoharie, NY 12157

Telephone Number: (518) 295-8347 Fax: (518) 295-8482

Section 1C Site Location Information

County: Schoharie State: NY Congressional District: 21

Latitude: 42.56939 Longitude: -74.26682 Section: _____ Township: _____ Range: _____

UTM Coordinates: N: 15463415 E: 1837840 (ft)

Drainage Name: Little Schoharie Creek Reach: Reach D - just below Lawton Hollow to Gridley Rd.

Damage Description: Stream bed and bank erosion threatening road, private bridge and property

Section 1D Site Evaluation

All answers in this Section must be YES in order to be eligible for EWP assistance.

Site Eligibility	**YES**	**NO**	**Remarks**
Damage was a result of a natural disaster?*	☑	☐	
Recovery measures would be for runoff retardation or soil erosion prevention?*	☑	☐	
Threat to life and/or property?*	☑	☐	
Event caused a sudden impairment in the watershed?*	☑	☐	
Imminent threat was created by this event?**	☑	☐	
For structural repairs, not repaired twice within ten years?**	☑	☐	
Site Defensibility			
Economic, environmental, and social documentation adequate to warrant action (Go to pages 3, 4, 5 and 6 ***)	☑	☐	
Proposed action technically viable? (Go to Page 9 ***)	☑	☐	

Have all the appropriate steps been taken to ensure that all segments of the affected population have been informed of the EWP program and its possible effects? YES ☑ NO ☐

Comments: Outreach to municipalities through both NRCS and FEMA and through County Emergency Services and SWCD

* Statutory
** Regulation
*** DSR Pages 3 through 5 are required to support the decisions recorded on this summary page. If additional space is needed on this or any other page in this form, add appropriate pages.

DSR NO: S-TM-10

Section 1E Proposed Action

Describe the preferred alternative from Findings: Section 5 A:

Cobble fill for streambed elevation, rock cross vanes for grade control, bioengineering for habitat improvement, and riprap and reinforced earth for misc. bank protection

Total installation cost identified in this DSR: Section 3: $ 2,538,000.0(

Section 1F NRCS State Office Review and Approval

Reviewed By: _____ Date Reviewed: _____
State EWP Program Manager

Approved By: _____ Date Approved: _____
State Conservationist

PRIVACY ACT AND PUBLIC BURDEN STATEMENT

NOTE: The following statement is made in accordance with the Privacy Act of 1974, (5 U.S.C. 552a) and the Paperwork Reduction Act of 1995, as amended. The authority for requesting the following information is 7 CFR 624 (EWP) and Section 216 of the Flood Control Act of 1950, Public Law 81-516, 33 U.S.C. 701b-1; and Section 403 of the Agricultural Credit Act of 1978, Public Law 95334, as amended by Section 382, of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104-127, 16 U.S.C. 2203. EWP, through local sponsors, provides emergency measures for runoff retardation and erosion control to areas where a sudden impairment of a watershed threatens life or property. The Secretary of Agriculture has delegated the administration of EWP to the Chief or NRCS on state, tribal and private lands.

Signing this form indicates the sponsor concurs and agrees to provide the regional cost-share to implement the EWP recovery measure(s) determined eligible by NRCS under the terms and conditions of the program authority. Failure to provide a signature will result in the applicant being unable to apply for or receive a grant the applicable program authorities. Once signed by the sponsor, this information may not be provided to other agencies. IRS, Department of Justice, or other State or Federal Law Enforcement agencies, and in response to a court or administrative tribunal.

The provisions of criminal and civil fraud statutes, including 18 U.S.C. 286, 287, 371, 641, 651, 1001; 15 U.S.C. 714m; and 31 U.S.C. 3729 may also be applicable to the information provided. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0578-0030. The time required to complete this information collection is estimated to average 117/1.96 minutes/hours per response, including the time for reviewing instructions, searching existing data sources, field reviews, gathering, designing, and maintaining the data needed, and completing and reviewing the collection information.

USDA NONDISCRIMINATION STATEMENT

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, martial status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programms.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202)720-2600 (vocie and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW., Washington, DC 20250-9410, or call (800)795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Civil Rights Statement of Assurance

The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended; the Civil Rights Restoration Act of 1987 (Public Law 100-259); and other nondiscrimination statutes: namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Amendments of 1972, the Age Discrimination Act of 1975, and the Americans with Disabilities Act of 1990. They will also be in accordance with regulations of the Secretary of Agriculture (7 CFR 15, 15a, and 15b), which provide that no person in the United States shall on the grounds of race, color, national origin, gender, religion, age or disability, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

Section 2 Environmental Evaluation

2A Resource Concerns	2B Existing Condition	2C Alternative Designation		
		Proposed Action	No Action	Alternative
		2D Effects of Alternatives		
Soil				
Water				
Air				
Plant				
Animal				
Other				

DSR NO: S-TM-10

Section 2E Special Environmental Concerns

Resource Consideration	Existing Condition	Alternatives and Effects		
		Proposed Action	No Action	Alternative
Clean Water Act Waters of the U.S.				
Coastal Zone Management Areas				
Coral Reefs				
Cultural Resources				
Endangered and Threatened Species				
Environmental Justice				
Essential Fish Habitat				
Fish and Wildlife Coordination				
Floodplain Management				
Invasive Species				
Migratory Birds				
Natural Areas				
Prime and Unique Farmlands				
Riparian Areas				
Scenic Beauty				
Wetlands				
Wild and Scenic Rivers				

Completed By: _____ Date: _____

DSR NO: S-TM-10

Section 2F Economic

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Future Damages ($)	Damage Factor (%)	Near Term Damage Reduction
Properties Protected (Private)			
		0%	
		0%	
		0%	
		0%	
Properties Protected (Public)			
		0%	
		0%	
		0%	
		0%	
Business Losses			
		0%	
		0%	
		0%	
		0%	
Other			
		0%	
		0%	
		0%	
		0%	
		0%	
Total Near Term Damage Reduction $			
Net Benefit (Total Near Term Damage Reduction minus Cost from Section 3)			-$2,538,000.0

Completed By: _____ Date: _____

Notes:

Section 2G Social Consideration This section must be completed by each alternative considered

(attach additional sheets as necessary).

	YES	NO	Remarks
Has there been a loss of life as a result of the watershed impairment?	☐	☑	
Is there the potential for loss of life due to damages from the watershed impairment?	☑	☐	
Has access to a hospital or medical facility been impaired by watershed impairment?	☐	☑	
Has the community as a whole been adversely impacted by the watershed impairment (life and property ceases to operate in a normal capacity)	☑	☐	
Is there a lack or has there been a reduction of public safety due to watershed impairment?	☑	☐	

Completed By: Thomas Lacko Date: 03/06/2012

Section 2H Group Representation and Disability Information

This section is completed only for the preferred alternative selected.

Group Representation	Number
American Indian/Alaska Native Female Hispanic	
American Indian/Alaska Native Female Non-Hispanic	
American Indian/Alaska Native Male Hispanic	
American Indian/Alaska Native Male Non-Hispanic	
Asian Female Hispanic	
Asian Female Non-Hispanic	
Asian Male Hispanic	
Asian Male Non-Hispanic	
Black or African American Female Hispanic	
Black or African American Female Non-Hispanic	
Black or African American Male Hispanic	
Black or African American Male Non-Hispanic	
Hawaiian Native/Pacific Islander Female Hispanic	
Hawaiian Native/Pacific Islander Female Non-Hispanic	
Hawaiian Native/Pacific Islander Male Hispanic	
Hawaiian Native/Pacific Islander Male Non-Hispanic	
White Female Hispanic	
White Female Non-Hispanic	
White Male Hispanic	
White Male Non-Hispanic	
Total Group	0

Census tract(s)_____

Completed By: _____ Date: _____

DSR NO: S-TM-10

Section 2I. Required consultation or coordination between the lead agency and/or the RFO and another governmental unit including tribes:

Easements, permissions, or permits:

Mitigation Description:

Agencies, persons, and references consulted, or to be consulted:

Section 3 - ENGINEERING SITE EVALUATION

DSR No: S-TM-10

Completed by: W. VanDeValk, J. Hornesky (*Name*) Date: 03/06/2012

Section 3A

Locate and mark the beginning and end of the project reach at stable banks. see attached aerial photo location map

Length of project reach: see attached aerial photo location map

How will the bank stabilization be keyed back into the stable bank sections? 10 ft. key at each end of vanes *Include this length in the total.*

Locate a benchmark and grade control. Determine the average slope of the reach. 2.9% existing, 2.9% proposed

Determine the typical cross section upstream and down. see table - "Estimated Stream Channel Geometry - Little Schoharie Creek 2011 EWP"

Determine the height of the low bank and the height of structural protection needed. approx. 3 ft (vanes), approx. 6 ft (riprap)

Look for opportunities to use vegetation rather than structural measures. Willow wattles/fascines & reinforced earth wall

Identify if a sill/weir is required in the channel to stabilize the channel bottom. cross vanes for energy dissipation, sediment transport & grade control

How many sills/weirs are required? approx. 57 What spacing? approx. 100 ft.

What depth of key is required in the toe of the slope? 3' ☑ 2' ☑

Determine if a plunge pool is required. Size the plunge pool. W: _____ L: _____ D: _____

Determine the slope of the bank needed in the protected area. see attached aerial photo location map

Determine if geotextile fabric is needed behind the structure. N/A

Determine estimated quantities of excavation, fill, clearing, and debris removal for section B. approx. 38,000 cy fill

Determine the needed pollution control and dewatering practices. Dewatering assumed

Determine the need for traffic control or road closure. Not required

Make a plan view sketch that includes the following:

- The alignment of the streambank to be repaired and the protected structure. see attached aerial photo location map
- The existing stream thalweg, north, the bench mark, and apparent landowners. _____
- Identify items not to be disturbed during construction (e.g., trees, mailboxes, etc.). _____
- Identify debris to be removed. failed bank materials and fallen trees (see attached photos)
- Locate all utilities. _____
- Identify spoil/staging area. _____
- Identify construction limits and access. _____

Take and label photographs. see attached photos

DSR NO: S-TM-10

Section 3 Engineering Cost Estimate

Completed By: W. VanDeValk Date: 03/06/2012

This section must be completed by each alternative considered (attach additional sheets as necessary).

Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)
(See attached "Engineer's Construction Cost Estimate")	1	each	$2,538,000.0(	$2,538,000.0
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
				$0.00
Total Installation Cost (Enter in Section 1F)$				2,538,000.00

Unit Abbreviations:

AC	Acre	LS	Lump Sum
CY	Cubic Yard	SF	Square Feet
EA	Each	SY	Square Yard
HR	Hour	TN	Ton
LF	Linear Feet	Other (Specifiy)	

DSR NO: S-TM-10

Section 4 NRCS EWP Funding Priority

Complete the following section to compute the funding priority for the recovery measures in this application (see instructions on page 14).

Priority Ranking Criteria	**Yes**	**No**		**Ranking Number Plus Modifer**
1. Is this an exigency situation?	☐	☑		
2. Is this a site where there is serious, but not immediate threat to human life?	☑	☐		2e
3. Is this a site where buildings, utilities, or other important infrastructure components are threatened?	☑	☐		
4. Is this site a funding priority established by the NRCS Chief?	☐	☑		
The following are modifiers for the above criteria			**Modifier**	
a. Will the proposed action or alternatives protect or conserve federally-listed threatened and endangered species or critical habitat?			No	
b. Will the proposed action or alternatives protect or conserve cultural sites listed on the National Register of Historic Places?			No	
c. Will the proposed action or alternatives protect or conserve prime or important farmland?			No	
d. Will the proposed action or alternatives protect or conserve existing wetlands?			No	
e. Will the proposed action or alternatives maintain or improve current water quality conditions?			Yes	
f. Will the proposed action or alternatives protect or conserve unique habitat, including but not limited to, areas inhabited by State-listed species, fish and wildlife management area, or State identified sensitive habitats?			No	

Enter priority computation in Section 1A, NRCS Entry, Funding priority number.

Remarks:

DSR NO: S-TM-10

Section 5A Findings

Finding: Indicate the preferred alternative from Section 2 (Enter to Section 1E):

I have considered the effects of the action and the alternatives on the Environmental Economic, Social; the Special Environmental Concerns; and the extraordinary circumstances (40 CFR 1508.27). I find for the reasons stated below, that the preferred alternative:

____ Has been sufficiently analyzed in the EWP PEIS (reference all that apply)
Chapter _____
Chapter _____
Chapter _____
Chapter _____
Chapter _____

____ May require the preparation of an environmental assessment or environmental impact statement.
The action will be referred to the NRCS State Office on this date:

NRCS representative of the DSR team:

Name/Title: Thomas Lacko/District Conservationist Date: 03/06/2012

Section 5B Comments:

Section 5C Sponsor Concurrence:

Sponsor Representative

Title: _____ Date: _____

Section 6 Attachments:

A. Location Map
B. Site Plan or Sketches
C. Other (explain)

INSTRUCTIONS FOR COMPLETING THE NRCS-PDM-20, DSR

	Explanation of Requested Item	Who Completes
Section 1	Enter Site Sponsor, Location, Evaluation, Selected Alternative, and Reviewed and Approval Signatures.	NRCS completes with voluntary assistance from Sponsor except for NRCS only portion of Section 1A.
1A	Enter the Date, DSR Number, Project Number. For NRCS only enter Eligible Yes/No, Approved Yes/No, Funding Priority Number, and Limited Resource Area Yes/No.	
1B	Enter Sponsor Name, Address, Telephone, Fax	
1C	Enter site location County, State, Congressional District, Latitude, Longitude, Section, Township, Range, UTM Coordinates, Drainage Name, Reach within drainage, and Damage Description.	
1D	Enter Yes/No and any Remarks for the Site Evaluation information. Any No response means the site is not eligible for EWP assistance and no further information is necessary to complete the DSR. (See NEWPPM 390-502.03 and 390-502-04) Enter Yes/No regarding whether the affected public has been informed of the EWP program.	
1E	Enter the proposed treatment and the cost of installation.	NRCS only.
1F	NRCS Review and Approval.	

	Explanation of Requested Item	Who Completes
Section 2	Use available natural resource, economic, and social, information, including the EWP Programmatic Environmental Impact Statement (PEIS), to briefly describe the effects of the alternatives to the proposed action including the "no action" alternative. Typically, the proposed action and no action are the alternatives considered for EWP recovery measures due to the focus on repairing or preventing damages within a watershed. However, in cases where additional alternatives are considered, include all pertinent information to adequately address the additional alternatives (e.g., proposed action would be bio-engineering for bank stabilization, no action alternative, and an additional alternative may be riprap for bank stabilization). Do not leave blanks where a consideration is not applicable, use NA to indicate the factor was considered but not applicable for the alternative.	NRCS completes with voluntary assistance from Sponsor.
2A	List all resource concerns which are relevant to the area of the proposed action and alternatives. Refer to National Bulletin 450-5-8 TCH-COMPLETING AND FILING MEASUREMENT UNITS FOR RESOURCE CONCERNS IN THE FIELD OFFICE TECHNICAL GUIDE (FOTG). Note: the affected area may extend beyond the construction foot print (ex. where water quality or water rights are affected downstream of the site).	
2B	Provide a brief description of the present condition of each resource concern listed in 2A. Quantify conditions where possible. Reference accompanying photo documentation.	
2C	Briefly summarize the practice/system of practices being proposed, as well as the "no action" alternative, and any other alternatives being considered. The "no action" alternative is the predicted future condition if no action is taken.	
2D	Document the efforts of the proposed action and alternatives for the considerations listed in 2A. Reference applicable quality criteria, information in the CPPE, and quantify effects whenever possible. Consider both long-term and short-term effects. Consider any effects which may be individually minor but cumulatively significant at a larger scale or over an extended time period. Clearly define the differences between proposed action, no action, and the other alternatives.	

2E	Enter Special Environmental Concerns for Clean Water Act Waters of the U.S., Coastal Zone Management Areas, Coral Reefs, Cultural Resources, Endangered and Threatened Species, Environmental Justice, Essential Fish Habitat, Fish and Wildlife Coordination, Floodplain Management, Invasive Species, Migratory Birds, Natural Areas, Prime and Unique Farmlands, Riparian Areas, Scenic Beauty, Wetlands, and Wild and Scenic Rivers for each alternative considered. In the case where the selected alternative from Section 5A impacts a Special Environmental Concern, additional information, coordination, permitting or mitigation may be required and adequate documentation should be prepared and attached to the DSR to identify how NRCS or the Sponsor addressed the concern	
2F	Identify Property Protected both private and public, business losses and other economic impacts considered for each alternative. Enter the dollar value of the potential future damages if no action is taken in the Future Damage (5) column. This would be the estimate of the value lost if the EWP recovery measure is not installed. Use the repair cost or damage dollar method to determine the estimate of future damages. The repair cost method uses the costs to return the impaired property, good, or services based on their original pre-event condition or value. The damage dollar method uses an estimate of the future damage to value (e.g. if the structure is condemned, then enter the value of the structure). Enter the estimated amount based upon existing information or information furnished by the sponsor, contractors or others with specific knowledge for recovery from natural disasters for each alternative considered. Often market values for properties or services can be obtained from personnel at the local county/parish tax assessment office. The DSI team needs to determine the Damage Factor (%) which is a coefficient that indicates the degree of damage reduction to a property that is attributed to the effect of the proposed EWP recovery measures. Use an appropriate estimate of how much of the damage the EWP recovery measure will avoid for the alternative being considered. If the recovery measures from a single site will prevent 100 percent of the damage use 100 percent. The Near Term Damage Reduction is the Future Damage ($) times the Damage Factor (%). Sum the Near Term Damage Reduction values to calculate the Total Near Term Damage Reduction. Enter the Net Benefit which is computed by subtracting the Cost from section 3 from the total near term damage reduction. The economic section must be completed for each alternative considered. Attach additional sheets as necessary.	
2G	Enter information to describe the potential social impacts and considerations for each alternative. Answer Yes or No and any remarks necessary to adequately address each question. The information may be obtained through interviews with community leaders, government officials or sponsors. Factors such as road closures, loss of water, electricity, access to emergency services are used when answering whether the community as a whole has been impaired. This information is part of the environmental evaluation portion of the DSR but may be pertinent in Section 4 regarding priorities. The Social Considerations Section must be completed for each alternative considered. Attach additional sheets as necessary.	
2H	Enter the Group Representation Information for the preferred alternative. Use the most recent census tract information based upon where the EWP recovery measures are located.	Sponsor completes.

2I	Enter whether easement, permissions, or permits, and mitigation will require consultation or coordination for the selected alternative (e.g., Clean Water Act section 404 permit, Endangered Species Act section 10 permits, and any State or county permits or requirements). Describe mitigation to be applied that will offset any adverse impacts and attach any documentation from other agencies regarding mitigation requirements.	NRCS completes with voluntary assistance from Sponsor.

	Explanation of Requested Item	**Who Completes**
Section 3	Enter Proposed Recovery Measure(s) including Quantity, Units, Unit Cost, and Total Amount Cost. Enter sum of all Proposed Recovery Measure Costs to calculate Total Costs. Enter Total Installation Costs in Section 1F. The Engineering Cost Estimate must be completed for each alternative considered. Attach additional sheets as necessary.	NRCS completes with voluntary assistance from Sponsor.

	Explanation of Requested Item	**Who Completes**
Section 4	This section is used to determine the Funding Priority for the preferred alternative and sequence for initiating recovery measures. Enter Yes/No for questions 1 through 4 and enter the number (exigency 1, serious threat to human life 2, etc.) in the right column, Ranking Number Plus Modifier. Complete the Modifier portion by placing the alphabetic indicator a. through f. in the Modifier column. Complete the Ranking Number Plus Modifier column by entering the alphabetic indictor(s) that exists within the site. The number of the site designates the priority (e.g., a site with a designation of 2 is a higher priority that a site with a designation of 3). The modifiers increase the priority for the same numeric site (e.g., a site with a designation of 1a, would be a higher priority than a site with a designation of 1, a site with a designation of 2bc would be a higher priority than a site designated as 2b). Enter the Funding Priority in Section 1A.	NRCS completes with voluntary assistance from Sponsor.

	Explanation of Requested Item	**Who Completes**
Section 5	Enter the Findings, Rationale Supporting Findings, NRCS Representative signature and Comments, and Concurrence signature by the Sponsor(s).	NRCS completes.
5A	Indicate the preferred alternative and check the applicable finding being made. The NRCS Representative signs indicating the Finding selected. If the proposed action was adequately addressed in the PEIS, check all appropriate chapter paragraphs.	
5B	Enter any additional Comments.	
5C	Sponsor(s) review and concurrence.	Sponsor(s) signature.

Section 6	Include attachments for location map, site sketch or plan and other information as needed.	NRCS completes with voluntary assistance from Sponsor.

Computation Sheet

NRCS–ENG-523A Rev. 6-2002

U.S. Department of Agriculture
Natural Resources Conservation Service

State	Project			
NY	EWP - Little Schoharie Creek - Reach D			
By: WAV	Date: 3/05/12	Checked by:	Date:	Job No.: DSR #: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 1 of 16

GIVEN: Reach D of the Little Schoharie Creek from just below Lawton Hollow (where USGS Topo Map Elev. 960' contour crosses stream) up to Gridley Rd. bridge (where streambed Elev. ≈ 1150' AMSL).

(1) REACH D Exist. Conditions (per "Little Schoharie Creek Reach Summary" spreadsheet, attached):

Reach Length = 6,653 LF (pre-Flood)
" " = 6,669 LF (post-Flood)
Reach Slope = 2.86% (pre-Flood)
" " = 2.85% (post-Flood)
Reach US Elev = 1,150' AMSL
" DS " = 960' "
" Fall = 190'
Valley Length = 5,750 LF

Left Bank Raw Bank Area = 123,489 sq.ft.
Right Bank " " " = 129,484 "
Total Reach D " " " = 252,973 sq. ft.

from Downstream End to just below Waterfall #2:

Reach Length = 3,321 LF
Reach US Elev = 1,040' AMSL
Reach Slope = 2.4%

(2.) Reach D Conceptual Design Geometry (per "Estimated Stream Channel Geometry - Little Schoharie Creek 2011 EWP Cost Estimating" spreadsheet, attached):

Bankfull Flow est., Q_{BF} = 350 cfs (@ Upstream end DA = 10.2 sq.mi.)
" Area ", A_{BF} = 70 sq.ft.
" Width ", W_{BF} = 35 ft
" Depth ", D_{BF} = 2.0 ft
Max BF Depth ", D_{max} = 3.0 ft

(3.) Channel Length, Slope & Grade Control Conceptual Design:

For B & C Stream Types, Sinuosity should be at least 1.2

∴ Recommended Min. Stream Length = Valley Length × 1.2 = 5,750 LF × 1.2 = 6,900 LF

However, the stream reach above the waterfalls appears relatively stable and the reach below the waterfalls does not present any real opportunity for increasing stream length. Therefore, for the purposes of this conceptual analysis, it is assumed that the existing stream sinuosity of 1.16 (slightly less than 1.2) is acceptable.

State	Project			
NY	EWP-Little Schoharie Creek-Reach D			
By: WAV	Date: 3/05/12	Checked by	Date	Job No.: DSR #: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 2 of 16

(3.) Channel Length, Slope & Grade Control Conceptual Design cont.:

A.) For the upper section of Reach D above Waterfall #2 (6669 - 3321 = 3,348 LF):

Since much of this section is under bedrock control and appears to be fairly stable (aside from some flood-related bank erosion), it is assumed that no significant grade altering is required. It is further assumed that a total of ten (10) rock cross vanes will be sufficient to redirect stream energy from eroded banks in this upper section of Reach D.

∴ Assume 10 rock cross vanes in upper section of Reach D

B.) For the lower section of Reach D below Waterfall #2 (3,321 LF):

$$\text{Gross Stream Slope} = \frac{\text{Fall}}{\text{Stream L}} = \frac{1040' - 960'}{3321\ \text{LF}} = \frac{80\ \text{ft}}{3{,}321\ \text{LF}} = 0.024 = 2.4\%\ \text{slope}$$

Such a steep slope will result in much too high flow velocities and shear stresses (Vel. on the order of 9 ft/sec, $\tau \approx 2.9\ \text{lb/ft}^2$) - see NY-Hydraulics2_WAV.xlsx Channel flow - unaltered slope tab.

From NY-Hydraulics2_WAX.xlsx, channel flow - proposed tab (attached), stream slope needs to be approx. 0.01 ft/ft to produce target flow conditions as follows:

@ stream slope = 0.01 ft/ft and Parabolic channel w/ D_{max} = 3.0 ft and TopWidth = 35 ft:

A =	70 sq. ft	=	70 sq. ft. Target
T = W =	35 ft	=	35 ft Target
Q =	408 cfs	≈	350 cfs Target
V =	5.8 ft/sec	≈	5 ft/sec Target

OK

State	Project			
NY	EWP - Little Schoharie Creek - Reach D			
By: WAV	Date: 3/06/12	Checked by	Date	Job No.: DSR#: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 3 of 16

(3.) Channel Length, Slope & Grade Control Conceptual Design cont.:

Then, 3,321 LF stream × 0.01 ft/ft = 33 ft of fall due to slope. The remainder of the existing fall (80 ft - 33 ft = 47 ft) to be accomplished with rock cross vanes for energy dissipation, sediment transport, and grade control. Assuming 1-foot of net drop across each cross vane, this will require approx. 47 cross vanes over the 3,321 LF lower section of Reach D.

∴ Assume 47 rock cross vanes in lower section of Reach D
" 57 rock cross vanes req'd for entire Reach D

Cross Vane geometry as indicated on NY-Hydraulics2_WAV.xlsx, rock vane design_WAV tab (attached) &

Channel Top Width	=	35 ft
Bank Angle	=	25 degrees
Vane Height (avg)	=	5 ft
Vane Width	=	3 ft
Overall Vane Length	=	68 ft
Total Keyway Length	=	20 ft
Total Vane Face Area	=	434 sq. ft. each

57 cross vanes × 434 sq. ft./vane = 24,738 sq. ft. ⇒ 24,750 sq. ft. Total Face Area of Cross Vanes

(4.) Temporary Bank Stabilization (Bioengineering) at Cross Vanes:

Assume willow wattles/fascines used at each cross vane for temporary bank stabilization. At each vane, assume 2 rows, each 40 ft long, on each side of stream.

2 rows × 40 ft each × 2 sides = 160 LF/vane @ 57 vanes = 9,120 LF Total

Use: 9,200 LF willow wattles/fascines
* Assume 100 LF/hr can be installed w/ unskilled labor & 1 backhoe

State	Project			
NY	EWP - Little Schoharie Creek-Reach D			
By: WAV	Date: 3/06/12	Checked by	Date	Job No.: DSR #: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 4 of 16

(5) Gravel Relocation/Streambed Elevation

For the purposes of this conceptual analysis, it is assumed that the upper portion of this reach (above Waterfall #2) has not experienced significant downcutting and will not need it's bed elevated. Although some bank stabilization will be required, it is further assumed that any gravel removal/relocation will be minor in this upper section.

For the lower section of this reach (below Waterfall #2), significant downcutting of the streambed has occurred, as outlined on the attached aerial photo base map. It is assumed that the streambed will be raised to reverse this downcutting, to reconnect the stream with its former floodplain. While some of the fill material may come from existing raw banks, this is assumed to be negligible, primarily due to the difficulties associated with separating out the required larger sized materials. As with reaches B and C, it is assumed that as the stream channel is raised, a small bankfull bench will be created at the base of high raw banks wherever possible. It is further assumed that most of these raw banks (the ones that are not immediately adjacent to roads or structures) will be allowed to self-stabilize over time, since mechanical stabilization of all raw banks would likely be cost-prohibitive. There are a few existing raw banks near roads/structures that will receive additional bank stabilization treatment.

Computation Sheet

NRCS–ENG-523A Rev. 6-2002

U.S. Department of Agriculture
Natural Resources Conservation Service

State	Project			
NY	EWP - Little Schoharie Creek - Reach D			
By: WAV	Date: 3/06/12	Checked by	Date	Job No.: DSR#: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 5 of 16

(5.) Gravel Relocation / Streambed Elevation cont.:

Assuming an average width of streambed fill of 35 ft., required streambed elevation fill volume for the lower section of Reach D is estimated as follows (beginning just below Waterfall #2 and progressing downstream toward Lawton Hollow):

Location	Fill Depth	Average Depth	Distance	Width	Fill Volume
1.) ≈300' DS of Waterfall #2	6 ft				
		10 ft	600 LF	35 ft	210,000 cu ft
2.) ≈900' DS " " "	14 ft				
		12 ft	270 LF	"	113,400 " "
3.) sharp bend nr. Hunters Island Rd.	10 ft				
		10 ft	960 LF	"	336,000 " "
4.) ≈1100' South of Lawton Hollow	10 ft				
		8 ft	940 LF	"	263,200 " "
5.) ≈200' South of Lawton Hollow	6 ft				
		6 ft	450 LF	"	94,500 " "
6.) @ Downstream end of Reach D	6 ft				
			3,220 LF	Total Vol =	1,017,100 cu ft
			≈ 3,231 LF OK		= 37,670 cu yd.

Use: 38,000 cu yd. Cobble Fill for streambed elevation

(6.) Mechanical Bank Stabilization:

For the purposes of this conceptual analysis, it is assumed that there are a few raw banks that are close enough to roads/structures that something must be done to help stabilize the bank and prevent or limit further bank erosion. In general, the assumed method of stabilization will be to add rock riprap to the face of a bankfull bench along the base of each raw bank. Some regrading and vegetation of the remaining raw bank is also assumed.

State	Project		
NY	EWP - Little Schoharie Creek - Reach D		
By: WAV	Date: 3/06/12	Checked by	Date
Job No.: DSR# 8 S-TM-10			
Subject: Conceptual Design Analysis & Quantities for Cost Estimating		Sheet 6 of 16	

(6) Mechanical Bank Stabilization cont.'s

The individual raw banks are addressed as follows (from upstream to downstream):

1.) Sharp Bend near Hunterslandd Rd, near mid-section of Reach D (Right Bank):

This location is included in the section where cobble fill will be imported to raise the streambed and reconnect the stream to its former floodplain. Due to the sharp bend and proximity to Huntersland Road (with evidence of prior bank instability) it is assumed that heavy rock riprap will be added to the face of the bankfull bench. For the purposes of this conceptual analysis, it is assumed that a 6-foot high bench extending a total length of 250 LF will be armored. Since there appears to be adequate room between the stream and the roadway, a 2H:1V riprap slope is assumed. Although a small amount of related earthwork will be required, due to the preliminary nature of this analysis, no earthwork quantities are estimated. Therefore, in the attached "Engineer's Construction Cost Estimate":

> Use 250 LF of Heavy Rock Riprap for a 6-ft High Elevation Difference & 2H:1V

2.) 60±-ft High Raw (Left) bank approx 500-ft West of Raw Bank in 1.) above:

This extremely high and steep raw bank is experiencing active toe erosion and is immediately upstream of a newer residence that is directly impacted by bank erosion. This location is also included in the section where cobble fill will be imported to raise the streambed elevation. For the purposes of this conceptual analysis,

State	Project			
NY	EWP - Little Schoharie Creek - Reach D			
By: WAV	Date: 3/06/12	Checked by	Date	Job No: DSR #: S-TM-10
Subject: Conceptual Design Analysis & Quantities for Cost Estimating				Sheet 7 of 16

(6.) Mechanical Bank Stabilization cont. :

2.) 60±-ft High Raw Left Bank cont. :

It is assumed that 350 LF of Bankfull bench will be armored with heavy rock riprap at a height of 6-feet (elevation difference) and a riprap slope of 1.5H:1V due to limited space. It is also assumed that a 200 LF stretch of 20-ft high reinforced earth wall system will be adequate to stabilize the worst area of steep raw bank.

Therefore, in the attached "Engineer's Construction Cost Estimate" :

> Use, 350 LF of Heavy Rock riprap for a 6-ft High Elev. Difference @ 1.5H:1V.
> and 200 LF x 20-ft High = 4,000 sq.ft. Reinforced Earth Wall System

3.) Raw Right Bank along Huntersland Road just West of Lawton Hollow Rd. :

This location is included in the section where cobble fill will be imported to raise the streambed elevation. Due to the proximity of the bank to Huntersland Road, it is assumed that Heavy rock riprap will be added to the face of the bankfull bench. For the purposes of this conceptual analysis, it is assumed that a 6-ft high bench extending a total of 200 LF will be armored. There appears to be adequate room to place the riprap at a 2H:1V slope. Although some related earthwork may be required, no separate earthwork quantities are included in this estimate.

Therefore, in the attached "Engineer's Construction Cost Estimate" :

> Use 200 LF of Heavy Rock Riprap for a 6-ft High Elev. Difference @ 2H:1V

State	Project			
NY	EWP - Little Schoharie Creek - Reach D			
By: WAV	Date: 3/06/12	Checked by	Date	Job No.: DSR# : S-TM-10
Subject: Conceptual Design Analysis : Quantities for Cost Estimating				Sheet 8 of 16

(7.) Dewatering :

Assume that some level of dewatering will be required. Assume that approx. 100 LF of channel can be reconstructed per day.

Then, $\frac{6,669 \text{ LF (Total Reach D)}}{100 \text{ LF/day}} = 66.7 \text{ days}$

Use : 65 days of Major Channel Reconstruction (for Dewatering)

(8.) Seeding : Mulching :

Assume a 100-foot wide swath on each side of the lower section of stream will be seeded/mulched, and a much lesser extent will be required in the upper section of Reach D, where work will primarily consist of installation of rock cross vanes. Then, for the lower section :

$3321 \text{ LF} \times 100 \frac{\text{ft}}{\text{side}} \times 2 \text{ sides} = 664,200 \text{ sq. ft.}$

$= 15.2 \text{ acres}$

Assume approximately 1/3 as much seeding/mulching for upper section (≈ 5 acres).

Use : 20 acres Seeding/Mulching

(9.) Conceptual-Level Cost Estimate :

See attached "Engineer's Construction Cost Est.", dated 3/06/12 for Reach D ⇒ $2,538,000

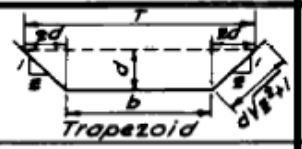
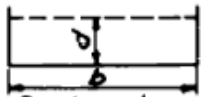
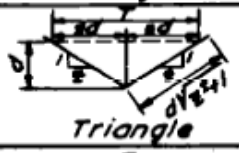
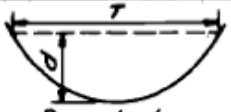
Little Schoharie Creek Reach Summary - Existing Conditions as of January 2012

Reach	Description	Stream Length		Valley	Stream Sinuosity		Approx. Elevation Data			Stream Slope		Raw Bank Area		
		Pre-Flood	Post-Flood	Length	Pre-Flood	Post-Flood	US Elev.	DS Elev.	Fall	Pre-Flood	Post-Flood	Left Bank	Right Bank	Total
		(ft)	(ft)	(ft)			(ft)	(ft)	(ft)	(%)	(%)	(sq.ft.)	(sq.ft.)	(sq.ft.)
A	Schoharie Creek to NYS Rte. 145	8,478	8,478	8,000	1.1	1.1	740	620	120	1.4	1.4	88,226	87,851	176,077
B	NYS Rte. 145 to Chichester property	8,274	7,626	6,800	1.2	1.1	860	740	120	1.5	1.6	198,082	106,290	304,372
C	Chichester property to near Lawton Hollow Rd.	6,036	5,170	4,850	1.2	1.1	960	860	100	1.7	1.9	87,650	64,603	152,253
D	Lawton Hollow Rd. to Gridley Rd.	6,653	6,669	5,750	1.2	1.2	1,150	960	190	2.9	2.8	123,489	129,484	252,973
	Total, 4 Reaches	29,441	27,943	25,400	1.2	1.1			530			497,447	388,228	885,675

U:\ENG Files\EWP\2011\August_2011\Schoharie_Cty\Little_Schoharie\[LittleSchoharie_Reach_Summary_Jan-2012.xlsx]Sheet1

Estimated Stream Channel Geometry - Little Schoharie Creek 2011 EWP Cost Estimating

Parameter	Locations on the Little Schoharie Creek analyzed for EWP Cost Estimating Little Schoharie at Gridley Rd	Little Scho. just below Brooky Hollow	Little Schoharie at NYS Rte. 145	Little Schoharie at VanAller Farm	Notes/Comments
Drainage Area, DA (sq.mi.)	10.2 (sq.mi.)	15.1 (sq.mi.)	18.1 (sq.mi.)	24.3 (sq.mi.)	
Flow, Q (cfs)					
Del. Cty. SWCD 2005 Regional Curve Q_{BF} (= 28.65*$DA^{1.01}$)	299 (cfs)	445 (cfs)	534 (cfs)	719 (cfs)	
USGS StreamStats Q1.5	273 "	397 "	472 "	628 "	
USGS StreamStats Q2	369 "	538 "	638 "	849 "	
USGS StreamStats Q5	666 "	971 "	1150 "	1530 "	
USGS StreamStats Q_{BF}	717 "	974 "	1120 "	1410 "	
Average Q_{BF}	508 "	709 "	827 "	1064 "	
Selected Q_{BF} (cfs)	350 (cfs)	500 (cfs)	600 (cfs)	800 (cfs)	
Bankfull Area, A_{BF} (sq.ft.) and Bankfull Velocity, V_{BF} (ft/sec)					
Del. Cty. SWCD 2005 Regional Curve A_{BF} (= 7.01*$DA^{0.93}$)	61 (sq.ft.) 5 (ft/sec)	88 (sq.ft.) 5 (ft/sec)	104 (sq.ft.) 5 (ft/sec)	136 (sq.ft.) 5 (ft/sec)	
USGS StreamStats A_{BF}	109 " 7 "	148 " 7 "	170 " 7 "	214 " 7 "	
Average A_{BF}	85 " 6 "	118 " 6 "	137 " 6 "	175 " 6 "	
Selected A_{BF} (sq.ft.)	70 (sq.ft.) 5 (ft/sec)	100 (sq.ft.) 5 (ft/sec)	120 (sq.ft.) 5 (ft/sec)	160 (sq.ft.) 5 (ft/sec)	
DCSWCD Post-Flood curve for East Branch Del. Basin (for comparison)	61	88	104	137	
Bankfull Width, W_{BF} (ft)					
DCSWCD 2005 Reg. Curve A_{BF} and W/D=16 for upper reaches (B-Type), W/D=18 for lower reaches (C-Type)	31 (ft)	37 (ft)	43 (ft)	50 (ft)	
USGS StreamStats W_{BF}	50 "	60 "	65 "	74 "	
Average W_{BF}	40 "	49 "	54 "	62 "	
Selected W_{BF} (ft)	35 (ft)	40 (ft)	45 (ft)	55 (ft)	
DCSWCD Post-Flood curve for East Branch Del. Basin (for comparison)	33	41	46	55	
Bankfull Depth, D_{BF} (ft)					
DCSWCD 2005 Reg. Curve A_{BF}/W_{BF}	1.9 (ft)	2.3 (ft)	2.4 (ft)	2.8 (ft)	
USGS StreamStats D_{BF}	2.2 "	2.5 "	2.7 "	2.9 "	
Average D_{BF}	2.1 "	2.4 "	2.5 "	2.8 "	
Selected D_{BF} (ft)	2.0 (ft)	2.5 (ft)	2.7 (ft)	2.9 (ft)	
DCSWCD Post-Flood curve for East Branch Del. Basin (for comparison)	1.9	2.1	2.3	2.5	
Resulting W/D ratio (dimensionless)	18	16	17	19	
Resulting D_{max} (cross vane sizing)	3.0	3.8	4.0	4.4	

Section	Area a	Wetted Perimeter p	Hydraulic Radius r	Top Width T
 Trapezoid	$bd+zd^2$	$b+2d\sqrt{z^2+1}$	$\frac{bd+zd^2}{b+2d\sqrt{z^2+1}}$	$b+2zd$
 Rectangle	bd	$b+2d$	$\frac{bd}{b+2d}$	b
 Triangle	zd^2	$2d\sqrt{z^2+1}$	$\frac{zd}{2\sqrt{z^2+1}}$	$2zd$
 Parabola	$\frac{2}{3}dT$	$T+\frac{8d^2}{3T}$	$\frac{2dT^2}{3T^2+8d^2}$	$\frac{3a}{2d}$

Little Schoharie Creek Reach D below Waterfall #2 - Existing Conditions (Jan. 2012) - Trapezoidal Channel

Given

Slope (s) = 0.024

Manning's n = 0.04

Compute

	Bottom Width b	Flow Depth d	Side Slope z	Top Width T	Wetted Perimeter p	Hydraulic Radius r	Area a	Velocity V	Discharge Q	Shear Stress τ	Average Rock feet
Trapezoid	25	6	2	49	51.83	4.28	222.00	15.22	3378.71	6.41	4.03019179
Rectangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Triangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Parabola					#DIV/0!	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Specific Weight of Water = 62.4 lbs/ft^3

Shield's Equation

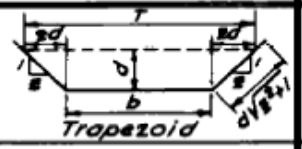
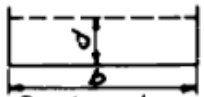
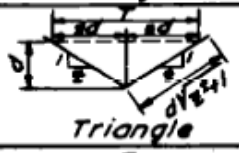
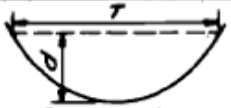
τ = Shear Stress (lbs/ft^2)

γ= specific weight of water (lbs/ft^3)

R=hydraulic radius (ft)

$$\tau = \gamma RS$$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$ Q=VA

Section	Area a	Wetted Perimeter p	Hydraulic Radius r	Top Width T
 Trapezoid	$bd+zd^2$	$b+2d\sqrt{z^2+1}$	$\frac{bd+zd^2}{b+2d\sqrt{z^2+1}}$	$b+2zd$
 Rectangle	bd	$b+2d$	$\frac{bd}{b+2d}$	b
 Triangle	zd^2	$2d\sqrt{z^2+1}$	$\frac{zd}{2\sqrt{z^2+1}}$	$2zd$
 Parabola	$\frac{2}{3}dT$	$T+\frac{8d^2}{3T}$	$\frac{2dT^2}{3T^2+8d^2}$	$\frac{3a}{2d}$

Little Schoharie Creek Reach D below Waterfall #2 - Stream Length unchanged at 3321 LF with sinuosity ~ 1.2. Resulting slope unaltered.

Given

Slope (s) = 0.024

Manning's n = 0.04

Compute

	Bottom Width b	Flow Depth d	Side Slope z	Top Width T	Wetted Perimeter p	Hydraulic Radius r	Area a	Velocity V	Discharge Q	Shear Stress τ	Average Rock feet
Trapazoid				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Rectangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Triangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Parabola		3		35	35.69	1.96	70.00	9.04	632.99	2.94	3.58858767

Specific Weight of Water = 62.4 lbs/ft^3

Shield's Equation

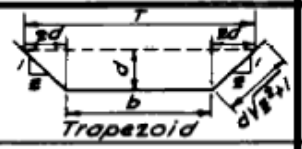
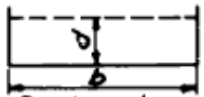
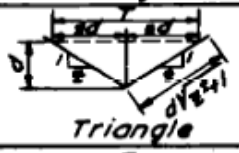
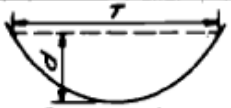
τ = Shear Stress (lbs/ft^2)

γ= specific weight of water (lbs/ft^3)

R=hydraulic radius (ft)

$$\tau = \gamma R S$$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$ Q=VA

Section	Area a	Wetted Perimeter p	Hydraulic Radius r	Top Width T
 Trapezoid	$bd+zd^2$	$b+2d\sqrt{z^2+1}$	$\frac{bd+zd^2}{b+2d\sqrt{z^2+1}}$	$b+2zd$
 Rectangle	bd	$b+2d$	$\frac{bd}{b+2d}$	b
 Triangle	zd^2	$2d\sqrt{z^2+1}$	$\frac{zd}{2\sqrt{z^2+1}}$	$2zd$
 Parabola	$\frac{2}{3}dT$	$T+\frac{8d^2}{3T}$	$\frac{2dT^2}{3T^2+8d^2}$	$\frac{3a}{2d}$

Little Schoharie Creek Reach D below Waterfall #2 - proposed conditions to model selected bankfull parameters. Stream Length remains at 3321 LF with sinuosity ~ 1.2. Required slope of 0.01 ft/ft to be achieved with cross-vanes.

Given

Slope (s) = 0.01

Manning's n = 0.04

Compute

	Bottom Width b	Flow Depth d	Side Slope z	Top Width T	Wetted Perimeter p	Hydraulic Radius r	Area a	Velocity V	Discharge Q	Shear Stress τ	Average Rock feet
Trapazoid				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Rectangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Triangle				0	0.00	#DIV/0!	0.00	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Parabola		3		35	35.69	1.96	70.00	5.84	408.60	1.22	3.0935101

Specific Weight of Water = 62.4 lbs/ft^3

Shield's Equation

τ = Shear Stress (lbs/ft^2)

γ= specific weight of water (lbs/ft^3)

R=hydraulic radius (ft)

$$\tau = \gamma RS$$

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$ Q=VA

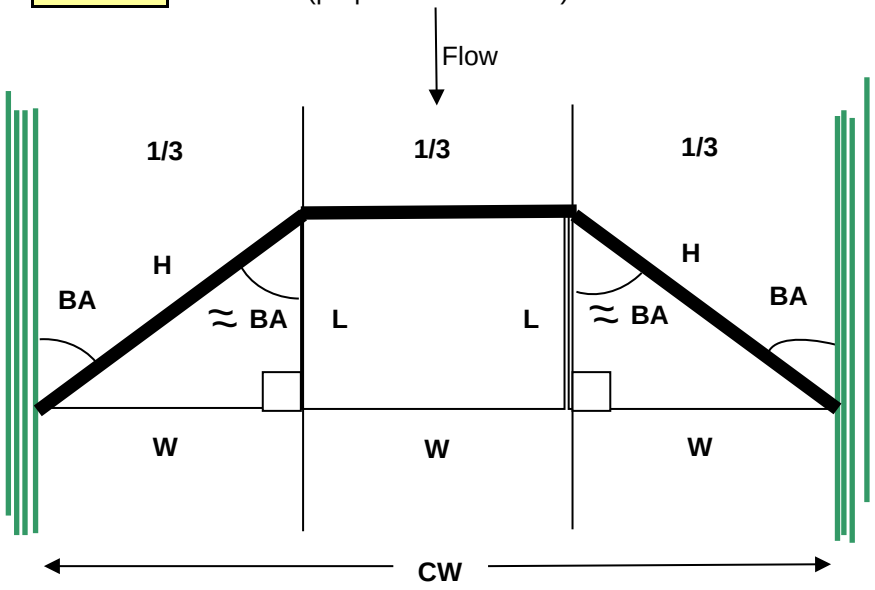
2011 Schoharie County EWP By: W. VanDeValk

DSR No.: S-TM-10 Date: 3/5/2012

Site Description: Little Schoharie Reach D

Given (Vane Height assumed to vary from 6 ft in center of channel to 4 ft at keyways)

CW =	35	ft	(channel top width)	Keyway into bank	left bank 10	ft
BA =	25	o	(stream bank to structure angle)			
Vane Height =	5.0	ft	(Top Rock to Bottom of Footer)	Keyway into bank	right bank 10	ft
Vane Width =	3.0	ft	(perpendicular to flow)			



Find

Solution

1) Determine weir length, ft.

Tan(BA) = W/L

Sin(BA) = W/H

W =	12	ft	(CW/3)
L =	25	ft	(W/TAN(BA))
H =	28	ft	(W/SIN(BA))

Assume thalweg bed elev. = 100, vane elev. @ thalweg = 101, BF elev. = 103.0 (Dmax = 3.0 ft), top of rock elev. = 103.0

Overall Weir Length

67 ft ((H*2)+W)

Left Arms				
Arm Length	TW Elev.	BKF Elev.	Slope (%)	Keyway Length
28	101.0	103.0	7.24%	10
Right Arms				
Arm Length	TW Elev.	BKF Elev.	Slope (%)	Keyway Length
28	101.0	103.0	7.24%	10

Invert Sill
Sill Length
12
Center 1/3

Drop in vane elevation 2.0 ft left

2.0 ft right

	Length (ft)	Face Area (ft^2)	Vol (ft^3)	Vol (yds^3)	Tons
Vane Arm Totals =	55	276	828	31	61
Invert Sill Totals =	12	58	175	6	13
Keyway Totals =	20	100	300	11	22
Totals:	87	434	1303	48	97

2011 Schoharie County EWP				By:	W. VanDeValk	
Engineer's Construction Cost Estimate				**Date:**	3/6/2012	
DSR No.:	**S-TM-10**		**Sponsor:**			
Site Description:	Little Schoharie Creek, Reach D					
Item	**Description**	**Unit cost**	**Unit**	**Quantity**	**Item cost**	
Mobilization/Demobilization		$5,000.00	job	2	$10,000	
Rip rap	Heavy stone (in place)	$67.00	ton	0	$0	
		$100.00	cy	1265	$126,500	
	Medium stone (in place)	$60.00	ton	0	$0	
		$90.00	cy	0	$0	
	Dumped rock (in place)	$53.00	ton	0	$0	
		$80.00	cy	0	$0	
	Pinning	$10.00	ft wall/# rock layers	0	$0	
Gravel	2" minus screened (in place)	$14.00	cy	0	$0	
	#2 Stone (in place)	$22.00	cy	0	$0	
	Cobbles (in place)	$15.00	cy	38000	$570,000	
	Bankrun (in place)	$12.00	cy	0	$0	
Geotextile		$0.15	sq ft	0	$0	
Geo-grid		$0.30	sq ft	0	$0	
Trucking		$85.00	hr	0	$0	
Excavator	large	$170.00	hr	0	$0	
	mid-size	$140.00	hr	0	$0	
Backhoe		$120.00	hr	92	$11,040	
Dozer	large	$150.00	hr	0	$0	
	mid-size	$130.00	hr	0	$0	
Labor	skilled	$50.00	hr	0	$0	
	unskilled	$35.00	hr	92	$3,220	
Willow stakes	w/o labor	$2.00	stake	0	$0	
Wattles & Fascines	w/o labor	$9.00	lin ft	9200	$82,800	
Brush layering	w/o labor	$18.00	bundle	0	$0	
Brush mattress	w/o labor	$3.00	sq ft	0	$0	
Silt fence	installed & maintained	$5.00	lin ft	0	$0	
Straw blanket	100 sq yard/roll	$175.00	roll	0	$0	
Geo-jute	65 sq yard/roll	$120.00	roll	0	$0	
Dewatering	small pump (<4"), incl. setup	$3,000.00	day	0	$0	
	mid-size (6") incl. setup	$5,000.00	day	65	$325,000	
	large (8-12") incl. setup	$8,000.00	day	0	$0	
Seeding & Mulching		$2,000.00	acre	20	$40,000	
		$0.05	sq ft	0	$0	
Overhead and Profit, %	20		Overhead and Profit		$233,712	
			Subtotal, excluding Wall Systems		$1,402,272	
Wall System costs (in place; wall system only; includes OH&P)						
Sheet Piling	Under 1000 sq ft	$35.00	sq ft	0	$0	
	Over 1000 sq ft	$30.00	sq ft	0	$0	
Rip rap	6' wall stacked/pinned	$33.00	sq ft	24750	$816,750	434 x 57 =
	8' wall stacked/pinned	$31.00	sq ft	0	$0	
	10' wall stacked/pinned	$30.00	sq ft	0	$0	
	12' wall stacked/pinned	$29.00	sq ft	0	$0	
Precast concrete	T-wall system	$35.00	sq ft	0	$0	
	Recon wall system	$35.00	sq ft	0	$0	
Reinforced earth	w/geogrid & fill (15' depth)	$22.00	sq ft	4000	$88,000	
				Subtotal	$2,307,022	
Contingency %	10			Contingency	$230,702	
Additional %	0			Additional	$0	
				Total Estimate	**$2,537,724**	

Conversions for estimating quantities

Assume for each 100' wall, will need to dewater for 3 days

Estimating sloped rip rap protection

Depth of key/toe (2 or 3')	3	ft	Quantity in key/toe	12	(based on trapezoidal key)	
Thickness of rip rap	2.5	ft				

Elevation difference	length of slope for 1.5:1 (ft)	quantity/ft @ 1.5:1		lin footage	total rock	
4	7.21	1.11	cy/ft	0	0	cy
5	9.01	1.28	cy/ft	0	0	cy
6	10.82	1.45	cy/ft	350	506	cy
7	12.62	1.61	cy/ft	0	0	cy
8	14.42	1.78	cy/ft	0	0	cy
9	16.22	1.95	cy/ft	0	0	cy
10	18.03	2.11	cy/ft	0	0	cy
11	19.83	2.28	cy/ft	0	0	cy
12	21.63	2.45	cy/ft	0	0	cy

Elevation difference	length of slope for 2:1	quantity/ft @ 2:1				
4	8.94	1.27	cy/ft	0	0	cy
5	11.18	1.48	cy/ft	0	0	cy
6	13.42	1.69	cy/ft	450	759	cy
7	15.65	1.89	cy/ft	0	0	cy
8	17.89	2.10	cy/ft	0	0	cy
9	20.12	2.31	cy/ft	0	0	cy
10	22.36	2.51	cy/ft	0	0	cy
11	24.60	2.72	cy/ft	0	0	cy
12	26.83	2.93	cy/ft	0	0	cy

2011 EWP- Middleburgh (T) Little Schoharie - Reach D

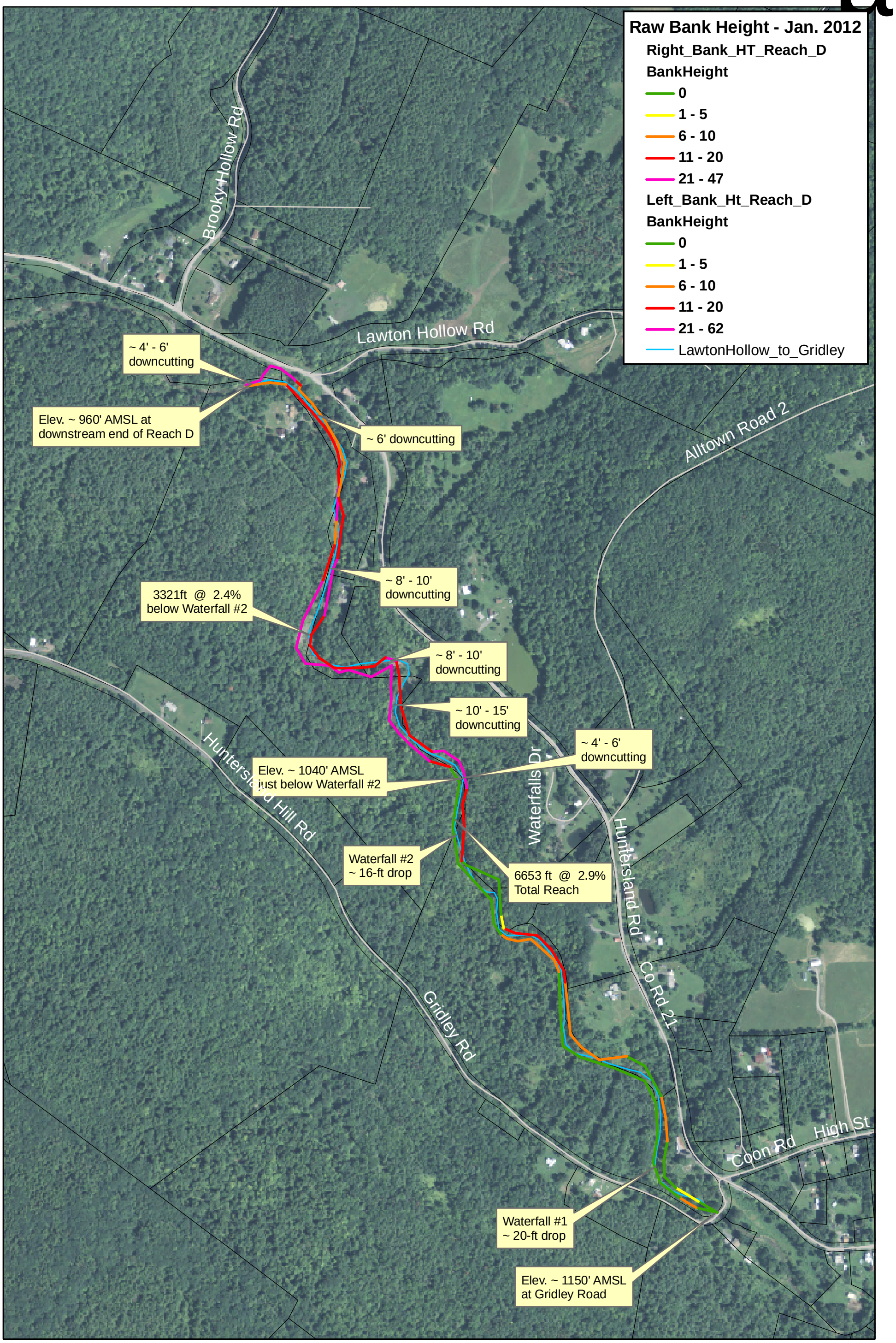


Photo 1: From Gridley Rd. Bridge looking upstream, above US end of Reach D

Photo 2: From Gridley Rd. Bridge looking downstream at upper end of Reach D

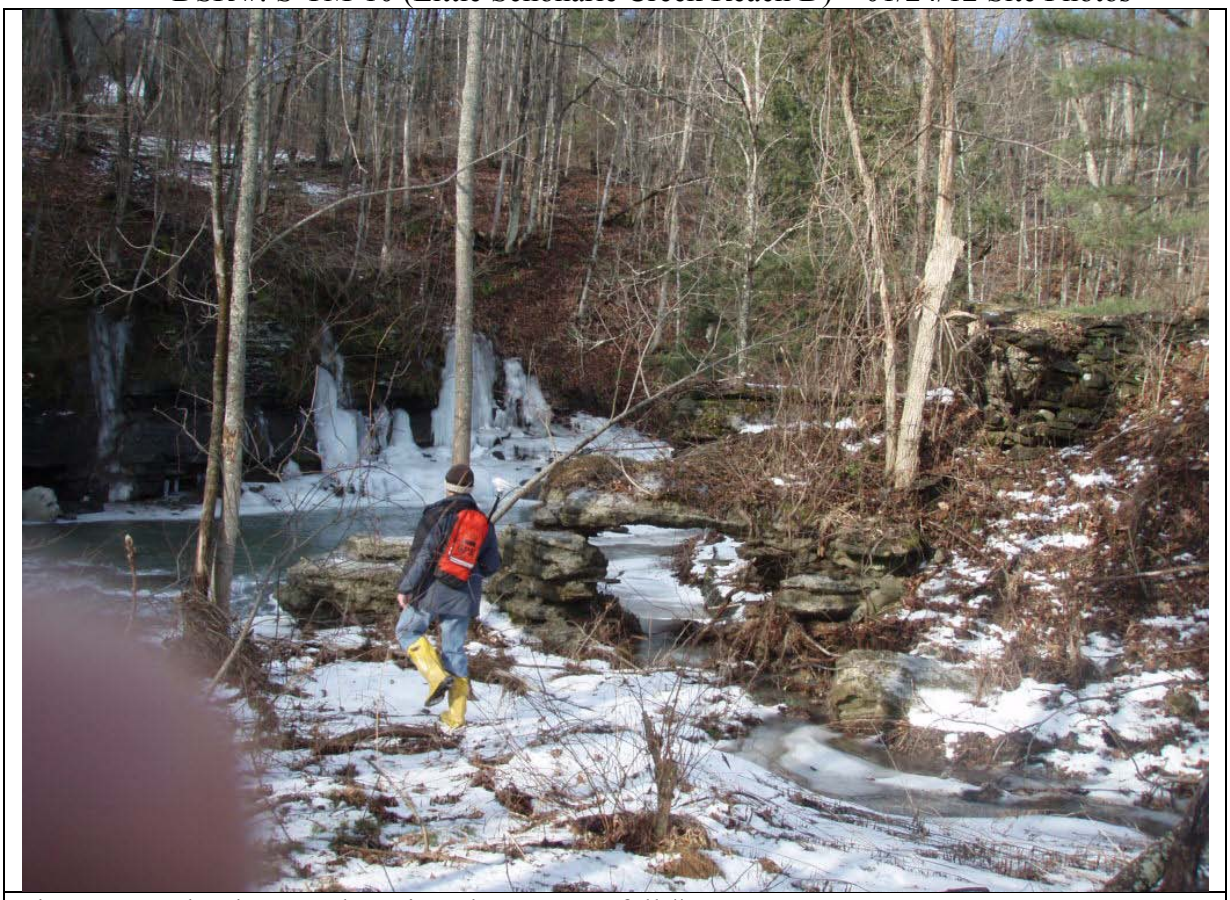


Photo 6: Bedrock control section above Waterfall #1

Photo 8: Looking downstream at Waterfall #1 (approx. 20-ft drop)

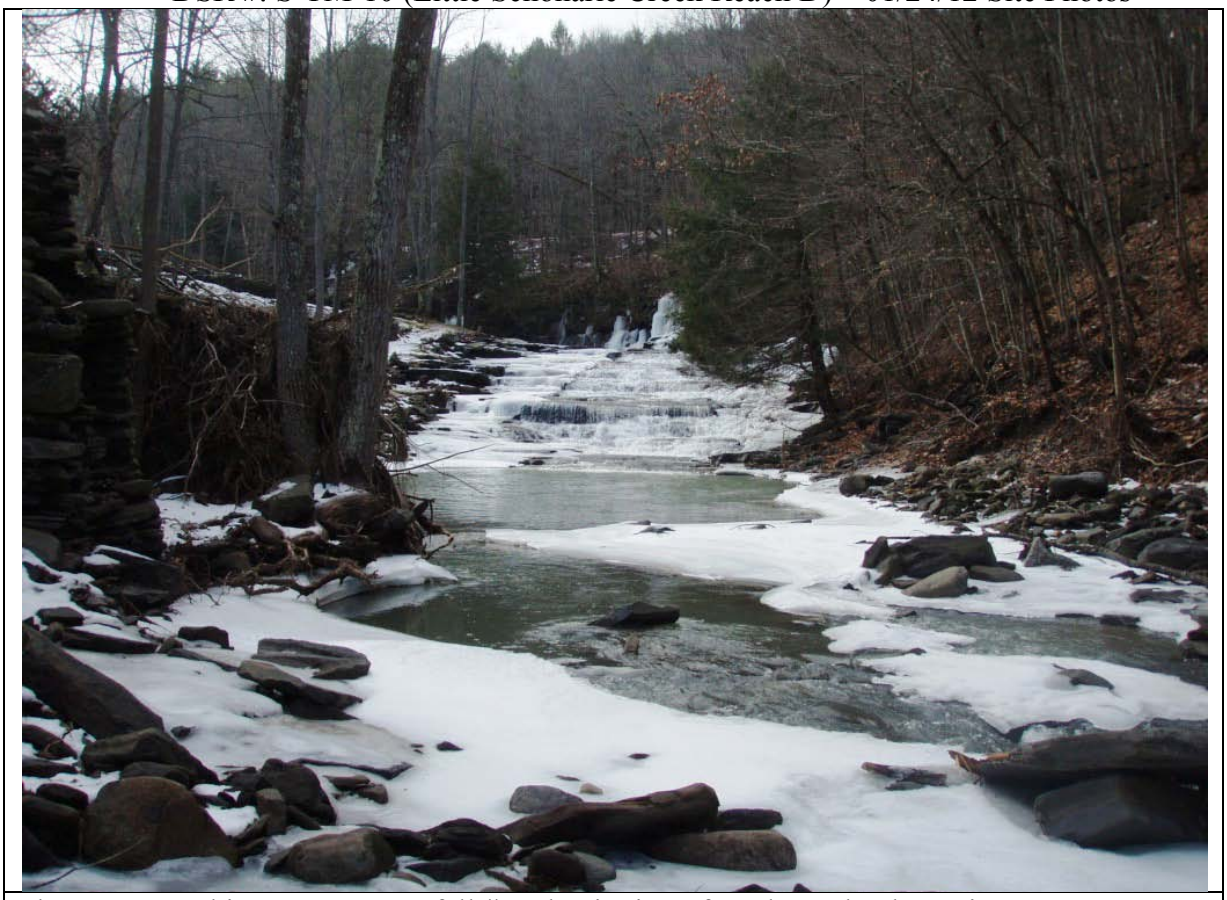


Photo 12: Looking US at Waterfall #1 – beginning of moderate bank erosion

Photo 21: Looking DS at raw banks and small headcut between Waterfalls #1 and #2

Photo 30: Looking US at Waterfall #2 (approx. 16-ft drop)

Photo 31: Looking DS from Waterfall #2 – begin of significant debris and bank erosion

Photo 33: Approx. 300’ DS of Waterfall #2 – begin significant downcutting (4’-6’)

Photo 43: Approx. 900’ DS of Waterfall #2 – streambed downcut 10’ – 15’

Photo 47: Looking DS toward sharp bend near Huntersland Rd (10' - 15' downcutting)

Photo 49: Looking US above sharp bend near Huntersland Rd (10' - 15' downcutting)

Photo 50: View showing that most bed and lower bank armoring has been washed away

Photo 53: Looking DS at sharp bend near Huntersland Rd (begin 8’ - 10’ downcutting)

Photo 64: 60+-ft high raw left bank approx. 1500-ft upstream of Lawton Hollow

Photo 67: 60+-ft high raw left bank showing absence of bed and bank armoring

Photo 73: raw right bank settling along side of newer home in area of 8' – 10' downcut

Photo 82: Looking US at raw banks just below newer home in photo 73

Photo 94: New 42'W x 11'H private bridge just above Lawton Hollow (~ 6' downcut)

Photo 97: Looking US at lower end of Reach D (4' – 6' streambed downcut)