

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

**Section 1A**

Date of Report: \_\_\_\_\_

DSR Number: \_\_\_\_\_ Project Number: \_\_\_\_\_

NRCS Entry Only

Eligible: YES \_\_\_\_\_ NO \_\_\_\_\_  
Approved: YES \_\_\_\_\_ NO \_\_\_\_\_  
Funding Priority Number (from Section 4) \_\_\_\_\_  
Limited Resource Area: YES \_\_\_\_\_ NO \_\_\_\_\_

**Section 1B Sponsor Information**

Sponsor Name: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Fax: \_\_\_\_\_

**Section 1C Site Location Information**

County: \_\_\_\_\_ State: \_\_\_\_\_ Congressional District: \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_ Section: \_\_\_\_\_ Township: \_\_\_\_\_ Range: \_\_\_\_\_

UTM Coordinates: \_\_\_\_\_

Drainage Name: \_\_\_\_\_ Reach: \_\_\_\_\_

Damage Description: \_\_\_\_\_

**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?***                                              |     |    |         |
| <b>Site Defensibility</b>                                                                                    |     |    |         |
| 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: \_\_\_\_\_

\* 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: \_\_\_\_\_

### Section 1E Proposed Action

Describe the preferred alternative from Findings: Section 5 A:

Total installation cost identified in this DSR: Section 3: \$ \_\_\_\_\_

### 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, marital 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 programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202)720-2600 (voice 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: \_\_\_\_\_

**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: \_\_\_\_\_

**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)                                           |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
| Properties Protected (Public)                                            |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
| Business Losses                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
| Other                                                                    |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
|                                                                          |                     |                   |                            |
| Total Near Term Damage Reduction \$                                      |                     |                   |                            |
| Net Benefit (Total Near Term Damage Reduction minus Cost from Section 3) |                     |                   |                            |

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

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

**(attach additional sheets as necessary).**

|                                                                                                                                             | <b>YES</b> | <b>NO</b> | <b>Remarks</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|----------------|
| 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: \_\_\_\_\_ Date: \_\_\_\_\_

DSR NO: \_\_\_\_\_

**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                                          |        |

Census tract(s) \_\_\_\_\_

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

DSR NO: \_\_\_\_\_

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

|                                                                                      |                                  |
|--------------------------------------------------------------------------------------|----------------------------------|
| Completed by: _____<br><div style="text-align: center; margin-top: 10px;">Name</div> | DSR No: _____<br><br>Date: _____ |
|--------------------------------------------------------------------------------------|----------------------------------|

Section 3A

Locate and mark the beginning and end of the project reach at stable banks.

Length of project reach:

How will the bank stabilization be keyed back into the stable bank sections?

*Include this length in the total.*

Locate a benchmark and grade control. Determine the average slope of the reach.

Determine the typical cross section upstream and down.

Determine the height of the low bank and the height of structural protection needed.

Look for opportunities to use vegetation rather than structural measures.

Identify if a sill/weir is required in the channel to stabilize the channel bottom.

How many sills/weirs are required?

What spacing?

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.

Determine if geotextile fabric is needed behind the structure.

Determine estimated quantities of excavation, fill, clearing, and debris removal for section B.

Determine the needed pollution control and dewatering practices.

Determine the need for traffic control or road closure.

Make a plan view sketch that includes the following:

- The alignment of the streambank to be repaired and the protected structure.
- 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.
- Locate all utilities.
- Identify spoil/staging area.
- Identify construction limits and access.

Take and label photographs.

DSR NO: \_\_\_\_\_

**Section 3 Engineering Cost Estimate**

Completed By: \_\_\_\_\_ Date: \_\_\_\_\_

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

| Proposed Recovery Measure<br>(including mitigation) | Quantity | Units | Unit Cost (\$) | Amount (\$) |
|-----------------------------------------------------|----------|-------|----------------|-------------|
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
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|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
|                                                     |          |       |                |             |
| Total Installation Cost (Enter in Section 1F)\$     |          |       |                |             |

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 (Specify) |

DSR NO: \_\_\_\_\_

#### 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 10).

| Priority Ranking Criteria                                                                                                                                                                                                         | Yes | No |                 | Ranking Number Plus Modifier |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|-----------------|------------------------------|
| 1. Is this an exigency situation?                                                                                                                                                                                                 |     |    |                 |                              |
| 2. Is this a site where there is serious, but not immediate threat to human life?                                                                                                                                                 |     |    |                 |                              |
| 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?                                                                                                                                                                 |     |    |                 |                              |
| <b>The following are modifiers for the above criteria</b>                                                                                                                                                                         |     |    | <b>Modifier</b> |                              |
| a. Will the proposed action or alternatives protect or conserve federally-listed threatened and endangered species or critical habitat?                                                                                           |     |    |                 |                              |
| b. Will the proposed action or alternatives protect or conserve cultural sites listed on the National Register of Historic Places?                                                                                                |     |    |                 |                              |
| c. Will the proposed action or alternatives protect or conserve prime or important farmland?                                                                                                                                      |     |    |                 |                              |
| d. Will the proposed action or alternatives protect or conserve existing wetlands?                                                                                                                                                |     |    |                 |                              |
| e. Will the proposed action or alternatives maintain or improve current water quality conditions?                                                                                                                                 |     |    |                 |                              |
| 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? |     |    |                 |                              |

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

Remarks:

DSR NO: \_\_\_\_\_

### 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: \_\_\_\_\_ Date: \_\_\_\_\_

**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

|                  | <b>Explanation of Requested Item</b>                                                                                                                                                                                                                                                                                                | <b>Who Completes</b>                                                                              |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Section 1</b> | 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. |
| <b>1A</b>        | 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.                                                                                                                                                                        |                                                                                                   |
| <b>1B</b>        | Enter Sponsor Name, Address, Telephone, Fax                                                                                                                                                                                                                                                                                         |                                                                                                   |
| <b>1C</b>        | Enter site location County, State, Congressional District, Latitude, Longitude, Section, Township, Range, UTM Coordinates, Drainage Name, Reach within drainage, and Damage Description.                                                                                                                                            |                                                                                                   |
| <b>1D</b>        | 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)<br>Enter Yes/No regarding whether the affected public has been informed of the EWP program. |                                                                                                   |
| <b>1E</b>        | Enter the proposed treatment and the cost of installation.                                                                                                                                                                                                                                                                          | NRCS only.                                                                                        |
| <b>1F</b>        | NRCS Review and Approval.                                                                                                                                                                                                                                                                                                           |                                                                                                   |

|                  | <b>Explanation of Requested Item</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Who Completes</b>                                   |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Section 2</b> | Use available natural resource, economic, and social, information, including the EWP Programmatic Environmental Impact Statement (PEIS), to <u>briefly</u> describe the effects of the alternatives to the proposed action including the “no action” alternative.<br>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).<br>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. |
| <b>2A</b>        | 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).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                        |
| <b>2B</b>        | Provide a brief description of the present condition of each resource concern listed in 2A. Quantify conditions where possible. Reference accompanying photo documentation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                        |
| <b>2C</b>        | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
| <b>2D</b>        | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                        |

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <b>2E</b> | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                    |
| <b>2F</b> | 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. |                    |
| <b>2G</b> | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |
| <b>2H</b> | 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. |

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                        |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>2I</b> | 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. |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|

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

|                  | <b>Explanation of Requested Item</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Who Completes</b>                                   |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Section 4</b> | 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 indicator(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 than 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. |

|                  | <b>Explanation of Requested Item</b>                                                                                                                                                                                                                  | <b>Who Completes</b>  |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>Section 5</b> | Enter the Findings, Rationale Supporting Findings, NRCS Representative signature and Comments, and Concurrence signature by the Sponsor(s).                                                                                                           | NRCS completes.       |
| <b>5A</b>        | 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. |                       |
| <b>5B</b>        | Enter any additional Comments.                                                                                                                                                                                                                        |                       |
| <b>5C</b>        | Sponsor(s) review and concurrence.                                                                                                                                                                                                                    | Sponsor(s) signature. |

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

# Computation Sheet

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U.S. Department of Agriculture  
Natural Resources Conservation Service

|                                                                              |                        |                                                          |      |                                 |
|------------------------------------------------------------------------------|------------------------|----------------------------------------------------------|------|---------------------------------|
| State<br><b>NY</b>                                                           |                        | Project<br><b>EWP - Little Schoharie Creek - Reach C</b> |      |                                 |
| By<br><b>WAV</b>                                                             | Date<br><b>3/01/12</b> | Checked by                                               | Date | Job No.<br><b>DSR # S-TM-09</b> |
| Subject<br><b>Conceptual Design Analysis: Quantities for Cost Estimating</b> |                        |                                                          |      | Sheet <b>1</b> of <b>13</b>     |

GIVEN: Reach C of the Little Schoharie Creek from the Chichester property (where USGS Topo Map Elev. 860' contour crosses stream) to just below Lawton Hollow (where USGS Topo Map Elev. 960' contour crosses stream).

① Reach C Existing Conditions (per "Little Schoharie Creek Reach Summary" spreadsheet, attached):

|                |   |                       |                                          |
|----------------|---|-----------------------|------------------------------------------|
| Reach Length   | = | 6,036 LF (pre-Flood)  |                                          |
| " "            | = | 5,170 LF (post-flood) | Left Bank Row Bank Area = 87,650 sq. ft. |
| Reach Slope    | = | 1.7 % (pre-flood)     | Right Bank " " " = 64,603 " "            |
| " "            | = | 1.9 % (post-flood)    | Total " " " = 152,253 sq. ft.            |
| Reach US Elev. | = | 960' AMSL             |                                          |
| " DS "         | = | 860' "                |                                          |
| " Fall "       | = | 100' "                |                                          |
| Valley Length  | = | 4,850 LF              |                                          |

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

Bankfull Flow est.,  $Q_{BF} = 500$  cfs (near upstream end  $DA = 15.1$  sq. mi.)

" Area ",  $A_{BF} = 100$  sq. ft.  $\rightarrow V_{BF} = 5$  ft/sec

" Width ",  $W_{BF} = 40$  ft.

" Depth ",  $D_{BF} = 2.5$  ft

Max BF Depth ",  $D_{max} = 3.8$  ft

③ Channel Length, Slope: Grade Control Conceptual Design:

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

∴ Required Minimum Stream Length = Valley Length  $\times$  1.2

$$= 4,850 \text{ LF} \times 1.2 = 5,820 \text{ LF}$$

Conceptual Design Stream Length = 6,000 LF

$$\text{Gross Stream Slope} = \frac{\text{Fall}}{\text{Stream L}} = \frac{100 \text{ ft}}{6,000 \text{ LF}} = 0.017 \frac{\text{ft}}{\text{ft}} = 1.7\% \text{ slope}$$

However, such a steep slope will result in much too high flow velocities and shear stresses (Vel. on the order of 8-9 ft/sec,  $\tau \approx 2.6 \text{ lb/ft}^2$ )

- see NY-Hydraulics 2-WAV.xls, Channel flow - unaltered slope tab.



# Computation Sheet

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U.S. Department of Agriculture  
Natural Resources Conservation Service

|                                                                                   |                        |                                                          |      |                                  |
|-----------------------------------------------------------------------------------|------------------------|----------------------------------------------------------|------|----------------------------------|
| State<br><b>NY</b>                                                                |                        | Project<br><b>EWP - Little Schoharie Creek - Reach C</b> |      |                                  |
| By<br><b>WAV</b>                                                                  | Date<br><b>3/01/12</b> | Checked by                                               | Date | Job No.<br><b>DSR #: S-TM-09</b> |
| Subject<br><b>Conceptual Design Analysis &amp; Quantities for Cost Estimating</b> |                        |                                                          |      | Sheet <b>2</b> of <b>13</b>      |

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

From NY-Hydraulics2\_WAV.xlsx, channel flow-proposed tab, stream slope needs to be approx. 0.006 ft/ft to produce target flow conditions as follows:

e Stream slope = 0.006 ft/ft and Parabolic channel w/ Max Depth = 3.8 ft:  
(and Top Width = 40 ft)

|                                                              |                    |
|--------------------------------------------------------------|--------------------|
| $A = 101 \text{ sq. ft.} \approx 100 \text{ sq. ft. Target}$ | } <u><u>OK</u></u> |
| $T=W = 40 \text{ ft.} = 40 \text{ ft Target}$                |                    |
| $Q = 535 \text{ cfs} \approx 500 \text{ cfs Target}$         |                    |
| $V = 5.3 \text{ ft/sec} \approx 5 \text{ ft/sec Target}$     |                    |

Then, 6,000 LF stream  $\times 0.006 \text{ ft/ft} = 36 \text{ ft}$  of fall due to slope.

The remainder of the existing fall ( $100 \text{ ft} - 36 \text{ ft} = 64 \text{ ft}$ ) 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. 64 cross vanes over the 6,000 LF reach.

$\therefore$  Assume 64 rock cross vanes req'd

Cross vane geometry as indicated on NY-Hydraulics2\_WAV.xlsx, rock vane design\_WAV tab (attached)

|                      |   |                 |
|----------------------|---|-----------------|
| Channel Top Width    | = | 40 ft           |
| Bank Angle           | = | 25 degrees      |
| Vane Height (avg)    | = | 5 ft            |
| Vane Width           | = | 3 ft            |
| Overall Vane Length  | = | 77 ft           |
| Total Keyway Length  | = | 20 ft           |
| Total Vane Face Area | = | 482 sq. ft each |

64 cross Vanes  $\times 482 \frac{\text{sq. ft.}}{\text{Vane}} = 30,848 \Rightarrow 30,850 \text{ sq. ft. Total Face Area of Cross Vanes}$

# Computation Sheet

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Natural Resources Conservation Service

|                                                                        |                                                   |            |      |                            |
|------------------------------------------------------------------------|---------------------------------------------------|------------|------|----------------------------|
| State<br>NY                                                            | Project<br>EWP - Little Schcharie Creek - Reach C |            |      |                            |
| By<br>WAV                                                              | Date<br>3/01/12                                   | Checked by | Date | Job No.<br>DSR # : S-TM-09 |
| Subject<br>Conceptual Design Analysis & Quantities for Cost Estimating |                                                   |            |      | Sheet 3 of 13              |

## 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.

$$2 \text{ rows} \times 40 \text{ ft each} \times 2 \text{ sides} = 160 \text{ LF at each cross vane}$$

$$\text{@ 64 cross vanes} = 10,240 \text{ LF Total}$$

Use : 10,250 LF willow wattles/fascines

\* Assume 100 LF/hr can be installed by unskilled labor & 1 backhoe

## ⑤ Gravel Relocation/Streambed Elevation :

This Reach appears to have experienced more severe downcutting than Reach B, likely due to the significant straightening that occurred during the flood event (flood flows produced several avulsions, causing the stream to abandon some of its original meander bends). Stream channel downcutting to-date appears to increase as you travel from downstream to upstream along Reach C.

For the purposes of this conceptual analysis/design, it is assumed that the streambed (which will be increased in length to approx. 6,000 LF per ③ above) will be raised an average of 8 feet, to help reconnect the stream to its floodplain. While some of the fill material may come from the existing raw banks, this is assumed to be unappreciable, primarily due to the difficulties associated with separating out the necessary larger sized materials. As with Reach B, it is assumed that as the stream channel is realigned and raised, a small bankfull bench will be created at the base of the high raw banks and that these banks will be allowed to self-stabilize over time. This assumption is considered reasonable since

# Computation Sheet

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Natural Resources Conservation Service

|                                                                              |                        |                                                         |      |                                  |
|------------------------------------------------------------------------------|------------------------|---------------------------------------------------------|------|----------------------------------|
| State<br><b>NY</b>                                                           |                        | Project<br><b>ELWP - Little Schoharie Creek-Reach C</b> |      |                                  |
| By<br><b>WAV</b>                                                             | Date<br><b>3/02/12</b> | Checked by                                              | Date | Job No.<br><b>DSR# : S-TM-09</b> |
| Subject<br><b>Conceptual Design Analysis: Quantities for Cost Estimating</b> |                        |                                                         |      | Sheet <b>4</b> of <b>13</b>      |

## ⑤ Gravel Relocation/Streambed Elevation cont.:

the raw banks are generally not immediately adjacent to roadways or structures, and stabilizing these extensive, high raw banks is most likely not practical or cost-prohibitive. Assuming an average width of streambed fill of 40 ft, resulting streambed elevation fill volume is as follows:

$$6,000 \text{ LF} \times 40 \text{ ft wide} \times 8 \text{ ft high (avg.)} = 1,920,000 \text{ cu. ft.}$$

$$= 71,100 \text{ cu. yd.}$$

Use: 71,000 cu.yd. Cobble fill for streambed elevation

## ⑥ Stream Channel Realignment:

Per Item ③ above, it is assumed that the present 5,170 LF of stream channel will be increased through realignment to approx. 6,000 LF. For the purposes of this conceptual analysis, it is assumed realignment will occur at abandoned meander bends and that, on average, excavation required will be twice the required bankfull area of 100 sq.ft. Then, for 800 LF of additional channel length, required excavation volume is:

$$800 \text{ LF (new channel)} \times 200 \text{ sq.ft (avg area)} = 160,000 \text{ cu. ft.}$$

$$= 6,000 \text{ cu. yd.}$$

Assume that an equipment group of 1 excavator (mid-size), 1 bulldozer (mid-size), 1 dumptruck, and 1 skilled labor (foreman) can remove/relocate approx. 100 cy of material per hour and place this in its final location. Then,

$$\frac{6,000 \text{ c.y.}}{100 \text{ cy/hr}} = \underline{\underline{60 \text{ hours req'd for 1 Excavator, 1 Dozer, 1 Truck, 1 Skilled Labor}}}$$

# Computation Sheet

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U.S. Department of Agriculture  
Natural Resources Conservation Service

|                                                                        |                |                                                   |      |                          |
|------------------------------------------------------------------------|----------------|---------------------------------------------------|------|--------------------------|
| State<br>NY                                                            |                | Project<br>EWP - Little Schoharie Creek - Reach C |      |                          |
| By<br>WAV                                                              | Date<br>3/2/12 | Checked by                                        | Date | Job No<br>DSR# 8 S-TM-09 |
| Subject<br>Conceptual Design Analysis & Quantities for Cost Estimating |                |                                                   |      | Sheet 5 of 13            |

## ⑦ Dewatering:

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

$$\text{Then, } \frac{6,000 \text{ LF (restored alignment)}}{100 \text{ LF/day}} = 60 \text{ days (Major Construction)}$$

Use: 60 days of Major Channel reconstruction (for Dewatering)

## ⑧ Seeding & Mulching:

Assume a 100-foot wide swath on each side of new channel to be seeded/mulched.

$$\begin{aligned} \text{Then, } 6,000 \text{ LF} \times \frac{100 \text{ ft}}{\text{side}} \times 2 \text{ sides} &= 1,200,000 \text{ sq. ft.} \\ &= 27.5 \text{ acres} \end{aligned}$$

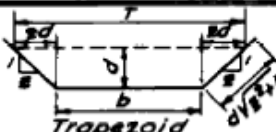
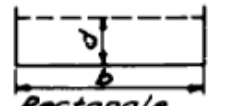
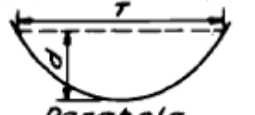
Use: 30 acres Seeding/Mulching

## ⑨ Conceptual-Level Cost Estimate:

See attached "Engineer's Construction Cost Estimate" dated 3/02/2012 for Reach C  $\Rightarrow$  \$3,188,000

|                                                                                                                      |                                               |                                                                               |            |        |                  |            |                        |          |      |              |            |               |            |          |
|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------|------------|--------|------------------|------------|------------------------|----------|------|--------------|------------|---------------|------------|----------|
|                                                                                                                      |                                               | Little Schoharie Creek Reach Summary - Existing Conditions as of January 2012 |            |        |                  |            |                        |          |      |              |            |               |            |          |
|                                                                                                                      |                                               |                                                                               |            |        |                  |            |                        |          |      |              |            |               |            |          |
|                                                                                                                      |                                               | Stream Length                                                                 |            | Valley | Stream Sinuosity |            | Approx. Elevation Data |          |      | Stream Slope |            | Raw Bank Area |            |          |
| Reach                                                                                                                | Description                                   | 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                                |                                |      |            |   |                                                                          |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |
|--------------------------------------------------------------------------------------------------------------------|--------------------------------|------|------------|---|--------------------------------------------------------------------------|------|------------|---|----------------------------------|------|------------|---|-----------------------------------|------|------------|---|----------------|--|
|                                                                                                                    |                                |      |            |   | Locations on the Little Schoharie Creek analyzed for EWP Cost Estimating |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |
| Parameter                                                                                                          | 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 <sub>BF</sub><br>(= 28.65*DA <sup>1.01</sup> )                                |                                | 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 <sub>BF</sub>                                                                                   |                                | 717  | "          |   |                                                                          | 974  | "          |   |                                  | 1120 | "          |   |                                   | 1410 | "          |   |                |  |
| Average Q <sub>BF</sub>                                                                                            |                                | 508  | "          |   |                                                                          | 709  | "          |   |                                  | 827  | "          |   |                                   | 1064 | "          |   |                |  |
| Selected Q <sub>BF</sub> (cfs)                                                                                     | 350 (cfs)                      |      |            |   | 500 (cfs)                                                                |      |            |   | 600 (cfs)                        |      |            |   | 800 (cfs)                         |      |            |   |                |  |
| Bankfull Area, A <sub>BF</sub> (sq.ft.) and Bankfull Velocity, V <sub>BF</sub> (ft/sec)                            |                                |      |            |   |                                                                          |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |
| Del. Cty. SWCD 2005 Regional Curve A <sub>BF</sub><br>(= 7.01*DA <sup>0.93</sup> )                                 |                                | 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 <sub>BF</sub>                                                                                   | 109                            | "    | 7          | " | 148                                                                      | "    | 7          | " | 170                              | "    | 7          | " | 214                               | "    | 7          | " |                |  |
| Average A <sub>BF</sub>                                                                                            | 85                             | "    | 6          | " | 118                                                                      | "    | 6          | " | 137                              | "    | 6          | " | 175                               | "    | 6          | " |                |  |
| Selected A <sub>BF</sub> (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 <sub>BF</sub> (ft)                                                                               |                                |      |            |   |                                                                          |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |
| DCSWCD 2005 Reg. Curve A <sub>BF</sub> 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 <sub>BF</sub>                                                                                   |                                | 50   | "          |   |                                                                          | 60   | "          |   |                                  | 65   | "          |   |                                   | 74   | "          |   |                |  |
| Average W <sub>BF</sub>                                                                                            |                                | 40   | "          |   |                                                                          | 49   | "          |   |                                  | 54   | "          |   |                                   | 62   | "          |   |                |  |
| Selected W <sub>BF</sub> (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 <sub>BF</sub> (ft)                                                                               |                                |      |            |   |                                                                          |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |
| DCSWCD 2005 Reg. Curve A <sub>BF</sub> /W <sub>BF</sub>                                                            |                                | 1.9  | (ft)       |   |                                                                          | 2.3  | (ft)       |   |                                  | 2.4  | (ft)       |   |                                   | 2.8  | (ft)       |   |                |  |
| USGS StreamStats D <sub>BF</sub>                                                                                   |                                | 2.2  | "          |   |                                                                          | 2.5  | "          |   |                                  | 2.7  | "          |   |                                   | 2.9  | "          |   |                |  |
| Average D <sub>BF</sub>                                                                                            |                                | 2.1  | "          |   |                                                                          | 2.4  | "          |   |                                  | 2.5  | "          |   |                                   | 2.8  | "          |   |                |  |
| Selected D <sub>BF</sub> (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 <sub>max</sub> (cross vane sizing)                                                                     |                                | 3.0  |            |   |                                                                          | 3.8  |            |   |                                  | 4.0  |            |   |                                   | 4.4  |            |   |                |  |
| U:\ENG Files\EWP\2011\August 2011\Schoharie_Cty\Little_Schoharie\[LittleSchoharie_Geometry_EWP_CostEst.xlsx]Sheet1 |                                |      |            |   |                                                                          |      |            |   |                                  |      |            |   |                                   |      |            |   |                |  |

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

Little Schoharie Creek Reach C - Existing Conditions (Jan. 2012) - Trapezoidal Channel

|           |               |            |            |           |                  |                  |        |          |           |              |              |  |  |
|-----------|---------------|------------|------------|-----------|------------------|------------------|--------|----------|-----------|--------------|--------------|--|--|
| Given     | Slope (s) =   |            | 0.019      |           | Compute          |                  |        |          |           |              |              |  |  |
|           | Manning's n = |            | 0.04       |           |                  |                  |        |          |           |              |              |  |  |
|           | Bottom Width  | Flow Depth | Side Slope | Top Width | Wetted Perimeter | Hydraulic Radius | Area   | Velocity | Discharge | Shear Stress | Average Rock |  |  |
|           | b             | d          | z          | T         | p                | r                | a      | V        | Q         | $\tau$       | feet         |  |  |
| Trapezoid | 30            | 6          | 2          | 54        | 56.83            | 4.43             | 252.00 | 13.86    | 3492.24   | 5.26         | 3.91768353   |  |  |
| 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 =

Shield's Equation

$\tau$  = Shear Stress (lbs/ft<sup>2</sup>)

$\gamma$  = specific weight of water (lbs/ft<sup>3</sup>)

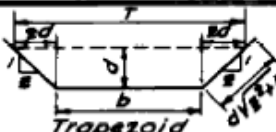
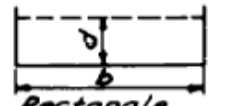
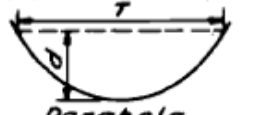
R = hydraulic radius (ft)

$$62.4 \text{ lbs/ft}^3$$

$$\tau = \gamma R S$$

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



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

Little Schoharie Creek Reach C - Stream Length increased to 6000 LF to achieve minimum sinuosity of 1.2. Resulting slope unaltered.

|           |                    |                 |                 |                |                       |                       |           |               |                |                        |                      |
|-----------|--------------------|-----------------|-----------------|----------------|-----------------------|-----------------------|-----------|---------------|----------------|------------------------|----------------------|
| Given     | Slope (s) = 0.017  | Compute         |                 |                |                       |                       |           |               |                |                        |                      |
|           | Manning's n = 0.04 |                 |                 |                |                       |                       |           |               |                |                        |                      |
|           | Bottom Width<br>b  | Flow Depth<br>d | Side Slope<br>z | Top Width<br>T | Wetted Perimeter<br>p | Hydraulic Radius<br>r | Area<br>a | Velocity<br>V | Discharge<br>Q | Shear Stress<br>$\tau$ | Average Rock<br>feet |
| Trapezoid |                    |                 |                 | 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  |                    | 3.8             |                 | 40             | 40.96                 | 2.47                  | 101.33    | 8.88          | 900.21         | 2.62                   | 3.52478177           |

Specific Weight of Water =

62.4 lbs/ft<sup>3</sup>

Shield's Equation

$\tau$  = Shear Stress (lbs/ft<sup>2</sup>)

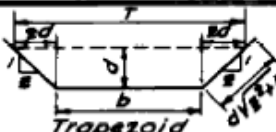
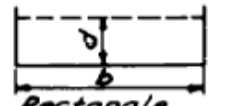
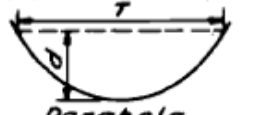
$\gamma$  = specific weight of water (lbs/ft<sup>3</sup>)

R = hydraulic radius (ft)

$$\tau = \gamma RS$$

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



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

Little Schoharie Creek Reach C - proposed conditions to model selected bankfull parameters. Stream Length increased to 6000 LF to achieve minimum sinuosity of 1.2. Required slope of 0.006 ft/ft to be achieved with cross-vanes.

|           |                    |                 |                 |                |                       |                       |           |               |                |                        |                      |
|-----------|--------------------|-----------------|-----------------|----------------|-----------------------|-----------------------|-----------|---------------|----------------|------------------------|----------------------|
| Given     | Slope (s) = 0.006  | Compute         |                 |                |                       |                       |           |               |                |                        |                      |
|           | Manning's n = 0.04 |                 |                 |                |                       |                       |           |               |                |                        |                      |
|           | Bottom Width<br>b  | Flow Depth<br>d | Side Slope<br>z | Top Width<br>T | Wetted Perimeter<br>p | Hydraulic Radius<br>r | Area<br>a | Velocity<br>V | Discharge<br>Q | Shear Stress<br>$\tau$ | Average Rock<br>feet |
| Trapezoid |                    |                 |                 | 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  |                    | 3.8             |                 | 40             | 40.96                 | 2.47                  | 101.33    | 5.28          | 534.81         | 0.93                   | 2.93583961           |

Specific Weight of Water =

62.4 lbs/ft<sup>3</sup>

Shield's Equation

$\tau$  = Shear Stress (lbs/ft<sup>2</sup>)

$\gamma$  = specific weight of water (lbs/ft<sup>3</sup>)

R = hydraulic radius (ft)

$$\tau = \gamma RS$$

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

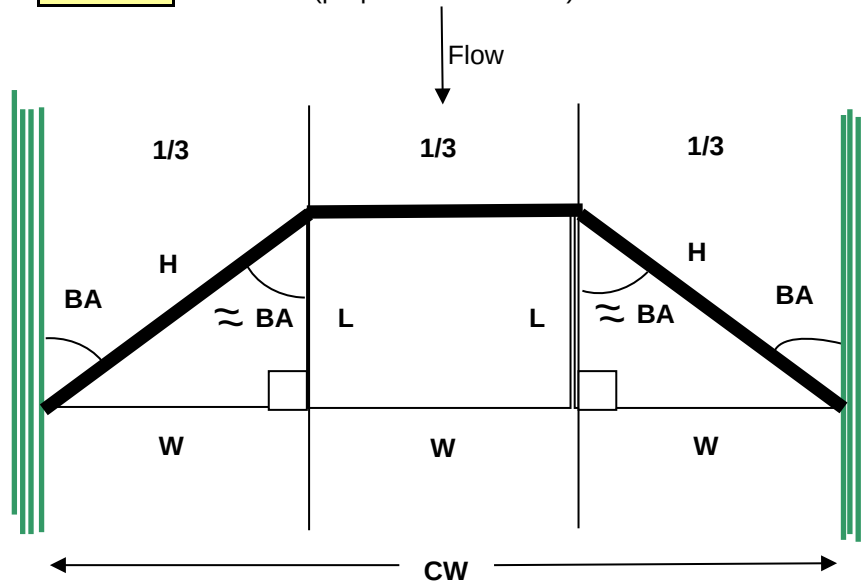
**2011 Schoharie County EWP**

DSR No.: S-TM-09  
 Site Description: Little Schoharie Reach C

By: W. VanDeValk  
 Date: 3/1/2012

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

|                      |     |    |                                  |                  |    |    |
|----------------------|-----|----|----------------------------------|------------------|----|----|
| <b>CW</b> =          | 40  | ft | (channel top width)              | Keyway into bank | 10 | ft |
| <b>BA</b> =          | 25  | °  | (stream bank to structure angle) | Keyway into bank | 10 | ft |
| <b>Vane Height</b> = | 5.0 | ft | (Top Rock to Bottom of Footer)   |                  |    |    |
| <b>Vane Width</b> =  | 3.0 | ft | (perpendicular to flow)          |                  |    |    |



**Find**

- 1) Determine weir length, ft.  $\tan(BA) = W/L$   
 $\sin(BA) = W/H$

**Solution**

|            |    |    |             |
|------------|----|----|-------------|
| <b>W</b> = | 13 | ft | (CW/3)      |
| <b>L</b> = | 29 | ft | (W/TAN(BA)) |
| <b>H</b> = | 32 | ft | (W/SIN(BA)) |

Assume thalweg bed elev. = 100,  
 vane elev. @ thalweg = 101,  
 BF elev. = 103.8 (Dmax = 3.8 ft),  
 top of rock elev. = 103.8

**Overall Weir Length**

**76** ft  $((H*2)+W)$

| Left Arms  |          |           |           |               |
|------------|----------|-----------|-----------|---------------|
| Arm Length | TW Elev. | BKF Elev. | Slope (%) | Keyway Length |
| 32         | 101.0    | 103.8     | 8.87%     | 10            |
| Right Arms |          |           |           |               |
| Arm Length | TW Elev. | BKF Elev. | Slope (%) | Keyway Length |
| 32         | 101.0    | 103.8     | 8.87%     | 10            |

**Invert Sill**  
**Sill Length**  
 13  
 Center 1/3

Drop in vane elevation      2.8 ft      left  
                                          2.8 ft      right

|                      | Length (ft) | Face Area (ft <sup>2</sup> ) | Vol (ft <sup>3</sup> ) | Vol (yds <sup>3</sup> ) | Tons |
|----------------------|-------------|------------------------------|------------------------|-------------------------|------|
| Vane Arm Totals =    | 63          | 315                          | 946                    | 35                      | 70   |
| Invert Sill Totals = | 13          | 67                           | 200                    | 7                       | 15   |
| Keyway Totals =      | 20          | 100                          | 300                    | 11                      | 22   |

|                |    |     |      |    |     |
|----------------|----|-----|------|----|-----|
| <b>Totals:</b> | 96 | 482 | 1446 | 54 | 107 |
|----------------|----|-----|------|----|-----|

|                                                                          |                                 |                  |                                  |                 |                  |            |
|--------------------------------------------------------------------------|---------------------------------|------------------|----------------------------------|-----------------|------------------|------------|
| <b>2011 Schoharie County EWP</b>                                         |                                 |                  |                                  | <b>By:</b>      | W. VanDeValk     |            |
| <b>Engineer's Construction Cost Estimate</b>                             |                                 |                  |                                  | <b>Date:</b>    | 3/2/2012         |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
| <b>DSR No.:</b>                                                          | <b>S-TM-09</b>                  |                  | <b>Sponsor:</b>                  |                 |                  |            |
| <b>Site Description:</b>                                                 | Little Schoharie Creek, Reach C |                  |                                  |                 |                  |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
| <b>Item</b>                                                              | <b>Description</b>              | <b>Unit cost</b> | <b>Unit</b>                      | <b>Quantity</b> | <b>Item cost</b> |            |
| Mobilization/Demobilization                                              |                                 | \$5,000.00       | job                              | 2               | \$10,000         |            |
| Rip rap                                                                  | Heavy stone (in place)          | \$67.00          | ton                              | 0               | \$0              |            |
|                                                                          |                                 | \$100.00         | cy                               | 0               | \$0              |            |
|                                                                          | 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                               | 71000           | \$1,065,000      |            |
|                                                                          | 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                               | 60              | \$5,100          |            |
| Excavator                                                                | large                           | \$170.00         | hr                               | 0               | \$0              |            |
|                                                                          | mid-size                        | \$140.00         | hr                               | 60              | \$8,400          |            |
| Backhoe                                                                  |                                 | \$120.00         | hr                               | 100             | \$12,000         |            |
| Dozer                                                                    | large                           | \$150.00         | hr                               | 0               | \$0              |            |
|                                                                          | mid-size                        | \$130.00         | hr                               | 60              | \$7,800          |            |
| Labor                                                                    | skilled                         | \$50.00          | hr                               | 60              | \$3,000          |            |
|                                                                          | unskilled                       | \$35.00          | hr                               | 100             | \$3,500          |            |
| Willow stakes                                                            | w/o labor                       | \$2.00           | stake                            | 0               | \$0              |            |
| Wattles & Fascines                                                       | w/o labor                       | \$9.00           | lin ft                           | 10250           | \$92,250         |            |
| 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                              | 60              | \$300,000        |            |
|                                                                          | large (8-12") incl. setup       | \$8,000.00       | day                              | 0               | \$0              |            |
| Seeding & Mulching                                                       |                                 | \$2,000.00       | acre                             | 30              | \$60,000         |            |
|                                                                          |                                 | \$0.05           | sq ft                            | 0               | \$0              |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
| Overhead and Profit, %                                                   | 20                              |                  | Overhead and Profit              |                 | \$313,410        |            |
|                                                                          |                                 |                  | Subtotal, excluding Wall Systems |                 | \$1,880,460      |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
| <b>Wall System costs (in place; wall system only; includes OH&amp;P)</b> |                                 |                  |                                  |                 |                  |            |
| 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                            | 30850           | \$1,018,050      | 482 x 64 = |
|                                                                          | 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                            | 0               | \$0              |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
|                                                                          |                                 |                  |                                  | Subtotal        | \$2,898,510      |            |
| Contingency %                                                            | 10                              |                  |                                  | Contingency     | \$289,851        |            |
| Additional %                                                             | 0                               |                  |                                  | Additional      | \$0              |            |
|                                                                          |                                 |                  |                                  |                 |                  |            |
|                                                                          |                                 |                  |                                  | Total Estimate  | \$3,188,361      |            |

|                                                            |                                |                     |                     |            |                            |  |
|------------------------------------------------------------|--------------------------------|---------------------|---------------------|------------|----------------------------|--|
| <b>Conversions for estimating quantities</b>               |                                |                     |                     |            |                            |  |
| Assume for each 100' wall, will need to dewater for 3 days |                                |                     |                     |            |                            |  |
| <b>Estimating sloped rip rap protection</b>                |                                |                     |                     |            |                            |  |
| 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          | 0                   | 0          | 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          | 0                   | 0          | 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 C

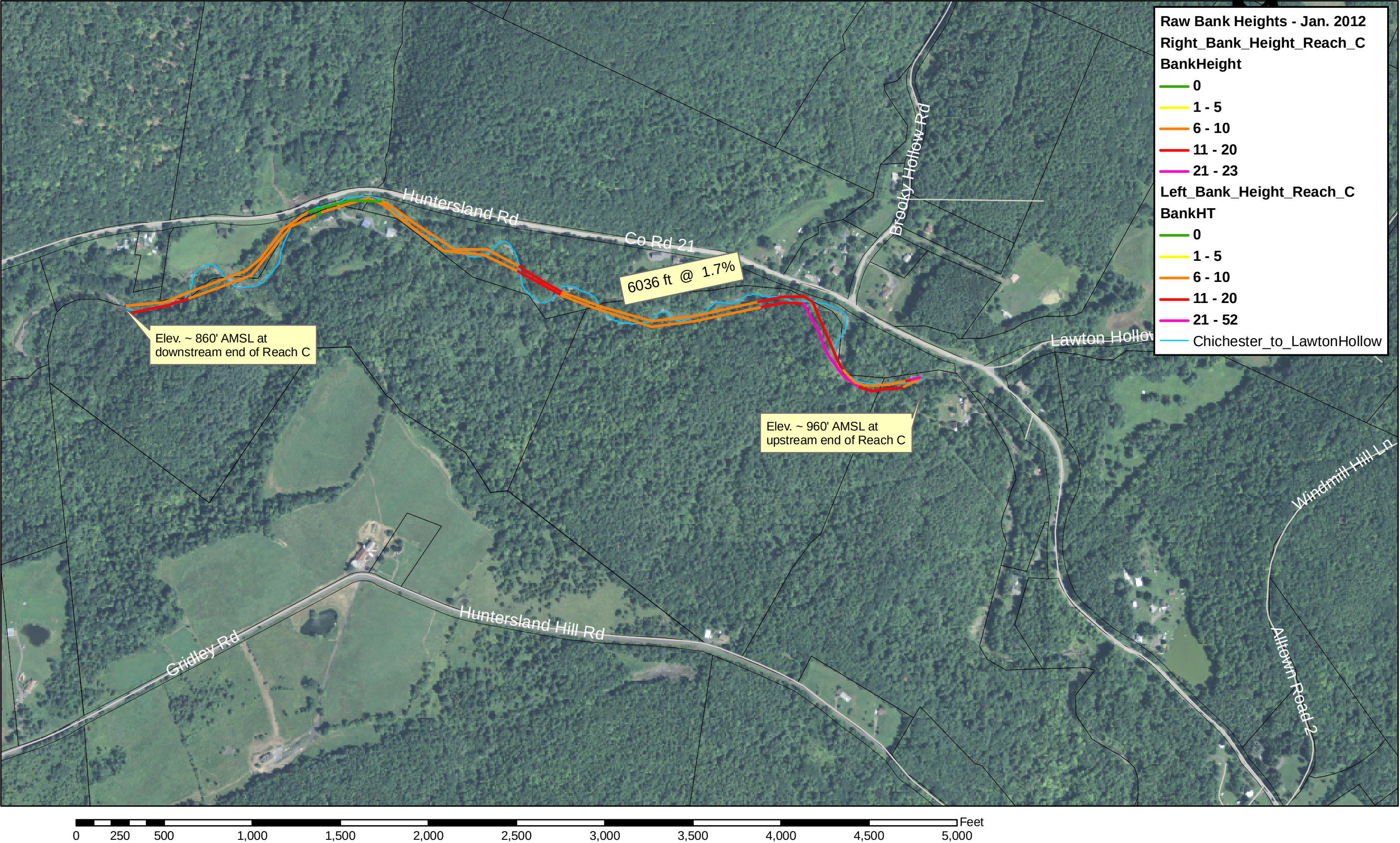






Photo 67 (1/19/12): approx. 18-ft high raw left bank near lower end of Reach C



Photo 68 (1/19/12): Looking upstream at lower end of Reach C





Photo 83: Looking US near mid-reach where old meander bends have been abandoned



Photo 84: Left Bank near mid-reach showing original meandering channel, now abandoned





Photo 86: Looking US near mid-reach where old meander bends have been abandoned



Photo 90: Looking US near mid-reach (possibly remnants of original channel @ left)





Photo 93 (1/19/12): Looking US toward confluence with Brooky Hollow @ left



Photo 99 (1/19/12): Looking DS near upper end of reach toward Brooky Hollow





Photo 102: Sheetpiling along Right Bank near Brooky Hollow (original channel alignment?)



Photo 106 (1/24/12): approx. 20-ft high raw left bank across from sheetpiling nr. Brooky H.