



FINAL ENGINEER'S PLAN REPORT
RED LAKE WATERSHED DISTRICT
PROJECT 60F
GRAND MARAIS CREEK OUTLET
RESTORATION

July 2012

Esther Township
Polk County
Red Lake Watershed District

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Engineer under the laws of the State of Minnesota.

A handwritten signature in black ink that reads "Jeffrey J. Langan". The signature is written in a cursive style and is positioned above a horizontal line.

Jeffrey J. Langan, P.E.
License No. 22805

Date: 07/20/2012

Houston Engineering Inc.
208 4th Street East
Thief River Falls, MN 56701
Ph. (218) 681-2951
HE Project No. 3655-057

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to the Board of Managers of the
Red Lake Watershed District
and the Joint Powers Board
July 20, 2012

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INTRODUCTION

I. Introduction

A. Project Need

Six miles of natural stream habitat on Grand Marais Creek, were bypassed with construction of a legal drainage ditch in the early 1900s. This action resulted in the complete loss of six miles of riverine and riparian corridor habitat, and diminished opportunities for fish passage to and from Red River and Grand Marais Creek. The Red Lake Watershed District, Middle Snake Tamarac Rivers Watershed District, landowners, and local, state, and federal agencies have initiated a comprehensive watershed project and are now ready to restore the natural stream channel and water flow to these six miles of disconnected aquatic habitat. Preliminary engineering is complete, environmental review is in progress, and most land acquisition is complete. This six mile restoration is a great opportunity to directly restore stream habitat in the Red River of the North basin.

The project proposes to:

1. Reconstruct six miles of natural channel based on sound scientific principles of natural channel design, hydrology, and fluvial geomorphology
2. Restore and sustain aquatic habitat conditions in the channel and up to 400 acres of riparian corridor habitats, which were abandoned and mostly farmed for the past 50+ years.
3. Divert flows from the existing outlet channel or Cutoff Ditch, and restore the hydrology to the original Grand Marais Creek channel. This will also re-establish the original and primary outlet point of the Grand Marais Creek to the Red River.
4. Maintain or slightly reduce existing flood stages immediately upstream of the project limits by increasing conveyance abilities during flood events on the Grand Marais Creek.
5. Minimize/contain flood impacts throughout channel restoration segment through establishment of flowage easements and isolated setback levees

The project will restore permanent and seasonal spawning and juvenile habitat to a variety of fish species. Additional project benefits include restoration of permanent and seasonal habitats for many aquatic and terrestrial plant and upland animal species that depend on healthy riparian corridor habitat. The restored channel corridor will also provide a more functional, reliable connection between the Red River and more than 20 miles of upstream riverine and wetland habitats in Grand Marais Creek.

Project 60F is a single component of the “Grand Marais Creek Subwatershed Flood Damage Reduction Project – Project 60”. The project is critical in providing an adequate and stable outlet to the Grand Marais Creek Subwatershed and its several tributaries. Although an adequate outlet generally relates to drainage capacity/conveyance issues, this project focuses on restoring riparian and aquatic

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features along the original Grand Marais Creek, reducing erosion, and improving water quality. Although this project initially provides minor drainage benefits, it will improve channel stability conditions at the Grand Marais Subwatershed outlet thereby allowing for future considerations of agricultural drainage projects in the Grand Marais Creek drainage area. A majority of the Grand Marais Subwatershed is located in proximity with the Red River Basin where improved conveyance of runoff should reduce peak flows on the Red River, relative to the 1997 flood event. The basis for this concept is presented in Technical Paper No. 11, as developed for the Red River Basin Flood Damage Reduction Work Group. This concept and project will likely support flood damage reduction interests by providing a stable outlet to accommodate potential future agricultural drainage projects.

The project addresses the Natural Resource Enhancement goals identified in the 1998 mediation agreement.

B. Location

The Grand Marais Creek Restoration Project is located in Polk County, North of East Grand Forks within Sections 15, 16, 22, 23, and 26 of Esther Township, T153N, R50W, (see Figures 1 and 2). The upstream limits of the project begin at the confluence of the Grand Marais Creek with the Cutoff Ditch. The restoration project is planned to extend up to 500 ft. downstream into the Cutoff Ditch Channel. The downstream limits of the project are planned to extend to near the confluence of the restored Grand Marais Creek with the Red River of the North.

(See following page)

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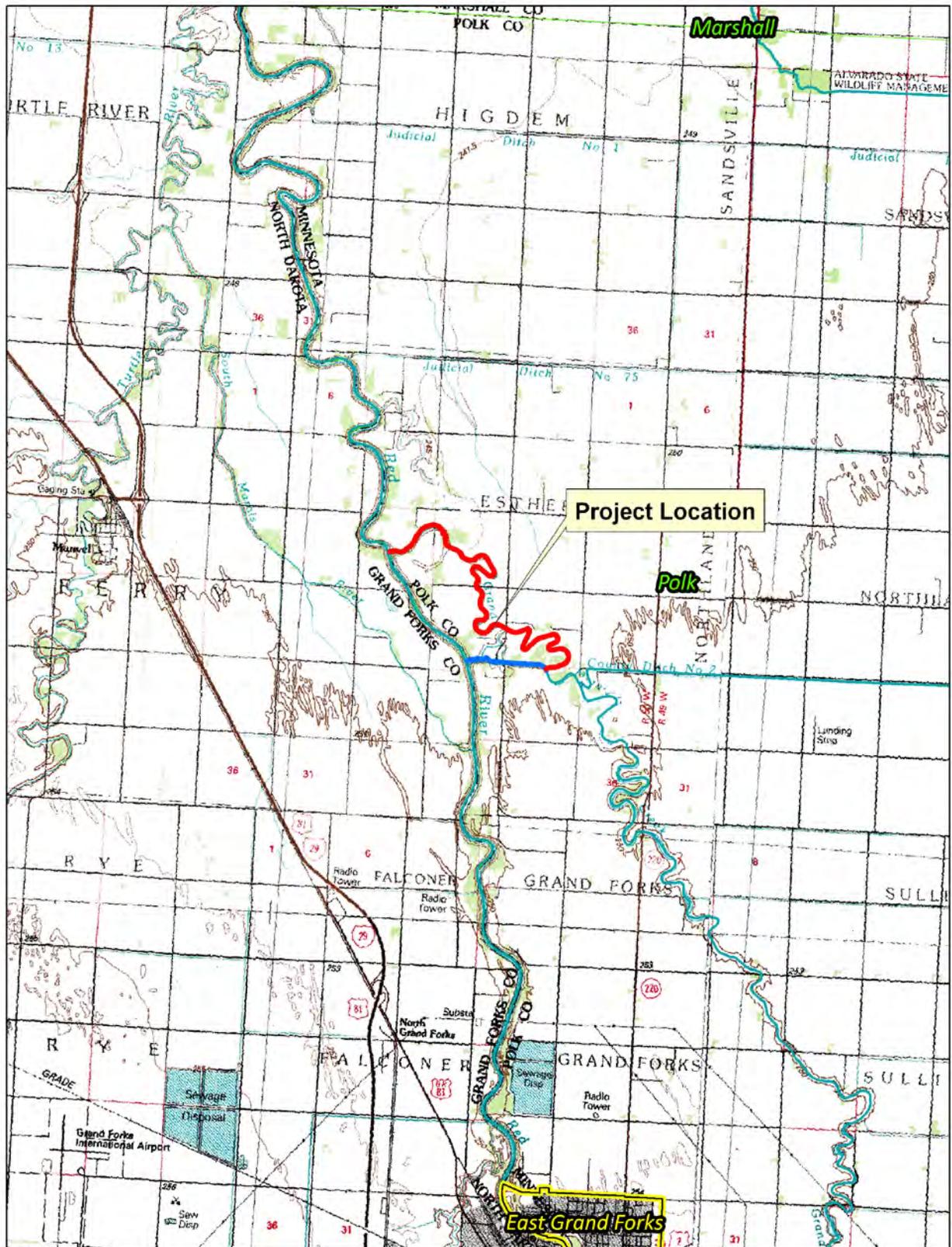


Figure 1: Project Location Map

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Figure 2: Project Features

C. Project Team

The project is the result of careful planning and engineering by an interdisciplinary project team of natural resource professionals, local landowners, and technical professionals dedicated to reducing flood damages and enhancing natural resources in the Grand Marais Creek sub-watershed within Red River watershed.

The Project 60 Project Work Team (PWT – established as part of the 1998 mediation agreement) has been discussing features and goals of the Grand Marais Creek outlet restoration project for several years, and have conducted several public information meetings to gauge the support of the local community. Discussions and public comment initiated the Red Lake Water Shed Board of Managers to complete a Preliminary Engineer’s Report in order to improve understanding of the project feasibility and cost.

The Project Team has been instrumental in developing project goals, and a Final Plan Report developing funding strategies, and completing a Preliminary Engineer’s Report.

D. Cooperating Agencies and Coordinated Local Plans

The following Agencies have expressed interests in the project development, will likely have permitting jurisdiction, and have been involved in developing the project goals, concepts, and establishing funding mechanisms:

Cooperating Agencies “Permitting” Jurisdiction

- 1) US Army Corps of Engineers
- 2) MnDNR
 - a. Waters
 - b. Fisheries
 - c. Wildlife (Game and Non Game)
- 3) MPCA
- 4) West Polk Soil and Water (WCA)
- 5) MnSHPO
- 6) USFWS
- 7) Red Lake Watershed District
- 8) Middle Snake Tamarac Rivers Watershed District
- 9) Polk County Highway Department
- 10) Polk County Planning and Zoning
- 11) Esther Township Board

Cooperating Agencies/Boards – “Project Development, Planning, Design, and Funding”

- 1) Project Team – RLWD Project 60
- 2) Grand Marais Creek Joint Powers Board - Red Lake Watershed District/Middle Snake Tamarac Rivers Watershed District
- 3) Red Lake Watershed District
- 4) Middle Snake Tamarac Rivers Watershed District
- 5) MnDNR Fisheries
- 6) MnDNR Waters
- 7) BWSR

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- 8) Lessard-Sams Outdoor Heritage Council
- 9) MCEA

The Grand Marais Creek Restoration Project is consistent with and supports various local, regional, state, and federal Cooperating Agency Conservation and Preservation Plans. In addition, the project supports local Watershed District Goals and Objectives as specified in their current Watershed Management Plans. The following applicable excerpts from these plans include, but are not limited to, the following:

Minnesota Statewide Conservation and Preservation Plan

Proposed projects are consistent with *“Habitat recommendation 6: protect and restore critical in-water habitats of lakes and streams”*

In particular, it is consistent with the recommendations on page 82: *“A priority for former prairie zones of Minnesota is to reverse the negative effects of stream channelization on in-stream habitats for fish and other aquatic organisms.....”*

Lessard – Sams Outdoor Heritage Council Preliminary Goals and Objectives 25-Year Targets, Prairie Section, August 27, 2009

This planning document includes a table on page 11 that identifies stream habitat restoration and protection goals and objectives. This proposed project is consistent with this plan and will help achieve year one goals for channel restoration and riparian restoration.

Red Lake Watershed District Plan (2006)

This proposed restoration project is consistent natural resource enhancement and water quality goals and objectives outlined in the Red Lake Watershed District Plan.

Red River Basin Mediation Agreement (1998)

This habitat restoration project is consistent with the flood natural resource goals and objectives in the mediation agreement including:

1. *Manage streams for natural characteristics.*
2. *Enhance riparian and in-stream habitats.*
4. *Provide connected, integrated habitat including compatible adjacent land uses.*
6. *Provide recreational opportunities.*

Campaign for Conservation – Fifty Year Vision

This habitat restoration project is consistent with the recommended actions in the fifty year vision for the Red River Valley planning region as follows:

- C. *Lakes, Rivers, Wetlands and Groundwater*
 2. *Return watercourses to semi-natural hydrology and morphology.*
- D. *Fish and Wildlife*
 1. *Develop incentives and regulations for enhanced protection of shoreline and stream restoration in both Minnesota and North Dakota.*
 4. *Ensure that suitable habitat for species of concern is primary focus of*

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land and water conservation efforts.

- 5. Expand private landowner stewardship incentive programs. Provide ongoing funding to entice landowners to idle (plant grass or trees) acres in sensitive wetland, riparian, and prairie areas.*
- 6. Create habitat corridor connections for prairie chickens and other grassland species across the Red River Valley from the Agassiz Beach Ridges prairies in the east to the Sheyenne National Grasslands in the west. Corridors are needed to provide dispersal routes and prevent genetic isolation.*

State AMA Acquisition Plan

This project is consistent with the following recommendations from the Red River Prairie Ecoregions needs section of the plan:

“The recreational demand on this area of the state will likely outpace the projected population change and additional public access to fishing lakes and streams is a priority. Permanent angling and management easements on streams, while maintaining private ownership, draw anglers to the area, bring additional dollars into the local economy, and provide the inroad to create permanent protection to shoreline habitat, which insures clean water for future generations. Additional lake and warmwater shoreline should still be acquired when extraordinary opportunities arise and County approval is obtained. There may be opportunities for Non-Government Organizations to acquire critical shoreline parcels in this area, to either be managed by them or turned over to the DNR as AMAs or other Outdoor Recreation Units.”

Tomorrow’s Habitat for the Wild and Rare- Minnesota’s Comprehensive Wildlife Conservation Strategy

This project is consistent with the following goals and strategies:

Goal 1: Stabilize and increase SGCN populations

- 3. Nonforested wetlands and floodplain forests*
 - c. manage habitats adjacent to wetlands and floodplain forests to enhance SGCN values*
- 4. Stream habitats*
 - a. maintain good water quality, hydrology, geomorphology, and connectivity in priority stream reaches*
 - b. Maintain and enhance riparian areas along priority stream reaches*

National Fish Habitat Action Plan

The proposed project is consistent with the goals and objectives of this plan.

- Reverse declines in the quality and quantity of aquatic habitats to improve the overall health of fish and other aquatic organisms.*
- Increase the quality and quantity of fish habitats that support a broad natural diversity of fish and other aquatic species.*

Minnesota Water Sustainability Framework

This proposed project is consistent with:

- 1) The following Minnesota Sustainable Water Policy Principles:*

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- *Protect, maintain, and restore the biological, chemical, and physical health of the state's water resources*
- *Provide resiliency to our ecosystems, our communities, and our economies*
- *Encourage sustainable, conservation-minded land use practices*
- *Preserve our water-rich heritage and ensure our future legacy as national and international water stewards*
- *Provide for a lasting foundation to achieve and maintain sustainable water management.*

2) *Strategy E.1: Restore and protect critical aquatic ecosystems using a watershed approach.*

BACKGROUND

II. Background

A. Existing Conditions

The Grand Marais Creek is a tributary of the Red River of the North. The current outlet into the Red River is located in a rural setting approximately 7 miles north of East Grand Forks, MN. In the early 1900's, a joint State and County initiative developed a drainage project to construct the 1.25 mile outlet channel beginning near the north south ¼ line between sections 23 and 26 of Esther Township and proceeding west along the section lines to the point where the channel terminated at the Red River. This new drainage channel (known locally as the Cutoff Ditch) provided a shorter outlet distance from the Grand Marais Creek to the Red River and effectively abandoned the lower 6 miles of natural channel. The abandonment of the lower 6 miles of the original Grand Marais channel created a loss of the aquatic and riparian ecosystem.

Since the establishment of the Cutoff Ditch, the lower 6 miles of the Grand Marais Creek has lost the hydrology required to sustain the channel as a functional waterway from a natural resource perspective (i.e. aquatic and riparian features) as well as its ability to convey flows. Photos A, B, C, and D display the existing typical channel section throughout a significant part of the lower 6 miles of the Grand Marais Creek.



Photo A - Sta. 306+00 entry in Original Grand Marais Channel from Diversion

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Photo B - Existing Grand Marais Channel Sta. 200+00 to 240+00



Photo C - Existing Grand Marais Channel Sta. 192+00 to 200+00

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Photo D - Existing Grand Marais Channel Sta. 136+00 to 144+00

In addition, since the establishment of the Cutoff Ditch, the cutoff ditch channel has eroded from its original shape to one of steep gradients and unstable banks (See Photo E). This has resulted in significant bank sloughing and nearly continuous channel erosion with the effect that the channel has deposited an annual average of approximately 700 hundred tons of sediment into the Red River.



Photo E – Existing Cutoff Ditch Bank Failures

This lower reach of the Grand Marais Creek has presented local concerns for over 100 years relative to natural resource, social, and economic interests.

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The instability of the Cutoff Ditch has been addressed through Red Lake Watershed Project 60FF - Grand Marais Creek Cut Channel Stabilization Project. The BWSR, Red Lake Watershed District, and Polk County have funded a project which will stabilize the Cutoff Ditch and significantly reduce future erosion, sedimentation, bank failures, and land loss. This project is currently under construction and likely completed by the end of 2012. Completing RLWD Project No. 60FF will allow focus on the restoration of the historic Grand Marais Creek and the reestablishment of the hydrologic characteristics which existed prior to the construction of the Cutoff Ditch.

The social concerns identified in the early 1900's included aesthetics, odor, and a general public health nuisance caused by the stagnant water. The condition generally remains today in several reaches of the Grand Marais Creek. This situation appears to be caused by a limited natural grade and inconsistent flows. According to an original report from 1901, the lower 24 miles of the Grand Marais channel was originally a part of the Red Lake River. A historic flood event created a new outlet for the Red Lake River abandoning this 24 mile reach of the Grand Marais and thereby significantly reducing the drainage area and flow. The Grand Marais was left as a north/northwesterly flowing channel limited to serving as an outlet for lands to the east which naturally sloped straight west at an average of 2 ft. per mile. According to the historic information and the recent preliminary survey data, the Grand Marais generally possesses a natural grade of 0.5 ft/mile to 1 ft/mile. Considering the minimal channel grade and lack of consistent flows, excessive sedimentation in the channel bottom and the eventual loss of low/moderate flow capabilities is most likely the source of the problems mentioned above.

The economic concerns relate primarily to agriculture. Originally, the Cutoff Ditch was constructed to enhance the drainage capabilities of the Grand Marais Creek Outlet and its tributary ditches. This original construction has ultimately caused instability along the Cutoff Ditch, displayed through bank failures and headcutting, resulting in sacrificed agricultural land as it slides into the channel. However, and as mentioned earlier, the instability along the Cutoff Ditch has been addressed through a stabilization project being constructed in 2012.

Economic problems are also present along the lower 6 miles of the Grand Marais Creek as farming practices adjacent to the channel have been difficult due to inconsistencies in establishing buffer limits, and the drainage abilities are negligible. In addition, need for future drainage projects in the upper reaches of the Grand Marais subwatershed will most likely continue as agriculture remains the vital component of our local economy and drainage is necessary to maintain successful farming operations. Due to the inability of the Grand Marais Creek outlet to convey flows and function as a stable outlet, these proposed drainage projects will most likely be limited, or contested until the problem at the outlet can be resolved.

Environmental problems have also developed related to sediment transport in the Grand Marais and the Red River. The entire Grand Marais Creek is identified on the 303(d) list as an impaired water relative to turbidity and aquatic life impairments. There are reaches of the Red River near the confluence with the Grand Marais that are also listed with the same impairment. In addition, excessive nutrients and

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chemicals introduced in the stormwater runoff from farming practices, loss of aquatic habitat, loss of riparian buffer adjacent to the original Grand Marais Creek, and reduced ability for fish passage are all identified as existing problems throughout the existing and proposed Grand Marais Creek channel.

As areas adjacent to the Grand Marais Creek are high valued agricultural land and have also been developed with residences, the proposed project must present no measurable negative impacts to these adjacent lands and property owners. Potential negative effects, most notably increased water levels upstream, may be mitigated through financial compensation or other provisions, but these processes only make the proposed project more difficult and expensive to complete. It is best to maintain or decrease flood stages upstream of the project and to therefore maintain or reduce negative impacts.

An administrative problem originally existed at the established boundary between the Middle-Snake-Tamarac (MST) Watershed District and the Red Lake Watershed District. The Grand Marais Creek passes from one district to the other at the boundary within section 22 of Esther Township (T153N, R50W). The Red Lake Watershed District was the local governmental unit sponsoring the potential work on the original Grand Marais Creek as primarily waters from this district would be served by re-introducing these original flows into a restored channel. Since this water is received by and must pass through a section of the Grand Marais channel primarily located in the Middle-Snake-Tamarac Watershed District, an administrative agreement was required to establish a joint approval process for any proposed changes to the existing drainage. In addition, the lower 2.6 miles of the original Grand Marais channel are now part of the outlet section of MST Watershed Ditch 6; therefore, the physical and administrative project effects to Watershed Ditch 6 must be identified and resolved as part of the project development work.

In February of 2009, a Joint Powers Board comprised of Board Members from the Red Lake Watershed District and the Middle Snake Tamarac Rivers Watershed was formed. The formation of the Joint Powers Board was developed due to the above mentioned concerns. It was determined that the best solution to administering the project development operations and future maintenance would best be served through a joint powers board.

Inadequate drainage along the Grand Marais Creek appears to be a historic problem. It appears that until the outlet is stabilized, drainage projects in the upper Grand Marais basin may be contested by those landowners near the outlet making the process very difficult. Floodwater impoundments appear to be the primary alternative for reducing flood frequency and stage along the Grand Marais channel, until the outlet is stabilized.

Due to the strong interests in stabilizing the outlet channel of the Grand Marais Creek Subwatershed, several engineering reports have been prepared over the past 20 years, including a recent USACOE Report completed in 2011. These past engineering reports were used as reference in preparing this Plan Report, and they are as follows:

• Grand Marais Creek Outlet Restoration

- Grand Marais Ecosystem Restoration - Section 206 Study - Technical Analysis Report - Prepared for the St. Paul District, United States Army Corps of Engineers - November 2011 – prepared by HDR Engineering, Inc.
- USACOE, Report “Preliminary Restoration Plan for the Grand Marais River Section 206 Environmental Rehabilitation Project, Polk County, MN – February 27, 2003
- USACOE, Report “Reconnaissance Report Section 205 Flood Control Red River of the North Grand Marais Outlet, Minnesota” – January 1995
- HDR Engineering, Inc., Report “Red Lake Watershed District Project No. 60A – Grand Marais Outlet – Preliminary Engineers Report (Draft)” – February 7, 1995
- JOR Engineering, Inc., Report “Grand Marais Outlet Improvement – Project 60A) – July 31, 1991
- Red Lake Watershed District Report, “Engineering Report Red Lake Watershed District Project #60” – September 13, 1988

The watershed district initiates projects based on priority problems identified in the watershed district plan (<http://www.redlakewatershed.org/planupdate.html>). This project is part of a much larger scope of work in the entire Grand Marais Creek sub-watershed (See Attachment 1). The entire scope of work will result in the enhancement of natural resources, improvement to water quality, and reduced flood damages. This stream habitat restoration project will complete a comprehensive watershed-based approach to managing water and habitat in the Grand Marais Creek watershed that has included strategic storage of 5,400 ac-feet and almost 1,100 acres of wetland and grassland restoration. Throughout the sub-watershed, targeted channel stabilization projects, buffer strip installation and erosion reduction projects at the outlet have been completed.

B. Project Development

In July of 2007, the Red Lake Watershed District appointed Houston Engineering, Inc. (HEI), as the Engineer to prepare a Preliminary Report – Feasibility Study on the “Grand Marais Creek Outlet Restoration - Red Lake Watershed District Project 60F”. The purpose of the report was to aid and advise the Board of Managers as to the desirability and feasibility of the proposed project. In February of 2008 a draft report was completed and a public meeting was held in April to solicit input from the public. In May of 2008, comments from the public meeting were incorporated into the Preliminary Report and a Final Draft was completed.

The Project 60 Project Work Team (PWT – established as part of the 1998 mediation agreement and composed of landowners and representatives of local, state, and federal agencies) has been discussing features and goals of the Grand Marais Creek Restoration Project for several years, and have conducted several public information meetings to gauge the support by the local community. The Joint Powers Board has also conducted several public meetings to solicit comments and ideas related to the Project. Discussions and public comment had originally initiated the Red Lake Watershed District Board of Managers to proceed with a “Preliminary Engineers Report - Feasibility Study” in order to improve understanding of the project feasibility and cost. The Final Engineer’s Plan Report, as prepared herewith, has been

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prepared at the direction of the Joint Powers Board using information provided in the “Preliminary Engineer’s Report – Feasibility Study” and updated design data developed since 2008. Since full project funding was established in 2011, the opportunity to complete the Final Engineer’s Plan Report and proceed to final design of the project was established.

The Red Lake Watershed District and the Grand Marais Creek Joint Powers Board, in cooperation with landowners, will be responsible for long term maintenance of this project. Long term maintenance will include, but not be limited to, weed control, mowing, beaver dam removal, and debris removal which significantly obstructs reasonable channel conveyance abilities. The Red Lake Watershed District has led the land acquisition, project development, and engineering of this project with full cooperation of the “Project Team”. The Red Lake Watershed District initiated this project by action of their board under Minnesota Statute 103D.601. Long term project maintenance and water management within the project boundaries is provided through authorized use of the Watershed District construction and maintenance funds. Maintenance of vegetation along the newly created stream corridor will also be provided as part of Reinvest in Minnesota (RIM) permanent easement contracts.

Right of Way acquisition includes up to approximately 400 total acres, including acreage throughout the restored original channel section, restored riparian buffer area, setback levee areas, and reestablishment of adjacent upland areas.

Reinvest in Minnesota (RIM), Working Lands Initiative (WLI), and the Red Lake Watershed District provided funding for right of way acquisition, directly and/or indirectly. Most all of the right of way has been acquired. The few parcels remaining have expressed no resistance to the project, and the permanent easements are expected to be acquired upon final establishment of the detailed construction limits. The lands acquired through RIM will be established and maintained in accordance with the rules and requirements associated with the RIM program agreements, as documented in the easement.

PROPOSED PROJECT DESIGN

III. Proposed Project Design

A. Alternatives Considered

Four project alternatives were originally considered to address the concerns identified at the outlet to the Grand Marais Creek Subwatershed. These four alternatives were presented in the Preliminary Engineers Report – Feasibility Study completed in May 2008, are as follows:

Alternative 1: Do Nothing

Alternative 2: Stabilize the existing Cutoff Ditch only and maintain all present flow patterns

Alternative 3: Restore the original Grand Marais Creek downstream of the Cutoff Ditch and divert all flows to the restored channel

Alternative 4: Restore the original Grand Marais Creek downstream of the Cutoff Ditch and stabilize the Cutoff Ditch. Flows up to a 2 yr. flood event would flow through the restored Grand Marais Creek, and flows exceeding the 2 yr. flood event would split between the stabilized Cutoff Ditch and the restored Grand Marais Creek.

Considering the Cutoff Ditch Stabilization Project 60FF is under construction, Alternatives 1 and 3 are eliminated from consideration and not presented in this Engineer's Plan Report.

Alternatives 2 and 4 are addressed below, as follows:

Alternative 1 (*originally Alt. 2*): Stabilize the existing Cutoff Ditch only and maintain all present flow patterns.

Alternative 2 (*originally Alt. 4*): Restore the original Grand Marais Creek downstream of the Cutoff Ditch and stabilize the Cutoff Ditch. Flows up to a 2 yr. flood event would flow through the restored Grand Marais Creek, and flows exceeding the 2 yr. flood event would split between the stabilized Cutoff Ditch and the restored Grand Marais Creek.

B. Alternative Descriptions

Alternative 1: This alternative will provide restoration and stabilization of the existing Cutoff Ditch allowing it to remain the primary outlet of the Grand Marais. No restoration work would be performed on the Grand Marais Creek. The Cutoff Ditch is currently being stabilized as part of a 2012 construction project, RLWD Project No. 60FF.

The benefits to this alternative is no changes in flow patterns, minimal political issues regarding drainage, reduction in sediment loads to the Red River, stabilization of Cutoff Ditch banks and reduction of future land loss, the ability for future economic

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growth by reducing conflict when considering upstream drainage projects, and no administrative issues to resolve with the neighboring watershed district.

There are several disadvantages to Alternative 1 to consider. First, there are no Grand Marais Creek restoration accomplishments as part of this alternative. The loss of aquatic and riparian habitat areas along the lower 6 miles of the Grand Marais Creek will not be reestablished with this alternative. The natural resource benefits will continue to be significantly impaired due primarily to the loss of hydrology and connectivity to the Red River. Although the project addresses the reduction of sediment load to the Red River by stabilizing the Cutoff Ditch, it does not restore the original Grand Marais Creek riparian buffer, aquatic habitat, fish passage, and restoration of other important natural features of the channel. This alternative would not necessarily qualify as a Natural Resource Enhancement project in the context specified in the mediation agreement. Funding from Flood Damage Reduction, DNR Wildlife/Fisheries, and other interested sources may be difficult for this alternative.

Second, the design frequency of the grade stabilization structures is for 50% of a 100 year runoff event. The desired design frequency is for a 100 year event. However, project costs related to a 100 year design event made this design frequency unfeasible. Restoration of the lower 6 miles of the Grand Marais Creek could accommodate the additional 50% of the flow. The design of the Cutoff Ditch stabilization project anticipated that the Grand Marais Creek restoration project would be completed eventually and would function hydraulically in coordination.

Alternative 2: Alternative 2 is mentioned most in the previous studies directed at collectively resolving the concerns along the Cutoff Ditch and the Grand Marais Creek, and it was also the most discussed and supported by the Project Work Team. This alternative includes stabilization of the Cutoff Ditch, construction of approximately 6 miles of channel restoration along the original Grand Marais Creek downstream of the confluence with the Cutoff Ditch, installation of a diversion structure, construction of grade stabilization structures at the outlet to the Red River capable of providing fish passage, reestablishment of a significant portion of the floodplain, construction of public road and private drive channel crossings, and construction of isolated setback levees. It proposes a split flow condition between the existing Cutoff Ditch and the original Grand Marais Creek.

As mentioned previously, the Cutoff Ditch is being constructed as part of RLWD Project 60FF. Therefore, a part of this project alternative will be completed prior to the end of 2012.

The concept of this alternative was presented in the February 27, 2003, Army Corps of Engineers report; Subject: "Preliminary Restoration Plan for the Grand Marais River Section 206 Environmental Rehabilitation Project, Polk County, Minnesota". It was also referenced in the November 2011 USACOE Section 206 Study Report referenced on page 13. This concept appeared to be the direction the PWT was headed, and the information included in the May 2008 – "Preliminary Engineers Report – Feasibility Study", was further developed to attain a better understanding of the approach.

The benefits of this alternative are as follows:

• Grand Marais Creek Outlet Restoration

- The Cutoff Ditch Stabilization Project will be completed in 2012, and it is designed to coordinate conveyance needs with restoration of the Grand Marais Creek.
- Restoration of the original Grand Marais channel to a condition similar to its pre 1900 condition including establishing a riparian buffer, aquatic habitat, fish passage capabilities, and low flow stream form and function
- Stabilization of the Cutoff Ditch will provide channel stability and reduced erosion and downstream sediment loads
- Maintaining similar or slightly reduced hydraulic characteristics of the Grand Marais to upstream landowners during flood events.
- The balanced benefits presented by this alternative create attractive options to outside funding sources because it addresses regional, statewide and federal interests.
- The Natural Resource Enhancement benefits of restoring nearly 6 miles of natural channel address the goals and objectives of the 1998 mediation agreement.
- Grade stabilization structures placed at the outlet of the Grand Marais Creek will stabilize the channel from further headcutting reducing future bank failures. Stabilizing the outlet of the Grand Marais Creek will also decrease sediment load to the Red River improving the water quality impairments.
- The split flow condition appears to have the ability to satisfactorily accomplish the natural resource, economic, and social concerns identified.
- Alternative 2 has been the focus of the PWT. Reviewing past meeting minutes, it appears this alternative has presented a consensus of favorable discussions from all sides. The preliminary work by the Project Work Team indicates a high potential that the environmental issues can be resolved with relative efficiency.
- RIM funds have been used to acquire right of way for a majority of the project. Restoration of the Grand Marais Creek corridor will introduce land use consistent with the RIM easements and provide value to this investment.

The disadvantages of Alternative 2 include primarily project costs, administration efforts, and changes of agricultural land use.

Due to concerns by local landowners and the history of the Grand Marais channel, addressing a long term maintenance plan for the channel will be provided. At this point in the design, a detailed and accurate operation and maintenance plan is not realistic and practical. Section III.D of this report provides a detailed channel design which provides a typical cross section and longitudinal grade which is expected to be sustainable as a natural channel. Future maintenance considerations have been presented as a concern at the PWT and public informational meetings, and the completed operation and maintenance plan will provide assurance for a sustainable and functional corridor.

Considering the alternatives, Alternative 2 has been selected as the most feasible and practical approach to restoring and stabilizing the outlet of the Grand Marais

Creek Sub Watershed. Balancing the functional and environmental interests of the restored original Grand Marais Creek, political/administrative considerations, hydraulic characteristics of the channel, practicality and functionality of the diversion structure, reduction of flow frequency to the Cutoff Ditch, and project costs/funding sources, Alternative 2 is the most practical and feasible. Alternative 2 was the focus of most meetings and discussions were generally addressed in a constructible, non-contentious manner at the PWT level.

C. Project Description and Plans

The project features proposed are displayed in the attached preliminary plan sheets and include the following:

- Reconstructing the original Grand Marais channel for Natural Resource Enhancement purposes (riparian corridor, aquatic habitat, fish passage, etc.), and providing a hydraulic capacity capable of conveying the diverted flows with no increase in water levels upstream at flood stages; primarily flood stages which could impact personal property or farmland
- Construction of a diversion structure capable of diverting all flows from the cutoff ditch up to a 2 yr flood event
- Constructing grade stabilization structures at the outlet of the Grand Marais Creek which will also provide for fish passage from the Red River
- Construction of public and private channel crossings which satisfy hydraulic requirements as well as fish passage and other aquatic needs
- Using the RIM program to acquire necessary land area adjacent to the Grand Marais Creek in order to restore the aquatic and riparian habitat with the corridor
- Constructing setback levees to contain the diverted flows and create a riparian buffer between the channel and agricultural land

The proposed project reflects Alternative 2, and includes the following primary features:

Diversion Structure/Weir

A diversion structure is proposed to direct flows up to a 2-yr event into the reconstructed original Grand Marais Channel. A conceptual detail drawing of the structure is provided on sheet 2 of the preliminary plans. The weir length is estimated at 100 ft. with an elevation set at 809.75. The diversion structure will incorporate a combination of compacted clay, sheet piling, rip rap, structurally armored spillway, vegetated slopes, and controlled drawdown culvert. Energy dissipating measures will be designed to control erosion immediately downstream.

Channel Restoration

The 6 mile restoration of the original Grand Marais Creek is the primary focus of the proposed project. Work includes excavation of approximately 5.0 miles of the channel creating a cross section, profile grade and sinuosity reflecting pre 1900 conditions. MnDNR Fisheries and Waters staff have worked with Houston Engineering to develop a typical section, alignment and design grade. Section III.D

- **Grand Marais Creek Outlet Restoration**

of this report provides the design basis, methodology, and details applied to the channel restoration.

Several in stream and riparian buffer features will be included in the final plans to encourage the establishment of aquatic and wildlife habitat. MnDNR staff will be used extensively during detail design to determine the most appropriate methods and techniques.

The proposed gradient of the restored channel was projected from the upper reach of the Grand Marais channel and generally set at a slope of 0.5' to 1.0' per mile. Proposed channel depth was verified by cursory soil borings and classification work performed by the local NRCS Office. Section III.D provides additional channel details.

The primary design objective of the channel is to re-establish the riparian buffer/corridor, aquatic habitat, fish passage abilities, and developing channel hydraulics capable of functioning as an adequate outlet. The proposed typical cross section and grade of the channel are shown in the attached preliminary plans and Section III.D. The design is intended to satisfy both hydraulic and environmental goals of the project. The lower 1.5 miles of this reach of the Grand Marais may only require minor work, but the establishment of a riparian buffer is proposed.

It is estimated that up to 400,000 Cubic Yards of excavation will be required as part of this project. All excavated materials will be strategically placed in upland areas, and no fill is proposed within wetland limits. These spoil placement areas are intended to be identified in the final plans.

Final channel alignment will generally follow the original pattern of the Grand Marais Creek, with the exception between stations 200+00 and 212+00. Realignment of the channel in this vicinity was required to eliminate an additional crossing at a private building site or driveway relocation. The channel realignment is primarily in an upland area. The original/existing channel alignment in this area will be maintained as a wetland with characteristics consistent with the adjacent ox bow areas. The proposed new channel alignment are shown in the attached preliminary plans. This change should not compromise the expected environmental integrity and value of the project, but should tend toward balanced interests and increased wetland area.

Setback levees are proposed to be constructed between approximate stations 80+00 and 136+00 to elevation 813.5 ft, and the levee section will be placed consistent with the required channel section. The Setback levee design elevation is based upon a 10-year water surface elevation with 2 ft. of freeboard or approximately a 50 Yr. design stage on the Grand Marais Creek. These setback levees are provided to contain high water events and will require land acquisition up to approximately an average of 400-500 ft. total corridor width. The width will vary depending on localized topography. Setback levees are proposed in areas where the landowners were not interested in the RIM program or desired to minimize the area restored to the channel floodplain. This situation includes very few locations relative to the total project length.

Grade Stabilization Structures

Two grade stabilization structures are planned to be constructed at approximate stations 4+00 and 8+00, or near the outlet of the Grand Marais Creek to the Red River. The original outlet location of the Grand Marais Creek at the Red River is exhibiting severe headcutting, and steep/unstable channel banks. These grade stabilization structures will be installed at the channel outlet to reduce the potential for future headcutting and channel bank failures. The structures will be designed to accommodate fish passage from the Red River up through the Grand Marais Creek. The design techniques and methods used to develop the grade stabilization structures will be coordinated with MnDNR Fisheries staff.

Road and Trail Crossings

Two major crossings along the restored Grand Marais Creek are required to carry the proposed flows. These crossings are located at Polk County Road 64 and at an Esther Township Road (130th St. NW). Bridge type crossings are proposed which are estimated at up to a 120 ft. total span bridge. Final geotechnical recommendations will likely dictate the overall length of the bridge more so than hydraulic requirements. The detailed design phase will dictate the appropriate crossing geometry. Polk County Highway Department and the Esther Twp. Board will be consulted during the development of the bridge plans.

Several private trail crossings exist along the existing channel restoration alignment. The intention in replacing trail crossings is to identify potentially unnecessary trail crossings, work with the landowners, and limit replacement to those that are necessary. Several of these are used for agriculture and recreational needs. The preliminary plan intends to furnish and install flat rail cars supported at grade and spanning the primary low flow channel. These crossings will be designed to be frequently overtopped; a condition which currently exists.

The project Schedule is included in this Report as an attachment. The tasks identified in the schedule will likely vary somewhat as the project development proceeds. However, the general construction schedule goals are expected to be consistent with the times displayed in the schedule.

D. Hydrologic/Hydraulic Analysis and Design

A hydrologic analysis was performed to determine the hydraulic needs of the outlet.

Table 1 provides a comparison of design peak flowrates used in the JOR Engineering, Inc. Report with flow estimates given in Red Lake Watershed District hydrologic model #5 of the Grand Marais subwatershed and estimates computed by regional regression equations of MnDOT, USGS and B. Johnson. **Figure 1** is a plot of these flow estimates on a log-normal probability graph. The Red Lake Watershed hydrologic model estimates are generally similar to the peak flows obtained using other methods and were used in the hydraulic analyses.

(See following page)

- Grand Marais Creek Outlet Restoration

Table 1: Design Peak Flow Rates

Recurrence Interval	JOR Engineering Engineers Report (1991)	RLWD HMS Model #5. GrMaraisCul vCikR6	MnDOT Regional Regression (1963)	USGS Regional Regression (1977)	USGS Regional Regression with 10% Storage (1997)	B. Johnson Regional Regression of Basin Characteristics (2005)
100-year (cfs)	5205	4488	3328	5135	5080	4534
50-year (cfs)		3905	2773	4274	4258	3690
25-year (cfs)	3860	2894	2218	3481	3465	
10-year (cfs)		2137		2544	2468	1943
5-year (cfs)	1750	1630		1868	1742	1293
2-year (cfs)		972		1006	834	538
1.25-year (cfs)		569				

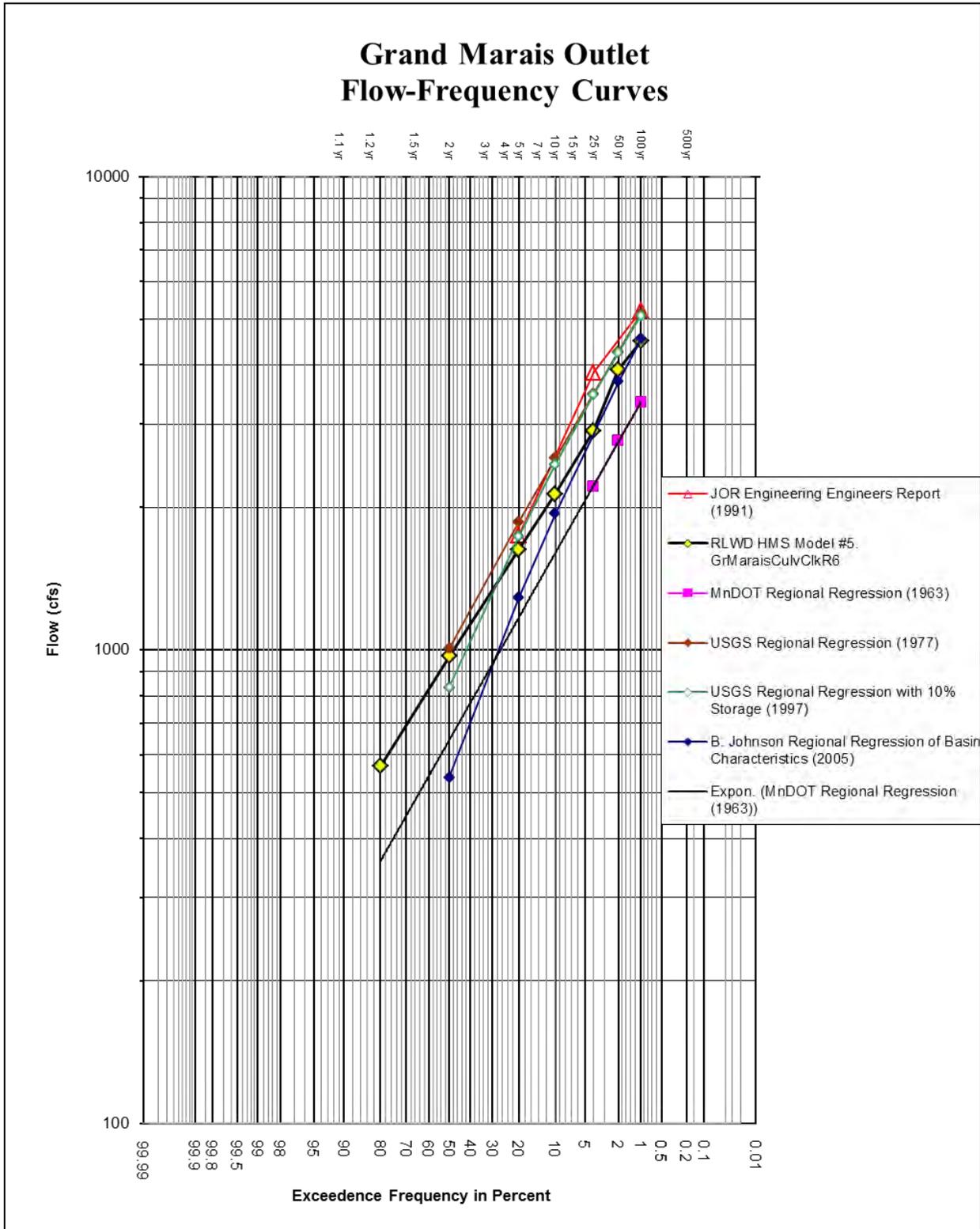


Figure 1: Flow-Frequency Plot, Grand Marais Outlet

- **Grand Marais Creek Outlet Restoration**

The drainage area of the Grand Marais at the Cutoff Ditch (Grand Marais outlet) is 301.8 square miles. When the original Grand Marais Channel is restored, the total drainage area at its outlet to the Red River will be the 301.8 square miles combined with the 11.5 square mile existing drainage area of the original channel and Middle-Snake-Tamarac Watershed Ditch 6, resulting in a total of 313.3 square miles (see **Table 2**).

Table 2: Summary of Drainage Areas

Location	Drainage Area (square miles)
Grand Marais at Cutoff Ditch	301.8
Local drainage area of original Grand Marais reach and Watershed Ditch 6	11.5
Total Drainage Area at original Grand Marais outlet to the Red River	313.3

The drainage area transfer method was used to estimate the design flow rates within the original Grand Marais reach below Watershed Ditch 6 based upon the design flow rates established for the Grand Marais at the Cutoff Ditch.

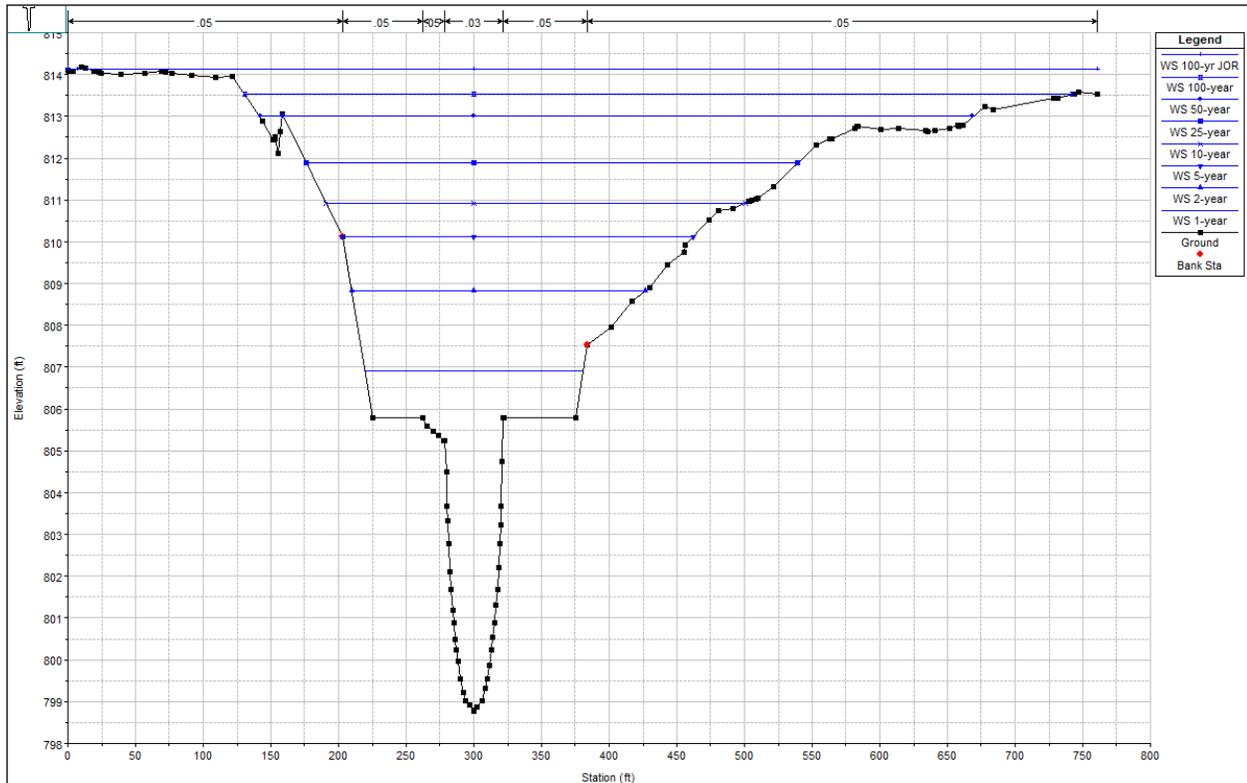
A hydraulics analysis was performed at the conclusion of the hydrologic work to determine hydraulic requirements of Alternative 2. The HEC-RAS hydraulic modeling software was used to analyze the proposed conditions. The proposed restoration of the original Grand Marais channel reach includes the following design features:

- Excavated channel from State Ditch near Station 310+00 to Station 70+00 within Watershed Ditch 6, i.e. a reach of about 24,000 feet, spot cleaning from about station 70+00 to Station 26+27,
- Channel design grade of 0.0001 to .00002 ft/ft (i.e. ½ to 1 foot per mile),
- Diversion structure weir spillway to direct flow away from the Cutoff Ditch to the restored Grand Marais channel (100 foot length of weir with crest elevation set to 809.75 feet).
- New road crossings simulated on County Road 64 (Station 201+78) and Esther Township Road near WD 6 (130th St. NW) (Station 138+13) as bridges.
- Five trail crossings at stations 297+08, 252+21, 153+66, 102+25, and 78+33. Each trail crossing is simulated as a 60-foot clear span bridge which will be provided by recycled rail flat cars.
- Total excavation volume is approximately 360,000 cubic yards
- Typical section of the excavated channel consists of the following (**Figure 2**)

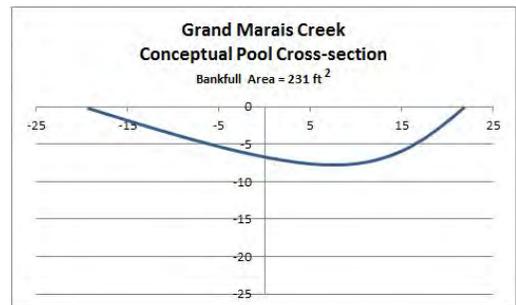
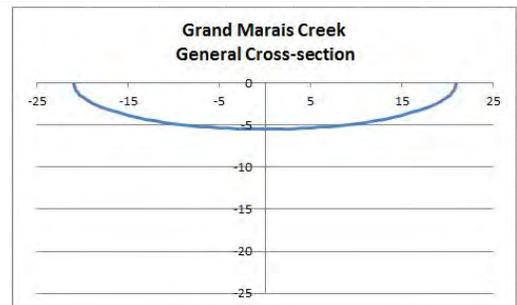
(See following page)

- Grand Marais Creek Outlet Restoration

Figure 2: Typical Section for Restored Original Grand Marais Channel



- Design channel restoration dimensions
 - Elliptical channel cross-section shape
 - Rosgen E6
 - Riffles
 - Bankfull width: 42 ft
 - Mean bankfull depth: 5.5 ft
 - Width: Depth ratio: 7.6
 - Floodprone area width: 400 ft
 - Entrenchment ratio: 9.5
 - Pools:
 - pools located within the downstream one-third of a meander bend
 - Maximum pool depth located a distance equal to one-third of the total pool bankfull width from the outside of the meander bend measured from the bankfull elevation point.



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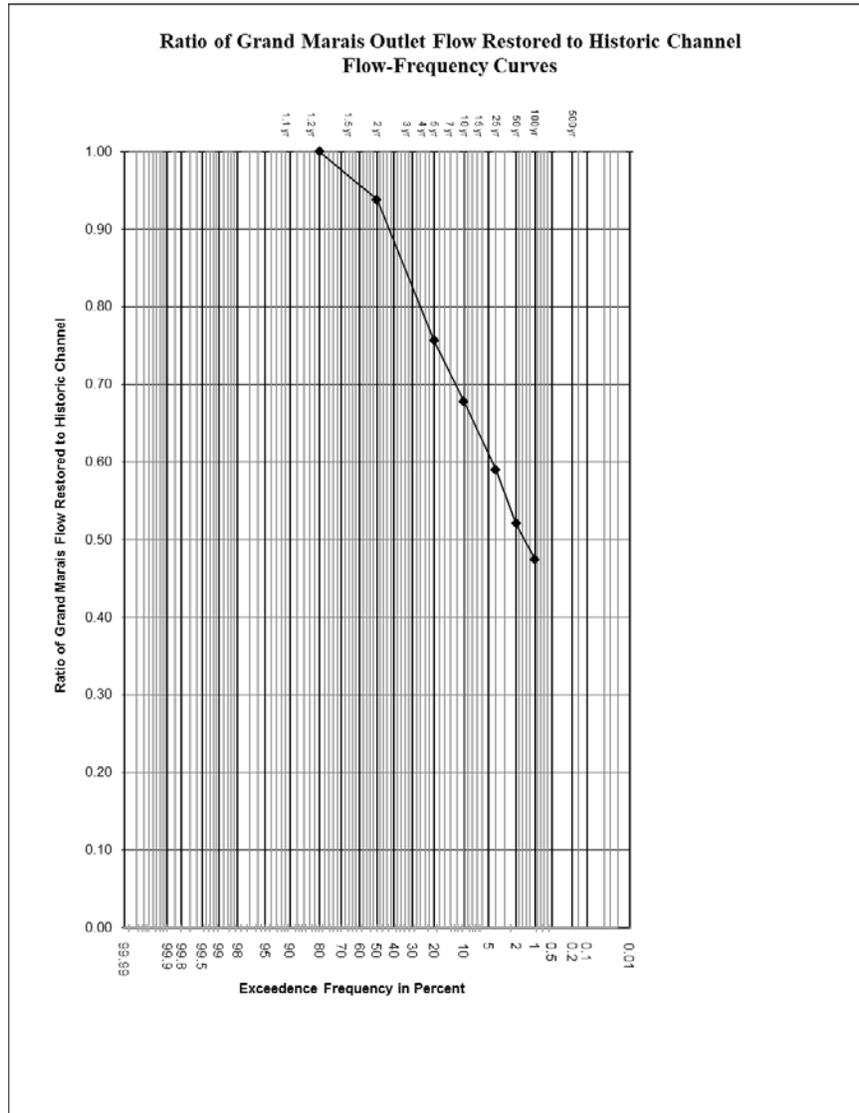
- Bankfull width: 45 ft
- Mean bankfull depth: 7 ft
- Channel pattern
 - Sinuosity: approx. 2
 - Radius of curvature: 100 to 130 ft
- Channel profile
 - Average Slope: 0.00015, but variable slope along the channel length

Table 4 shows the ratios of flow diverted to the restored channel to the total flow arriving at the diversion. The design channel restoration features have the effect of diverting all of the 1.25-year and 94% of the 2-year flood peak flows away from the Cutoff Ditch and into the restored channel reach. This information is presented graphically in **Figure 3**.

Table 4: Proposed Flows (cfs) at point of Diversion Structure and to Restored Grand Marais Channel

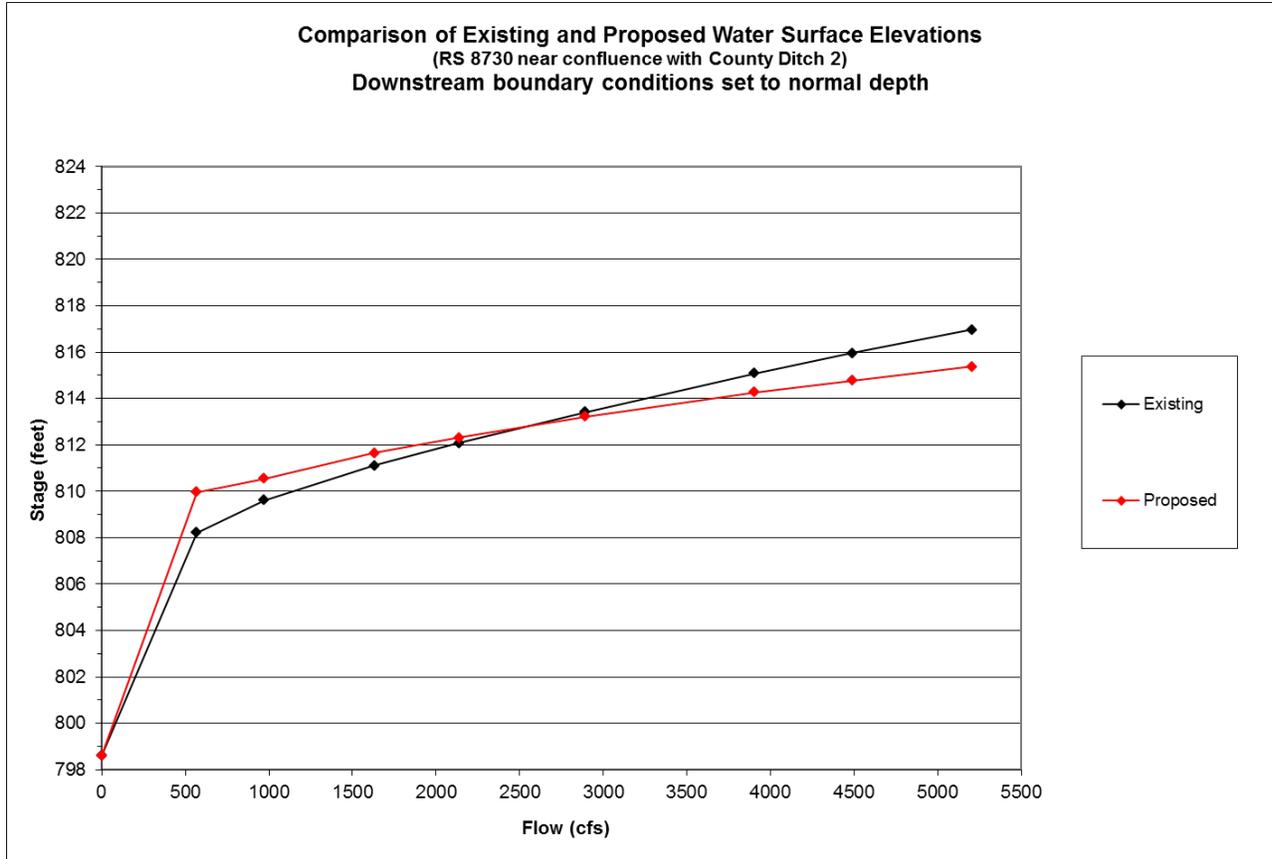
Recurrence Interval (yrs)	Total Flow to Diversion Structure	Flows to Restored Historic Channel	Ratio of Diverted Flows to Total Flows	Flows on Restored channel below WD 6
100	5205	2213	0.49	2328
50	3905	2031	0.52	2131
25	2894	1707	0.59	1781
10	2137	1448	0.68	1502
5	1630	1233	0.76	1274
2	972	911	0.94	936
1.25	569	569	1.00	583

Figure 3: Ratios of Grand Marais Outlet flow to Restored Historic Channel



The hydraulic model was used to simulate water surface elevations along the existing channels and the proposed restoration reach for a range of flood events ranging from the 1.25-year to 100-year recurrence intervals. Existing conditions water surface elevations at this range in flows were compared to proposed conditions water surface elevations at Station 87+30, near the confluence with County Ditch 2. **Figure 3** displays discharge rating curves in the Grand Marais near the confluence with County Ditch 2. These curves indicate that proposed conditions water surface elevations are very similar to the simulated existing conditions water surface elevations for the range in simulated events. For the 1.25-year through 10-year events, the stage is slightly higher under the proposed condition, and for the 25-year through 100-year events, the stage is slightly lower under the proposed condition. Note that in this scenario, the downstream boundary condition of the hydraulic model is set to a normal depth of 0.0002.

Figure 3: Comparison of Existing and Proposed Conditions Rating Curves (Normal Depth at Downstream Boundary Condition)



Figures 4 and 5 show the water surface profiles for existing conditions, as well as proposed conditions, with the downstream boundary condition set at normal depth in the HEC-RAS model. Stationing shown on the x-axis of these figures are not compatible. Reference is made to the limits shown at the top of the charts. Grand Marais Coulee 1 represents the segment of the Grand Marais channel upstream of the proposed diversion structure or the confluence of the original Grand Marais channel and the Cutoff Ditch. Grand Marais Coulee 2 represents the Cutoff Ditch, and the New Grand Marais Channel represents the restored historic Grand Marais channel.

(See following page)

Figure 4: Existing Water Surface Elevations in Grand Marais and Cutoff Ditch (Normal Depth as Downstream Boundary Condition)

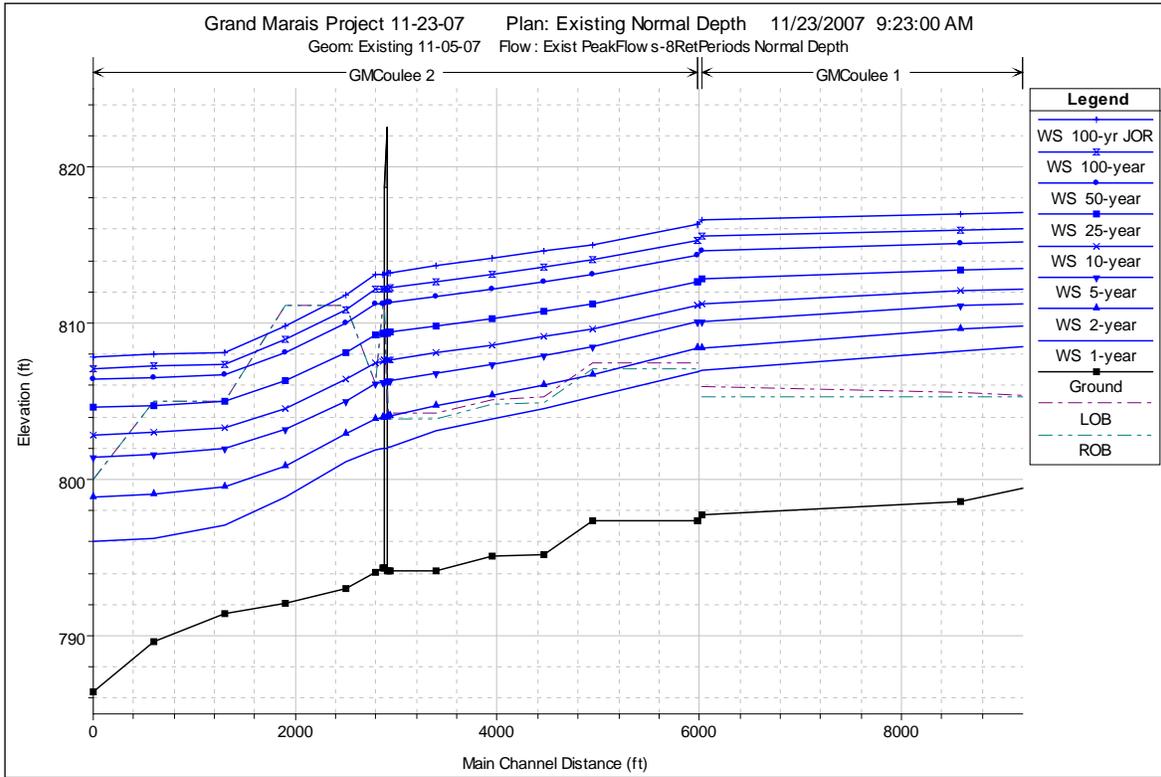
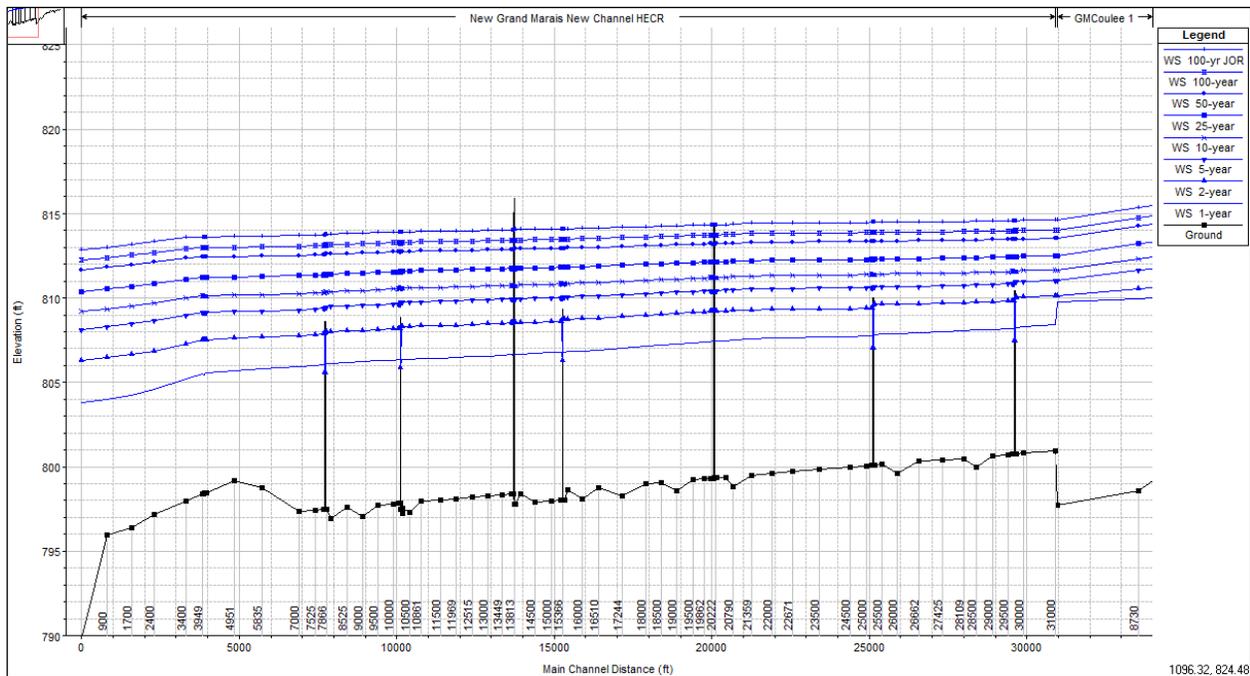


Figure 5: Proposed Water Surface Elevations in Grand Marais and Restored Grand Marais Channel (Normal Depth as Downstream Boundary Condition)



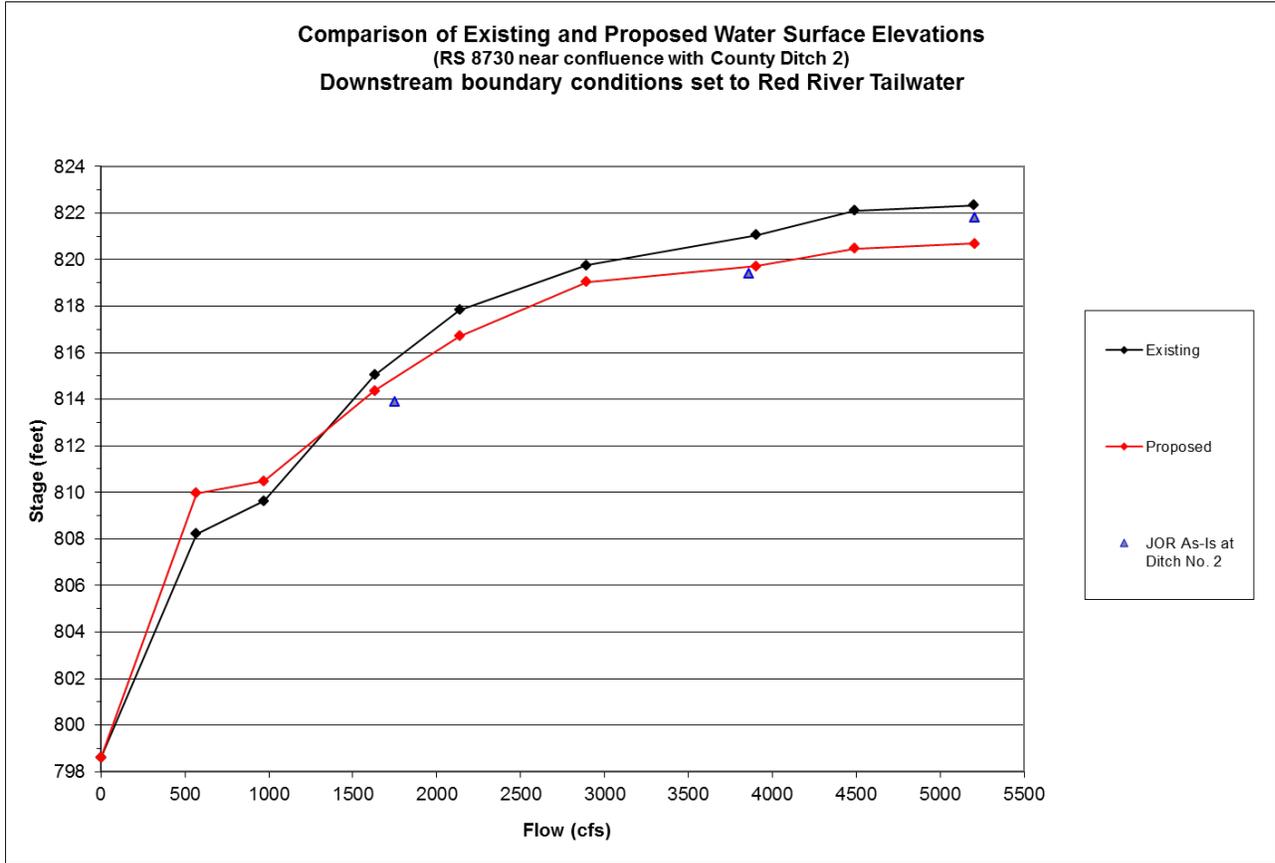
- **Grand Marais Creek Outlet Restoration**

A model simulation was also carried out for the scenario setting the downstream boundary condition at the Red River tailwater (i.e. the water surface elevation predicted by the Corps of Engineers for the corresponding flood event). The Red River water surface elevations are shown in Table 3. **Figure 6** displays discharge rating curves in the Grand Marais near the confluence with County Ditch 2 (just upstream of the proposed diversion structure and Cutoff Ditch) for the scenario setting the downstream boundary condition at the Red River tailwater (i.e. the water surface elevation predicted by the Corps of Engineers for the corresponding flood event). These curves indicate that proposed conditions water surface elevations are very similar to the simulated existing conditions water surface elevations for the range in simulated events. For the 1.25-year through 2-year events, the stage is slightly higher under the proposed condition, and for the 5-year through 100-year events, the stage is slightly lower under the proposed condition. The JOR data points shown simply verify that the repeatability of the rating curve data compiled in this report is consistent with past work.

Table 3: Red River Elevations used as Boundary Conditions

Recurrence Interval (yrs)	Cutoff Ditch	Restored Historic Channel
1-year	794.9	790.02
2-year	803.85	804.65
5-year	814.53	813.53
10-year	817.5	816.11
25-year	819.35	818.46
50-year	820.48	818.87
100-year	821.47	819.73

Figure 6: Rating Curves in Marais Ditch Existing and Proposed Conditions with Red River Tailwater.



Figures 7 and 8 show the water surface profiles for existing conditions, as well as proposed conditions, with the downstream boundary condition set to the Red River tailwater in the HEC-RAS model.

(See following page)

• Grand Marais Creek Outlet Restoration

Figure 7: Existing Water Surface Elevations in Grand Marais Channel and Cutoff Ditch with Effects of the Red River Tailwater

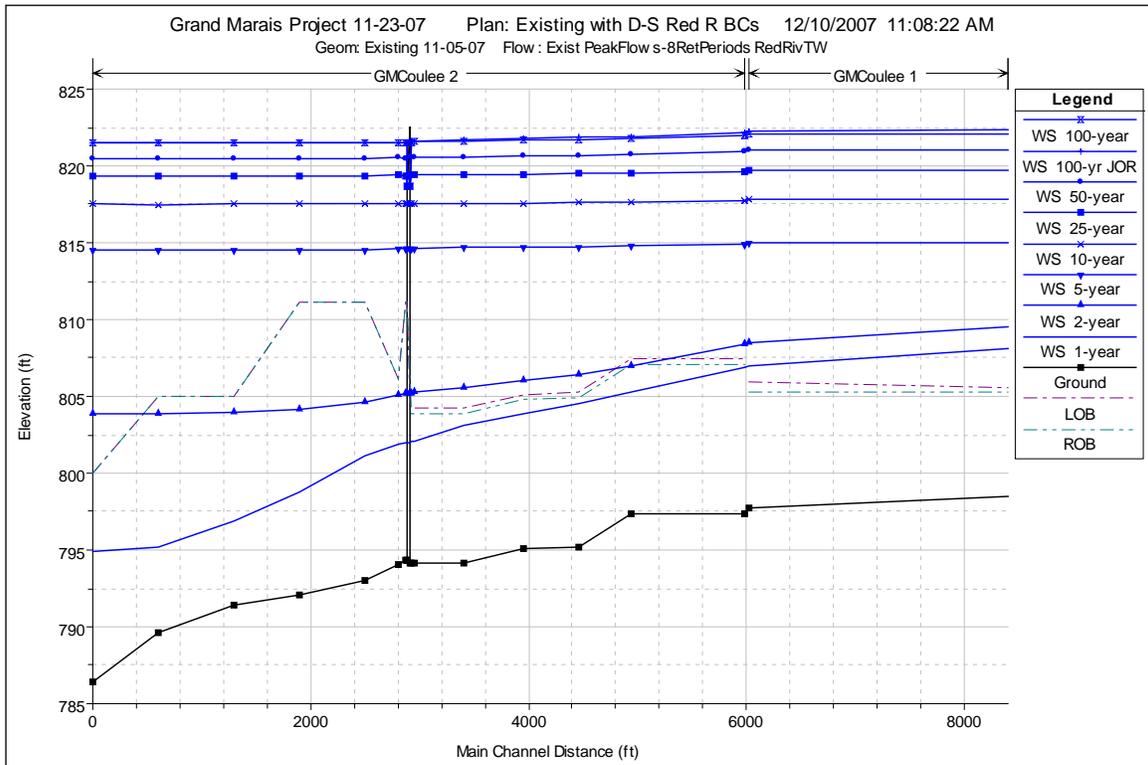
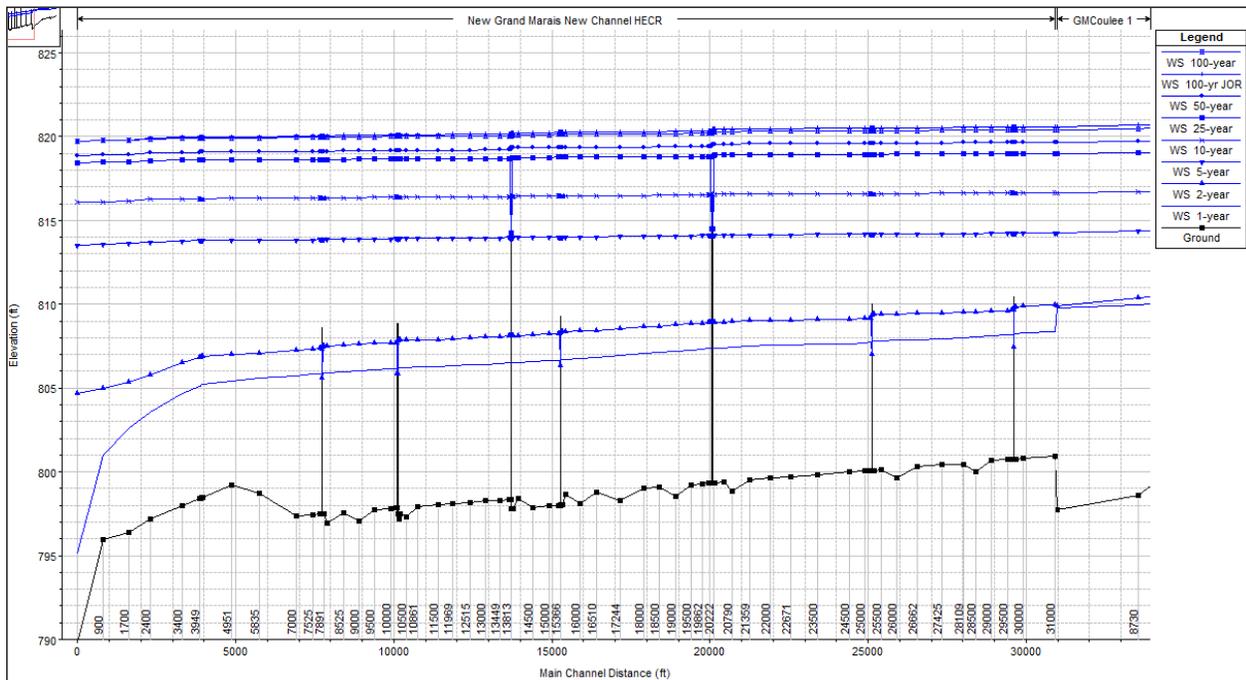


Figure 8: Proposed Water Surface Elevations in Grand Marais and Restored Grand Marais Channels with Affects of the Red River Tailwater



- **Grand Marais Creek Outlet Restoration**

Figure 8 shows that when the Red River floods in excess of a 5-year event, its elevation will create significant backwater effects on the Grand Marais channel, resulting in similar water surface elevations in both the pre- and post-project conditions all along the restored channel. The project has no effect of the frequency of Red River flooding.

Figures 7 and 8 indicate that Red River Floods in excess of a 5 yr event will likely create significant backwater effects on the Grand Marais which nearly eliminates the project impacts to the adjacent lands.

Converging Red River and Grand Marais Creek flood events at the outlet of the original Grand Marais channel may create slightly higher stages along the original Grand Marais channel just upstream of the outlet. A subwatershed divide, within Section 15 Esther Township, has been identified as a concern by the Middle Snake Tamarac Rivers Watershed District which has historically allowed Red River flood waters to overtop and flow north cross country through an existing coulee system where it eventually may re enter the Red River near the outlet of MST Watershed Ditch 5. The overtopping frequency at this divide by Red River flood events are estimated to occur at a approximately a 4 year frequency, or at a stage between 811 and 812 ft. Introducing flood events along the Grand Marais coincidental with the 4 year stage of the Red River may create slight stage increases near this divide. The table below displays the estimated stages and frequencies of these coincidental events for existing and proposed conditions near station 76+00 along the original Grand Marais channel:

Approximate Stage-Frequency for Coincidental Flood Events – Red River at 4 yr. stage		
Coincidental Flood Frequency With Grand Marais	Existing Stage	Proposed Stage (where get these numbers?)
1	812.0	812.0
2	812.0	812.0
5	812.0	812.0
10	812.0	812.0
25	812.0	812.1
50	812.0	812.2
100	812.0	812.4

Hydrologic and Hydraulic data used to prepare the stage-frequency relationships in the above Table were developed from the January 2003, "Regional Red River Flood Assessment Report", prepared by the US Army Corps of Engineers. Stage, frequency, and discharge data developed from this document were coordinated with Hydrologic data developed from the Grand Marais model. The data sets were

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combined, and the resulting stages developed from the combined runoff events, using the Red River rating curve data as the reference for the site, allowed for the estimated impacts to stage increases at this site as influenced by coincidental flood events from the Red River and the Grand Marais Creek.

The coincidental events from the Red River and the Grand Marais Creek were assumed as independent occurrences for analysis and estimating purposes. The error in viewing these events as independent are somewhat reduced due to the significant difference in basin size between the Red River and the Grand Marais Creek.

The 100 yr. event approximates the coincidental occurrence of the 4 yr flood on the Red River and the 25 yr flood on the Grand Marais. Stage increases appear to be minimal and likely infrequent for stage increase occurrences, contingent on the channels remaining open and maintaining the ability to convey flows. In addition, the 5 yr flood stage on the Red River at this location, independent of flow contributions of the Grand Marais, appears to significantly surpass the 100 yr event exhibited on the flood impacts estimated by the 4 yr event on the Red River and a coincidental 25 yr flood event on the Grand Marais Creek.

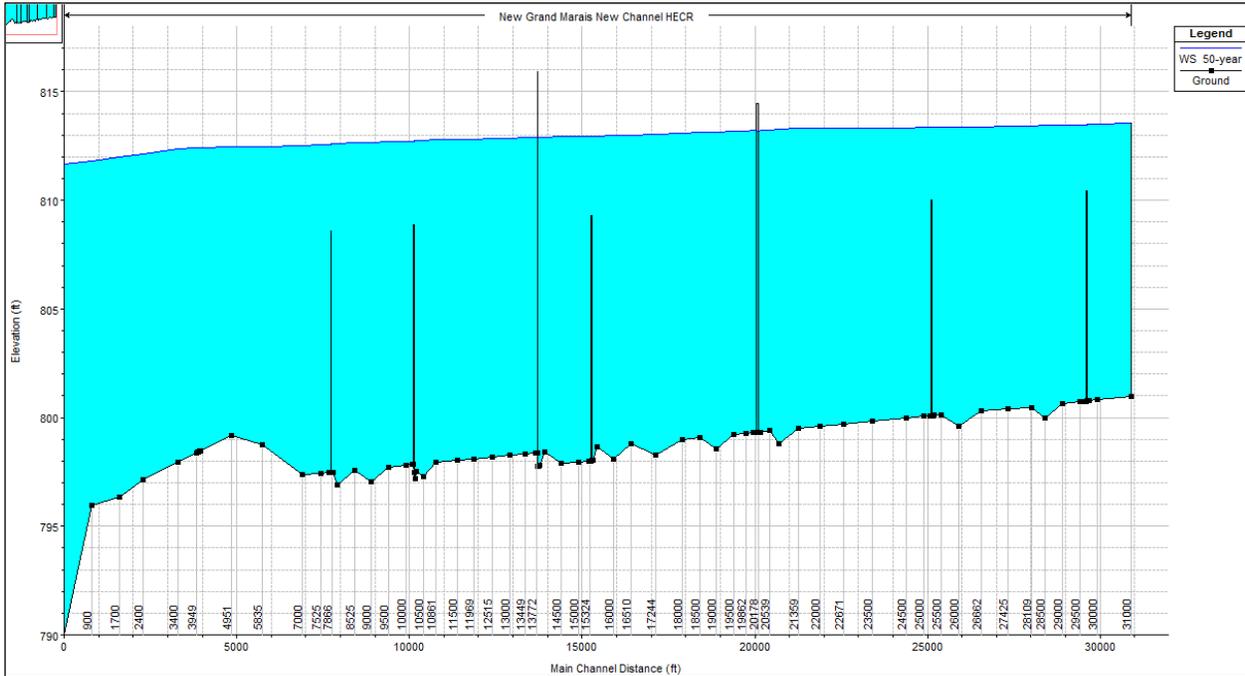
The stages and frequencies presented are approximate and based on limited field survey and lidar data, and the conclusions are intended to provide a scope and magnitude of possible effects. The primary conclusions presented from the preliminary hydraulic work indicate that the Red River has significantly greater flooding impacts on the adjacent farm land near the outlet than does the Grand Marais Creek, relative to both stage and frequency. In addition, the stage increases presented by restoring flows to the Grand Marais appear minor and infrequent. Considering the above, these effects appear reasonably practical to mitigate through various design measures (i.e. diversion structure design, flowage easements, levee elevation limits along channel, constriction culverts at the diversion, possible weir adjustments, etc.). It appears that the project will not create significant changes to the coulee system and lands within and north of Section 15, Esther Township.

Land Acquisition

Land is intended to be purchased and secured by easement up to elevation 813.5. Figure 9 shows that the 50-year water surface elevation for flows on the Grand Marais remain at or under 813.5 all along the restored Grand Marais channel. However, the Red River 50-year and 100-year flood levels (see Table 3) would cause stages in the Grand Marais to be much higher.

(See following page)

Figure 9: Proposed Water Surface Elevations along Restored Grand Marais Channel



Impacts to Jim Lambert Property

The residence of Jim Lambert is shown in Figure 10. Table 8 and Figure 11 show the difference in estimated water surface elevation between the existing conditions and proposed conditions (restored Grand Marais channel downstream of cutoff ditch) under the scenario with downstream boundary conditions in the hydraulic model set to a normal depth with an energy grade of 0.0002. For the 1.25-year through 10-year events, the stage is slightly higher under the proposed condition. For the 25-year event, the stage is equal to the stage in the existing conditions, and for the 50-year through 100-year events, the stage is slightly lower under the proposed condition.

Figure 10: Location of Jim Lambert Property along the Grand Marais Channel

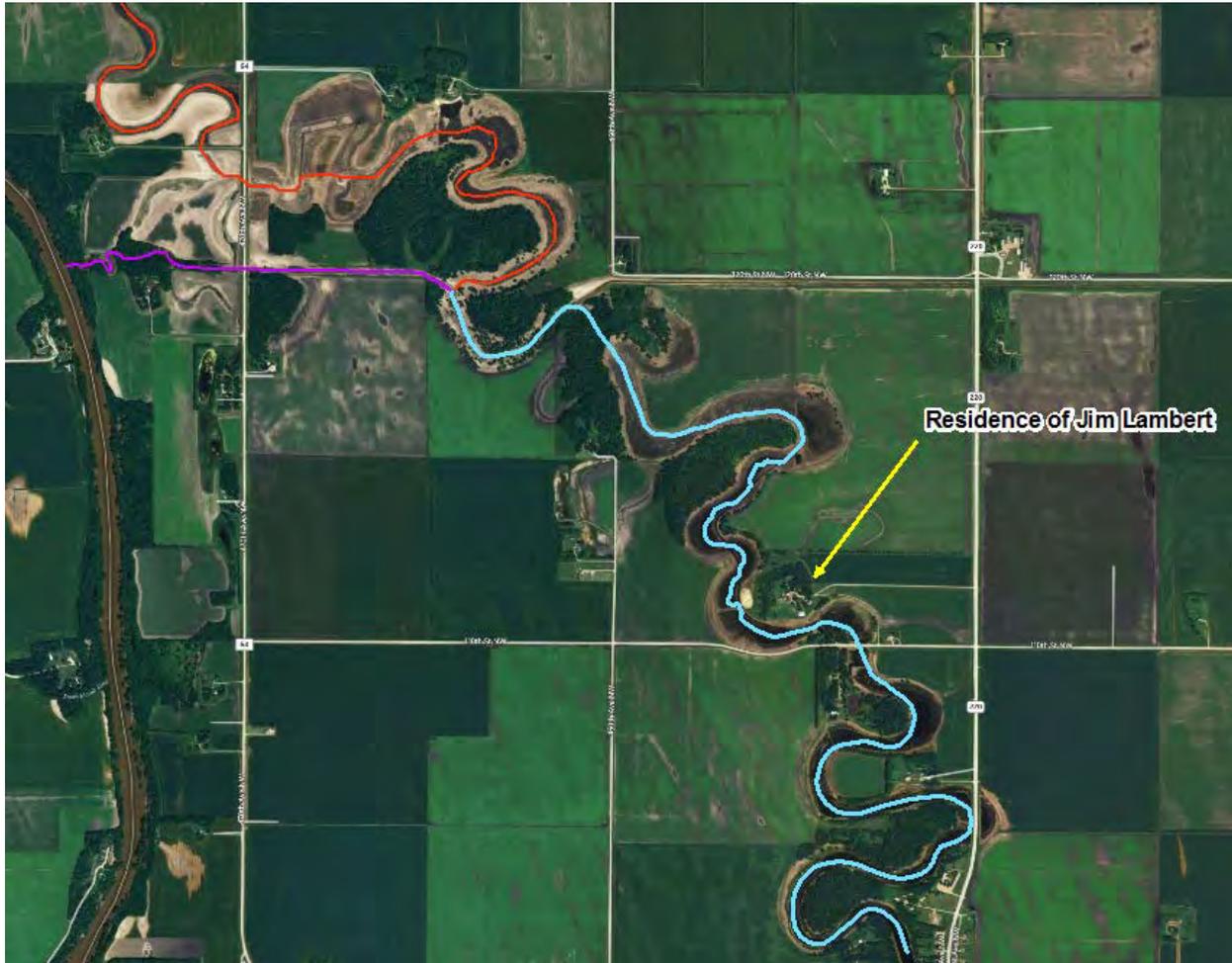


Table 8: Predicted Water Surface Elevations in the Grand Marais Channel near the Lambert Residence (Normal Depth used as Boundary Conditions)

Recurrence Interval (yrs)	Existing Conditions	Proposed Conditions
1.25-year	809.70	810.46
2-year	810.94	811.36
5-year	812.40	812.68
10-year	813.32	813.50
25-year	814.56	814.56
50-year	816.08	815.78
100-year	816.89	816.40

Figure 11: Comparison of Existing and Proposed Conditions Rating Curves at Jim Lambert Property (Normal Depth at Downstream Boundary Condition)

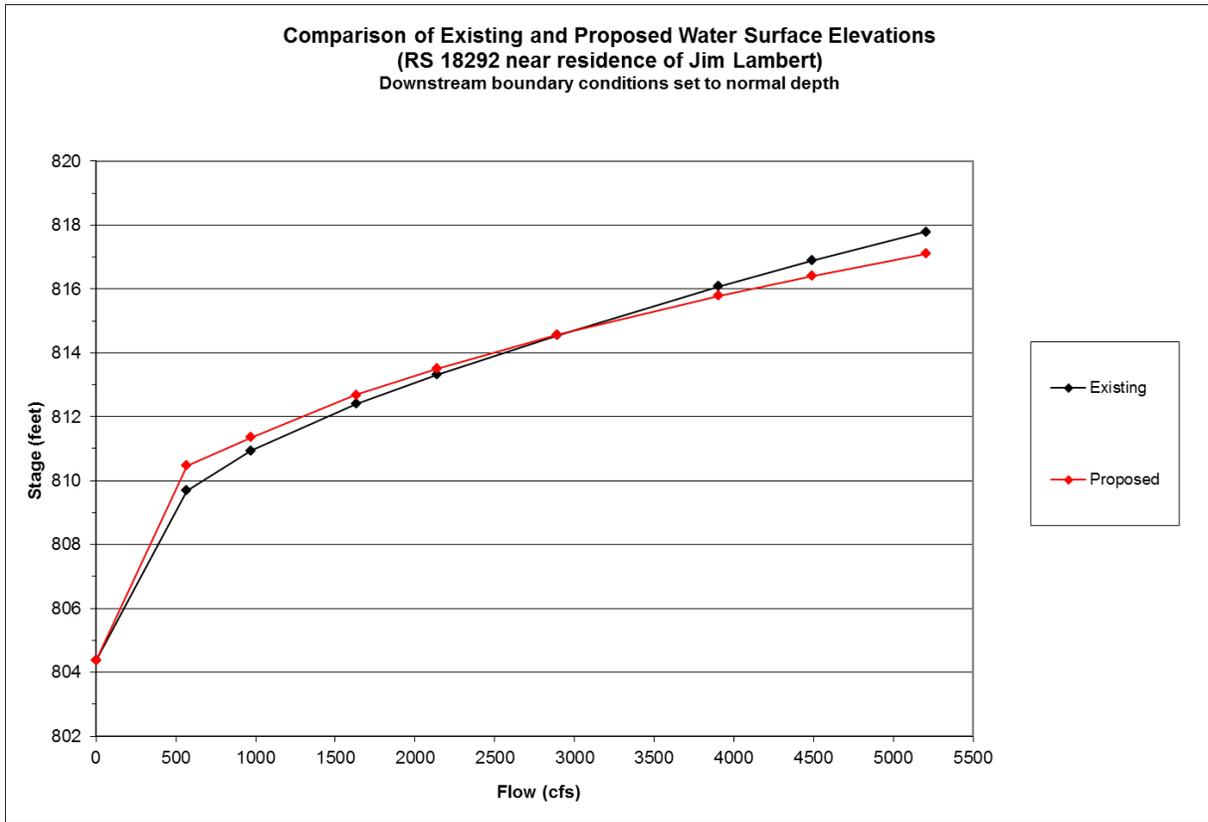
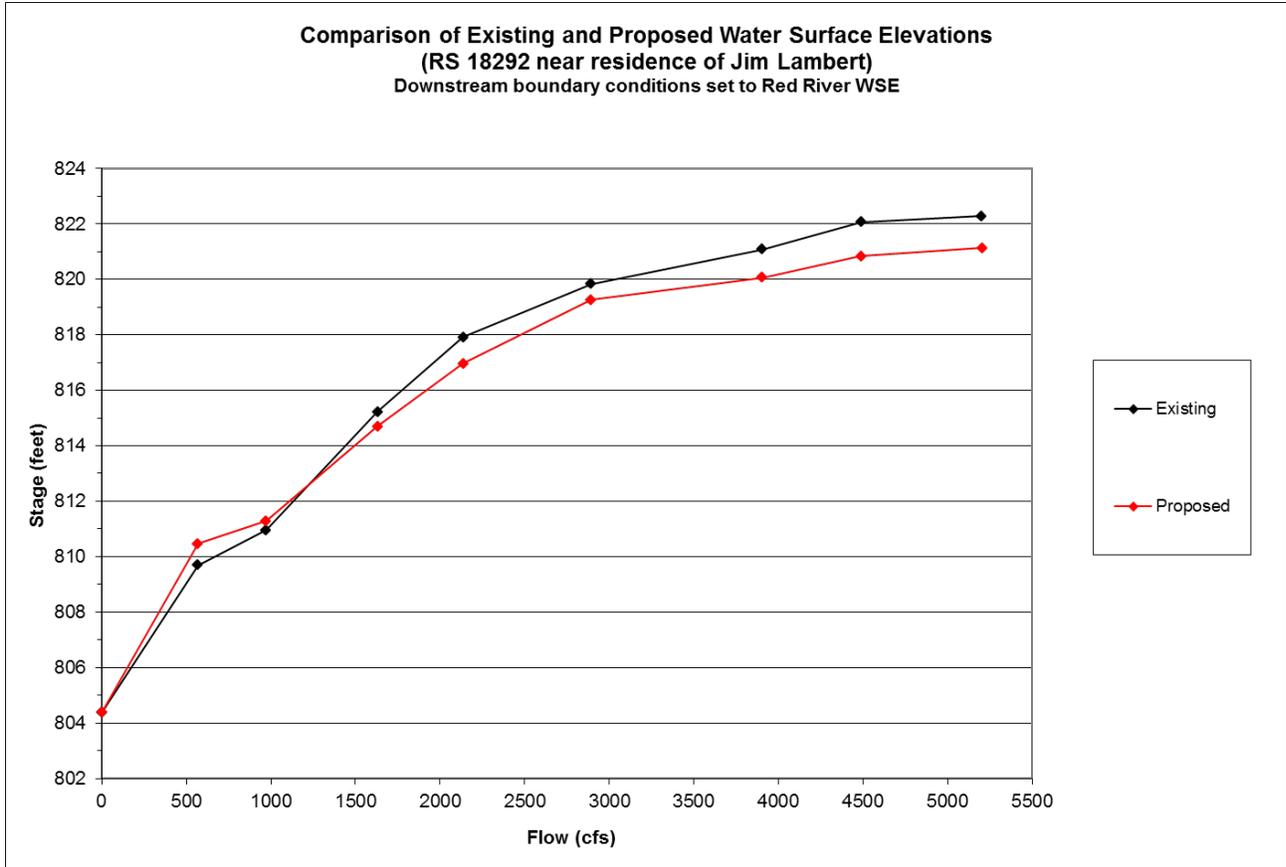


Table 9 and Figure 12 show the difference in estimated water surface elevation between the existing conditions and proposed conditions (restored Grand Marais channel downstream of cutoff ditch) under the scenario with downstream boundary conditions in the hydraulic model set to Red River water surface elevations for matching storm events. For the 1.25-year through 2-year events, the stage is slightly higher under the proposed condition, and for the 5-year through 100-year events, the stage is lower under the proposed condition.

Table 9: Predicted Water Surface Elevations in the Grand Marais Channel near the Lambert Residence (Red River Elevations used as Boundary Conditions)

Recurrence Interval (yrs)	Existing Conditions	Proposed Conditions
1.25-year	809.70	810.46
2-year	810.95	811.28
5-year	815.22	814.69
10-year	817.91	816.96
25-year	819.83	819.25
50-year	821.08	820.06
100-year	822.07	820.83

Figure 12: Comparison of Existing and Proposed Conditions Rating Curves at Jim Lambert Property (Red River Water Surface Elevations at Downstream Boundary Condition)



The following are critical elevations as indicated in previous public meetings:

- a. Top of the Lambert property ring dike is 823.36
- b. Main floor of house is 822.57
- c. Top of the window well on the house is 821.41
- d. Natural ground NE of house is 820.91
- e. Basement floor is 814.63
- f. Invert of drain tile is approximately 812.63

It is apparent that the elevations referenced which are below 814.56 would likely experience a reduction in water surface elevation as a result of the project, which includes from the basement floor elevation and above. However, it is likely that the invert elevation of the drain tile could experience an increase in water surface elevation more frequently. Under existing conditions, it appears the invert elevation could be reached at slightly over a 5 year runoff event, and upon completion of the restoration project it appears that this condition would exist at slightly under a 5 year event. The differences are approximately within 0.2 ft. or slightly under 3". This condition exists primarily when the Red River is low. The condition could be somewhat improved when the Red River is high, and could potentially reduce the

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frequency of water levels reaching the invert of the drain tile as a result of the project. The hydraulic and hydrologic results developed from these models should be used as guidance in providing direction and basis for final design decisions. Physical channel characteristics which exist during the various runoff events will likely differ for each event, which would likely result in varying stages for similar runoff events. Based on the values and conditions being considered at the Lambert site, it is apparent that the tile and basement floor may be an issue which could be addressed as the final design details are developed.

Summary

The hydraulics/hydrology analysis supports the goals of Alternative 2 as follows:

- 94% of flows up to a 2-year flood can be diverted
- Water surface elevations upstream of the Cutoff Ditch and diversion structure are similar to existing conditions for the range of flows from 1-year to 100-year recurrence interval.
- 0.00015 grade appears to reflect the estimated original profile grade of the Grand Marais channel.
- Existing and proposed flood elevations upstream of the Cutoff Ditch are similar for conditions with and without Red River floods.
- The Red River is the primary source of flood frequency and stage within the Grand Marais Creek restoration limits. This understanding is supported through discussions with local landowners and individuals familiar with the area, and through the hydraulic and hydrologic models applied to this project.
- Land is intended to be purchased and secured by easement up to elevation 813.5. The 50-year water surface elevations along the restored Grand Marais channel remain at or below this elevation.

ENVIRONMENTAL CONSIDERATIONS

V. Environmental Considerations

A mandatory Environmental Assessment Worksheet has been prepared in accordance with MN Rules EQB 4410.4800 subp.'s 26 and 27 to address the potential environmental impacts of the project. The EAW process was completed in 2009 with a concluding Finding of Fact and Record of Decision which determined and stated a negative EIS declaration. The EAW and Findings of Fact Documents are provided as an attachment to this report for reference.

The proposed project emphasizes Natural Resources Enhancement benefits and reduction in erosion and resulting downstream sedimentation. There are secondary and indirect flood control or drainage improvements. Considering this concept as the primary basis of the project, environmental funding is the primary source for this project. Design concepts will focus on primarily satisfying environmental interests and striving toward a balance with the social and economic impacts the project may introduce. Permitting a project directed toward addressing environmental deficiencies is expected to present limited conflicts with permitting agencies, and therefore environmental processing is expected to be predictable and efficient.

The Project Work Team process has allowed preliminary insight on the proposed project concepts, and there appears to be no social, economic, or environmental "Red Flags" apparent at this point.

Wetland impacts have been determined and quantified. The joint notification form has been completed and circulated to the respective agencies.

Cultural Resources work will likely be required in various areas of the project excavation limits. Coordination of archaeological reviews and satisfaction of clearance requirements will be properly conducted as part of the project development work. This requirement will also be referenced in various other permit documents.

Social impacts have not been apparent but various comments made at previous public informational meetings and recorded in the minutes have indicated concerns of a few landowners regarding the modifications being made to existing drainage patterns. The concerns are located both upstream of the diversion structure and downstream along the restored channel. The project goals have been clearly stated that the proposed changes in drainage are to not increase upstream flood stages at critical levels and not flood farmland downstream without containment and compensation. Various measures have been taken, as mentioned in previous sections of this report, to successfully address these concerns. The hydraulics and hydrology work conducted have indicated that these goals can be attained by applying the measures identified in this report.

The preliminary assessment of the project impacts appear to conclude that the social, economic, and environmental effects may be mitigated in a satisfactory manner.

OPINION OF PROBABLE COSTS,
FUNDING AND BENEFITS

VI. Opinion of Probable Costs, Funding and Benefits

Project costs and lack of funding resources were historically the primary reasons the Grand Marais Creek Restoration Project had not progressed beyond the study phase. A local distribution of project costs was historically resisted by the prospective benefitted landowners in the Grand Marais Creek subwatershed. Local agricultural benefits were perceived as limited, and therefore non local funding was required to achieve the Natural Resource Benefits desired.

Based on the preliminary design and the project features presented in prior sections of this report, the preliminary opinion of probable project costs are as follows:

Project Element	Preliminary Opinion of Probable Costs
Total Construction Contracts	\$3,970,000
Diversion Structure	\$800,000
Channel Excavation/Restoration	\$1,670,000
Public/Private Channel Crossings	\$1,100,000
Grade Stabilization Structures	\$400,000
Flowage Easements¹	\$600,000
Engineering, Legal, and Administration	\$800,000
Total Project Preliminary Opinion of Probable Cost =	\$5,370,000

Funding resource options have been a significant issue regarding the successful development of this project. Due to the nature of the work, drainage benefits introduced by the proposed project are secondary. Project assessments to local landowners based on drainage benefits would be unreasonable and impractical. Project costs would likely be distributed over a very small area with negligible direct benefit.

If costs were to be assessed throughout the entire Grand Marais Subwatershed, the cost per landowner would be reduced, but the project costs and complications to determine the benefits of this primarily natural resource enhancement project would be very difficult. The political challenges and reasonable justification of assessing lands so far displaced from the outlet without major direct drainage benefits would also be difficult.

Funding this project locally has not been received well by the local units of government and local taxpayers, as discussed at the Project Team meetings and at the public informational meetings. Therefore, it was determined that if local funds

- **Grand Marais Creek Outlet Restoration**

would be the primary source of funding, the project would have a difficult time being perceived locally as favorable, and would likely not proceed beyond the study phase.

Therefore, the Project Team, the Joint Powers Board and the Red Lake Watershed District aggressively pursued non local funding sources directed to restore and enhance our local and statewide natural resources. Through several years of efforts, the project funding concerns have been resolved. The following fund sources and amounts are listed below:

Funding Source	Approximate Funds Provided
Lessard Sams Outdoor Heritage Council	\$2,320,000
Flood Damage Reduction (MnDNR)	\$1,341,000
Red River Water Management Board	\$1,300,000
Red Lake Watershed District / Other	\$150,000
BWSR - RIM	\$530,100
Working Lands Initiative	\$132,000
US Fish and Wildlife Service	\$150,300
Total Approximate Project Funds Provided =	\$5,900,000

These funds have generally been approved for use and the project is proceeding with the understanding these funds are available to apply to the project.

Based on the above Preliminary Opinion of Probable Project Costs and the Project Budget Funding Sources and Amounts, the project funding is in place to proceed with final plans and construction. The funding sources show that no direct local project assessments will be applied to landowners, Polk County, or Esther Township taxpayers. The project funding identified is primarily intended for natural resource enhancement projects with drainage benefits being secondary.

CONCLUSION

VII. Conclusion

This Engineers Plan Report provides the information necessary to display and support the favorable feasibility and need for the proposed project.

The Grand Marais Creek Restoration Project is primarily a natural resources enhancement project with limited direct drainage benefits. The project is identified in the current Watershed Management Plan and is the final component of the Project 60 Grand Marais Subwatershed work.

At the conclusion of presenting this report at the public hearing, the Board will consider the findings in the report and the input from the public hearing to determine whether the project promotes the public interest and welfare and is practicable and in conformity with the Watershed Management Plan. If, after the hearing, the managers determine the proposed project is favorable, conducive to public health, promotes the public interest and welfare, is practicable and in conformity with the watershed management plan of the district, the managers may adopt a final resolution approving the project, and proceed with the project in accordance with the appropriate section of MnStatute 103D. If the project is determined as unfavorable, the managers may dismiss the project proceedings or refer back to the Engineer for further study and report.

APPENDIX A
Preliminary Plans

RED LAKE WATERSHED DISTRICT

PRELIMINARY PLAN

FOR

GRAND MARAIS CREEK CHANNEL RESTORATION

RED LAKE WATERSHED DISTRICT PROJECT NO. 60F

ESTHER TOWNSHIP, POLK COUNTY, MINNESOTA

JULY, 2012

SHEET INDEX

- 1 COVER SHEET
- 2 LOCATION MAP
- 3 DETAILS
- 4-6 PLAN AND PROFILE -- HISTORIC CHANNEL

PRELIMINARY

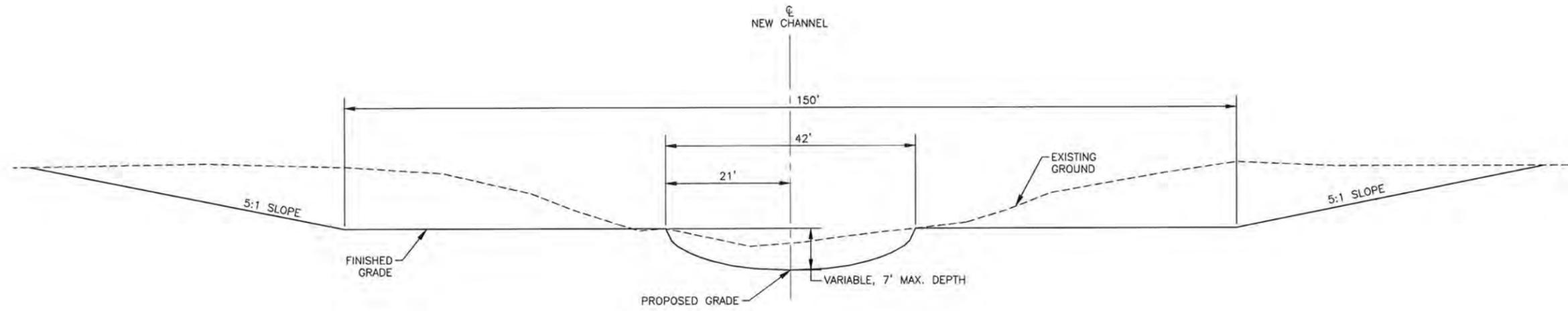
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature: *William J. Langan* Date: 07/19/2012
Printed Name: William J. Langan License #: 52806

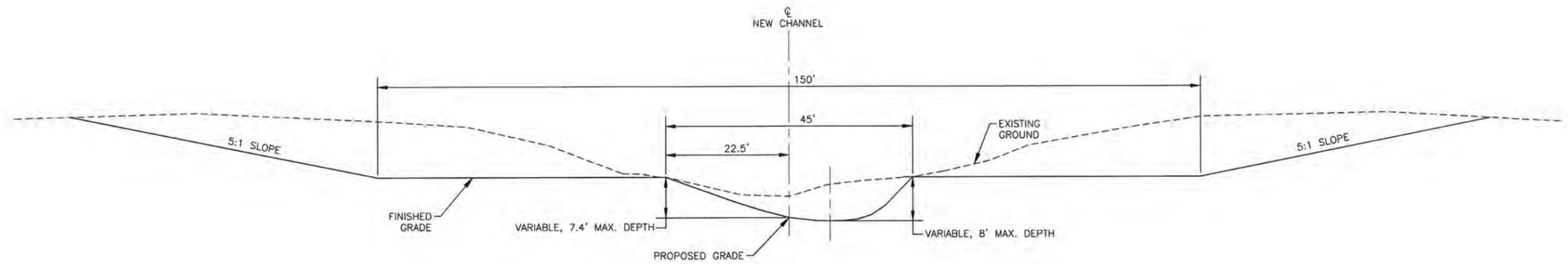
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature: *Brent H. Johnson* Date: 7-19-2012
Printed Name: Brent H. Johnson License #: 20378





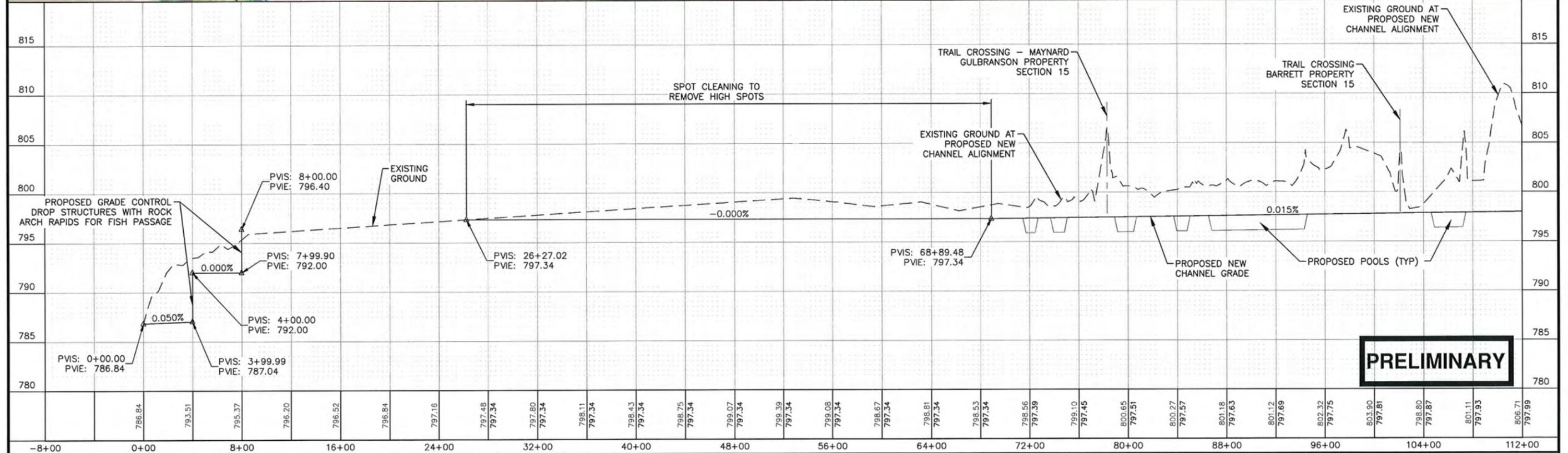
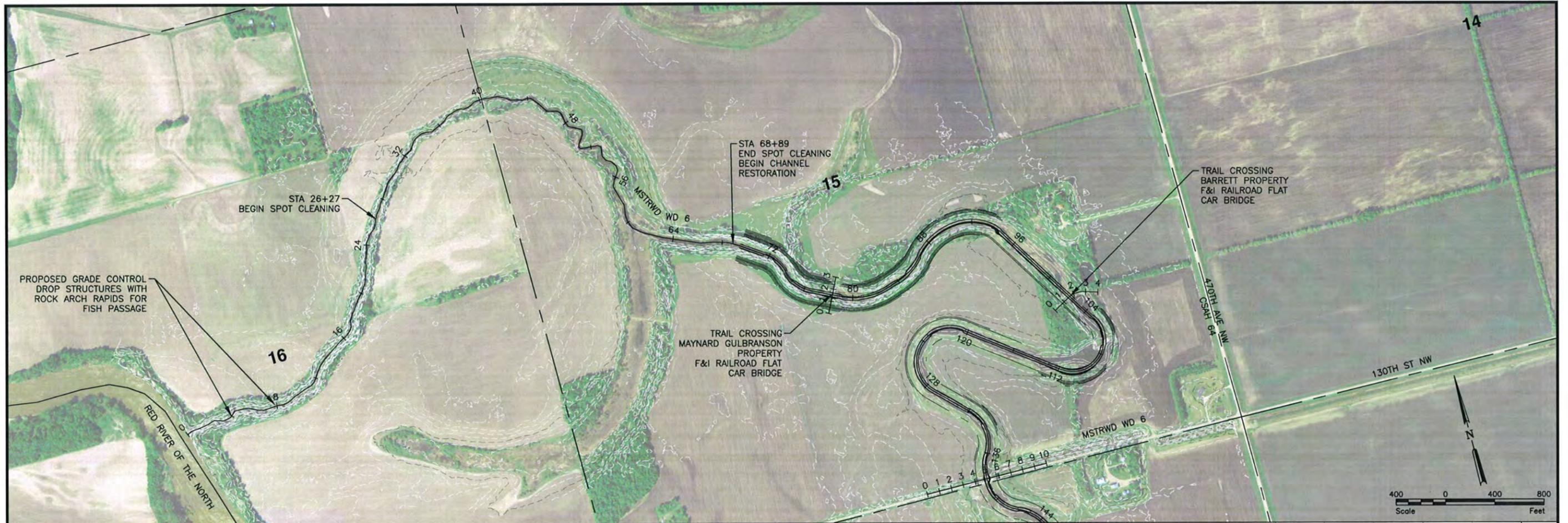
RIFFLE SECTION



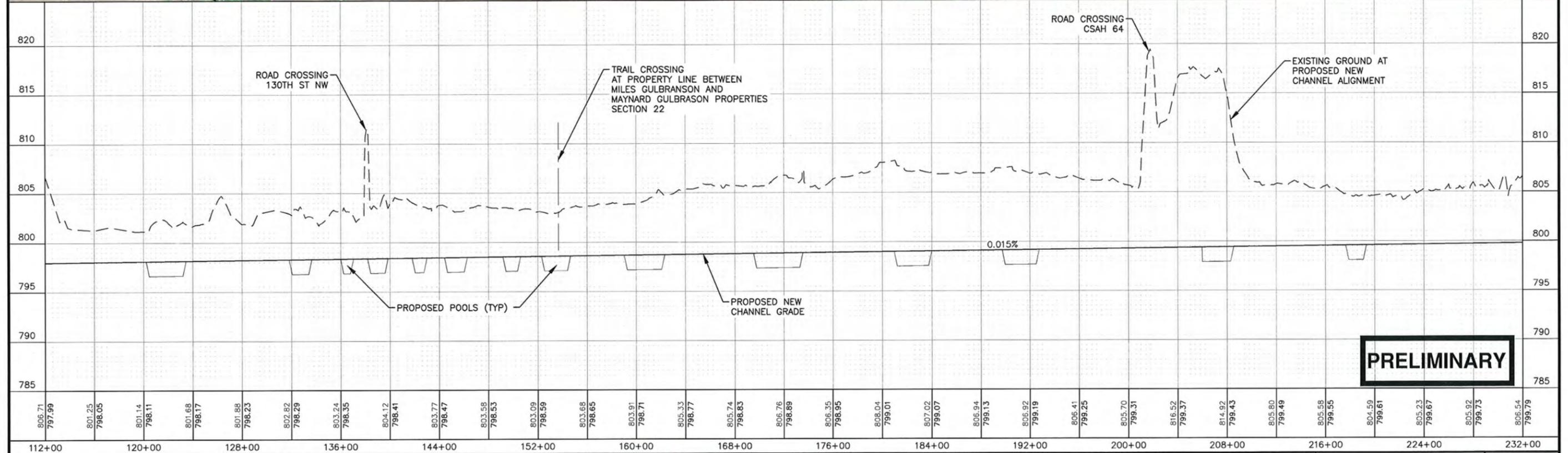
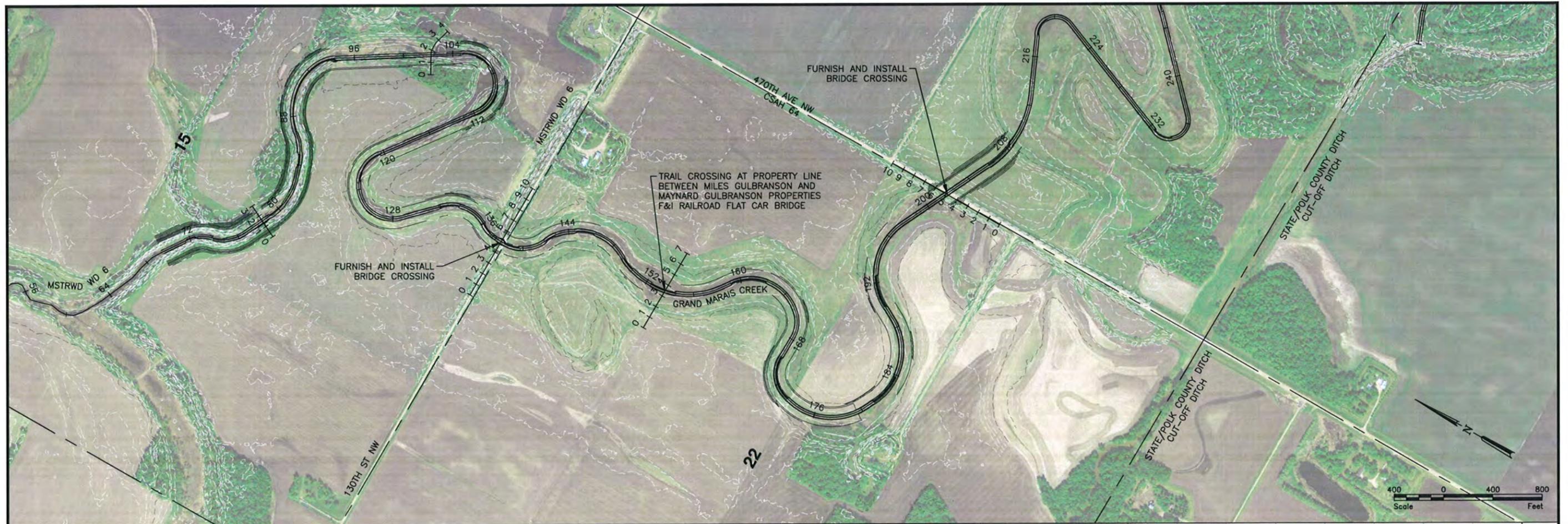
POOL SECTION

PRELIMINARY

No.	Revision	Date	By	I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota. Signature: <i>Brent H. Johnson</i> Date: 7-19-2012 Printed Name: Brent H. Johnson License #: 20378		Thief River Falls P: 218.681.2951 F: 218.681.2987	Drawn by DJL Checked by BHJ Date 7-19-12 Scale AS SHOWN	GRAND MARAIS CREEK CHANNEL RESTORATION RED LAKE WATERSHED DISTRICT PROJECT NO. 60F SECTIONS NO. 15, 16, 22, 23, AND 26; T153N; R50W ESTHER TOWNSHIP, POLK COUNTY, MINNESOTA	DETAILS PROJECT NO. 3655-057	SHEET 3 of 6



No.		Revision		Date	By	I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota. Signature: <i>Brent H. Johnson</i> Date: 7-19-2012 Printed Name: Brent H. Johnson License #: 20378				Thief River Falls P: 218.681.2951 F: 218.681.2987		Drawn by DJL Date 7-19-12 Checked by BHI Scale AS SHOWN		GRAND MARAIS CREEK CHANNEL RESTORATION RED LAKE WATERSHED DISTRICT PROJECT NO. 60F SECTIONS NO. 15, 16, 22, 23, AND 26; T153N; R50W ESTHER TOWNSHIP, POLK COUNTY, MINNESOTA		PLAN AND PROFILE HISTORIC CHANNEL PROJECT NO. 3655-057		SHEET 4 of 6	
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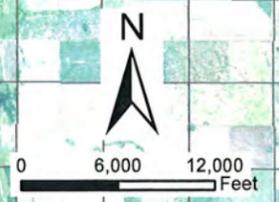


No.	Revision	Date	By	I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota. Signature: <i>Brent H. Johnson</i> Date: 7-19-2012 Printed Name: Brent H. Johnson License #: 20378		Thief River Falls P: 218.681.2951 F: 218.681.2987	Drawn by DJL Checked by BHJ Date 7-19-12 Scale AS SHOWN	GRAND MARAIS CREEK CHANNEL RESTORATION RED LAKE WATERSHED DISTRICT PROJECT NO. 60F SECTIONS NO. 15, 16, 22, 23, AND 26; T153N; R50W ESTHER TOWNSHIP, POLK COUNTY, MINNESOTA	PLAN AND PROFILE HISTORIC CHANNEL PROJECT NO. 3655-057	SHEET 5 of 6
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APPENDIX B

Project 60 Map

Red Lake Watershed District Grand Marais Creek Subwatershed - Project 60



Grand Marais Creek Outlet
Restoration Site
Proposed Project 60F

Current BWSR CWF Project
Outlet Channel Stabilization

Stream Channel
Restoration Project

Land Area Includes 1,000
Acres of Wetland Restoration

Brandt Reservoir
Completed Project 60 D & E

Euclid East Reservoir
Completed Project 60 C

Parnell Reservoir
Completed Project RLWD No. 81

East Grand Forks

Fisher

Crookston

Legend

- Proposed Creek Restoration
- Rivers / Creeks
- Subwatershed
- MN Municipalities
- Impoundments
- Wetland Restoration

APPENDIX C

Parcel List

Attachment C. Parcel List

Name of Proposal: Grand Marais Creek Outlet Restoration Project

Legislative Citation: _____

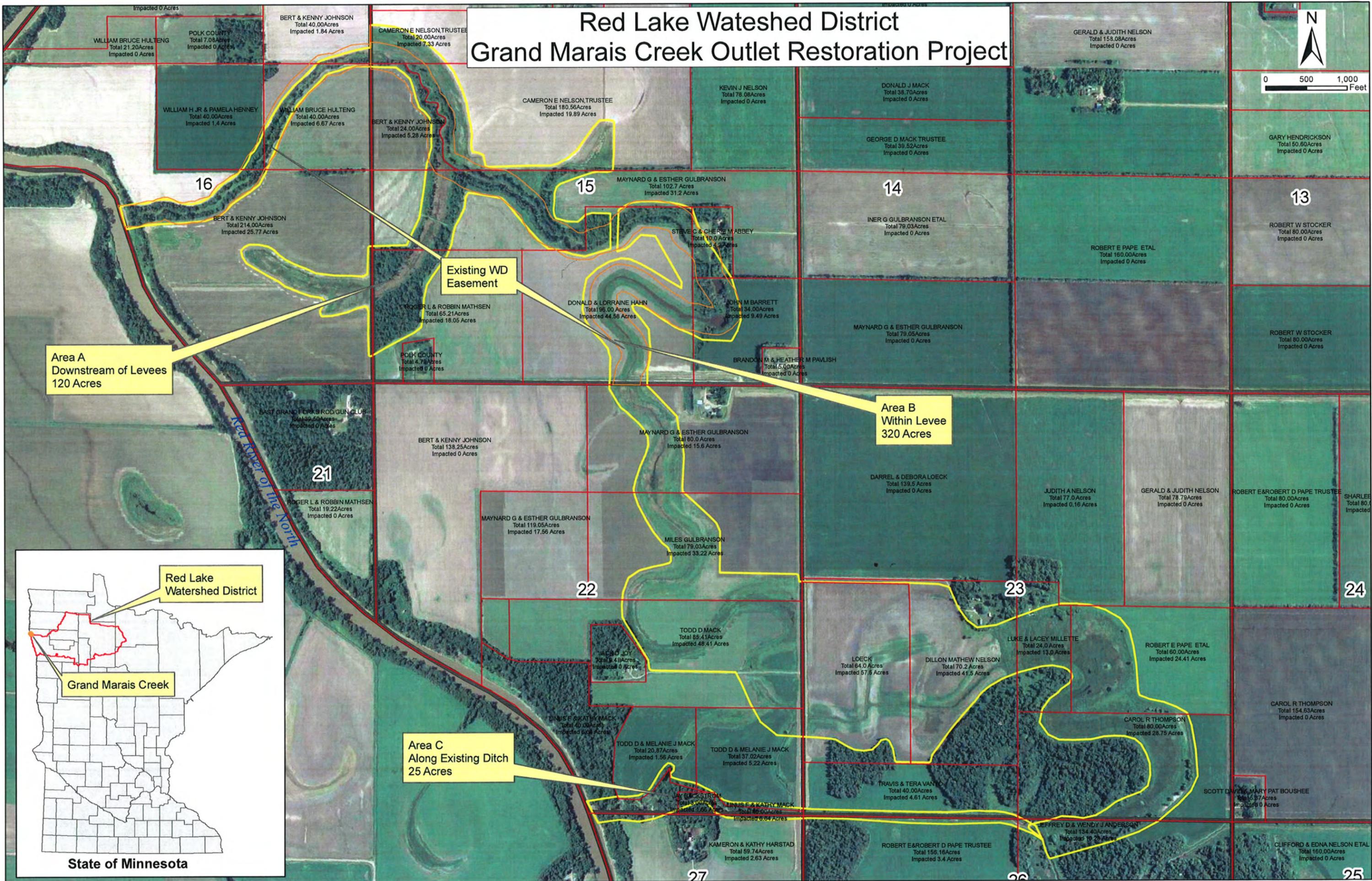
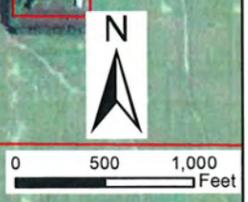
Date: 10/21/2011

Parcel Name	County	Township (25-258)	Range (01-51)	Direction most parcels are 2 with the exception of some areas of Cook County which is 1	Section (01 thru 36)	TRDS	# of acres	Description
<i>Gulbranson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>NW1/4</i>	<i>15</i>		<i>5</i>	<i>Prairie</i>
<i>Gulbranson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SW1/4</i>	<i>15</i>		<i>5</i>	<i>Prairie</i>
<i>Nelson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>NE1/4</i>	<i>15</i>		<i>5</i>	<i>Prairie</i>
<i>Gulbranson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>NE1/4</i>	<i>22</i>		<i>30</i>	<i>Wetland</i>
<i>Gulbranson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>NE1/4</i>	<i>22</i>		<i>40</i>	<i>Prairie</i>
<i>Mack</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SE1/4</i>	<i>22</i>		<i>110</i>	<i>Forested</i>
<i>Mack</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SE1/4</i>	<i>22</i>		<i>15</i>	<i>Wetland</i>
<i>Loeck</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SW1/4</i>	<i>23</i>		<i>32</i>	<i>Prairie</i>
<i>Loeck</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SW1/4</i>	<i>23</i>		<i>60</i>	<i>Wetland</i>
<i>Nelson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SW1/4</i>	<i>23</i>		<i>20</i>	<i>Wetland</i>
<i>Millette</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SE1/4</i>	<i>23</i>		<i>14</i>	<i>Wetland</i>
<i>Pape</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SE1/4</i>	<i>23</i>		<i>22</i>	<i>Wetland</i>
<i>Thompson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>SE1/4</i>	<i>23</i>		<i>31</i>	<i>Wetland</i>
<i>Anderson</i>	<i>Polk</i>	<i>153</i>	<i>50</i>	<i>NE1/4</i>	<i>26</i>		<i>8</i>	<i>Wetland</i>
Grand Marais Channel	Polk	153	50	NE1/4			6 miles	Habitat for Fish, Game, Wildlife

APPENDIX D

Approximate Right of Way Map

Red Lake Watershed District Grand Marais Creek Outlet Restoration Project

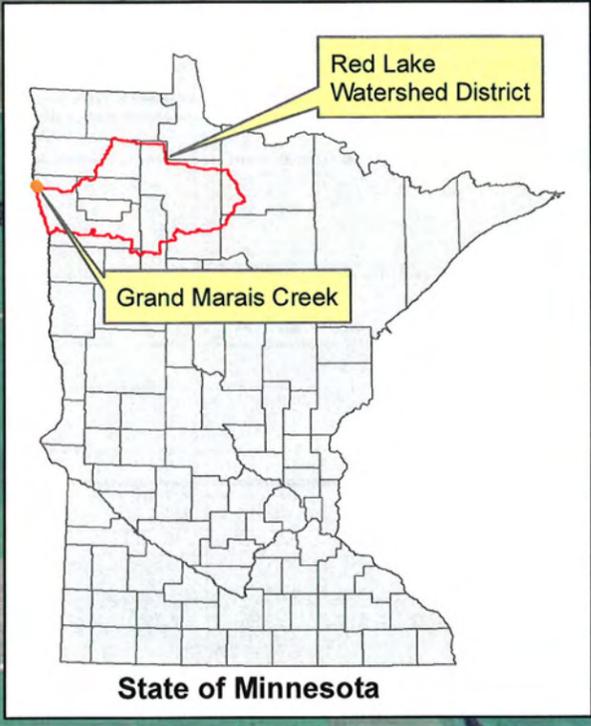


Area A
Downstream of Levees
120 Acres

Existing WD Easement

Area B
Within Levee
320 Acres

Area C
Along Existing Ditch
25 Acres



Red Lake Watershed District

Grand Marais Creek

State of Minnesota

WILLIAM BRUCE HULTENG
Total 21.20 Acres
Impacted 0 Acres

POLK COUNTY
Total 7.08 Acres
Impacted 0 Acres

BERT & KENNY JOHNSON
Total 40.00 Acres
Impacted 1.84 Acres

CAMERON E NELSON, TRUSTEE
Total 20.00 Acres
Impacted 7.33 Acres

CAMERON E NELSON, TRUSTEE
Total 180.56 Acres
Impacted 19.89 Acres

KEVIN J NELSON
Total 78.08 Acres
Impacted 0 Acres

DONALD J MACK
Total 38.70 Acres
Impacted 0 Acres

GERALD & JUDITH NELSON
Total 158.08 Acres
Impacted 0 Acres

WILLIAM H JR & PAMELA HENNEY
Total 40.00 Acres
Impacted 1.4 Acres

WILLIAM BRUCE HULTENG
Total 40.00 Acres
Impacted 6.67 Acres

BERT & KENNY JOHNSON
Total 24.00 Acres
Impacted 5.28 Acres

MAYNARD G & ESTHER GULBRANSON
Total 102.7 Acres
Impacted 31.2 Acres

GEORGE D MACK TRUSTEE
Total 39.52 Acres
Impacted 0 Acres

GARY HENDRICKSON
Total 60.60 Acres
Impacted 0 Acres

16

15

14

13

BERT & KENNY JOHNSON
Total 214.00 Acres
Impacted 25.77 Acres

STEVE C & CHERIE M ABBEY
Total 10.0 Acres
Impacted 4.2 Acres

INER G GULBRANSON ETAL
Total 79.03 Acres
Impacted 0 Acres

ROBERT E PAPE ETAL
Total 160.00 Acres
Impacted 0 Acres

ROBERT W STOCKER
Total 80.00 Acres
Impacted 0 Acres

ROGER L & ROBBIN MATHSEN
Total 65.21 Acres
Impacted 18.05 Acres

DONALD & LORRAINE HAHN
Total 96.00 Acres
Impacted 44.58 Acres

JOHN M BARRETT
Total 34.00 Acres
Impacted 9.49 Acres

MAYNARD G & ESTHER GULBRANSON
Total 79.05 Acres
Impacted 0 Acres

ROBERT W STOCKER
Total 80.00 Acres
Impacted 0 Acres

POLK COUNTY
Total 4.78 Acres
Impacted 0 Acres

BRANDON M & HEATHER M PAVLISH
Total 5.00 Acres
Impacted 0 Acres

Area A
Downstream of Levees
120 Acres

Area B
Within Levee
320 Acres

EAST GRAND FORKS'S ROD/GUN CLUB
Total 39.50 Acres
Impacted 0 Acres

MAYNARD G & ESTHER GULBRANSON
Total 80.0 Acres
Impacted 15.6 Acres

DARREL & DEBORA LOECK
Total 139.5 Acres
Impacted 0 Acres

JUDITH A NELSON
Total 77.0 Acres
Impacted 0.16 Acres

GERALD & JUDITH NELSON
Total 78.79 Acres
Impacted 0 Acres

ROBERT E & ROBERT D PAPE TRUSTEE
Total 80.00 Acres
Impacted 0 Acres

SHARLEE
Total 80.00 Acres
Impacted 0 Acres

21

MAYNARD G & ESTHER GULBRANSON
Total 119.05 Acres
Impacted 17.56 Acres

MILES GULBRANSON
Total 79.03 Acres
Impacted 33.22 Acres

JUDITH A NELSON
Total 77.0 Acres
Impacted 0.16 Acres

JUDITH A NELSON
Total 77.0 Acres
Impacted 0.16 Acres

GERALD & JUDITH NELSON
Total 78.79 Acres
Impacted 0 Acres

ROBERT E & ROBERT D PAPE TRUSTEE
Total 80.00 Acres
Impacted 0 Acres

SHARLEE
Total 80.00 Acres
Impacted 0 Acres

22

23

24

JACK O JOY
Total 9.48 Acres
Impacted 0 Acres

TODD D MACK
Total 85.41 Acres
Impacted 48.41 Acres

LOECK
Total 64.0 Acres
Impacted 57.5 Acres

DILLON MATHEW NELSON
Total 70.2 Acres
Impacted 41.5 Acres

LUKE & LACEY MILLETTE
Total 24.0 Acres
Impacted 13.0 Acres

ROBERT E PAPE ETAL
Total 60.00 Acres
Impacted 24.41 Acres

CAROL R THOMPSON
Total 80.00 Acres
Impacted 0 Acres

CAROL R THOMPSON
Total 80.00 Acres
Impacted 28.75 Acres

Area C
Along Existing Ditch
25 Acres

DINUS F & KATHY MACK
Total 40.00 Acres
Impacted 6.98 Acres

TODD D & MELANIE J MACK
Total 20.87 Acres
Impacted 1.56 Acres

TODD D & MELANIE J MACK
Total 37.02 Acres
Impacted 5.22 Acres

TRAVIS & TERA VANTO
Total 40.00 Acres
Impacted 4.61 Acres

JEFFREY D & WENDY J ANDERSON
Total 134.40 Acres
Impacted 10.28 Acres

SCOTT DAVID & MARY PAT BOUSHEE
Total 5.97 Acres
Impacted 0 Acres

JAY BACKSTROM
Total 3.00 Acres
Impacted 1.66 Acres

DINUS F & KATHY MACK
Total 40.00 Acres
Impacted 6.84 Acres

KAMERON & KATHY HARSTAD
Total 59.74 Acres
Impacted 2.63 Acres

ROBERT E & ROBERT D PAPE TRUSTEE
Total 156.16 Acres
Impacted 3.4 Acres

CLIFFORD & EDNA NELSON ETAL
Total 160.00 Acres
Impacted 0 Acres

27

26

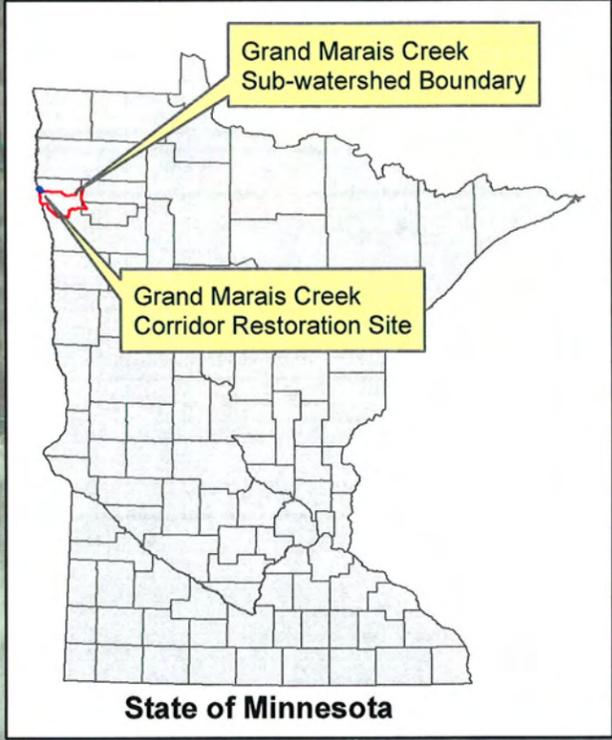
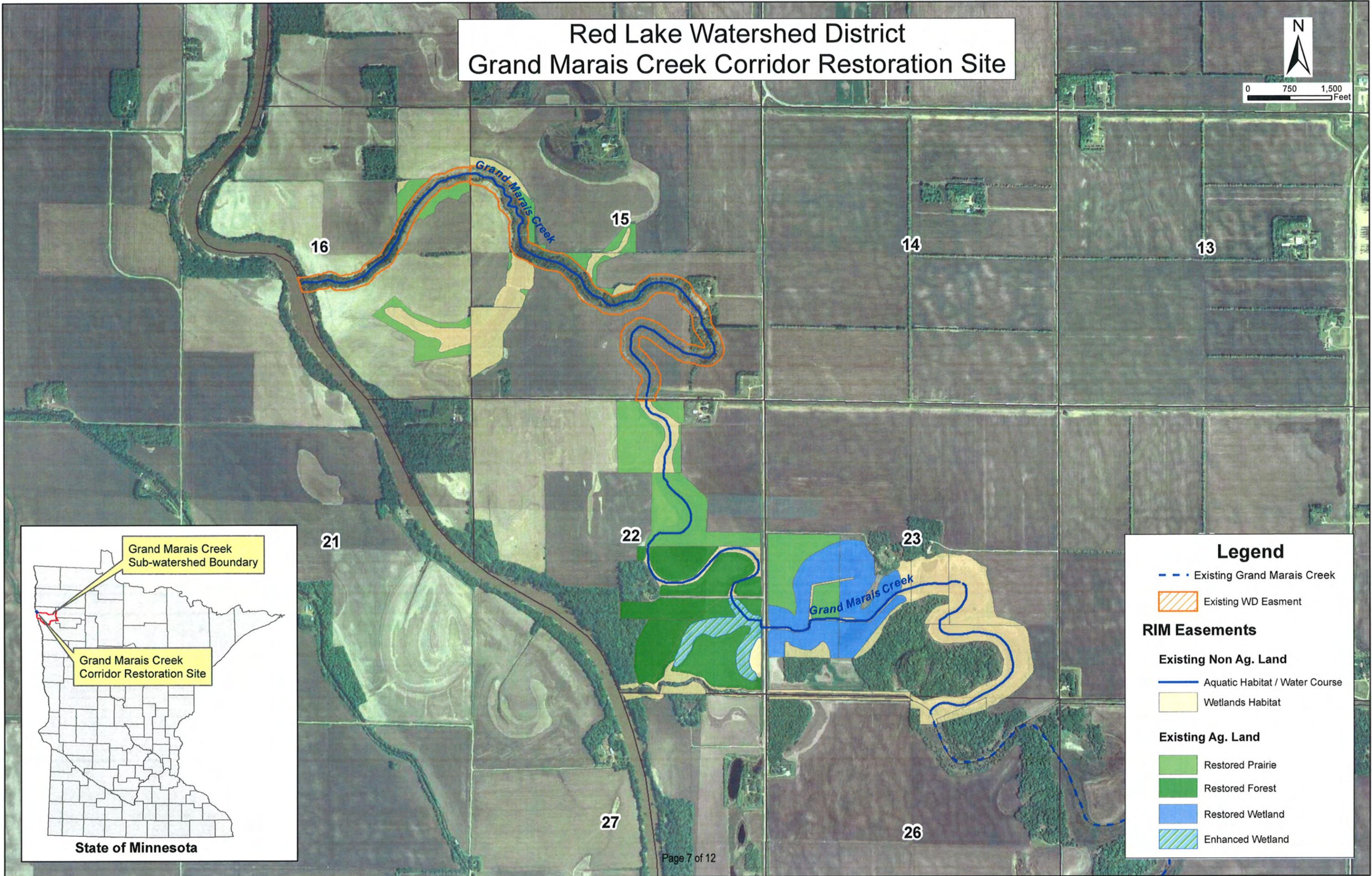
25

APPENDIX E
RIM Easements

Red Lake Watershed District Grand Marais Creek Corridor Restoration Site



0 750 1,500
Feet



Legend

- - - Existing Grand Marais Creek
- Existing WD Easment

RIM Easements

Existing Non Ag. Land

- Aquatic Habitat / Water Course
- Wetlands Habitat

Existing Ag. Land

- Restored Prairie
- Restored Forest
- Restored Wetland
- Enhanced Wetland

APPENDIX F

Fish and Wildlife Benefits Map

Red Lake Watershed District Grand Marais Creek Corridor Restoration Site



0 800 1,600
Feet

Restore Fish
Passage to Red River

16

15

14

13

Upland Habitat

Fish Spawning, Rearing,
Summer Habitat and Passage

Waterfowl Nesting Habitat

21

22

23

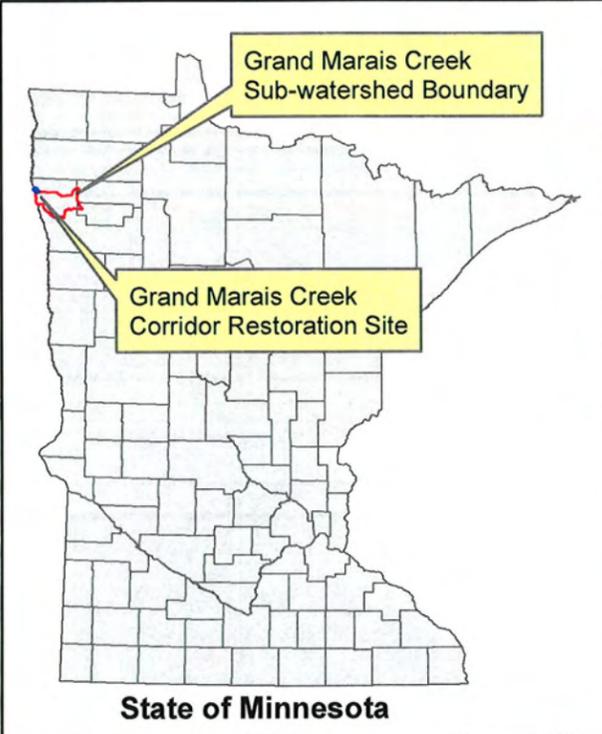
24

Grand Marais Creek

27

26

Fish Passage
Benefits Continue
Additional 20 Miles



Legend

Fish and Wildlife Benefits

Fish Species

- Channel Catfish, Northern Pike

Wildlife Species

- Riparian: Song Birds
Other: Whitetail Deer
- Waterfowl
Furbearing: Mink, Otter, Muskrat
Riparian: Song Birds

APPENDIX G

EAW and Findings of Fact

ENVIRONMENTAL ASSESSMENT WORKSHEET

Note to preparers: This form and EAW Guidelines are available at the Environmental Quality Board's website at: <http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm>. The Environmental Assessment Worksheet provides information about a project that may have the potential for significant environmental effects. The EAW is prepared by the Responsible Governmental Unit or its agents to determine whether an Environmental Impact Statement should be prepared. The project proposer must supply any reasonably accessible data for — but should not complete — the final worksheet. The complete question as well as the answer must be included if the EAW is prepared electronically.

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** Grand Marais Creek Outlet Restoration – Red Lake Watershed District Project 60F
2. **Proposer:** RLWD/MSTRWD Joint Board
Contact person: Myron Jesme
Title: RLWD Administrator
Address: 1000 Pennington Avenue S.
Thief River Falls, MN 56701
Phone : 218-681-5800
Fax : 218-681-5839
E-mail: jesme@wiktel.com
3. **RGU:** RLWD/MSTRWD Joint Board
Contact person: Myron Jesme
Title: RLWD Administrator
Address: 1000 Pennington Avenue S.
Thief River Falls, MN 56701
Phone : 218-681-5800
Fax : 218-681-5839
E-mail: jesme@wiktel.com

4. **Reason for EAW preparation** (check one)
 EIS scoping Mandatory EAW Citizen petition RGU discretion

If EAW or EIS is mandatory give EQB rule category subpart number and subpart name:
Subp 27. Wetlands and Public Waters

5. **Project location** Polk County, North of East Grand Forks

Sections 15, 16, 22, 23, and 26 of Township 153N Range 50W

GPS Coordinates **N** **W**
Tax Parcel Number

Attach each of the following to the EAW:

- Figure 1: Location Map
- Figure 2: USGS Quad Map
- Figure 3: Land Cover Map/Land Use Map
- Figure 4: Rare and Natural Features – Rare and Natural Resources
- Figure 5: National Wetland Inventory Map – Wetlands Map
- Figure 6: Preliminary Cultural Resources Review – Trefoil GM
- Figure 7: Project Plan sheets 2-8

6. **Description**

a. Provide a project summary of 50 words or less to be published in the *EQB Monitor*.

Grand Marais Creek discharges into the Red River. The original channel meandered to the northwest to the River until the early 1900's when a legal ditch was constructed to divert flow west to the River. This Project will restore the original meander (~6 miles) for purposes of natural resource enhancement.

b. Give a complete description of the proposed project and related new construction. Attach additional sheets as necessary. Emphasize construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes. Include modifications to existing equipment or industrial processes and significant demolition, removal or remodeling of existing structures. Indicate the timing and duration of construction activities.

The project features proposed are displayed in the attached preliminary plan sheets and include the following:

- Construction of a diversion structure capable of diverting all flows from the existing outlet channel up to a 2-year flood event into the restored original Grand Marais channel;
- Reconstructing the original Grand Marais channel for Natural Resource Enhancement purposes (riparian corridor, aquatic habitat, fish passage, etc.), and hydraulic capacity capable of handling the diverted flows from the existing outlet channel;
- Constructing setback levees to contain the diverted flows and create a riparian buffer between the channel and agricultural land; and
- Constructing grade stabilization structures on the existing and new outlet channel.

Diversion Structure/Weir

A diversion structure is proposed to direct all flows up to a 2-year event into the reconstructed original Grand Marais Creek channel. A conceptual detail drawing of the structure is provided on sheet 2 of the preliminary plans. The weir length is estimated at 100 feet with an elevation set at 809.75. The diversion structure will incorporate a combination of compacted clay, sheet piling, rip rap, a structurally armored spillway, vegetated slopes, and controlled drawdown culvert. Energy dissipating measures will be designed to control erosion immediately downstream.

Channel Restoration and Levee Construction

The 6 mile restoration of the original Grand Marais Creek channel is the primary focus of the proposed project. Work includes excavation of approximately 5.0 miles of the channel creating a cross section, profile grade and sinuosity reflecting pre-1900 conditions. A natural channel classification will be developed during the design phase, most likely reflecting those as described in the publication, "Field Guide for Stream Classification." The original Grand Marais channel includes gentle slopes (.0001-.0002 ft/ft), width to depth ratio near 12, channel forming inside larger channel, silt/clay dominated soils, and sinuosity >1.2. These features generally appear to characterize the Grand Marais Creek and could possibly reflect a type E channel. The detail design phase will provide the necessary channel characteristics required to sustain a healthy and stable channel.

The proposed gradient for the restored channel was projected from the upper reach of the Grand Marais channel and generally set at a slope of 0.5' to 1.0' per mile. The proposed channel depth was verified by cursory soil borings and classification work performed by the local NRCS Office. Section VII of the Preliminary Engineers Report provides additional channel details.

The primary design objective for the channel is to re-establish the riparian buffer/corridor, provide aquatic habitat, enable fish passage, and develop the channel hydraulics required to function as an adequate outlet. The proposed cross section and grade of the channel are shown in the attached plans, sheet 2. The design is adequate to accomplish both the hydraulic and environmental goals

of the project. The lower 1.5 miles of the reach for the Grand Marais Creek will only require minor work, however, the establishment of a riparian buffer is also proposed.

The final channel alignment will be determined at the final design stage. There are proposals to relocate the channel alignment in order to limit major public/private road crossings. The current proposed alignment is shown in the plans; however, additional changes may be requested as the final design proceeds. Any changes to the proposed alignment will be done so without compromising the environmental integrity of the Project.

Setback levees are proposed to be constructed to the approximate elevations and cross section shown on sheets 6, 7, and 8 of the attached plans. The setback levee design elevation is based upon a 10-year water surface elevation with 2-feet of freeboard. Setback levees are provided to contain flood events and will require land acquisition for a corridor width averaging 400 to 500 feet. The actual width required will depend on the localized topography. Setback levees will terminate approximately 1.8 miles upstream of the outlet to the Red River because the channel capacity appears adequate in this lower reach of Grand Marais Creek.

The physical construction of the setback levees may be avoided if an adequate floodway corridor width is acquired which has a ground elevation equivalent to the proposed levee elevation. Based on the potential RIM program use on this corridor, it appears that a significant percentage of the linear corridor will be placed into RIM at corridor widths adequate to eliminate setback levees on a major portion of the project. This will provide improved channel corridor restoration abilities.

Grade Control Structures

Four Grade control structures are planned to be constructed at or near stations 1+00, 4+00, 10+00, and 18+00 of the Cutoff Ditch. The structures are proposed as a combination of sheet piling, rip rap, and vegetated slopes. They are intended to eliminate future head cutting and consequent bank failures along the drainage ditch. Vegetation is intended to play a significant role in stabilizing the Cutoff Ditch. This is possible due to the ability of diverting flows to the restored Grand Marais Channel. Sheet 5 of the preliminary plans displays the proposed detail.

Grade control structures are also proposed for the outlet of the restored Grand Marais Creek channel. These structures will prevent future head cutting of the re-established outlet channel area. Similar methods used on the stabilization structure for the Cutoff Ditch will apply. Fish passage abilities will be required and various proven fish passage details will be provided in the plans to insure adequate accessibility to the upper reaches of the Grand Marais Creek.

Road and Driveway Crossings

Two major crossings along the restored Grand Marais Creek channel are required to carry the proposed flows. These crossings are located at Polk County Road 64 and at an Esther Township Road (130th St. NW). Bridge type crossings are proposed which are estimated as 3 lines of 12x12 reinforced concrete box culverts or a 120 foot total span bridge. Although bridges are referenced, the Township Road crossing may be suitable as an overflow section (Texas Crossing).

A driveway in section 22 of Esther Township may also be realigned eliminating the need for an additional bridge type crossing. The work generally involves grading and aggregate surfacing. Relocating an 800' to 1000' segment of the Grand Marais channel would eliminate the need for a crossing or driveway realignment.

Several private agricultural and recreational field crossings exist throughout the channel restoration limits. Some of these crossings will be eliminated. The crossings which are to remain will be designed to accommodate required MnDNR fisheries and waters hydraulic criteria for fish passage and channel stability.

c. 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.

Grand Marais Creek is a tributary of the Red River of the North. The current outlet into the Red River is located in a rural setting approximately 7 miles north of East Grand Forks, MN. In the early 1900's, a joint State and County initiative included construction of a drainage project consisting of a 1.25 mile outlet channel beginning near the north-south ¼ line between sections 23 and 26 of Esther Township and proceeding west along the section lines to the point where the channel terminated at the Red River. This new channel provided a shorter outlet distance from Grand Marais Creek to the Red River and effectively abandoned the lower 6 miles of natural creek channel. The abandonment of the lower 6 miles of the original Grand Marais Creek channel created a loss of aquatic and riparian habitat.

Since the establishment of the ditch outlet, the constructed ditch has eroded from its original shape to a channel of steep gradients and unstable banks. This has resulted in significant bank sloughing and channel erosion, which is estimated to have deposited an annual average of several hundred tons of sediment into the Red River since the early 1900's.

Project 60F is a single component of the "Grand Marais Creek Sub-watershed Flood Damage Reduction Project, "Project 60". The project is critical in providing an adequate and stable outlet to the Grand Marais Creek sub-watershed and its tributaries. The Project focus is on erosion reduction, water quality improvement, and restoring riparian and aquatic characteristics along the original Grand Marais Creek outlet. The primary focus of the Project is to address the Natural Resource Enhancement goals identified in the 1998 mediation agreement. The "Project 60" Project Work Team (PWT – established as part of the 1998 mediation agreement) has been evaluating features and goals of the outlet restoration project for several years, and has conducted several public information meetings to gauge the local community support. Discussions and public comment have convinced the RLWD Board of Managers to proceed with a Preliminary Engineers Report in order to improve understanding of the project's feasibility and cost.

A joint board was created from the Red Lake Watershed District and the Middle-Snake-Tamarac Rivers Watershed District (Joint Board) to administer and maintain the proposed Grand Marais Creek restoration project. The governing board was officially formed in January 2009.

The proposed project is intended to:

- Divert low flows away from the existing outlet channel (legal drainage ditch);
- Restore the original Grand Marais Creek channel for natural resource enhancement purposes and hydraulic capacity;
- Stabilize the channel bottom and banks of the existing outlet channel (legal drainage ditch);
- Maintain existing flood stage conditions upstream of the project limits; and
- Minimize/contain proposed flood stage conditions within the project limits.

Beneficiaries to the project include:

- General Public/State of Minnesota – The project enhances natural resources for future game and fish production. Water quality of the Red River will be improved due to erosion reduction in the channel.
- Benefitted landowners of upstream legal drainage systems - a stable outlet will be provided for the Grand Marais Creek Sub-watershed.
- Landowners adjacent to the cut-off ditch - bank failures and ultimate land loss adjacent to the channel will be significantly reduced.

d. Are future stages of this development including development on any other property planned or likely to happen? Yes No

If yes, briefly describe future stages, relationship to present project, timeline and plans for

environmental review.

e. Is this project a subsequent stage of an earlier project? Yes No

If yes, briefly describe the past development, timeline and any past environmental review.

7. Project magnitude data

Total project acreage:

The combined project area of the "Restored" Grand Marais Creek and the "Repaired" cut-off ditch is approximately 465 acres.

Area of probable construction impacts: 300 acres (approx.). This assumes a 500-foot restoration corridor 5 miles long from the branch location of the original Grand Marais Creek Channel Cut-Off Ditch, to within 1 mile of the Red River (including the 1,000 foot area immediately upstream of the outlet to the Red River). The project will not impact the full 500-foot corridor for the entire channel length. In addition, the project includes a 200-foot wide repair and outlet stabilization corridor along the Cut-Off Ditch.

Number of residential units: unattached 0 attached 0 maximum units per building 0
Commercial, industrial or institutional building area (gross floor space): total square feet

Indicate areas of specific uses (in square feet):

Office	0 square feet	Manufacturing	0 square feet
Retail	0 square feet	Other industrial	0 square feet
Warehouse	0 square feet	Institutional	0 square feet
Light industrial	0 square feet	Agricultural	majority use

Other commercial (specify): Private driveways and public road crossings.

Building height: 0 If over 2 stories, compare to heights of nearby buildings

8. Permits and approvals required. List all known local, state and federal permits, approvals 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.*

<u>Unit of government</u>	<u>Type of application</u>	<u>Status</u>
Polk County	Wetland Conservation Act	Need to apply
Polk County	Conditional Use Permit	Need to apply
MN Department of Natural Resources	Public Waters Work Permit	Need to apply
MN Pollution Control Agency	NPDES Permit	Need to apply
U.S. Army Corps of Engineers	Section 404	Need to apply
Polk County Highway Department	Right-of-way/Utility permits	Need to apply
Township Roads	Right-of-way/Utility permits	Need to apply
RLWD Permit	Watershed Permit	Need to apply
MSTRWD Permit	Watershed Permit	Need to apply

9. Land use. Describe current and recent past land use and development on the site and on adjacent lands. Discuss project compatibility with adjacent and nearby land uses. Indicate whether any potential conflicts involve environmental matters. Identify any potential environmental hazards due to past site uses, such as soil contamination or abandoned storage tanks, or proximity to nearby hazardous liquid or gas pipelines.

Land use within the project area, current and historic; is primarily agricultural (cultivated land and conservation reserve program (CRP)); floodplain channel; and wetlands as shown in Figure 5. The area

that will be impacted by the construction of the proposed channel restoration and stabilization is primarily wetland and public waters channel, wooded area, legal drainage ditch (cut-off ditch), and a small area of agricultural.

The operations proposed for the Project is consistent with the current land and recreational use.

Constructing the project features is also consistent with the current land use. There is no known history of previous contamination; the presence of storage tanks; or industrial, chemical or other types of manufacturing at the locations where construction is expected.

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

Construction activities associated with this project will include streambed excavation and minor levee construction, which will also result in permanent land impacts associated with the project. Levees will be constructed along the Grand Marais Creek floodplain corridor at a top elevation between 811 and 813 with a minimum 500 foot floodplain corridor width. The levees will be constructed beginning at the cutoff channel, and following the original creek alignment. Levees will end approximately 1.80 miles from where the creek discharges to the Red River. Impact estimates are based on this maximum 500 foot width; the final design width may be less based on the local topography and RIM land area acquired throughout the Grand Marais Channel restoration corridor.

All excess channel excavation material will be spoiled in upland areas with landowner approval.

Wetland impacts due to embankment construction will be avoided if possible. If setback levees are required within wetland limits for purposes of project function, these wetland impacts will be mitigated on site. Due to the recent extensive RIM land acquisition, it appears these impacts may be minimal as the need for these levees has been significantly reduced. The construction activities may impact areas as wide as 800 feet centered on the current floodplain alignment, but these activities will be considered temporary impacts. Wetland impacts in these areas will be restored to their original, pre-construction condition. Unavoidable, permanent impacts to wetland areas will not result in a net loss of wetland acreage or function, as any impact areas will be mitigated in accordance with the Wetland Conservation Act within the restored floodplain corridor.

Table 1: Project corridor cover types, before and after project completion

	Before (Acres)	After (Acres)
Cultivated Crops	183.564	0.000
Deciduous Forest	0.205	0.205
Developed, Low Intensity	0.771	0.771
Developed, Open Space	9.765	193.329
Open Water	28.581	28.581
Woody Wetlands	27.736	27.736
TOTAL	250.622	250.622

Areas between the final levee placement and the creek will remain unchanged or will be temporarily impacted due to construction activities. Cultivated cropland will be converted to developed open space (areas between the levee and the Creek). Deciduous forest and developed low intensity impacts will not be converted to developed open space, but will remain in their natural state. Construction of the levee and/or land converted through RIM will preclude the use of these areas for the continued cultivation of crops. To utilize the natural habitat, these areas may do well serving as project specific wetland mitigation sites. Inclusion of these lands into the RIM program has been actively pursued by a high percentage of the affected landowners.

All areas within the Grand Marais Channel restoration corridor and the RIM easements will be seeded into native vegetation and maintained in a condition consistent with the RIM program.

Open Water areas may increase in the Project Area due to the excavation of the streambed, although this amount would be limited to the low flow channel area, and at this time it is difficult to estimate this increase.

11. Fish, wildlife and ecologically sensitive resources

a. Identify fish and wildlife resources and habitats on or near the site and describe how they would be affected by the project. Describe any measures to be taken to minimize or avoid impacts.

Following completion of this Project, Grand Marias Creek will again flow and empty into the Red River, as it has done historically. No fish data is available for the Grand Marais Creek, however, according to the Minnesota Department of Natural Resources, the Red River contains Channel Catfish, Northern Pike, Smallmouth Bass, Walleye, Sauger, and Lake Sturgeon (special concern species, noted below). Other species encountered include Muskellunge, Carp and Sheephead, Goldeyes, Stonecats, Suckers and other small fish. The reintroduction of this historical stream will likely promote and/or improve the habitat for fish species in the Red River. No negative effects on fish populations are expected.

The following information was compiled by the DNR Minnesota County Biological Survey (MCBS) AniMap, which summarizes MCBS data on mammals, breeding-season birds, reptiles, and amphibians that are NOT considered rare in the state: The DNR lists 13 species of mammal, primarily rodents, within the project area. The list includes 5 species of shrews and moles, and 8 species of rodents. No reptilian/amphibian data was available. This MCBS list also includes 135 species of birds that breed in the area.

There should be very little permanent impacts to any of the above species. The bulk of the land impacts associated with this project may involve the construction of levees adjacent to the stream restoration. While these levees may be a significant addition to the landscape, they will not inhibit the movement of the species that habitat in the area. Levees will be re-vegetated with native, non-invasive vegetation to promote integration into the natural environment. The remaining land use changes involve the restoration of a historically active stream channel, which will most likely encourage an increase in biodiversity in the project area.

b. Are any state-listed (endangered, threatened or special concern) species, rare plant communities or other sensitive ecological resources on or near the site? Yes No

If yes, describe the resource and how it would be affected by the project. Describe any measures that will be taken to minimize or avoid adverse impacts. Provide the license agreement number (LA-526) and/or Division of Ecological Resources contact number (ERDB __) from which the data were obtained and attach the response letter from the DNR Division of Ecological Resources. Indicate if any additional survey work has been conducted within the site and describe the results.

A search of the Natural Heritage & Nongame Research Program database of the Minnesota Department of Natural Resources showed one state-listed species near the project area. They are listed in the Table 6 below and shown on Figure 4.

Table 6: Natural Heritage Species

Common Name	Scientific Name	Type	Status
Lake Sturgeon	<i>Acipenser fulvescens</i>	Vertebrate Animal	Special Concern

In 1994, Lake Sturgeon was identified approximately 2.6 miles south of the existing cutoff channel in the Red River. There is no impact to the Lake Sturgeon anticipated as a result of this restoration project, as the project does not involve additional water input or impacts to the water quality. Since there are no impacts identified as a result of this project, no additional survey work has been

performed.

12. **Physical impacts on water resources.** Will the project involve the physical or hydrologic alteration — dredging, filling, stream diversion, outfall structure, diking, and impoundment — of any surface waters such as a lake, pond, wetland, stream or drainage ditch? Yes No
If yes, identify water resource affected and give the DNR Public Waters Inventory number(s) if the water resources affected are on the PWI:

Grand Marais River (no Inventory Number)

Joint County/State Grand Marais Ditch also referenced to as the “Cutt-Off Ditch” (Outlet)

Describe alternatives considered and proposed mitigation measures to minimize impacts.

The alternative considered is proposed as mitigation to impacts which occurred over 100 years ago. The project is, in general, a mitigation measure to restore this reach of the Grand Marais Creek channel to its pre-1900 condition and to serve the local natural resource needs.

13. **Water use.** Will the project involve installation or abandonment of any water wells, connection to or changes in any public water supply or appropriation of any ground or surface water (including dewatering)? Yes No
If yes, as applicable, give location and purpose of any new wells; public supply affected, changes to be made, and water quantities to be used; the source, duration, quantity and purpose of any appropriations; and unique well numbers and DNR appropriation permit numbers, if known. Identify any existing and new wells on the site map. If there are no wells known on site, explain methodology used to determine.

14. **Water-related land use management district.** Does any part of the project involve a shoreland zoning district, a delineated 100-year flood plain, or a state or federally designated wild or scenic river land use district? Yes No
If yes, identify the district and discuss project compatibility with district land use restrictions.

The project is within the 100-year flood plain, of the Red River. The Grand Marais Creek is neither identified as a state or federally designated wild or scenic river.

The project will involve the Polk County Shoreland Management and Floodplain Ordinance. A special use or conditional use permit application may apply due to minor changes in flow direction, flood stages, and construction of the proposed diversion structure. Based on the preliminary hydraulic analysis conducted, no negative impacts are anticipated due to stage changes as a result of the project.

The diversion structure will create increased stages in the Grand Marais channel upstream of the Cut-Off Ditch up to approximately a 20 year event. Above a 20 year event, the stage change upstream will be slightly reduced from existing conditions. No upstream impacts to lands outside the channel floodway bank limits should occur as a result of the diversion structure operation. The diversion structure will divert 100% of flows below a 2 year event into the restored Grand Marais channel, and create a split flow condition for flood events in excess of a 2 year. The split flow condition allows for the reduced upstream stages at higher flow events since increased channel conveyance will result from the project.

The project will likely be subject to the rules adopted as a result of the Joint and Cooperative Agreement between North Dakota and Minnesota regarding the construction of agricultural levees within the Red River floodplain. The proposed project may incorporate setback levees along the Grand Marais channel and several public and private crossings, but the limited application is not likely to have any measurable impacts on the Red River floodplain.

15. **Water surface use.** Will the project change the number or type of watercraft on any water body?

Yes No

If yes, indicate the current and projected watercraft usage and discuss any potential overcrowding or conflicts with other uses.

16. **Erosion and sedimentation.** Give the acreage to be graded or excavated and the cubic yards of soil to be moved:

Approximately 300 acres of surface area may be disturbed by the project. The total earthwork volume for the entire project, including excavation and backfill, is approximately 600,000 cubic yards of material.

Describe any steep slopes or highly erodible soils and identify them on the site map. Describe any erosion and sedimentation control measures to be used during and after project construction.

Steep slopes will exist longitudinally along the channel bottom within 1,000 ft. of the Red River for both the Cutoff Ditch and Restored Grand Marais Creek channel. Permanent grade control structures will be constructed to reduce future headcutting and erosion. (See the attached plan sheets for channel outlets). Similar measures will be applied to each outlet.

Public road crossings and private crossings will be designed to provide stable adjacent slopes. Riprap will most likely be applied to these slopes to minimize erosive action.

17. **Water quality: surface water runoff**

- a. Compare the quantity and quality of site runoff before and after the project. Describe permanent controls to manage or treat runoff. Describe any stormwater pollution prevention plans.

The volume and the quality of surface runoff within the project site will experience only minor changes due to the project operations and the associated project features. Generally, due to a net reduction in adjacent agricultural land, increased ability exists to improve the quality of the surface water runoff. In addition, the agricultural lands converted to RIM will be placed into permanent cover, which will also be less prone to erosion.

Best management practices will be included in preparation of the construction plans to satisfy temporary and permanent erosion control requirements. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared, in accordance with the current Minnesota Pollution Control Agency National Point Discharge Elimination System Construction Permit. The SWPPP will include the applicable erosion and sediment control measures for use during construction and as permanent establishments.

- b. Identify routes and receiving water bodies for runoff from the site; include major downstream water bodies as well as the immediate receiving waters. Estimate impact runoff on the quality of receiving waters.

General surface runoff routes and receiving channels will be permanently maintained after the project is completed. The major receiving waters include the restored Grand Marais Creek, the joint County/State Ditch System, and ultimately the Red River. Water quality impacts to the receiving water bodies are estimated to be improved as a result of the project. Reduced agricultural lands, increased lands in permanent cover, and stabilized channel grades and banks will all influence the improvement in water quality.

18. **Water quality: wastewaters**

- a. Describe sources, composition and quantities of all sanitary, municipal and industrial wastewater produced or treated at the site.

No sanitary sewer facilities are necessary for the proposed project.

b. Describe waste treatment methods or pollution prevention efforts and give estimates of composition after treatment. Identify receiving waters, including major downstream water bodies, and estimate the discharge impact on the quality of receiving waters. If the project involves on-site sewage systems, discuss the suitability of site conditions for such systems.

No discharge facilities are necessary for the proposed project.

c. If wastes will be discharged into a publicly owned treatment facility, identify the facility, describe any pretreatment provisions and discuss the facility's ability to handle the volume and composition of wastes, identifying any improvements necessary.

No wastes will be discharged by the proposed project.

d. If the project requires disposal of liquid animal manure, describe disposal technique and location and discuss capacity to handle the volume and composition of manure. Identify any improvements necessary. Describe any required setbacks for land disposal systems.

No land disposal will occur as a result of the proposed project

19. Geologic hazards and soil conditions

a. Approximate depth (in feet) to ground water: 0-25 feet to groundwater, as listed in the Polk County Soil Survey
 Depth to bedrock: greater than 200 feet.

Describe any of the following geologic site hazards to ground water and also identify them on the site map: sinkholes, shallow limestone formations or karst conditions. Describe measures to avoid or minimize environmental problems due to any of these hazards.

There are no known geologic hazards in the project area. There should be no effect on the ground water quality.

b. Describe the soils on the site, giving NRCS (SCS) classifications, if known. Discuss soil texture and potential for ground water contamination from wastes or chemicals spread or spilled onto the soils. Discuss any mitigation measures to prevent such contamination.

Table 7 below shows the soils found in the 800-foot Project Corridor:

Table 7: Soils within the Project Corridor

Symbol	Name	Prime farmland status
67B	Bearden silt loam, 2-6 percent slopes	All areas are prime farmland
W	Bearden-Clovin Complex	Prime farmland if drained
422A	Bygland silty clay loam, 0-2 percent slopes	All areas are prime farmland
422B	Bygland silty clay loam, 2-6 percent slopes	All areas are prime farmland
47	Colvin silty clay loam	Prime farmland if drained
667B	Fairdale silt loam, 1-6 percent slopes, occasionally flooded	All areas are prime farmland
1006	Fluvaquents-Haploborolls complex	Not prime farmland
450	Rauville silty clay loam	Not prime farmland
W	Water	N/A

The depth to ground water within the project corridor is shallow as a result of the riparian system, the geologic history and flat natural topography. Due to the nature of the project, there is no chance of groundwater contamination after construction. Any spills that occur during construction will be

cleaned up immediately to avoid ground water contamination.

Soil textures range from silt loam to silty clay loam. These soils have a fairly slow permeability rate. Any spills resulting from project construction activities would be very minimal and therefore have little or no chance to contaminate the ground water. After project completion, no sources of ground water contamination will remain in the project area.

20. Solid wastes, hazardous wastes, storage tanks

a. Describe types, amounts and compositions of solid or hazardous wastes, including solid animal manure, sludge and ash, produced during construction and operation. Identify method and location of disposal. For projects generating municipal solid waste, indicate if there is a source separation plan; describe how the project will be modified for recycling. If hazardous waste is generated, indicate if there is a hazardous waste minimization plan and routine hazardous waste reduction assessments.

No wastes will be directly generated.

b. Identify any toxic or hazardous materials to be used or present at the site and identify measures to be used to prevent them from contaminating groundwater. If the use of toxic or hazardous materials will lead to a regulated waste, discharge or emission, discuss any alternatives considered to minimize or eliminate the waste, discharge or emission.

No toxic or hazardous waste material will be present at the site, or will be generated during construction activities.

c. Indicate the number, location, size and use of any above or below ground tanks to store petroleum products or other materials, except water. Describe any emergency response containment plans.

No above ground or below ground tanks are proposed as a component of the project.

21. Traffic. Parking spaces added: 0

Existing spaces (if project involves expansion):

Estimated total average daily traffic generated: < 1 daily traffic generated

Estimated maximum peak hour traffic generated and time of occurrence: < 1 daily traffic generated

Indicate source of trip generation rates used in the estimates.

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. Using the format and procedures described in the Minnesota Department of Transportation's Traffic Impact Study Guidance (available at: <http://www.oim.dot.state.mn.us/access/pdfs/Chapter%205.pdf>) or a similar local guidance, provide an estimate of the impact 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.

The Project will have no impact on the regional transportation system.

22. Vehicle-related air emissions. Estimate the effect of the project's traffic generation on air quality, including carbon monoxide levels. Discuss the effect of traffic improvements or other mitigation measures on air quality impacts.

There is no vehicle-related air emission impacts expected from the Project.

23. Stationary source air emissions. Describe the type, sources, quantities and compositions of any emissions from stationary sources of air emissions such as boilers, exhaust stacks or fugitive dust sources. Include any hazardous air pollutants (consult *EAW Guidelines* for a listing) and any greenhouse gases (such as carbon dioxide, methane, nitrous oxide) and ozone-depleting chemicals (chloro-fluorocarbons, hydrofluorocarbons, perfluorocarbons or sulfur hexafluoride). Also describe any proposed pollution prevention techniques and proposed air pollution control devices. Describe the impacts on air quality.

There is no stationary air emission impacts expected from the Project.

24. **Odors, noise and dust.** Will the project generate odors, noise or dust during construction or during operation? Yes No
If yes, describe sources, characteristics, duration, quantities or intensity and any proposed measures to mitigate adverse impacts. Also identify locations of nearby sensitive receptors and estimate impacts on them. Discuss potential impacts on human health or quality of life. (Note: fugitive dust generated by operations may be discussed at item 23 instead of here.)

Noise, odor and dust during the construction of the project are expected. Equipment operational hours are expected to be confined to the daylight hours. The temporary noise, odor from the use of diesel equipment and dust is not expected to pose a risk to human health or the quality of life.

25. **Nearby resources.** Are any of the following resources on or in proximity to the site?
Archaeological, historical or architectural resources? Yes No
Prime or unique farmlands or land within an agricultural preserve? Yes No
Designated parks, recreation areas or trails? Yes No
Scenic views and vistas? Yes No
Other unique resources? Yes No

If yes, describe the resource and identify any project-related impacts on the resource. Describe any measures to minimize or avoid adverse impacts.

There are no previously identified sites in or adjacent to the project area of potential effect. There have been no comprehensive archaeological surveys of this area, so it is possible that previously unrecorded sites may exist in the project area. One archaeological site (21PL28) has been identified on the banks of Grand Marais Creek, approximately 2 miles south of the cutoff ditch. This site is an early American Indian occupation site and is quite large (approximately 18 acres). While the proposed restoration project would not impact this site, the site is worth noting as it illustrates the archaeological potential of the area around Grand Marais Creek.

The General Land Survey map of 1875 does not indicate any cultural resources (American Indian or EuroAmerican) in the area of Grand Marais Creek. This area of Minnesota was settled by EuroAmericans around 1870's, and there was some substantial growth in the rural areas during the height of wheat production (through the 1920's). The nearby Esther Township cemetery has burials dating as early as 1877.

The Project Area has the potential to contain both historic and prehistoric archaeological remains. A standard Phase I Cultural Resources survey would be appropriate for any areas where ground disturbance will occur. Areas within existing channels, wetland areas, and areas disturbed by previous channel modifications may not require survey. Archaeological testing at 21PL28 indicated shallow soils, but there always exists the possibility of deeply buried soils in the Red River Valley and appropriate subsurface testing techniques should be used.

26. **Visual impacts.** Will the project create adverse visual impacts during construction or operation? Such as glare from intense lights, lights visible in wilderness areas and large visible plumes from cooling towers or exhaust stacks? Yes No
If yes, explain.
27. **Compatibility with plans and land use regulations.** Is the project subject to an adopted local comprehensive plan, land use plan or regulation, or other applicable land use, water, or resource management plan of a local, regional, state or federal agency? Yes No.
If yes, describe the plan, discuss its compatibility with the project and explain how any conflicts will be resolved. If no, explain.

A comprehensive land use management plan was developed in Polk County in 1996, which will subject the project to various land use conditions. The plan is fairly general in nature, and it does not appear that the proposed project will create conditions inconsistent with the plan's goals and objectives.

Based on preliminary discussions, it appears the proposed project shouldn't conflict with goals and objectives identified in the plan. Proposed land use resulting from the project are consistent with existing areas throughout the Red River Valley. Several public meetings have occurred in the past few years to solicit public opinion/comment regarding the project. There have been relatively few conflicts and concerns presented by the public. Those presented at the meetings appear to have been satisfactorily addressed.

28. **Impact on infrastructure and public services.** Will new or expanded utilities, roads, other infrastructure or public services be required to serve the project? ___Yes No.
If yes, describe the new or additional infrastructure or services needed. (Note: any infrastructure that is a connected action with respect to the project must be assessed in the EAW; see *EAW Guidelines* for details.)
29. **Cumulative potential effects.** Minnesota Rule part 4410.1700, subpart 7, item B requires that the RGU consider the "cumulative potential effects of related or anticipated future projects" when determining the need for an environmental impact statement. Identify any past, present or reasonably foreseeable future projects that may interact with the project described in this EAW in such a way as to cause cumulative potential effects. (Such future projects would be those that are actually planned or for which a basis of expectation has been laid.)
Describe 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 (*or discuss each cumulative potential effect under appropriate item(s) elsewhere on this form*).
- Very low potential exists for cumulative effects as a result of future projects associated with the proposed project. There are no known future projects planned, related to, or contingent on the completion of the proposed project.
- Future proposed drainage projects in the upper reaches of the Grand Marais sub-watershed will be supported by a stable outlet as a result of completing the proposed project. The stabilized outlet may create less opposition to future agricultural drainage projects in the upper reaches of the sub-watershed, which may be considered as a cumulative potential effect.
30. **Other potential environmental impacts.** If the project may cause any adverse environmental impacts not addressed by items 1 to 28, identify and discuss them here, along with any proposed mitigation.
- None
31. **Summary of issues.** *Do not complete this section if the EAW is being done for EIS scoping; instead, address relevant issues in the draft Scoping Decision document, which must accompany the EAW.*
List any impacts and issues identified above that may require further investigation before the project is begun. Discuss any alternatives or mitigative measures that have been or may be considered for these impacts and issues, including those that have been or may be ordered as permit conditions.

This project was developed through the Project Work Team (PWT) process. Nearly all agencies requiring project permits and several landowners have assisted and provided input in the development of the overall project goals, project features, functions, and operation of the project. This process has significantly reduced the risk of developing a project which creates adverse impacts to the social,

economic and natural environment.

The primary issues created by the project are related to the potential changes in existing stages, flow routes, and flow rates associated with the diversion of the existing Grand Marais Outlet Channel. A detailed hydraulic model provides reasonable verification that the proposed post project hydraulic characteristics of this area of the Grand Marais will have negligible effects on existing flood stages.

The restored channel will also be designed to insure a stable and low maintenance open channel corridor. Design methodology will be consistent with MnDNR Waters and Fisheries criteria for natural channels emphasizing habitat, stability, and efficient conveyence.

The final plans will incorporate permit conditions which are identified in Section 8 of this EAW. All of these agencies have been involved in the PWT process.

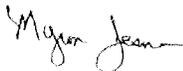
A field delineation of the potential wetland impacts may be warranted as well as a survey of rare state species to confirm the presence or absence of these species along the project corridor.

A Phase 1 cultural resource survey may be needed if requested. Preliminary information from the Minnesota State Historic Preservation Office suggests that while there have been artifacts located in the area, there are none in the immediate vicinity.

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 9b and 60, respectively.
- Copies of this EAW are being sent to the entire EQB distribution list.

Signature 

Date June 3, 2009

Title Administrator

Environmental Assessment Worksheet was prepared by the staff of the Environmental Quality Board at the Minnesota Department of Administration, Office of Geographic and Demographic Analysis. For additional information, worksheets or for *EAW Guidelines*, contact: Environmental Quality Board, 658 Cedar St., St. Paul, MN 55155, 651-201-2492, or <http://www.eqb.state.mn.us>

RLWD/MSTRWD JOINT BOARD NEGATIVE EIS DECLARATION

**In the Matter of the Decision of the
Need for an Environmental Impact
Statement for the RLWD/MSTRWD
Joint Board Proposal for Construction
and Operation of the Grand Marais
Creek Outlet Restoration Project –
Red Lake Watershed District Project
60F, North of East Grand Forks, in
Polk County, Minnesota.**

FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER

The above-mentioned matter came for review before the RLWD/MSTRWD Joint Board of Managers on the 13th day of August, 2009. The Board, having reviewed an Environmental Assessment Worksheet, the comments thereto, the presentations of the RLWD Administrator, Myron Jesme, and the Consulting Engineer, Jeff Langan, and in full consideration of comments by the public, and being fully advised in the premises, makes the following Findings of Fact, Conclusions of Law and Order:

FINDINGS OF FACT

- A. The RLWD/MSTRWD Joint Board as local sponsor, on behalf of itself, is proposing to restore the original meander (~6 miles) of the Grand Marais Creek Outlet as nearly as practical considering changes in the historic landscape, for purposes of natural resource enhancement.
- B. As local sponsor and project proposer, the RLWD/MSTRWD Joint Board initiated environmental review by the preparation of a mandatory Environmental Assessment Worksheet (EAW) as required by 4410.4300 subp. 27 (A) to determine if the project had the potential for significant environmental effects, in accordance with Minnesota Rules 4410.1000 subp. 3.D.
- C. The RLWD/MSTRWD Joint Board prepared the EAW for the project in accordance with Minnesota Rules Chapter 4410.
- D. The EAW and supporting technical materials used in preparation of the EAW are incorporated by reference into this Record of Decision on the Determination of Need for an Environmental Impact Statement (EIS).
- E. Prior to notice of the EAW, the RLWD/MSTRWD Joint Board held several meetings with affected land owners and local agencies, and also formally provided opportunities for public input. A Project Work Team, comprised of several agency personnel and landowners, consistent with the Flood Damage Reduction Mediation Agreement, was also involved in the development of the project.

- F. The EAW was filed with the Environmental Quality Board (EQB) and a notice of its availability was published in the EQB *Monitor* on June 15th, 2009. A copy of the EAW was sent to all persons on the EQB Distribution List and to those persons requesting a copy. Press releases announcing the availability of the EAW were sent to the local newspaper and the Red Lake Watershed District web site.
- G. The 30-day EAW public review and comment began June 15th, 2009 and ended July 15th, 2009 pursuant to Minnesota Rules part 4410.1600.
- H. During the 30-day public review and comment period, the RLWD/MSTRWD Joint Board received 4 letters/emails containing written comments. Comments were received from the following parties:
- a. John P. Wingard, PE, District 2 Hydraulics Engineer, Minnesota Department of Transportation.
 - b. Karen Kromar, Planner Principal, Environmental Review and Feedlot Section Regional Division, Minnesota Pollution Control Agency
 - c. Michael R. Carrol, Regional Director, Minnesota Department of Natural Resources.
 - d. Peter Buessler, Ecological Resources Regional Manager NW, Minnesota Department of Natural Resources.
- I. The written comments received are presented below, as compiled and summarized from the comment letters. The RLWD/MSTRWD Joint Board response follows each comment.

Comment Letter A: John P. Wingard, PE, District 2 Hydraulics Engineer, Minnesota Department of Transportation.

Comment a-1: *Mr. Wingard provided comment indicating that his project interests on behalf of the Department were related to potential impacts to TH 220. He continued to comment that it did not appear the project would have any noticeable impact on TH 220, and that it appeared the project would be a nice enhancement to the area.*

Response a-1: Comment noted. Based on the Preliminary Engineers Report and Hydrologic/Hydraulic modeling, the project is not anticipated to cause impacts to the function and operation of TH 220.

Comment Letter B: Karen Kromar, Planner Principal, Environmental Review and Feedlot Section Regional Division, Minnesota Pollution Control Agency.

Comment b-1: *Ms. Kromar provided comment indicating if a US Army Corps of Engineers (Corps) Section 404 Individual Permit is required, then a MPCA CWA Section 401 Water Quality Certification or waiver must also be obtained as part of the permitting process.*

Comment b-2: *The MPCA comments that recommendations for “cover type” guidance regarding dredging activities follow the publication referenced in <http://www.pca.state.mn.us/publications/wq-gen2-01.pdf>, or contact Jeff Stollenwerk.*

Comment b-3: *Ms. Kromar comments that the Grand Marais Creek is listed as an Impaired Water as referred to on the MPCA 2008 303 (d) TMDL list for turbidity. Ms. Kromar further comments that the EAW should note that the impairment will dictate additional increased stormwater treatment both during and post construction phase, and that it should be noted that these treatment requirements can be achieved on the project site or elsewhere.*

Comment b-4: *Ms. Kromar comments that the project will require a Storm Water Pollution Prevention Plan (SWPPP) be prepared and submitted for review and approval to the MPCA 30 days prior to beginning of construction operations. This requirement is due to the total disturbed area and proximity to an impaired water.*

Response b-1: Comment noted. It is understood that a USACOE Section 404 Individual Permit as well as Section 401 Water Quality Certification will be required. Permit/certification application proceedings will be executed upon completion of preliminary design.

Response b-2: Comment noted. Guidance publications and/or recommended contacts for dredging operations and spoil placement will be referred to during preliminary design phase.

Response b-3: Comment noted. Although the restored section of the Grand Marais Creek is not listed as impaired on the 2008 List of Impaired Waters, it is understood that since it adjoins and will become a part of the Grand Marais Creek channel that is listed as impaired, additional treatment requirements may apply to the associated storm water runoff. Currently, no TMDL has been prepared for the Grand Marais Creek. However, due to the nature and intent of the project, turbidity is a water quality characteristic which is anticipated to be improved through the restoration of the Grand Marais Creek Outlet corridor.

Response b-4: Comment noted. It is the Project Proposer's intention to follow the current rules referenced in the NPDES Construction Storm Water Permit. This includes preparation of a SWPPP and submittal to the MPCA for review.

Comment Letter C: Michael R. Carrol, Regional Director, Minnesota Department of Natural Resources.

Comment c-1: *Mr. Carrol comments that the Project Work Team (PWT) process used to develop the project provided an interdisciplinary approach which appears to minimize natural resource impacts. He identifies that this project meets the natural resource enhancement goals of the 1998 Red River Mediation Agreement, and provides a reduction in channel erosion, water quality improvements, and restoration of riparian and aquatic habitat along the creek; all of which are goals of the Department.*

Response c-1: Comments are noted.

Comment Letter D: Peter Buessler, Ecological Resources Regional Manager NW, Minnesota Department of Natural Resources.

Comment c-1: *Mr. Buessler comments that the MnDNR supports the project and EAW with the understanding the various design, construction and operational details are met. The EAW implies several of these details but should be clarified.*

Comment c-2: *Mr. Buessler comments that the general alignment and slope of the proposed channel (as described in the EAW Section #6 – Project Description) is acceptable. Although more detailed channel cross section dimensions and patterns are recommended. The restored channels'.....*

Comment c-3: *Mr. Buessler comments that the establishment and maintenance of vegetation throughout the channel corridor (as described in the EAW Section #10 – Cover Types) is critical to channel stability of an E Channel. It is recommended that the native plant community be established within the project corridor prior to diverting water into the restored channel. He also expands his comments addressing strong support for the RIM easement acquisition process used to establish the corridor which eliminated the need for setback levees throughout a majority of the project area.*

Comment c-4: *Mr. Buessler comments that fish passage methods (as described in the EAW Section #11 – Fish, Wildlife, and Ecologically Sensitive Resources) should be designed into the grade control structures and diversion structure. He states that the proposed grade control structure details are known to create fish passage barriers and promote bank erosion below the structure. Incorporating fish passage design details should satisfy the statement in the EAW, “No negative effects on fish populations are expected.” Rock riffles are recommended in lieu of sheet piling type structures.*

Comment c-5: *Mr. Buessler comments that the erosion and sedimentation control measures proposed at the lower 1,000 ft. of each channel (as described in the EAW Section #16 – Erosion and Sedimentation), as related to channel grade stability, should consider Grade Control Rock Riffles in place of the proposed sheet pile check dams. “Riffle design should be a hybrid of the Newbury Weir (Newbury and Gaboury 1993) and structures used by Rosgen (1996).” He states that these methods better emulate natural riffles in Minnesota channels, and provide for improved compatibility with the natural channel function related to flows and habitat.*

Comment c-6: *Mr. Buessler comments that the hydraulic function of the diversion structure (as described in the EAW Section #14 – Water-Related Land Use Management Districts) will operate in an acceptable manner if the final designed operation is as described in this section of the EAW. Mr. Buessler also comments that the placement of required setback levees should be as far away from the restored channel as possible to allow as large a floodplain as possible, and he recommends avoidance of setback levee construction in areas where natural ground elevations equal or exceed the proposed top of setback levee elevation, and that a flowage or RIM easement was acquired throughout these limits.*

Response b-1 through b-6: Comments are noted. The comments relate to design features which are requested to be incorporated into the project. It is the Project Proposer's intention to incorporate the listed design requests as appropriate, practical and consistent with the project goals and budget. The project goals listed are consistent with

that of the Project Proposer, and specific design methods incorporated into the project to accomplish these goals will be coordinated between the MnDNR, the Project Proposer, and the Project Engineer.

|

CONCLUSIONS OF LAW

1. The RLWD/MSTRWD Joint Board has fulfilled all applicable procedural requirements of law and rule regarding the determination of need for an environmental impact statement for the Grand Marais Creek Outlet Restoration Project – Red Lake Watershed District Project 60F in Polk County, Minnesota.
2. *Type, extent and reversibility of environmental effects.*
Based on the Findings of Fact, the RLWD/MSTRWD Joint Board has determined that the following potential environmental effects will be minor in type, extent or are reversible:

Cover type conversion – land will be converted to permanent cover.

Physical Impacts on Water Resources and Water Quality - potential temporary impacts during construction

Erosion and Sedimentation – potential temporary impacts during construction

Odor, Noise and Dust and Air - potential temporary impacts during construction

The determination of minor in type, extent and reversibility incorporates environmental commitment as described below:

Permanent Vegetation Plan
Wetland Mitigation Plan
Sediment and Erosion Control Plan
SWPPP

3. *Cumulative potential effects of related or anticipated future projects.*
Cumulative effects are potential impacts placed within the context of the impacts caused by other past, present or reasonably foreseeable projects. Those impacts may or may not result from the same or a similar type of project.

Based upon the technical analyses completed and the information available to the RLWD/MSTRWD Joint Board, the Grand Marais Creek Outlet Restoration – Red Lake Watershed District Project 60F is not expected to interact with other past, present or reasonably foreseeable projects to generate adverse cumulative impacts.

Extent to which environmental effects are subject to mitigation by on-going public regulatory authority.

- *Cover type conversion (Wetland Conservation Act, County Conditional Use Permitting)*
- *Physical Impacts on Water Resources (MnDNR Public Waters Work Permit, Wetland Conservation Act, U.S)*
- *Effects on Surface Water Use (MnDNR Public Waters Work Permit)*
- *Erosion and Sedimentation (Minnesota Pollution Control NPDES Construction Permit and SWPPP requirements)*

- Water Quality (Minnesota Pollution Control Agency and NPDES Construction Permit and SWPPP requirements)
- Odor, Noise and Dust (Minnesota Pollution Control Agency Noise Standards)
- Effects to Archeological Resources (if necessary) (State Historic Preservation Office Authorities)

4. *Extent to which environmental effects can be anticipated and controlled as a result of other environmental studies undertaken by public agencies or the project proposer, or other EISs.*

There are no known relevant environmental studies conducted outside the scope of this project.

5. Based on consideration of the standards and criteria and factors specified in the Minnesota Environmental Review Program Rules (MN Rules Part 4410.1700, subpart 6 and 7) to determine whether a project has the potential for significant environmental effects, and on the Finding and Record in this matter, the RLWD/MSTRWD Joint Board determines that the proposed Grand Marais Creek Outlet Restoration Project – Red Lake Watershed District Project 60F does not have the potential for significant environmental effects.

ORDER

Based on the above Findings of Fact and Conclusions and the entire record of this matter:

The RLWD/MSTRWD Joint Board hereby makes a Negative Declaration on the need for an Environmental Impact Statement. An EIS is not required for the Grand Marais Creek Outlet Restoration Project – Red Lake Watershed District Project 60F in Polk County, Minnesota.

Any Findings that might properly be termed Conclusions and any Conclusions that might properly be termed Findings are hereby adopted as such.

Date this ____ day of August, 2009

**RLWD/MSTRWD
JOINT BOARD**

Attest:

Gene Tiedeman, Chair

Orville Knott, Secretary

APPENDIX H

Project Schedule

Grand Marais Channel Restoration Project Schedule - RLWD Project 60F

Preliminary Schedule - 04/23/2012

ID	Primary Task	Sub - Task 1	Sub - Task 2	Sub - Task 3	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14		
1	Secure Project Funding																																				
2	Project Development																																				
2.1		Environmental																																			
2.1.1			Wetlands																																		
2.1.1.1				USACOE																																	
2.1.1.2				MnDNR Waters																																	
2.1.1.3				WCA/SWCD																																	
2.1.2			Wildlife																																		
2.1.2.1				USFWS																																	
2.1.2.2				MnDNR Game/Non Game																																	
2.1.3			Cultural																																		
2.1.3.1				SHPO																																	
2.1.4			Watercourse																																		
2.1.4.1				MnDNR Waters																																	
2.1.5			Pollution Control																																		
2.1.5.1				MPCA/SWPPP																																	
2.2			Project Team Meetings - Estimate 3 meetings																																		
2.3			EAW - Completed																																		
2.4			Right of Way																																		
3	Preliminary Design																																				
3.1			Wetlands																																		
3.1.1				Delineation - Completed																																	
3.1.2				Impacts																																	
3.1.3				Mitigation Plan																																	
3.2			Topographic Survey - Completed																																		
3.3			Geotechnical Investigation																																		
3.4			Channel Restoration - alignment, cross sections, grades																																		
3.5			Channel Crossings - Twp. Rd. Bridge, County Rd. 64 Bridge, Trails (Low Water)																																		
3.6			Fish Passage/Grade Control Structures																																		
3.7			Diversion Structure																																		
3.8			Hydraulic Modeling - Verify high flow and low flow operations and sustainability																																		
3.9			Plan Preparation and OPC																																		
3.9.1				Channel Restoration																																	
3.9.2				Channel Crossings																																	
3.9.3				Fish Passage/Grade Control Structures																																	
3.9.4				Diversion Structure																																	
3.9.5				Preparation of Wetland Mitigation Plans																																	
4	Final Design																																				
4.1			Construction phasing																																		
4.2			Channel Restoration																																		
4.3			Channel Crossings - Twp. Rd. Bridge, County Rd. 64 Bridge, Trails (Low Water)																																		
4.4			Fish Passage/Grade Control Structures																																		
4.5			Diversion Structure																																		
4.6			Preparation of Final Plans, Specifications, Bid Documents, and OPC																																		
4.6.1				Channel Restoration																																	
4.6.2				Channel Crossings																																	
4.6.3				Fish Passage/Grade Control Structures																																	
4.6.4				Diversion Structure																																	
4.6.5				Preparation of Wetland Mitigation Plans																																	
5	Preparation and Solicitation of Bids																																				
5.1			Channel Crossings - Twp. Rd. Bridge, County Rd. 64 Bridge, Trails (Low Water)																																		
5.2			Fish Passage/Grade Control Structures																																		
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5.4			Diversion Structure																																		
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6.2			Fish Passage/Grade Control Structures																																		
6.3			Channel Restoration																																		
6.4			Diversion Structure																																		
7	Operations and Maintenance																																				