City of Duluth
Planning Division

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Duluth City Planning Commission, File No.: PL14-022
Stewart Creek Bank Stabilization

ENVIRONMENTAL ASSESSMENT, RECORD OF DECISION

BACKGROUND

The City of Duluth Planning Commission is the responsible governmental unit for environmental review of the Stewart Creek Bank Stabilization. The preparation and distribution of the EAW was in accordance with the Environmental Review Regulations of the Minnesota Environmental Quality Board (MEQB).

The EAW was filed with the MEQB and circulated for review and comment to the EQB's EAW Distribution List. The notice was published in the EQB Monitor on March 17, 2014. The 30 day comment period ended on Wednesday, April 16, 2014. A notice was sent to the Duluth News Tribune and other area media, and a press release was issued informing the public of the EAW and that written comments were being received by the Duluth Planning Commission.

The Duluth Planning Commission, at its regular May 13, 2014 meeting, held an optional public hearing on the project's potential environmental impacts, and considered oral public comments from its staff and the public.

Following careful evaluation of the documents and testimony, the Commission approved a "negative declaration" on the need to prepare an Environmental Impact Statement (EIS) for the Stewart Creek Bank Stabilization.

BRIEF PROJECT DESCRIPTION

This project will stabilize stream banks and restore the channel of Stewart Creek damaged by the 2012 flood. The City of Duluth and South St. Louis Soil and Water Conservation District will restore 588' of stream channel to a natural pool and riffle state and remove debris upstream of a culvert.

COMMENTS RECEIVED, RESPONSES, AND OTHER DOCUMENTS REVIEWED

1. Minnesota Historical Society dated April 9, 2014

Comment: No properties listed in the Natural or State Registers of Historic Places, and no known or suspected archeological properties in the area that will be affected by this project.

Response: No response needed.

2. Minnesota Department of Natural Resources dated April 9, 2014

Comment: Project not within 1 mile of any identified rare features, as described in Minnesota Natural Heritage Information System.

Response: No response needed.

3. Minnesota Pollution Control Agency Dated April 14, 2014

Comment: Questions/comments on Item 8, 10c, and 11 (3 comments)

Response: See attached response letter dated April 18, 2014

4. Minnesota Department of Natural Resources dated April 16, 2014

Comment: Proposed project will need a DNR permit for work in the bed of public waters, and final design detail will need to be provide to the DNR in the permit process.

Response: See attached response letter dated April 18, 2014

DECISION ON NEED FOR AN ENVIRONMENTAL IMPACT STATEMENT
An environmental impact statement is not considered necessary for the project based on the following criteria.

A. Type, extent, and Reversibility of Impacts. Based on the information in the EAW and the comments/and responses, the proposed project has no other environmental impacts.

B. Cumulative Potential Effects of Related or Anticipated Future Projects. This project is not dependent on any other projects. There are no known anticipated future projects at this time on which this project would depend.

C. Extent to Which the Environmental Effects are Subject to Mitigation By Ongoing Public Regulatory Authority. Mitigation of the impact shall be achieved through design or regulations currently in place.

D. Extent to Which Environmental Effects Can Be Anticipated and Controlled as a Result of Other Environmental Studies undertaken by public agencies or the project proposed, or of EISs previously prepared on similarly projects.
No other environmental effects are anticipated.

CONCLUSIONS

Based on the above findings, the Planning commission has determined (vote: 8 in support, 0 opposed, and 1 absent) that the environmental review requirements have been met by the EAW, that the proposed project does not pose the potential for significant environmental impacts, and that, therefore, an Environmental Impact Statement is not required.

Decided at Duluth, Minnesota, on Tuesday, May 13, 2013

BY ORDER OF THE CITY PLANNING COMMISSION

Charles Froseth, Secretary

Attachments: copies of questions raised, and responses

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MEMORANDUM

DATE: May 5, 2014
TO: Duluth City Planning Commission
FROM: Charles Froseth, Land Use Supervisor
SUBJECT: Environmental Assessment Worksheet (EAW) for Stewart Creek (PL 14-022)

The purpose of this memo is to provide background and a recommendation regarding Planning Commission action on the Duluth Traverse Trail EAW.

The 30-day public comment period for the EAW was from March 17, 2014 to April 16, 2014. As of the date of this memo, a total of **three comments** were received during the public comment period; all three comments from a public agencies and two from the public. On the May 13, 2014 agenda, the Planning Commission, as the Responsible Governmental Unit (RGU), is to make a determination on the need for an Environmental Impact Statement (EIS). Please reference the attached document titled "Findings of Fact"

Summary:
This project will stabilize stream banks and restore the channel of Stewart Creek damaged by the 2012 flood. The City of Duluth and South St. Louis Soil and Water Conservation District will restore 588' of stream channel to a natural pool and riffle state and remove debris upstream of a culvert.

EAW:
According to the EQB document, Preparing Environmental Assessment Worksheets, the "purpose of the EAW, comments and comment responses is to provide the record on which the RGU can base a decision about whether an EIS needs to be prepared for a project. EIS need is described in the rules: An EIS shall be ordered for projects that have the potential for significant environmental effects."

"In deciding whether a project has the potential for significant environmental effects, the RGU shall compare the impacts that may reasonably be expected to occur from the project with the criteria in this rule, considering the following factors (part 4410.1700, subparts 6 and 7):

A. Type, extent, and reversibility of environmental effects;
B. Cumulative potential effects of related or anticipated future projects;
C. The extent to which environmental effects are subject to mitigation by ongoing public regulatory authority; and
D. The extent to which environmental effects can be anticipated and controlled as a result of other available environmental studies undertaken by public agencies or the project proposer, including other Environmental Impact Statements."

Recommendation:
Based on the Environmental Assessment Worksheet, the Findings of Fact and Record of Decision, and related documentation for this project, Staff recommends that the Planning Commission makes a Negative Declaration and does not require the development of an Environmental Impact Statement (EIS) for this project.

The Planning Commission is asked to review the attached information, consider public comment, and make a motion determining if an EIS is needed or not.

July 2013 version

ENVIRONMENTAL ASSESSMENT WORKSHEET

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at:
http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.
Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.
Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. **Project title: Stewart Creek Bank Stabilization**

2. **Proposer:**
   Contact person: Chris Kleist
   Title: Program Coordinator
   Address: 411 West First Street Rm 211
   City, State, ZIP: Duluth, MN 55802
   Phone: 218-730-4063
   Fax: 218-730-5907
   Email: ckleist@duluthmn.gov

3. **RGU**
   Contact person: Charles Froseth
   Title: Land Use Supervisor
   Address: 411 West First Street Rm 208
   City, State, ZIP: Duluth, MN 55802
   Phone: 218-730-5325
   Fax: 218-730-5907
   Email: cfroseth@duluthmn.gov

4. **Reason for EAW Preparation:** (check one)

Required:	Discretionary:
☐ EIS Scoping	☐ Citizen petition
x☐ Mandatory EAW	☐ RGU discretion
	☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):

State Statute 4410.4300 Subp. 26. Stream Diversion.

5. **Project Location:**
   County: St Louis
   City/Township: Duluth, MN
   PLS Location (¼, ¼, Section, Township, Range): (S27 T49N R15W)
   Watershed (81 major watershed scale): St. Louis River
   GPS Coordinates: 46°42'05.99"N 92°13'05.19"W
   Tax Parcel Number(s): 010-4060-00350
   010-4060-00350
   010-4060-00360

010-4060-00390
010-4060-00500
010-4060-00530
010-4060-00560
010-4060-00580
010-4060-00590

At a minimum attach each of the following to the EAW:

- County map showing the general location of the project;
- U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and
- Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.

See attached Figures

6. **Project Description:**

a. Provide the brief project summary to be published in the *EQB Monitor*, (approximately 50 words).

This project will stabilize stream banks and restore the channel of Stewart Creek damaged by the 2012 flood. The City of Duluth and South St. Louis Soil and Water Conservation District will restore 588' of stream channel to a natural pool and riffle state and remove debris upstream of a culvert.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

This project is to stabilize eroded streambanks along Stewart Creek that were washed out during the June 2012 flood. See Figures 4 & 5 attached for images. Natural vegetation and appropriate sideslope grading will be used wherever possible. A more open and natural floodplain will be established above bank-full width. The stream will be realigned away from steep sensitive streambanks and a larger floodplain will be established. Please refer to Figure 2 for exact location of realignment.

Construction methods will include slope grading and stabilization using earthwork machinery, with as little work as possible done from within the actual streambed. Material removal will be completed by hand or my using small machinery. Vegetation will include hand planting of live stakes to minimize disturbance of the shoreland area.

There are no additional infrastructure needs, and no existing infrastructure will be changed as a result of this project.

Some minor debris removal of woody material that could be easily mobilized in future high flows will occur in the lower section of this project.

Construction timing will occur during the DNR's work-in-waters timeframe; between July 1 and October 1. Actual construction time is expected to be about two weeks.

c. Project magnitude:

Total Project Acreage	1.16
Linear project length	588'
Number and type of residential units	N/A
Commercial building area (in square feet)	N/A
Industrial building area (in square feet)	N/A
Institutional building area (in square feet)	N/A
Other uses – specify (in square feet)	N/A
Structure height(s)	N/A

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

Some parts of the City of Duluth's storm sewer and stream infrastructure sustained major damage during the June 2012 flood. While some sections of the system held together remarkably well, many areas were damaged or destroyed and required extensive repair.

In cases such as this site on Stewart Creek, the upstream washout of the DWP trail deposited a large volume of rock and debris in the stream channel immediately downstream. This material changed the course of the stream, pushing it against exposed and highly-erodible streambanks. See Figures 4 & 5 for images of the bank washouts. This project proposes to re-create the stream channel near its original location, stabilize sections of streambank that were damaged, and remove some debris as needed.

The project will be carried out by a partnership between the City of Duluth and the South St Louis Soil and Water Conservation District. Benefitting parties are the City of Duluth, the State of Minnesota, and private landowners in the neighborhood.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes x☐ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

This project is proposed as a single-phase repair/restoration.

f. Is this project a subsequent stage of an earlier project? ☐ Yes x☐ No
If yes, briefly describe the past development, timeline and any past environmental review.

N/A

7. **Cover types:** Estimate the acreage of the site with each of the following cover types before and after development:

	Before	**After**		**Before**	**After**
Wetlands	0	0	Lawn/landscaping	0.1	0.1
Deep water/streams	0.1	0.1	Impervious surface	0	0
Wooded/forest	0.96	0.96	Stormwater Pond	0	0
Brush/Grassland	0	0	Other (describe)		
Cropland	0	0			
			TOTAL	**1.16**	**1.16**

8. **Permits and approvals required:** List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. *All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.*

Unit of government	Type of application	Status
MN Pollution Control Agency	Stormwater CA Permit	to be submitted
City of Duluth Planning	EAW	in-process
State of MN DNR	EAS Application	to be submitted
US Army Corps of Engineers & MnDNR	Water/Wetland Projects	to be submitted

*Submitted to request coverage under the state Flood Damage Repair General Permit and under the federal Regional General Permit

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. **Land use:**
   a. Describe:
      i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

         The current land use is public, undeveloped and forested. The public land adjoins several parcels of residential property.

         Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

         The property is zoned R-1 and the future land use is designated as preservation.

      ii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

         Stewart Creek is a Minnesota Department of Natural Resources designated trout stream. The land is considered to be in the Cold Water shoreland.

         Definition of a Coldwater river: Rivers including trout streams and their tributaries.

   b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The project will improve the overall health of this trout stream, reduce the likelihood of streambank washouts of this magnitude in the future, reduce impact on downstream infrastructure, and improve the aquatic habitat of this trout stream. This project is compatible with the City's Unified Development Code (UDC) zoning.

The land is zoned R-1 (Traditional Residential). Purpose: An R-1 district is established to accommodate traditional neighborhoods of single-family detached residences, duplexes and townhouses on moderately sized lots. This district is intended to be used primarily in established neighborhoods. Many of the dimensional standards in this district require development and redevelopment to be consistent with development patterns, building scale, and building location of nearby areas.

Future land use is preservation.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

N/A

10. Geology, soils and topography/land forms:

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

No known geologic hazards are present in this area. Depth to bedrock varies across the site, but is generally shallow.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading.

44.6% Urban land-Amnicon-Rock outcrop complex, 0 to 18 percent slopes
55.4% Ahmeek-Rock outcrop Fluaquents, frequently flooded, complex, 0 to 50 percent slopes

c. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

This project will enhance surface and groundwater connectivity by slowing the flow of the water through a natural pool and riffle system. Soil loss will be lessened by the improved streambank and riparian vegetation and an adequate floodplain bench.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils and topography/land forms and potential effects described in EAW Item 10.

11. Water resources:

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within 1 mile of the project. Include DNR Public Waters Inventory number(s), if any.

Stewart Creek is a Minnesota Department of Natural Resources designated trout stream that flows through the site and is the focal point of this project.

Lake Superior is an Outstanding Resource Value Water (ORVW) and is about eight miles northeast of the project site.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any onsite and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

There are no wells located in or near this project area. Depth to groundwater varies across the site.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.
2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.
3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

No wastewater will be produced or discharged in the area.

ii. Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.

Since the amount of impervious will not change, we do not anticipate the volume of stormwater produced to change. However, since a natural channel will be re-established in the area and riparian vegetation restored we anticipate that overland flow will receive some more natural filtration than it currently does before it reaches Stewart Creek. Temporary sediment and erosion control BMPs will be employed during project construction as shown in detail on the engineering drawings and construction Stormwater Pollution Prevention Plan (SWPPP). Permanent controls rely primarily on establishing a healthy vegetative cover.

iii. Water appropriation - Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

This project will not result in any water appropriation from Stewart creek, either during construction or permanently.

iv. Surface Waters

a) Wetlands - Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

No wetland features will be altered by this project. The location of the material staging, laydown and excess soil stockpile area will be outside of the riparian zone and 100 year floodplain. Per plans, the contractor must install silt fence around the area after the exact in-field location is approved by the project engineer.

b) Other surface waters- Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.

This project proposes to re-establish a natural stream channel and stabilize streambanks that were severely damaged during the June 2012 flood. See images in Figures 4 & 5. The natural stream channel is only a few feet wide, extremely shallow and rocky, and any watercraft access is virtually impossible under any flow condition.

During construction, flow in Stewart Creek will temporarily be diverted around the active project reach. A baseflow of up to ten cubic feet per second will be maintained within Stewart Creek downstream of the project reach using pumping or passive gravity flow to bypass the construction area. To accommodate in-stream construction activities, temporary water diversion sequencing will be used with energy dissipation measures on the downstream end of the diversion. The dewatering activity impact will be minimized by placing the inlet and outlets as close to active construction as possible.

12. Contamination/Hazardous Materials/Wastes:

a. Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

N/A Hazardous contamination conditions do not exist.

b. Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Any solid waste generated during construction will be carried off site and disposed of properly.

c. Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

The only potential hazardous spill would be a small amount of vehicle fuel from motorized tools used during construction. Small capacity canisters will be used, and fueling will occur at least 100 feet from any body of water.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

N/A No hazardous materials will be generated by this project.

13. Fish, wildlife, plant communities, and sensitive ecological resources (rare features):

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

Aquatic and riparian habitat on the site is fair and was worsened by the June 2012 flood. This project would have the multiple benefits including: stabilizing the existing exposed streambanks, moving the stream channel away from the banks and opening up a floodplain, improving the aquatic habitat and fish passage, improving riparian vegetation. Proposed channel modifications should greatly improve stream structure from a habitat standpoint including creation of more natural riffle-pool structures, addition of root wads along the bank, and vegetation to shade the stream.

Currently, vegetation in the project area consists of woody upland and lowland forest abutting private property with established turfgrass lawn and landscaping.

b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (LA-____) and/or correspondence number (ERDB _____) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.

We are not aware of any rare features on the site. We have requested a natural heritage review from the Minnesota DNR. We anticipate the potential to encounter Blanding's turtles on the site and will ensure that contractors working on the project are able to identify and handle these rare creatures.

c. Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.

Fish, wildlife, and plant habitats will be improved by this project. All necessary precautions will be taken to avoid spreading invasive species.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

In-stream work will be done with close coordination with the Minnesota Department of Natural Resources (DNR) to avoid trout spawning impacts. No work will occur within restricted dates to protect the resident brook trout population.

In-stream work shall be completed with as little disturbance to the stream as possible. Stream diversion will be used for this purpose as described above in Part II.b.iv(b). Material stockpiles adjacent to the stream shall be stabilized per the project construction SWPPP. Sediment capturing devices shall be placed outside of the streambed to ensure continued fish passage during construction. Any necessary dewatering shall be minimized with the intake and outlet as close to the active work area as possible to lessen the area disturbed.

14. Historic properties:

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

N/A – No historic structures affected by this project.

15. Visual:

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

N/A Vistas and views will not be impacted by this project.

16. Air:

a. Stationary source emissions - Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

N/A

b. Vehicle emissions - Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Unnecessary construction vehicle idling will be minimized and controlled by on-site inspector. Hours of construction operation shall be limited to between 7am and 5pm.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

N/A Dust and odors will be minimal and incidental.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Vehicle noise will be controlled as much as possible. All vehicles shall meet noise and emission standards.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

No additional parking spaces shall be created; no impacts on traffic are expected.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. *If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW.* Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 *(available at: http://www.dot.state.mn.us/accessmanagement/resources.html)* or a similar local guidance,

N/A

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

N/A

19. Cumulative potential effects: (Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items)

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

20. Other potential environmental effects: If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

RGU CERTIFICATION. *(The Environmental Quality Board will only accept **SIGNED** Environmental Assessment Worksheets for public notice in the EQB Monitor.)*

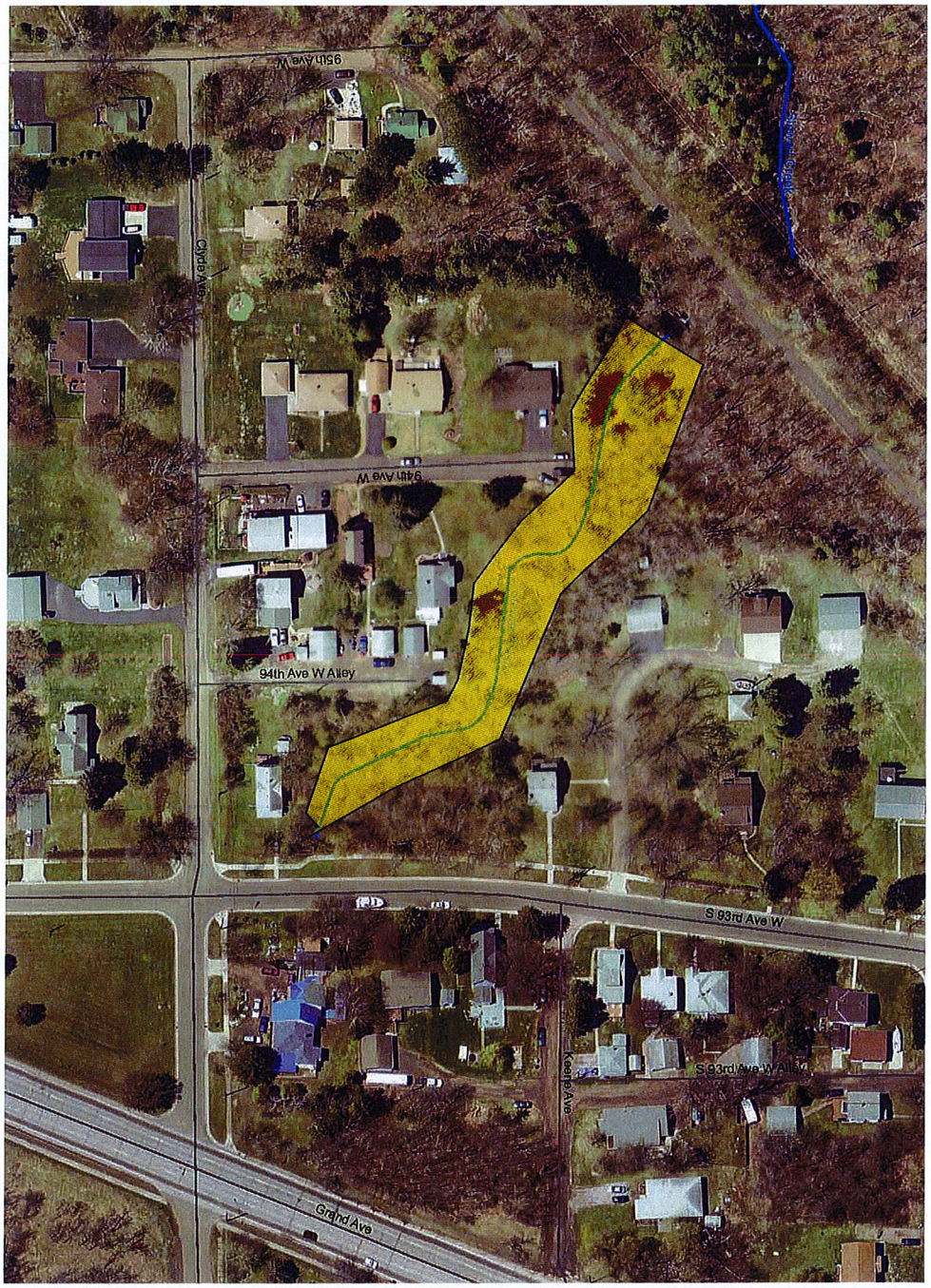
I hereby certify that:

- The information contained in this document is accurate and complete to the best of my knowledge.
- The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

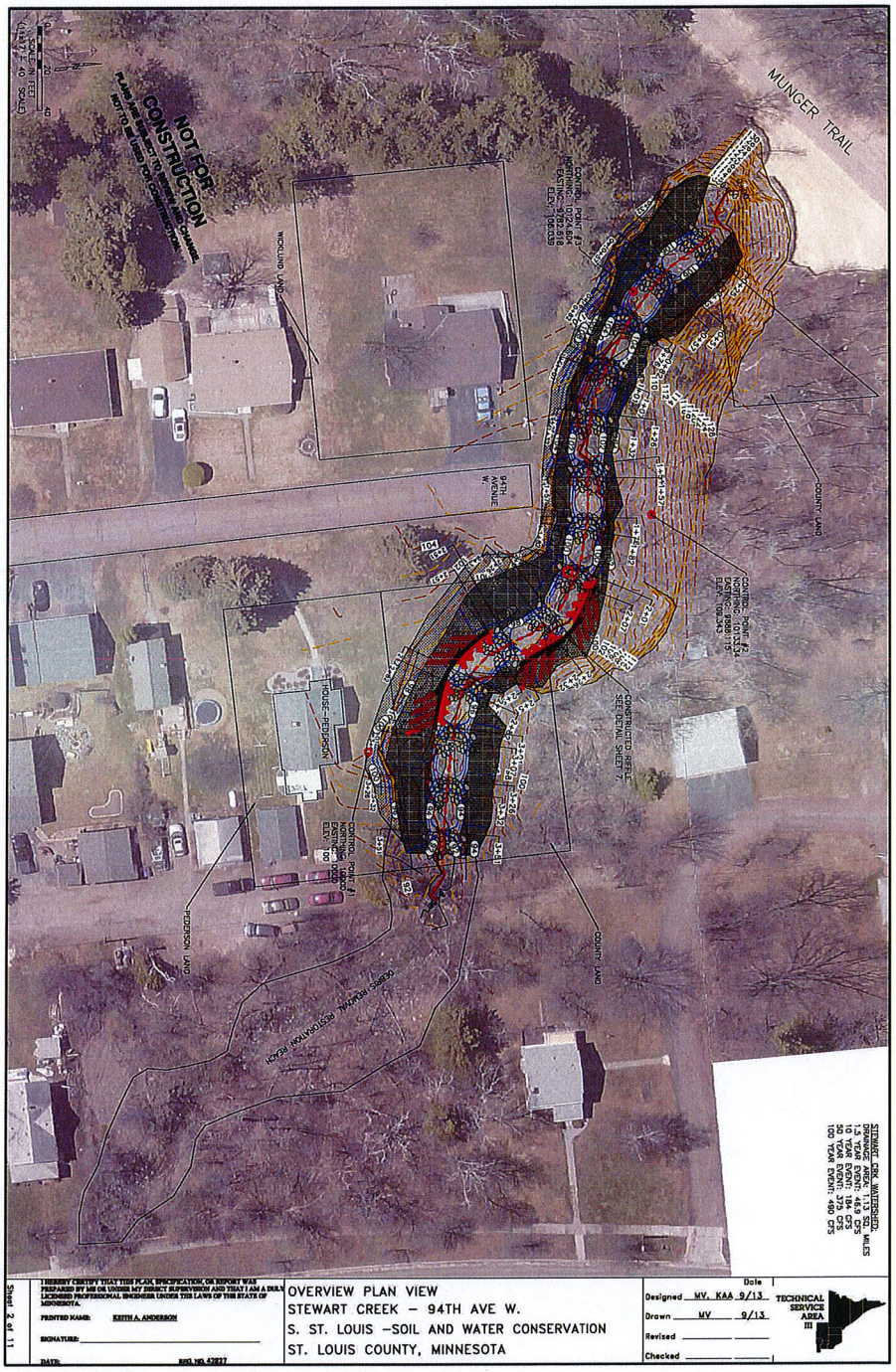
Signature _____ Date MARCH 10, 2014

Title Land Use Supervisor

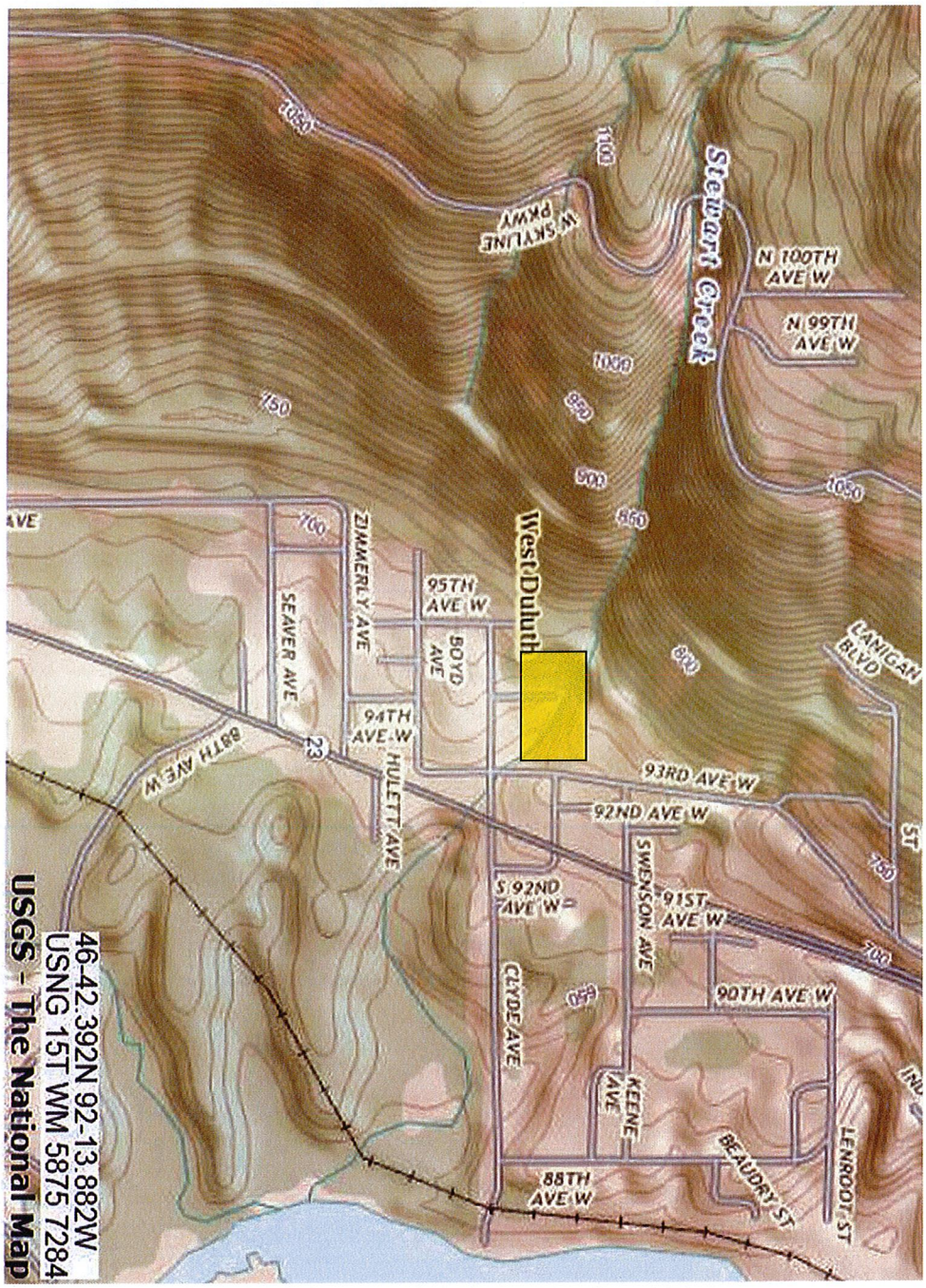
Project Location Map
Stewart Creek Bank Stabilization
Figure 1



Project Location Map
Stewart Creek Bank Stabilization
Figure 2



Project Location Map
Stewart Creek Bank Stabilization
Figure 3



Project Location Image
Stewart Creek Bank Stabilization
Figure 4

View from mid-project looking upstream

Project Location Image
Stewart Creek Bank Stabilization
Figure 5

View from the upper project area looking downstream

EQB MONITOR

Publication Date March 17, 2014
Vol. 38, No. 6

Next Publication: March 31, 2014
Submittal Deadline: March 24, 2014
Submit to EQB.Monitor@state.mn.us

CORRECTION: Please note that the March 3, 2014 EQB Monitor should have been Volume 38-5.

The EQB has transitioned to a new electronic notification system called GovDelivery. Add MNEQB@public.govdelivery.com to your address book or safe sender list. Manage your subscription.

EQB Meetings are regularly scheduled for the third Wednesday of the month, which can be found on the EQB Calendar. There may be additional special meetings as well. Meeting minutes, packets, and agendas are posted on the EQB website.

- Environmental Assessment Worksheets
- EAW Need Decisions
- EIS Need Decisions
- AUAR Update Available
- Notices

Environmental Assessment Worksheets

EAW Comment Deadline: April 16, 2014

Project Title: Stewart Creek Bank Stabilization

Project Description: This project will stabilize stream banks and restore the channel of Stewart Creek damaged by the 2012 flood. The City of Duluth and South St. Louis Soil and Water Conservation District will restore 588' of stream channel to a natural pool and riffle state and remove debris upstream of a culvert.

RGU: City of Duluth

Contact Person: Charles Froseth, Land Use Supervisor
411 West First Street Rm 206,
Duluth, MN 55802
Phone: 218-730-5325
Email: cfroseth@duluthmn.gov

EAW Need Decisions

The noted responsible governmental unit has made a decision regarding the need for an EAW in response to a citizen petition.

- Verizon Telecommunication Tower near the Gull River in Sylvan Township, Sylvan Township, EAW denied

EIS Need Decisions

The noted responsible governmental unit has determined the following project does not require preparation of an EIS. The dates given are, respectively, the date of the determination and the date the EAW notice was published in the EQB Monitor.

- Buffalo-Red River Watershed District,Wolverton Creek Restoration, February 24, 2014 (November 11, 2013)
- Department of Natural Resources, Blazing Star State Trail, Myre-Big Island State Park to Hayward project in Freeborn County, March 4, 2014 (December 23, 2013)
- Minnesota Department of Transportation, TH 34 Passing Lanes from Detroit Lakes to Nevis, March 10, 2014 (December 23, 2013)
- **UPDATED:** Hennepin County, Reconstruction of CSAH 101 from CSAH 5 to US Highway 12, February 24, 2014 (October 14, 2013)

Minnesota Historical Society

Using the Power of History to Transform Lives
PRESERVING › SHARING › CONNECTING

STATE HISTORIC PRESERVATION OFFICE

April 9, 2014

Mr. Charles Froseth
Land Use Supervisor
City of Duluth
411 W. 1st Street, Room 208
Duluth, MN 55802

RE: EAW – Stewart Creek Bank Stabilization Project
T49 R15 S27 NE
Duluth, St. Louis County
SHPO Number: 2014-1328

Dear Mr. Froseth:

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the Minnesota Historical Society by the Minnesota Historic Sites Act and the Minnesota Field Archaeology Act.

Based on our review of the project information, we conclude that there are **no properties** listed in the National or State Registers of Historic Places, and no known or suspected archaeological properties in the area that will be affected by this project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36CFR800, Procedures of the Advisory Council on Historic Preservation for the protection of historic properties. If this project is considered for federal assistance, or requires a federal permit or license, it should be submitted to our office by the responsible federal agency.

Please contact our Compliance Section at (651) 259-3455 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers

Sarah J. Beimers, Manager
Government Programs and Compliance

Minnesota Department of Natural Resources
Division of Ecological and Water Resources, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-4025
Phone: (651) 259-5109 E-mail: lisa.joyal@state.mn.us

April 9, 2014 **Correspondence # ERDB 20140275**

Mr. Chris Kleist
City of Duluth
411 West First Street
Duluth, MN 55802

RE: Natural Heritage Review of the proposed Stewart Creek Bank Stabilization,
T49N R15W Section 27, St. Louis County

Dear Mr. Kleist,

As requested, the above project has been reviewed for potential effects to known occurrences of rare features. A search of the Minnesota Natural Heritage Information System did identify rare features within an approximate one-mile radius of the proposed project, but these records did not include any federally listed species and were either historical or not of concern given the project details that were provided with the data request form. As such, I do not believe the proposed project will adversely affect any known occurrences of rare features.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location (noted above) and project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

Sincerely,

Lisa Joyal

Lisa Joyal
Endangered Species Review Coordinator

Minnesota Department of Natural Resources
Northeast Region • 1201 East Highway 2 • Grand Rapids MN • 55744

April 16, 2014

Correspondence # ERDB 20140275

Chris Kleist
Program Coordinator
411 West First Street Rm 211
Duluth, MN55802

RE: Stewart Creek Bank Stabilization

Dear Mr. Kleist:

In addition to the Natural Heritage Review, the Department of Natural Resources (DNR) Northeast Region has reviewed the Stewart Creek Bank Stabilization Environmental Assessment Worksheet (EAW) and has the following comments for your consideration.

The proposed Stewart Creek stabilization proposal, outlined in the EAW, provides a brief description of the overall project. If the project is a comprehensive stream restoration approach that offers long-term improved natural function and protection in response to sustained damage to the creek, careful attention is needed to the design. This will be critical to providing the intended stream stability and resource enhancement outcome. Since the proposed project will require a DNR permit for work in the bed of public waters, final design detail will need to be provided to the DNR in the permit process.

Specific items to consider include the following.

- Identification in greater detail where the channel will be moved relative to original channel location prior to the flood.
- Longitudinal profile and identification of where issues are. Pre-flood profile, at a minimum riffle/water surface, should be available utilizing LIDAR data.
- Specific Identification of areas where bank hardening for erosion protection will occur including length of banks to be stabilized.
- Identification of current channel length relative to proposed channel length.
- As this project potentially entails significant disturbance of aquatic invertebrate communities, it would be beneficial to provide more detail regarding project need.

Thanks for the opportunity to comment, please feel free to call or email me with any questions you may have.

Sincerely,

Rian Reed
Regional Environmental Assessment Ecologist
MNDNR
1201 East Hwy 2
Grand Rapids, MN 55744
218-999-7826
rian.reed@state.mn.us

Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

April 14, 2014

Mr. Charles Froseth
Land Use Supervisor
411 West First Street, Room 208
Duluth, MN 55802

Re: Steward Creek Bank Stabilization Environmental Assessment Worksheet

Dear Mr. Froseth:

Thank you for the opportunity to review and comment on the Environmental Assessment Worksheet (EAW) for the Stewart Creek Bank Stabilization project (Project) located in Duluth, Minnesota. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, the MPCA staff has the following comments for your consideration.

Item 8 – The project may require a Section 401 Water Quality Certification determination from MPCA depending upon the permitting mechanism utilized by the U.S. Army Corps of Engineers.

Item 10c – This section of the EAW does not provide sufficient details on project activities, project phasing, or temporary and permanent measures that will be employed to manage stabilization of disturbed areas.

Item 12a – It should be noted that there is a closed leak site (Leak # 16869) located approximately 420 feet to the southwest and up-gradient of the proposed project. The leak was discovered June 21, 2007, and the project file was closed July 17, 2007.

Item 12b – The project proposer should also consider recycling as much of the culvert materials as possible to reduce the volume of material disposed of in the landfill. Reuse of materials such as uncontaminated concrete should be in accordance with Minn. R. 7035.2860. Additional information is available on the MPCA's Solid Waste Utilization webpage: http://www.pca.state.mn.us/tchy863.

Item 12c – The project proposers and their contractors should be mindful of operating heavy equipment in and near the stream and to develop a plan for managing fuels and lubricants, including a plan of action to implement in the event of spills. Project proposers and their contractors should be prepared to respond to spills and to recover and contain spilled material as quickly and thoroughly as possible. For petroleum spills that are five or more gallons, the project proposers and/or their contractors are required to contact the State Duty Officer at 651-649-5451 or 800-422-0798. Information on reporting spills and leaks is available on the MPCA website at: http://www.pca.state.mn.us/index.php/view-document.html?gid=2807

We appreciate the opportunity to review this Project. Please provide your specific responses to our comments and the notice of decision on the need for an Environmental Impact Statement. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this EAW, please contact me at 651-757-2482.

Sincerely,

Kevin Kain
Planner Principal
Environmental Review Unit
Resource Management and Assistance Division

KK:bt

cc: Craig Affeldt, MPCA, St. Paul
Tom Estabrooks, MPCA, Duluth

City of Duluth
Department of Public Works/Utilities
Chris Kleist - Engineering Division
411 West First Street Room 211 • Duluth MN 55802
(218) 730-4063 ckleist@duluthmn.gov

April 18, 2014

Response to DNR and MPCA Comments:

DNR Comment Letter April 16, 2014.

Bullet Point #1: Identification in greater detail where the channel will be moved relative to original channel location prior to the flood.

Please see attached design summary memo for detailed information on this comment.

Bullet Point #2: Longitudinal profile and identification of where issues are. Pre-flood profile, at a minimum riffle/water surface, should be available utilizing LIDAR data.

Pre-flood, post flood, and proposed longitudinal profiles will be included in the DNR permit application. Please see attached design summary memo for detailed information on this comment.

Bullet Point #3: Specific identification of areas where bank hardening for erosion protection will occur including length of banks to be stabilized.

Please see attached design summary memo for detailed information on this comment.

Bullet Point #4: Identification of current channel length relative to proposed channel length.

Please see attached design summary memo for detailed information on this comment.

Bullet Point #5: As this project potentially entails significant disturbance of aquatic invertebrate communities, it would be beneficial to provide more detail regarding project need.

The goal of the project is to create a more natural, free-flowing, healthy stream channel with stable vegetated streambanks. Although short term disturbance of aquatic invertebrates is unavoidable, the long-term stream health benefits outweigh the short term disturbance. Please see attached design summary memo for detailed information on this comment.

MPCA Comment Letter dated April 14, 2014.

Item 8. The project may require a 401 Water Quality Certification depending upon the permitting mechanism utilized by the U.S. Army Corps of Engineers:

We do not anticipate this project requiring a 401 Water Quality Certification.

Item 10c. This section of the EAW does not provide sufficient details on project activities, project phasing, or temporary and permanent measures that will be employed to manage stabilization of disturbed areas.

This comment is well taken. The City of Duluth, the design consultant (Limnotech), and the construction contractor that we select will utilize all appropriate Best Management Practices (BMPs) during all construction phases to minimize erosion and sedimentation.

Item 12a. It should be noted that there is a closed leak site (Leak #16869) located approximately 420 feet to the southwest and up-gradient of the proposed project. The leak was discovered June 21, 2007, and the project file was closed July 17, 2007.

We appreciate the information. The closed leak site is outside the limits of construction.

Item 12b. The project proposer should also consider recycling as much of the culvert materials as possible to reduce the volume of material disposed of in the landfill. Reuse of materials such as uncontaminated concrete should be in accordance with Minn. R. 7035.2860. Additional information is available on the MPCA's Solid Waste Utilization webpage: http://www.pca.state.mn.us/tchy863

We do not anticipate this project producing much, if any, recyclable material. However, if concrete or blacktop is removed we will seek reuse options.

Item 12c. The project proposers and their contractors should be mindful of operating heavy equipment in and near the stream and to develop a plan for managing fuels and lubricants, including a plan of action to implement in the event of spills. Project proposers and their contractors should be prepared to respond to spills and to recover and contain spilled material as quickly and thoroughly as possible. For petroleum spills that are five or more gallons, the project proposers and/or their contractors are required to contact the State Duty Officer and 651-649-5451 or 800-422-0798. Information on reporting spills and leaks is available on MPCA website at: http://www.pca.state.mn.us/index.php/view-document.html?gid=2807

This comment is well taken. We are aware of the sensitivity of small coldwater trout streams to pollution from fuel spills and thus we will ensure that no fueling or lubricating activities occur within 100' of the stream. Additionally, we will require the contractor to have an emergency spill response kit on site during construction. These specifics will all be addressed in the construction SWPPP.

Soil & Water Conservation Districts
TECHNICAL SERVICE AREA III

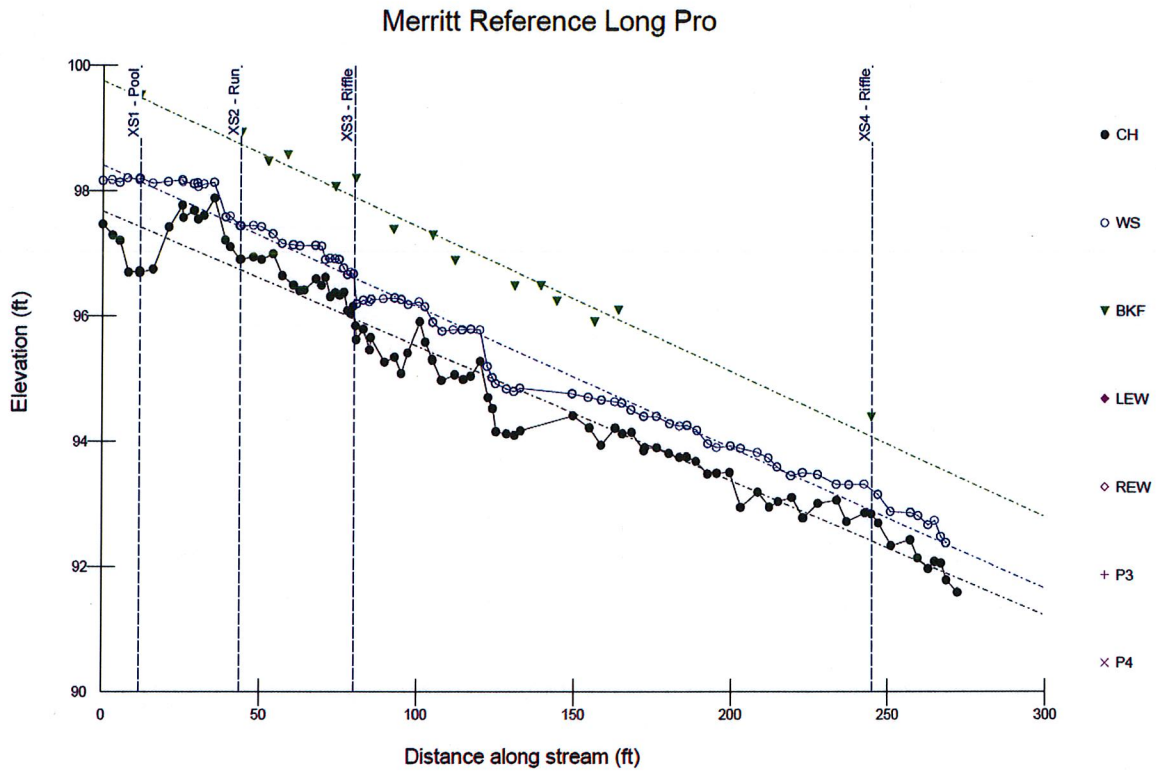
To: Limnotech
From: Matias Valero, E.I.T.
Date: February 12, 2014
Re: Stewart Creek Design Summary

Basis of Design

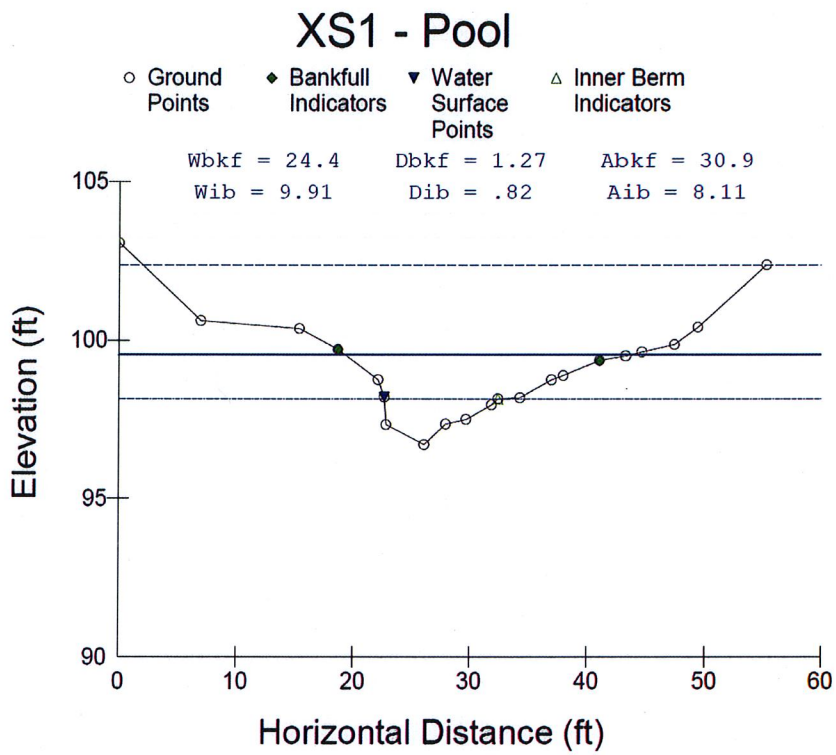
The Stewart Creek restoration design utilizes natural channel design methods developed by David Rosgen of Wildland Hydrology, Inc. The design methodology emphasizes the study of a natural, stable reference stream reach from which design parameters are measured to be used on a similar, impacted reach. The parameters involved are the dimensions, pattern, and profile of the channel. These are studied on the reference reach, scaled accordingly based on watershed size for the impacted reach and the design is developed from those parameters. The design methodology is laid out in detail in the NRCS Chapter 11 of the Stream Restoration and Design National Handbook. This document will not describe the steps in detail but provide the basis for design and data that went into the design of the new channel.

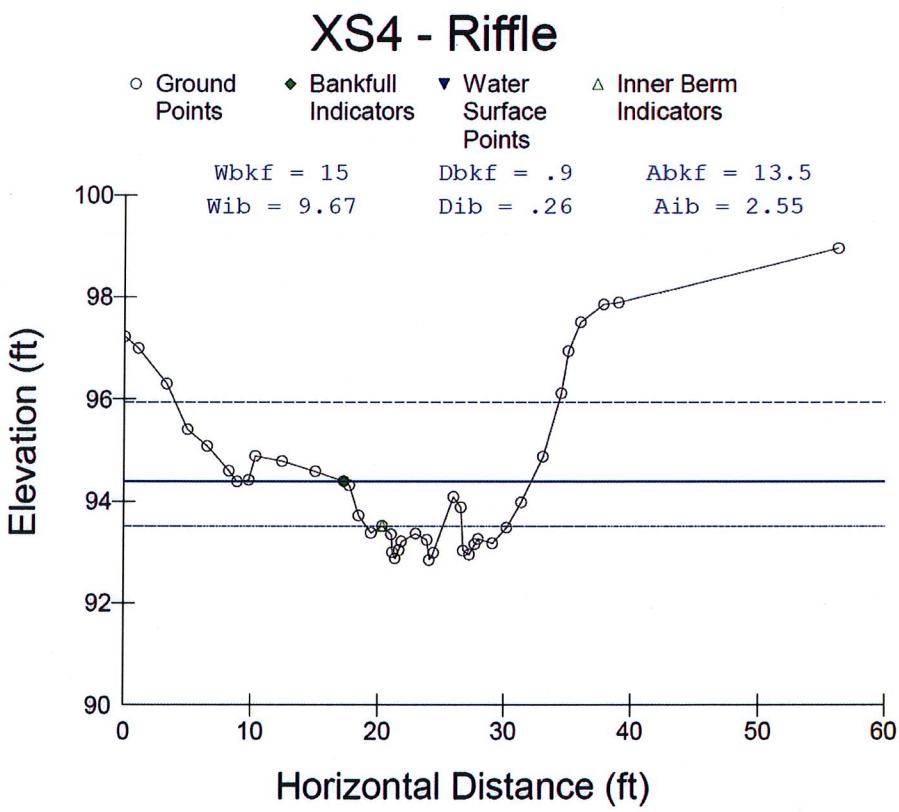
Merritt Creek Reference Reach Data

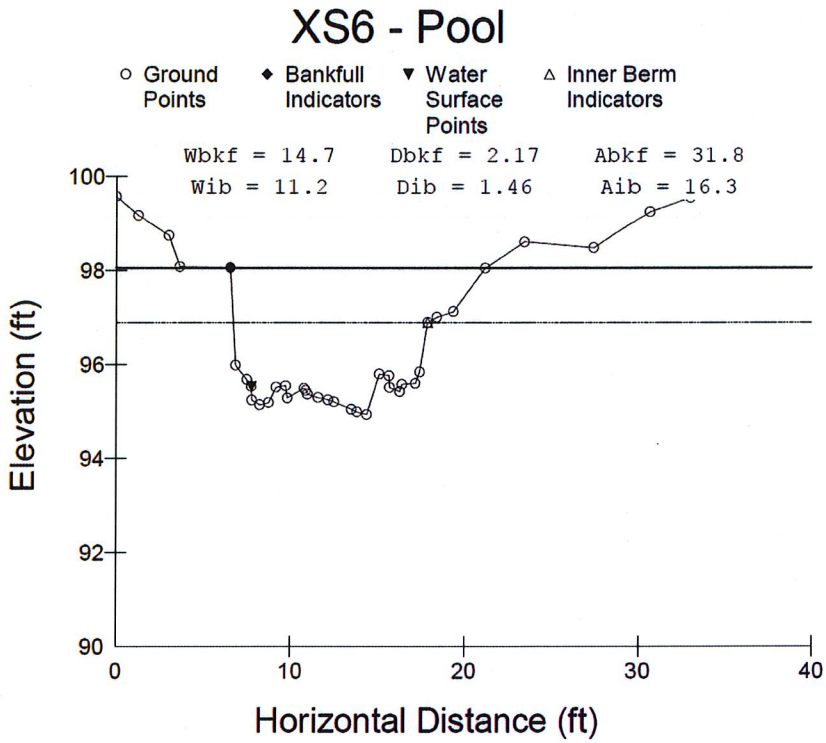
A reach on Merritt Creek just upstream of Skyline Parkway in Duluth Minnesota was selected due to its slope, its similar watershed land use, and the watershed area at the reference reach (1.13 mi^2, coincidentally identical to the watershed area of the Stewart Creek site), as well as the geographic location of the reference reach, five miles from the project site. The Merritt reference lies along a mostly wooded area with some urban runoff. Locations for the reference and other parameters can be found in the background documents regarding this project.

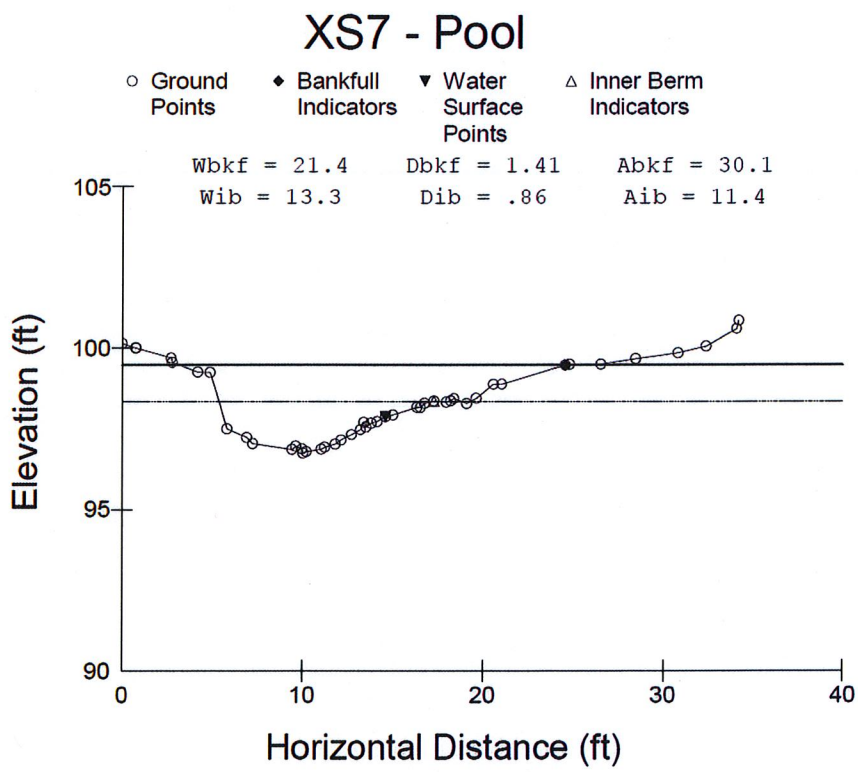


As can be seen Merritt Creek reference longitudinal profile above, both the reference and the design reach were relatively steep, B-type channels. Both creeks have mainly cobble bed material. There are two further pool reference cross-sections not shown in this profile—they are located just upstream of this reference survey on the same creek. After analyzing reference reach data, we decided to bring in information from another reference reach survey performed by the DNR on a similar, B-type section of the Split Rock River, just up the North Shore from Duluth. This second reference reach had similar dimensionless ratios to the Merritt Creek reference, but a shallower slope and a much larger watershed. We used the ratios from the Split Rock reference to double-check the feasibility of our design dimensions. Some of the cross sections indicated in the profile above are displayed below, including the two pool cross-sections not shown on the longitudinal profile.


XS1 - Pool
Ground Points
Bankfull Indicators
Water Surface Points
Inner Berm Indicators
Wbkf = 24.4
Dbkf = 1.27
Abkf = 30.9
Wib = 9.91
Dib = .82
Aib = 8.11
Elevation (ft)
105
100
95
90
0
10
20
30
40
50
60
Horizontal Distance (ft)


XS4 - Riffle
Ground Points
Bankfull Indicators
Water Surface Points
Inner Berm Indicators
Wbkf = 15
Dbkf = .9
Abkf = 13.5
Wib = 9.67
Dib = .26
Aib = 2.55
Elevation (ft)
100
98
96
94
92
90
0
10
20
30
40
50
60
Horizontal Distance (ft)

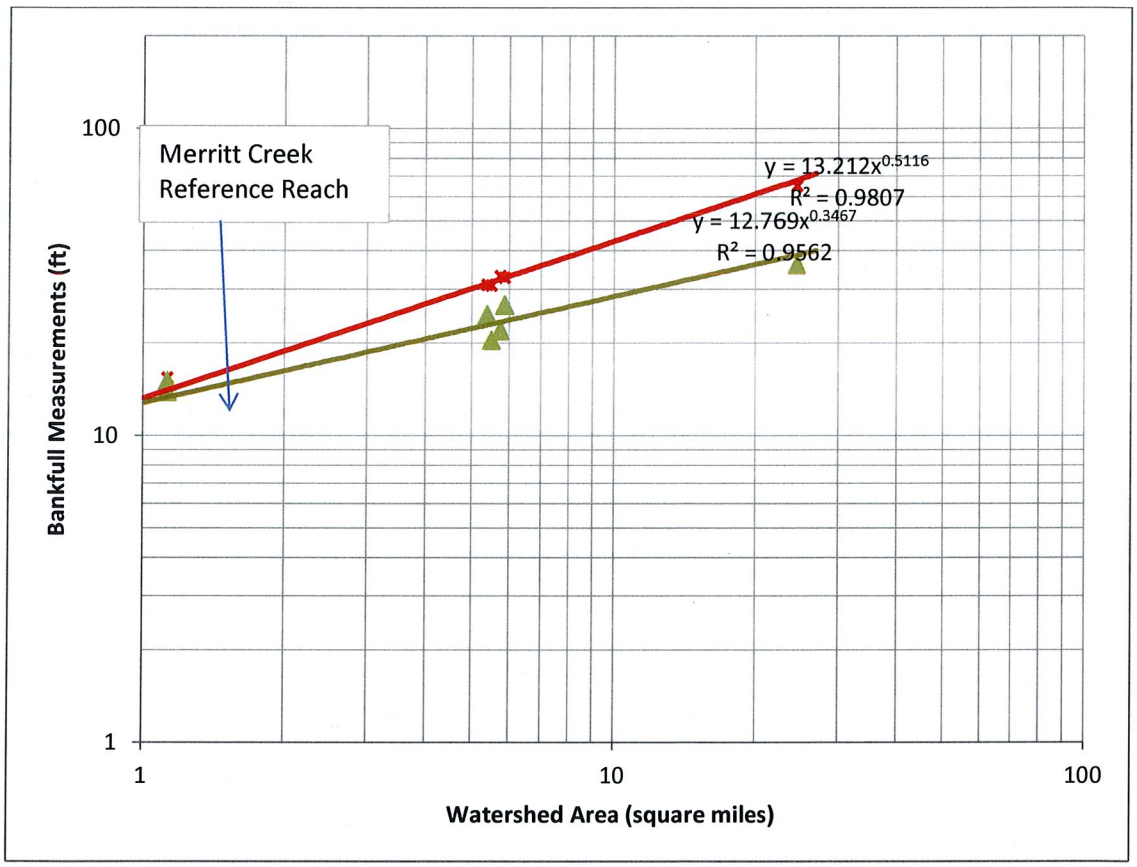

XS6 - Pool
Ground Points
Bankfull Indicators
Water Surface Points
Inner Berm Indicators
Wbkf = 14.7
Dbkf = 2.17
Abkf = 31.8
Wib = 11.2
Dib = 1.46
Aib = 16.3
Elevation (ft)
100
98
96
94
92
90
0
10
20
30
40
Horizontal Distance (ft)


XS7 - Pool
Ground Points
Bankfull Indicators
Water Surface Points
Inner Berm Indicators
Wbkf = 21.4
Dbkf = 1.41
Abkf = 30.1
Wib = 13.3
Dib = .86
Aib = 11.4
Elevation (ft)
105
100
95
90
0
10
20
30
40
Horizontal Distance (ft)

Dimensionless parameters were taken from the cross sections above, excepting the pool width, which was derived from the W_{pool}/W_{riffle} ratio of the Split Rock survey.

Regional Curve

The reference reach dimensions indicated that the Merritt watershed in question fairly well with the eastern Minnesota regional curve in terms of bankfull width area versus watershed area. The bankfull width of the reference was around 15 sq. ft. which falls very near the regional curve (The green line). Therefore from the regional curve, the bankfull width from for the design reach could be double-checked as well. Since both the reference and design reaches had the same watershed area, their bankfull cross-sectional widths and areas should be closely similar. This relationship was supported by the dimensionless ratios measured in our reference cross sections.



The above regional curve yields a bankfull cross sectional area of 14 sq. feet for the design channel, which we discarded in favor of a slight larger cross sectional area of 18 sq. feet based off of the reference cross sections.

Riffle/Pool Design

The reference reach width to depth ratios ranged from 7-19 square feet for the pool cross sections taken on the reference. This is generally wider than what is typical for a B channel type in high gradient, cobble channels. This may be due to the 2012 flood in Duluth depositing material and aggrading channels/widening banks to an unstable degree. Therefore, it was determined that a lower width to depth ratio should be used on the design channel. A width to depth ratio of 5.8 was chosen as a good design ratio based on the W_{pool}/W_{riffle} data from the Split Rock reference survey. From the riffle cross sectional area of 19 sq. feet and width to depth ratio of 8.3 the other design channel parameters were determined.

Stewart Creek Restoration Design Channel Design Parameters

Channel Parameters	**Riffle**	**Pool**
Bankfull Area (sq. Ft.)	19	41
Width (ft.)	15	18
Max Depth (ft.)	1.8	3.5
Mean Depth (ft.)	1.27	2.27
Width to Depth Ratio	11.8	8.37
Entrenchment Ratio	2.4	2.0
Channel Slope	0.044 upstream, 0.05 downstream.	
Valley Slope	0.041	

The above design should be sized for the natural bankfull conditions present at the site and consequently handle the sediment transport at the site without aggrading or degrading. A detailed sediment transport analysis was not able to be completed due to the overwhelming presence of cobble and boulder embankment material aggrading the channel from the 2012 flooding, which blew out the Munger Trail embankment upstream of the project site.

Questions from MN DNR, Rian Reed, April 16, 2014:

- Identify in greater detail where the channel will be moved relative to original channel location prior to the flood.

The channel will remain in its pre-flood floodplain, with the main change being the shifting of the thalweg away from the presently unstable path that developed since the 2012 flood. Currently, since the failure of the rock-protected slopes along the Munger trail upstream of the project during the flood, a large quantity of coarse material deposited in the Stewart Creek project reach, causing extreme aggradation in the existing channel and shunting the pre-flood thalweg towards the edges of the floodplain, where it immediately began to and still continues to erode at exposed clay slopes and residential yards.

The above photo is a view looking upstream on Stewart Creek of the mouth of the culvert flowing under the Munger trail into the project reach. Where before flooding the channel flowed along the center of an established floodplain, the photo displays the extreme aggradation downstream of the Munger trail embankment, as well as the current clay bank scouring occurring due to the new, shunted channel's location.

The proposed design restores the thalweg of the channel nearer to the center of the floodplain, while retaining the sinuosity appropriate to a steep B-channel according to the reference reach and the idea that steep B channel have low sinuosity. The bankfull elevation and floodplain of the channel will be reconstructed to more closely match a stable channel profile and cross section throughout the project reach. See the existing and proposed alignment on the plan view sheets 3 and 4 for an idea of where the post-flood thalweg lies in comparison to the proposed design thalweg.

- Longitudinal profile and identification of where issues are. Pre-flood profile, at a minimum riffle/water surface, should be available utilizing LIDAR data.

  The new channel profile is emulating the pre flood channel elevations from LIDAR. The design was modeled in HEC-RAS using pre-flood cross sections and LIDAR to determine the elevation change and potential flood risk of the proposed channel versus the pre-flood channel.

- Specific Identification of areas where bank hardening for erosion protection will occur including length of banks to be stabilized.

  The plans do not really contain bank hardening. The thrust of the plan is to reconstruct the channel with the existing material on site which is coarse cobble and some boulder with gravel substrates also present. The banks will be graded and seeded and planted with native seed and trees and shrubs. Furthermore, much of the rocky material that aggraded the channel when the Munger trail embankment collapsed during the flood will be removed, leading to a potential decrease in channel bank hardness.

- Identification of current channel length relative to proposed channel length.

  The existing channel length is 410 feet, relative to the proposed channel length of 360 feet. The reduction is due to the existing thalweg being longer than what occurred pre-flood since it was forced to flow through an aggraded surface with no discernable stable channel or floodplain. The new channel is being constructed in the fall line of the valley and will result in a more stable natural channel than what is currently present.

- As this project potentially entails significant disturbance of aquatic invertebrate communities, it would be beneficial to provide more detail regarding project need.

  The current status of the stream is that it is flowing through cobble and rubble from the roadway embankment that was washed into the channel during the flood and in some areas there is no discernable channel at low flow. Our goal is to create a stable channel that will pass water and sediment in the long term without aggradation or degradation. This will provide for much improved aquatic invertebrate habitat and consequently fish habitat in this reach. The invertebrates will occupy the much improved habitat naturally once the project is complete and the aquatic community is allowed to establish.