State of Wisconsin
Department of Natural Resources-WT/3
101 S. Webster St.
Madison, WI 53707

dnr.wi.gov

Final Report

Targeted Runoff Management Grant Program and Urban Nonpoint Source and Storm Water Management Grant Program

Form 3400-189 (R 6/08)

Notice: This final report is authorized by ss. 281.65 and 281.66, Wis. Stats., and chs. NR 153 and NR 155, Wis. Adm. Code. Personally identifiable information collected will be used for program administration and may be made available to requesters as required under Wisconsin's Open Records Law [ss. 19.31-19.39, Wis. Stats.].

Instructions: Your grant agreement requires you to submit a Final Report 60 days after the end date listed in the grant agreement. This Final Report form must be used in conjunction with the "FINAL REPORT INSTRUCTIONS." The instructions detail how to complete and submit the report to DNR. The DNR prefers that Final Reports be submitted in electronic format. If, however, printed copies of Final Reports are submitted, please submit three (3) complete originals to your regional Nonpoint Coordinator.

1. Grant Type – Please check one.

☐ Targeted Runoff Management Grant – Agricultural

☒ Targeted Runoff Management Grant – Urban

☐ Urban Nonpoint Source & Storm Water Management Grant – Construction

☐ Urban Nonpoint Source & Storm Water Management Grant – Planning

2. Grantee & Project Information

Project Name	Grant Number
Little Sugar River Streambank Restoration Project	**TUC-SP14-23161-08**
Governmental Unit Name	Primary Watershed Name and Watershed Code
Village of New Glarus	**Little Sugar River, SP14-180**
Nearest Water Body Name	Nearest Water Body Identification Code (WBIC) (if applicable)
DNR Water Management Unit (River System) Name	s. 303 (d) Listed Waterbody? ☐ Yes ☒ No.
Sugar - Pecatonica	

What pollutant(s) were addressed by the project (e.g., nitrogen, phosphorus, sediment, thermal control, *etc.*)?

Sediment

For **each** project site location provide the following: (attach additional sheets if necessary)

Location:		A	B	C	D	E
Minor Civil Division Name (City, Township, Village, etc.)		**Village of New Glarus**				
PLSS	Town	**4North**				
	Range	**7East**				
	Section	**23**				
	Quarter	**SE**				
	Quarter-Quarter	**NW**				
Latitude (degrees, minutes, seconds North of Equator; use the DNR's Surface Water Data Viewer, SWDV)		**42.806892**				
Longitude (degrees, minutes, seconds W of Prime Meridian, use the SWDV)		**-89.630913**				
Property Owner(s)	Name	**Village of New Glarus**				
	Mailing address	**319 Second St. New Glarus, WI 53574**				

Site address *(Not mailing address)*	**1301 Elmer Road New Glarus, WI 53574**				

3. Summary of Results

A. Performance Standards and Prohibitions and Other Water Resources Management Priorities

For grants issued in calendar year 2006 or later, complete Tables A and B (following) consistent with the entries on your grant application.

TABLE A. PERFORMANCE STANDARDS AND PROHIBITIONS (per ch. NR 151, Wis. Adm. Code, effective October 1, 2002)

Performance Standard or Prohibition	Units of Measure	Quantity	Measurement Method Used
Sheet, rill and wind erosion	Acres meeting T		
Manure Storage Facilities: New Construction/Alterations	Number of facilities		
	Number of animal units		
Manure Storage Facilities: Closure	Number of facilities		
Manure Storage Facilities: Failing/Leaking Facilities	Number of facilities		
	Number of animal units		
Clean Water Diversions in WQMA	Pollutant load reduction		
	Number of farms with diversions		
	Number animal units		
Nutrient Management on Agricultural Land	Acres planned		
Prohibition: Manure Storage Overflow	Number of facilities		
	Number of animal units		
Prohibition: Unconfined Manure Pile in WQMA	Number of farms		
Prohibition: Direct Runoff From Feedlot/Stored Manure	Pollutant load reduction		
	Number of facilities		
	Number of animal units		
Prohibition: Unlimited Livestock Access	Feet of bank protected		
	Number of farms		
Urban: 20-40% Reduction in Total Suspended Solids (TSS)	Pounds TSS reduced		
	% TSS reduction		

TABLE B. OTHER WATER RESOURCES MANAGEMENT PRIORITIES

I. Agricultural Areas	Units of Measure	Quantity	Measurement Method Used
Buffers	Feet of bank protected		
	Number of farms		
Streambank	Tons of bank erosion reduced		
	Feet of bank protected		
Other (specify)			
II. Developed Urban Areas	**Units of Measure**	**Quantity**	**Measurement Method Used**
Urban: 20-40% Reduction in TSS	Pounds TSS reduced		
	% TSS reduction		
Infiltration	% Pre-development stay-on volume		
	Cubic feet stay-on volume		
Peak flow discharge	Change in cubic feet per second		
Protective areas	Feet of bank protected		
Fueling & maintenance areas	Oily sheen presence		
Streambank	Tons of bank erosion reduced	**183.8**	**NRCS Method in Tons per Year**
	Feet of bank protected	**825**	**Constructed Length**
Other (specify)			
III. Planning	**Units of Measure**	**Quantity**	**Measurement Method Used**
Quantify how implementation of the planning project decreased storm water impacts on state waters (*i.e.*, storm water plan, I & E plan, *etc.*)	Municipalities planned for		
	Acres planned for		
Document/track progress made in implementing the planning product (*i.e.*, ordinance, utility district evaluation/formation, storm water management plan information & education, *etc.*)	Municipalities planned for		
	Acres planned for		

Other (specify)			

B. Project Results Narrative

• Bids for the streambank improvements were received by the Village of New Glarus on April 10, 2008. CD Smith Construction of Fond du Lac, WI was the low bidder at $190,000. Bids were very close to the estimated construction cost cited in the grant application ($199,170).

• A pre-construction meeting was held on July 3, 2008 at the project site. Those in attendance included representatives from CD Smith, Village of New Glarus, WDNR, and Strand Associates, Inc. Construction of the streambank improvements commenced shortly thereafter.

•Placement of the boulder revetment and subsequent fine grading was generally complete by the end of August 2008. Final seeding and restoration was completed in early Sept. 2008.

•Photographs of the streambank were taken on September 25, 2008 (see attached). Vegetation is coming in very well. Per the provisions of the contract, the contractor will be required to return in the spring to reseed areas where vegetation has not been adequately established.

4. Satisfaction of Notice Requirements (if applicable)

If cost sharing for this project was offered under a formal notice to achieve compliance with performance standards or prohibitions, provide information for each notice in the table below.

Notice Information				Notice Satisfaction Information		
				Satisfied?		
Notice Type	Issue Date	From (Name)	To (Name)	Yes	No	Date Letter Sent
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	

5. Summary of Project Challenges

- Procurement of the Chapter 30 permit application and floodway construction permits was a lengthly process that threatened to delay the project. However, the necessary permit approvals were obtained with enough time to allow the project to stay on schedule.

- Very heavy rainfall that occurred in June 2008 resulted in higher than expected baseflow in the Little Sugar River. As a result, the contractor opted to delay streambank regrading until early July rather the original schedule of early June. However, the contractor was still able to complete the streambank construction by the end of August 2008.

- The field stone originally delivered to the construction site did not meet our material specifications and was rejected.

6. Additional Information about the Project (optional)

7. Final Product(s) -- All Projects

A. Construction Projects

☒ A.1. Checking here indicates that a printed copy of project plans and specifications was sent to your DNR Regional Nonpoint Source Coordinator.

☒ A.2. Checking here indicates that photo-documentation of the project's construction is attached.

B. Planning Projects

☐ B.1. Checking here indicates that a printed copy of the planning product (*e.g.*, plans, ordinances, analyses) was sent to your DNR Regional Nonpoint Source Coordinator.

☐ B.2. Checking here indicates that the Regional Nonpoint Source Coordinator has approved the final Planning Product(s).

☐ B.3. Checking here indicates that your governmental unit has adopted the final Planning Product(s).

Name of Planning Document(s)	Date(s) effective	Date Submitted to NPS Coordinator

8. Grantee Certification:

☒ Checking here certifies that, to the best of your knowledge, the information contained in this report is correct and true.

Type or print Name and Title of Authorized Representative certifying here.

Nicholas Owen, Village Administrator

Signature of Authorized Representative	Date

9. FOR DEPARTMENTAL USE ONLY

REGIONAL NONPOINT COORDINATOR -- Please complete the following:

☐ Checking here indicates that you received either planning or construction plans and specifications from the project sponsor, as appropriate. Attach a copy of the approval.

☐ Checking here indicates that you approved the final construction. Attach a copy of the final construction approval.

☐ Checking here indicates that you have approved the final Planning Product(s).

☐ Check here if two (2) signed, original copies of the Final Report and attachments have been sent to Runoff Management Section Grants Coordinator. Note: Regional Nonpoint Source Coordinator may retain one (1) copy of the signed, original Final Report.

Type or print Name of Regional Nonpoint Coordinator

James Amrhein

Signature of Regional Nonpoint Coordinator	Date

NRCS Streambank Erosion Estimator (Direct Volume Method)

Project Name:	Little Sugar River Streambank Stabilization	Evaluated By:	MKS
Location:	Village of New Glarus, WI	Evaluation Date:	November 13, 2008

Field Number	Eroding Streambank Reach Number	Eroding Bank Length (Feet)	Eroding Bank Height * (Feet)	Area of Eroding Streambank (FT^2)	Lateral Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT^3	Estimated Soil Loss (Tons/Year)
	1	825.0	16.5	13,613	0.30	4,083.8	Silty Clay Loam	90	183.8
	2								
	3								
				Total Estimated Annual Streambank Erosion Soil Loss (Tons):					183.8

Field Number	Eroding Streambank Reach Number	Eroding Bank Length (Feet)	Eroding Bank Height * (Feet)	Area of Eroding Streambank (FT^2)	Lateral Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT^3	Estimated Soil Loss (Tons/Year)
	1								
	2								
	3								
				Total Estimated Annual Streambank Erosion Soil Loss (Tons):					

Field Number	Eroding Streambank Reach Number	Eroding Bank Length (Feet)	Eroding Bank Height * (Feet)	Area of Eroding Streambank (FT^2)	Lateral Recession Rate (Estimated) (FT / Year)	Estimated Volume (FT^3) Eroded Annually	Soil Texture	Approximate Pounds of Soil per FT^3	Estimated Soil Loss (Tons/Year)
	1								
	2								
	3								
				Total Estimated Annual Streambank Erosion Soil Loss (Tons):					

* Eroding bank height is measured along the bank, not the vertical height of bank.

Streambank Erosion Calculation Formula:

$$\frac{\text{Eroding Bank } \mathbf{Length} \times \text{Eroding Bank Height} \times \text{Lateral Recession Rate (FT/YR)} \times \text{Soil Weight (lbs/ft}^3\text{)}}{2000} = \mathbf{Estimated} \text{ Soil Loss Per Year (Tons)}$$

Streambank Erosion: The wearing away of streambanks by flowing water. The removal of soil from streambanks is typically caused by the direct action of stream flow and/or wind/wave action, typically occurring during periods of high flow. Streambank erosion:

<> is a natural process that generally increases when unprotected streambanks (e.g. no woody vegetation) are subject to the actions of flowing water and ice damage.

<> is a common occurrence on many Vermont river channels that are experiencing geomorphic adjustments

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The soil loss from ephemeral gullies, gullies and streambank erosion areas can be estimated by calculating the volume of soil removed by erosion processes. The volume of soil loss can be multiplied by the typical unit weight of the soil (based on soil texture) which is eroded. Approximate soil unit weights are expressed below[1]:

Soil Texture	Estimated Dry Density lb/ft^3
Gravel	110
Sand	105
Loamy Sand	100
Sandy Loam	100
Fine Sandy Loam	100
Sandy Clay Loam	90
Silt Loam	85
Silty Clay Loam	85
Silty Clay	85
Clay Loam	85
Organic	22

Procedure for estimating Ephemeral Soil Erosion:

The following formula will be used to calculate annual estimated ephemeral gully erosion:

$$\frac{\text{Ephemeral Gully } \textbf{Length} \times \text{Gully Average } \textbf{Width} \times \text{Gully Average } \textbf{Depth}}{2000} \times \underline{\text{Soil Weight}}\ (\text{lbs/ft}^3) \times \text{Occurrences per Year} = \underline{\textbf{Estimated}}\ \text{Soil Loss (Tons per Year)}$$

* Ephemeral gully erosion may reform multiple times per year, and under certain conditions it may not form in a given year. The voided volume which would be calculated after a runoff event is not necessarily representative of an annual rate, but is representative of only the specific event. This erosion can be calculated for individual storms and can be summed for a yearly estimate.

[1] Data from published soil surveys, laboratory data, and soil interpretation record are to be used where available. Parent materials, soil consistency, soil structure, pore space, soil texture, and coarse fragments all influence unit weight.

Procedure for estimating Gully Soil Erosion:

The following formula will be used to calculate annual estimated classic gully erosion:

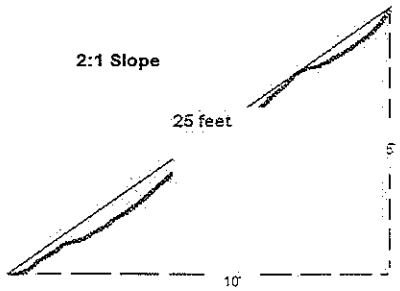
$$\frac{\text{Gully } \underline{\textbf{Length}} \text{ X (Average } \underline{\textbf{Width}} \text{ X Average } \underline{\textbf{Depth}}\text{) X } \underline{\textbf{Soil Weight}} \text{ (lbs/ft3)}}{2000} \;/\; \text{Formation Years} = \underline{\textbf{Estimated}} \text{ Soil Loss Per Year (Tons)}$$

Procedure for estimating Streambank Soil Erosion (Direct Volume Method):

The following formula will be used to calculate annual estimated streambank erosion unless a field measurement procedure[2] is used:

$$\frac{\text{ing Bank } \underline{\textbf{Length}} \text{ X Eroding Bank } \underline{\text{Height}} \text{ X } \underline{\text{Lateral Recession Rate}} \text{ (FT/YR) X } \underline{\text{Soil Weight}} \text{ (lb}}{2000} = \underline{\textbf{Estimated}} \text{ Soil Loss Per Year (Tons)}$$

** Eroding bank height is measured along the bank, not the vertical height of bank. Example: if vertical height of an eroding streambank is 5 feet, and the bank is on a 2:1 slope, the total eroding bank distance is 25 feet -- 1/2 (Base X Height).



***The average annual recession rate is the thickness of soil eroded from a bank surface (perpendicular to the face) in an average year.

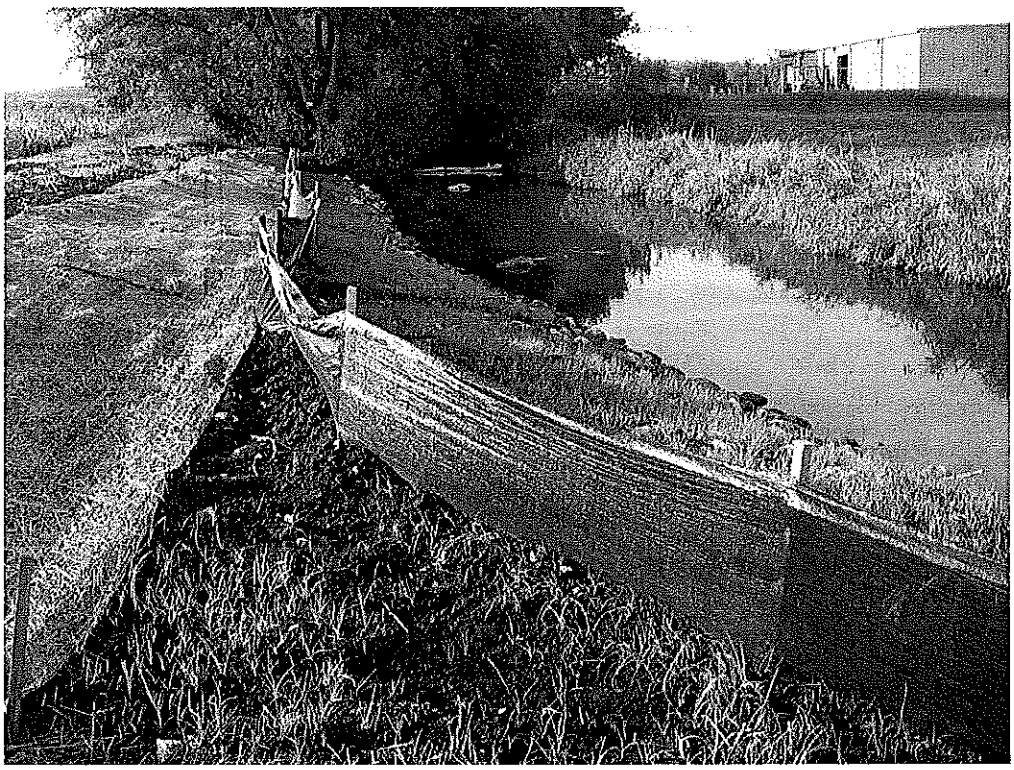
Stream bank erosion sometimes presents itself as a major occurance in a given year, whereas the same bank may not erode significantly for a period of years if no major runoff events occur. Recession rates need to be calculated as an average of years when erosion does and does not occur. Recession rate is not calculated as the erosion occurring after a single event.

Use available resources to assist in the estimation of recession rate: use past and present aerial photography, old survey records, and any other information that helps to determine the bank condition at known times in the past. When such information is lacking or insufficient, field observations and professional judgement are needed to estimate recession rates.
It is often not possible to directly measure recession rates in the field. Therefore, the following table has been included which relates recession rates to narrative descriptions of banks eroding at different rates (Table from NRCS Wisconsin guidance).

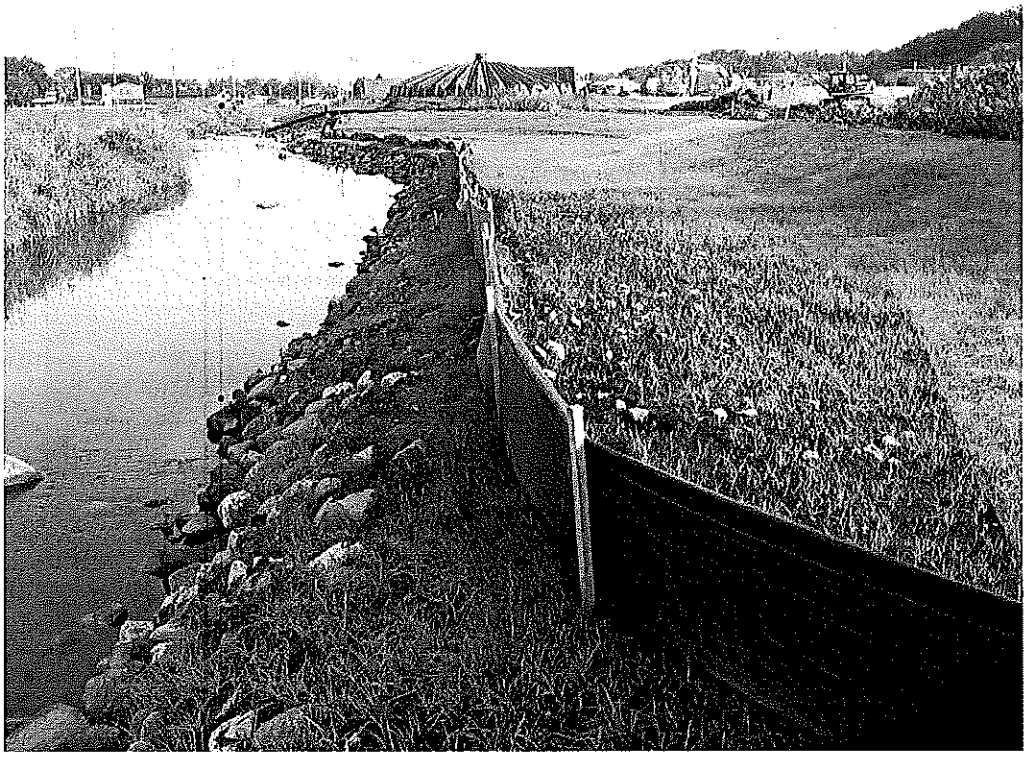
Lateral Recession Rate (ft/yr)	Category	Description
0.01-0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang. No exposed tree roots.
0.06-0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang. Some exposed tree roots but no slumps or slips.
0.3-0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross section becomes U-shaped as opposed to V-shaped.
0.5+	Very Severe	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and changes in cultural features as above. Massive slips or washouts common. Channel cross section is U-shaped and stream course may be meandering.

[2] The best way to quantify streambank erosion is to measure it directly in the field. The basic procedure in measuring streambank erosion is to survey, flag, or in some way fix a "before" image of the channel you are evaluating in order to establish the baseline condition. Changes due to erosion can then be monitored over time by going back to the study area and re-measuring from the fixed reference points.
Channel cross-sections can be surveyed and plotted on a periodic basis to monitor change. Stakes or pins can be driven into channel banks flush with the surface. The amount of stake or pin exposed due to erosion is the amount of change at the streambank erosion site between your times of observation.
The time required to monitor a site often precludes this method of data collection. The Direct Volume Method can be used to estimate streambank erosion at your site.

Acknowledgements: This Excel workbook was created as a planning tool for use by conservation planners. The basic format and content of the tool is a compilation of various similar tools, processes and procedures employed by NRCS in several states including: Indiana, Iowa, Kansas, Maryland, Michigan, Missouri, Nebraska, Oklahoma, South Dakota and Wisconsin. Some of the terminology in the 'Definitions' section of this Readme document closely mirrors these sources.



9-25-2008 – River Station 11+00 Looking Downstream



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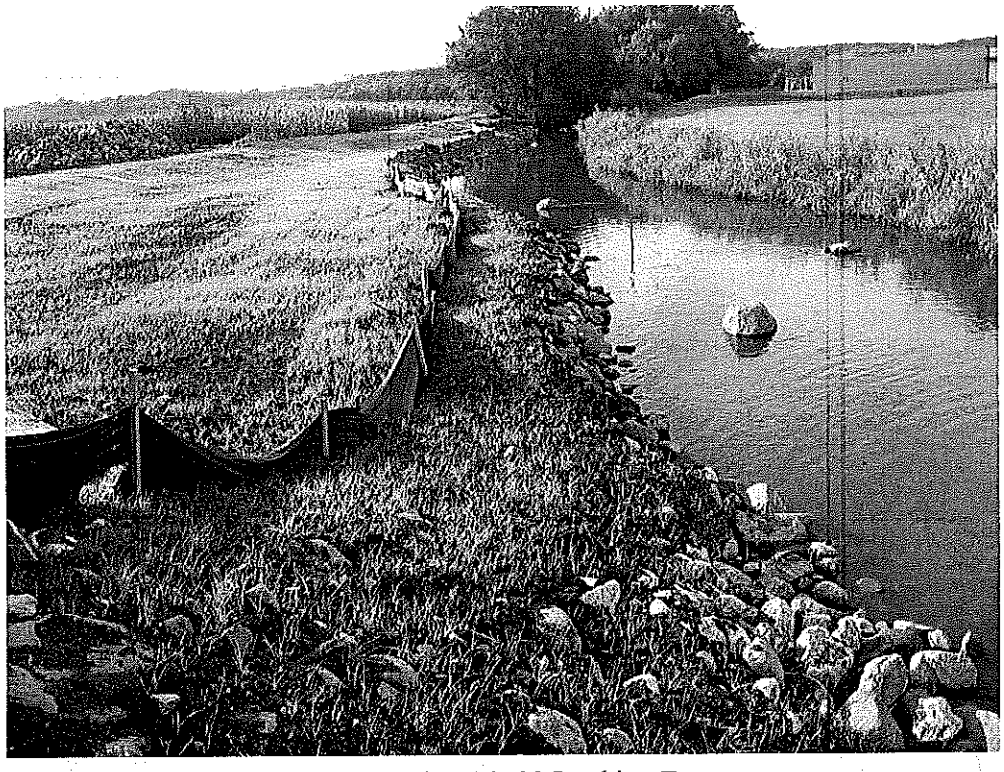

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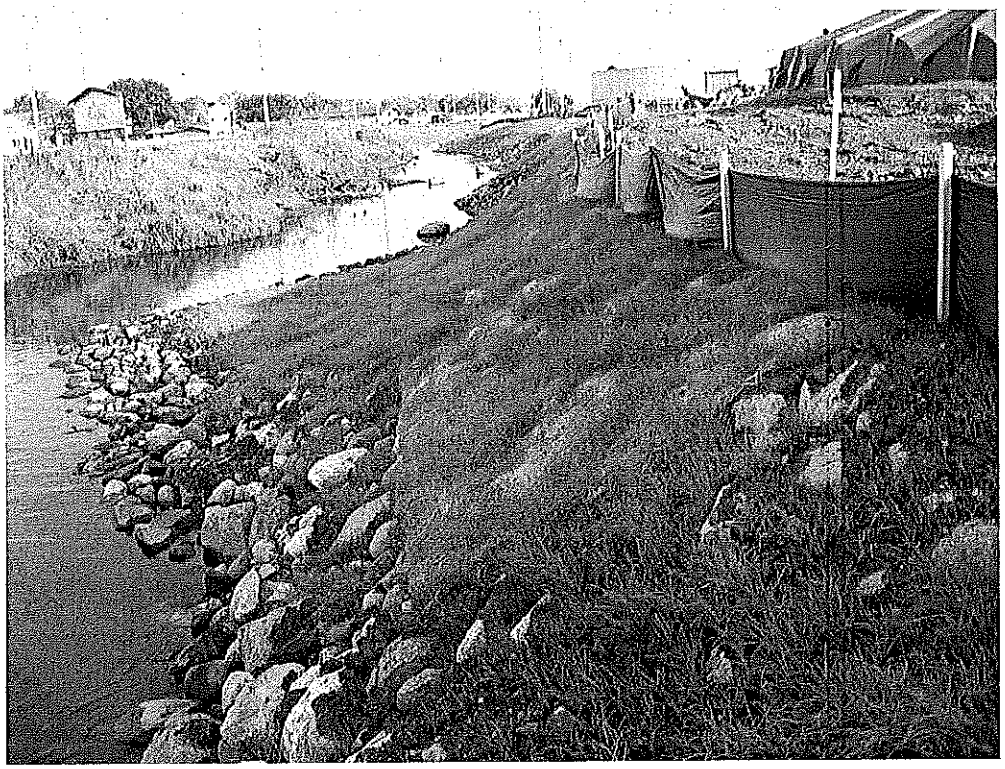

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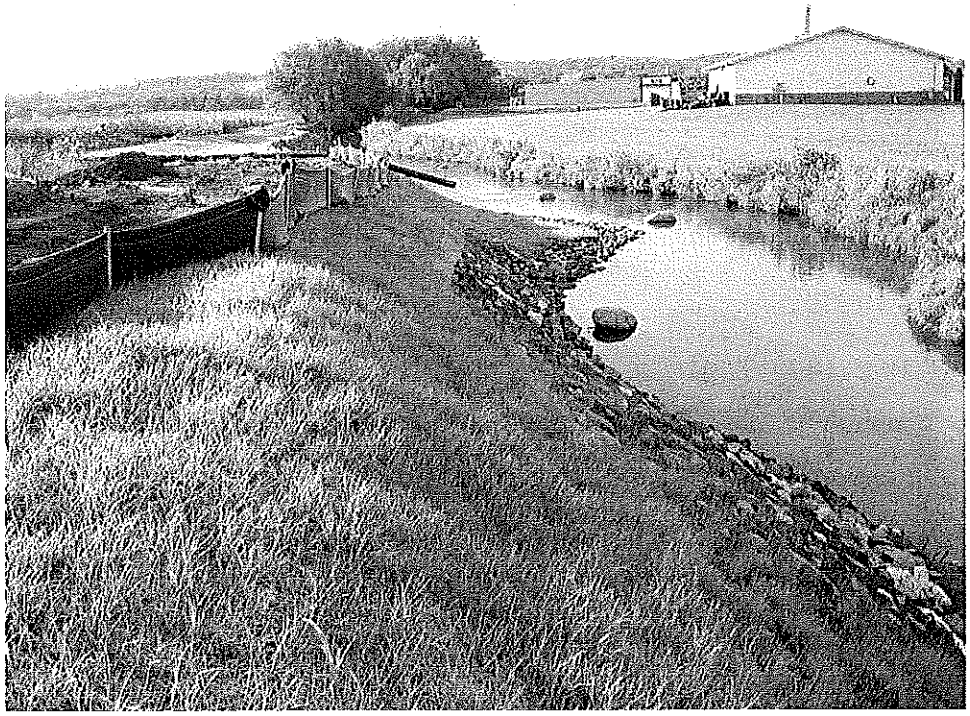

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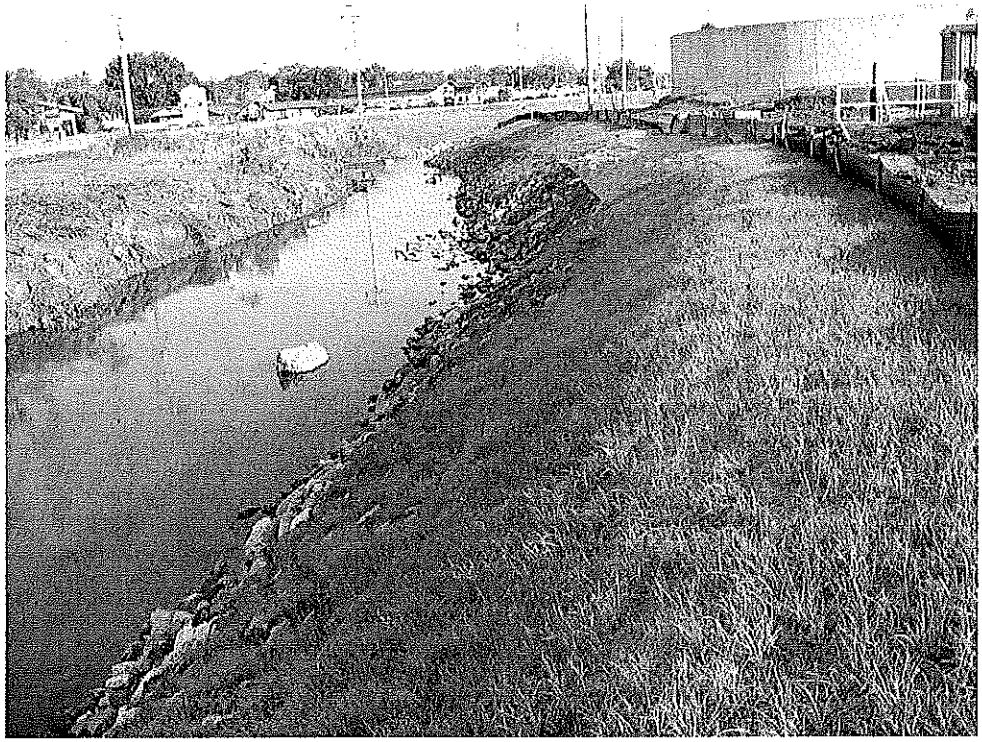

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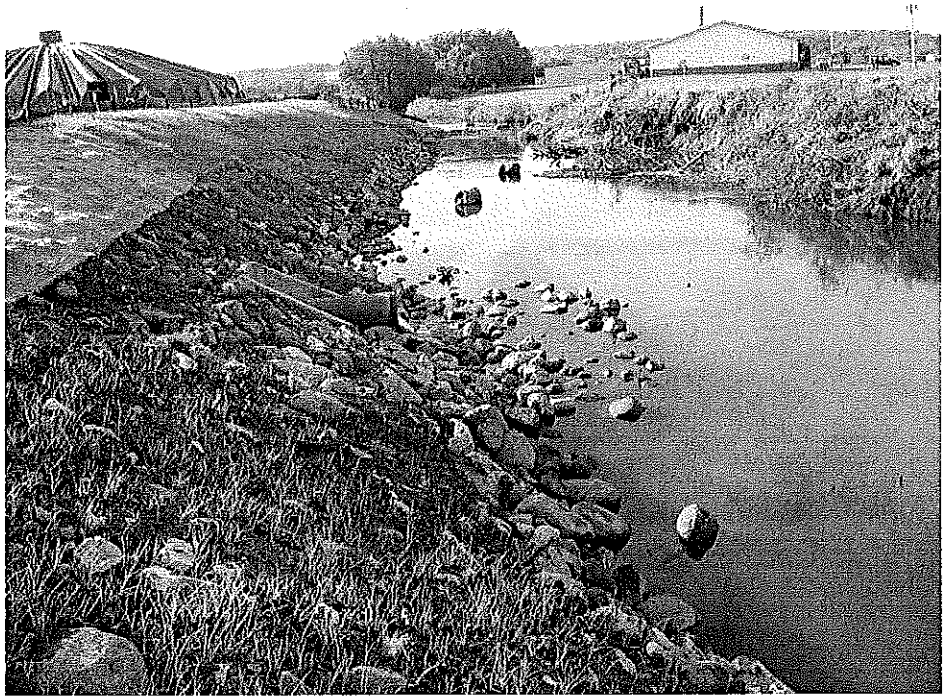

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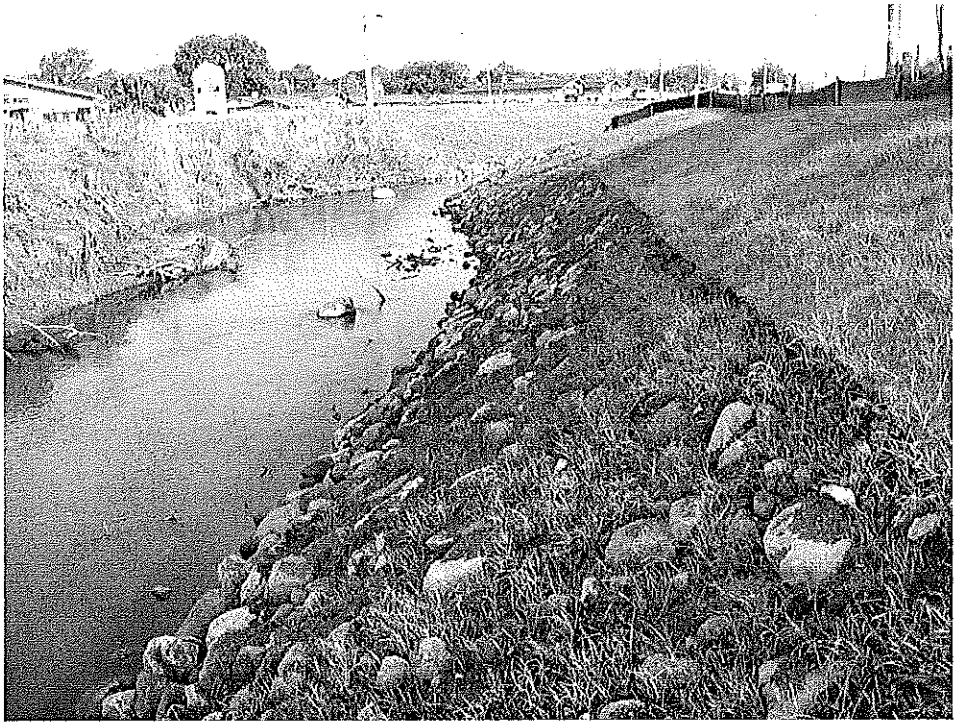

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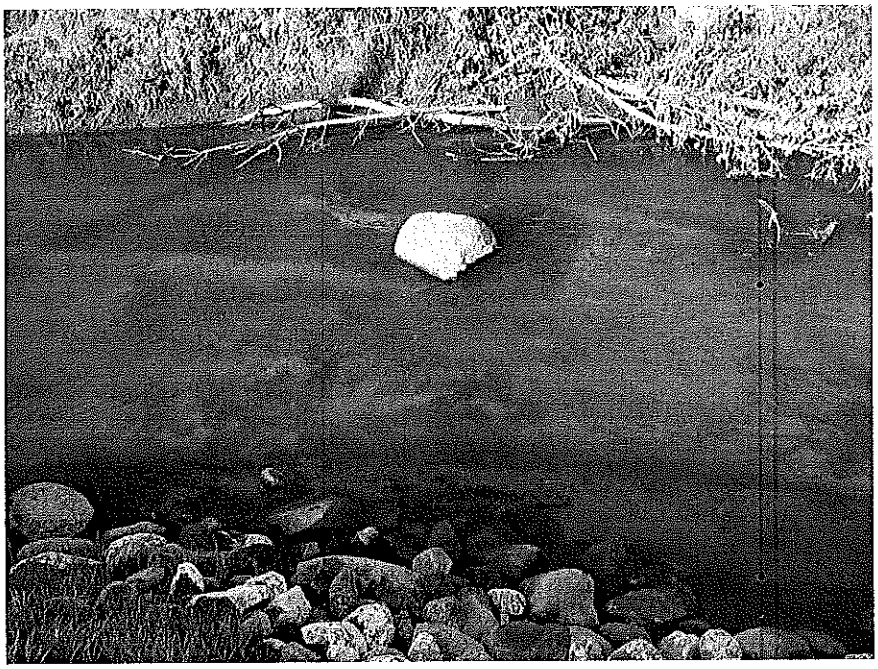
9-25-2008 – River Station 18+00 Looking Downstream

9-25-2008 – River Station 18+00 Looking Upstream



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