

Minnesota Local/State/Federal Application for Water/Wetland Projects

Project Name:

Clear Lake Water Quality Improvement Project

Applicant:

Clearwater River Watershed District

Location:

Meeker County, Minnesota

Date:

December 13, 2011

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Minnesota Local/State/Federal Application Form for Water/Wetland Projects

For Internal Use Only			
Application No.	Field Office Code	Date Initial Application Received	Date Initial Application Deemed Complete

PART I: BASIC APPLICATION

"See HELP" directs you to important additional information and assistance in Instructions, Page 1.

1. LANDOWNER/APPLICANT CONTACT INFORMATION (See Help 1)

Name: Dennis Loewen, Clearwater River Watershed District Phone: (320)274-3935 E-mail: loewen.dennis@yahoo.com
Complete mailing address: 75 Elm Street East, Box 481, Annandale, MN 55302

1A. AUTHORIZED AGENT (See Help 1A) (Only if applicable; an agent is not required)

Name: Wes Boll, Wenck Associates, Inc. Phone: (763)479-4283 E-mail: wboll@wenck.com
Complete mailing address: 1800 Pioneer Creek Center, PO Box 249 Maple Plain, MN 55359

2. NAME, TYPE AND SIZE OF PUBLIC WATERS or WETLANDS IMPACTED (Attach Additional Project Area sheets if needed)

Name or I.D. # of Waters Impacted (if applicable; if known):

(Check all that apply): ☐ Lake ☐ River ☒ Circular 39 Wetland type: ☐ 1, ☐ 11, ☐ 2, ☒ 3, ☐ 4, ☐ 5, ☐ 6, ☐ 7, ☐ 8

Wetland plant community type¹: ☐ shallow open water, ☐ deep marsh, ☒ shallow marsh, ☐ sedge meadow, ☐ fresh meadow,

☐ wet to wet-mesic prairie, ☐ calcareous fen, ☐ open bog or coniferous bog, ☐ shrub-carr/alder thicket,

☐ hardwood swamp or coniferous swamp, ☐ floodplain forest, ☐ seasonally flooded basin

Indicate size of entire lake or wetland (check one): ☐ Less than 10 acres (indicate size:) ☒ 10 to 40 acres ☐ Greater than 40 acres

3. PROJECT LOCATION (Information can be found on property tax statement, property title or title insurance):

Project street address: Fire #: City (if applicable):
¼ Section: SW Section: 28 Township #: 121 Range #: 30 County: Meeker
Lot #: Block: Subdivision: Watershed (name or #) 20 UTM location: N 16-46638.5 E 1264974.9

Attach a simple site locator map. If needed, include on the map written directions to the site from a known location or landmark, and provide distances from known locations. Label the sheet SITE LOCATOR MAP.

4. TYPE OF PROJECT: Describe the type of proposed work. Attach TYPE OF PROJECT sheet if needed.

See Appendix A

5. PROJECT PURPOSE, DESCRIPTION AND DIMENSIONS: Describe what you plan to do and why it is needed, how you plan to construct the project with dimensions (length, width, depth), area of impact, and when you propose to construct the project. This is the most important part of your application. See HELP 5 before completing this section; see What To Include on Plans (Instructions, page 1). Attach PROJECT DESCRIPTION sheet.

See Appendix B

Footprint of project: acres or 64 square feet drained, filled or excavated.

6. PROJECT ALTERNATIVES: What alternatives to this proposed project have you considered that would avoid or minimize impacts to wetlands or waters? List at least TWO additional alternatives to your project in Section 5 that avoid wetlands (one of which may be "no build" or "do nothing"), and explain why you chose to pursue the option described in this application over these alternatives. Attach PROJECT ALTERNATIVES sheet if needed.

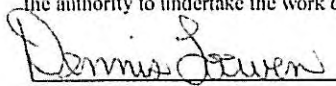
N/A

7. ADJOINING PROPERTY OWNERS: For projects that impact more than 10,000 square feet of water or wetlands, list the complete mailing addresses of adjacent property owners on an attached separate sheet. (See HELP 7) N/A

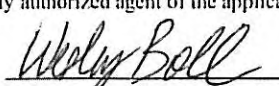
8. PORTION OF WORK COMPLETED: Is any portion of the work in wetland or water areas already completed? ☐ Yes ☒ No. If yes, describe the completed work on a separate sheet of paper labeled WORK ALREADY COMPLETED. (See HELP 8)

9. STATUS OF OTHER APPROVALS: List any other permits, reviews or approvals related to this proposed project that are either pending or have already been approved or denied on a separate attached sheet. See HELP 9. See Appendix D

10. I am applying for state and local authorization to conduct the work described in this application. I am familiar with the information contained in this application. To the best of my knowledge and belief, all information in Part I is true, complete, and accurate. I possess the authority to undertake the work described, or I am acting as the duly authorized agent of the applicant.


Signature of applicant (Landowner)

10/14/11
Date


Signature of agent (if applicable)

12/14/11
Date

This block must be signed by the person who desires to undertake the proposed activity and has the necessary property rights to do so. If only the Agent has signed, please attach a separate sheet signed by the landowner, giving necessary authorization to the Agent.

¹See Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, 1997) as modified by the Board of Water and Soil Resources, United States Army Corps of Engineers.

The public burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of these addresses. Completed applications must be submitted to the District engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT: Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research and Sanctuaries Act, 33 USC 1413, Section 103. Principal purpose: Information provided on this form will be used in evaluating the application for a permit. Routine uses: This information may be shared with the Department of Justice and other Federal, state, and local government agencies. Submission of requested information is voluntary; however, if information is not provided, the permit application cannot be evaluated nor can a permit be issued.

ITEMS 1 THROUGH 4 TO BE FILLED IN BY THE CORPS

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
--------------------	----------------------	------------------	-------------------------------

YOU DO NOT NEED TO COMPLETE ITEMS 6-10 and 12-25 in the SHADED AREAS.

All applicants must complete non-shaded items 5 and 26. If an agent is used, also complete items 8 and 11. This optional Federal form is valid for use *only* when included as part of this entire state application packet.

5. APPLICANT'S NAME
Dennis Loewen

8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required)
Wes Boll, Consultant

6. APPLICANT'S ADDRESS

9. AGENT'S ADDRESS

7. APPLICANT'S PHONE NO.

10. AGENT'S PHONE NO.

11. STATEMENT OF AUTHORIZATION (if applicable; complete only if authorizing an agent)

I hereby authorize Wes Boll to act on my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

APPLICANT'S SIGNATURE: Dennis Loewen

DATE: 12/14/11

12. PROJECT NAME OR TITLE (see instructions)

13. NAME OF WATERBODY, IF KNOWN (if applicable)

14. PROJECT STREET ADDRESS (if applicable)

15. LOCATION OF PROJECT

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

17. DIRECTIONS TO THE SITE

18. NATURE OF ACTIVITY

19. PROJECT PURPOSE

20. REASON(S) FOR DISCHARGE

21. TYPES OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS

22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED

23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? YES _____ NO ____ IF YES, DESCRIBE COMPLETED WORK.

24. ADDRESSES OF ADJOINING PROPERTY OWNERS.

25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Dennis Loewen
Signature of applicant

12/14/11
Date

Wes Boll
Signature of agent (if any)

12/14/11
Date

The application must be signed by the person who desires to undertake the proposed activity (applicant), or it may be signed by a duly authorized agent if the statement in Block 11 has been filled out and signed. 18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up with any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

ENG FORM 4345, Jul 97

EDITION OF FEB 94 IS OBSOLETE.

(Proponent: CECW-OR)

FOR LGU USE ONLY:

Determination for Part I: ☐ No WCA Jurisdiction
☐ Exempt: No. ____ (per MN Rule 8420.0122)
☐ No Loss: ____ (A,B, . .G, per MN Rule 8420.0220)
☐ Wetland Boundary or type
☐ Replacement required – applicant must complete Part II

COMPLETE THE SECTION BELOW ONLY IF REPLACEMENT IS NOT REQUIRED:

Application is (check one): ☐ Approved ☐ Approved with conditions (conditions attached) ☐ Denied

Comments/Findings: _____

LGU official signature

Date

Name and Title

For Agricultural and Drainage exemptions (MN Rule 8420.0122 Subps. 1 and 2B), LGU has received proof of recording of restrictions (per MN Rule 8420.0115):

County where recorded

Date

Document # assigned by recorder

LGU official signature

Date

Appendix A - Type of Project

The Applicant (Clearwater River Watershed District (CRWD)) has proposed a water quality improvement project in Meeker County south of Clear Lake (See Figure 1). The project is proposed in a ditch channel in a wetland located upstream of Clear Lake (DNR Public Water 47-009500) (See Figure 2).

Clear Lake is an Impaired Water that exceeds the state standard for nutrient concentrations. The completed TMDL study for Clear Lake indicated that a 90% reduction of total phosphorus loads is necessary to meet in-lake water quality goals.

The proposed project gives the CRWD an opportunity to progress towards the achievement of water quality goals established in its TMDL Implementation Plan (approved in 2009) and Comprehensive Watershed Management Plan (approved in 2011). The goals of the project include progress towards meeting water quality goals for downstream water bodies by removing particulate and soluble phosphorus from surface water draining to Clear Lake.

The primary purpose of the project is to reduce phosphorus flowing through the ditch channel to Clear Lake. The CRWD proposes to install a weir with a rectangular notched opening to create a temporary retention area to treat agricultural runoff and reduce particulate phosphorus load to Clear Lake. In order to address the significant soluble phosphorus load from the wetland, the CRWD also proposes to install a sand/iron filter to remove soluble phosphorus during low flow conditions. Based on water quality data from the site, the installation of the filter will allow for significant phosphorus load reductions to Clear Lake.

The proposed project will involve a small amount of fill and temporary impacts to a Type 3 wetland adjacent to the ditch channel. Under the Minnesota Wetland Conservation Act (WCA), no wetland replacement plan is necessary, since all impacts qualify as no-loss or exempt activities according to WCA.

Appendix B - Project Description

The CRWD proposes to install a notched sheet pile weir and sand/iron filter in a wetland in the proposed project area to remove particulate and soluble phosphorus from low flows before the water reaches Clear Lake.

As shown in Figure 2, 1,404 acres of land drain to the proposed project area, with an estimated annual total phosphorus load of 1,470 lbs. The proposed project will temporarily extend the retention time of water over approximately 12 acres in the wetland to allow phosphorus to settle out of agricultural runoff before discharging to Clear Lake. Temporary retention volume offered by the proposed weir is equal to the 1.25 inch storm event, also known as the water quality event through which most nutrients and sediments are transported.

Based on the retention provided by the weir, the approximate total phosphorus removal efficiency is estimated at 40 to 50 percent. Assuming a 40 percent removal rate of total phosphorus by installing the weir, the total reduction of phosphorus load to Clear Lake would be 588 lbs/year.

The passive sand/iron filtration system is designed to remove soluble phosphorus from the low flows at the project location. Water quality data collected by the CRWD at the site shows that soluble phosphorus makes up approximately 70-80% of the total phosphorus measured at the site during some time periods and flow conditions. According to data conducted by the University of Minnesota, sand/iron filters can remove up to 90% of soluble phosphorus. Assuming a more conservative removal rate of 40%, the installation of the sand/iron filter could potentially reduce the phosphorus load to Clear Lake by an additional 300-400 lbs per year.

The installation of the notched sheet pile weir and sand/iron filter will not significantly alter the hydrology or physical characteristics of the wetland. The top of the sheet pile weir will be set at an elevation of 1133 ft, which is 0.4 feet below the top of the culvert. The bottom elevation of the 6 inch wide notch in the weir will be set to 1129.4 ft, matching the elevation of the existing culvert invert. Under this configuration, the weir will not change the existing hydrologic controls of the wetland elevation. During high flow events, the water will flow over the top of the weir and through the culvert or over the road as it does under the existing conditions.

Since the bottom of the notch will be set at the same elevation as the culvert invert, the weir will not permanently impound water in the wetland or alter the hydrology or elevation of the wetland boundary. Rather, the weir will extend the retention time of water of the 1.25 inch runoff event in the wetland by approximately 48 hours.

A Hydrocad hydrologic model comparing the existing conditions to the proposed condition outflows under different runoff events is found in Appendix D. The figures in Appendix D show the existing and proposed runoff conditions under the 1.25 inch event,

1 year 2.20 inch event, 2 year 2.80 inch event, 10 year 4.80 inch event, and 100 year 6.00 inch event. As shown by these figures, there is no significant change in outflow in events above the 1.25 inch event.

There will be no impacts to the hydrology of the wetland by the proposed project. Although the wetland may have slightly elevated water elevations for a slightly longer period of time (approximately 48 hours) under the proposed conditions, it will not be a long enough period to cause a change in the vegetation community or wetland type.

Design Summary

An overview of the proposed design of the sheet pile weir and filter is shown overlaid on a recent aerial photograph in Figure 3. Plan and section views of the weir and filter design are shown in Figure 4. Additional detail of the filter design is shown in Figure 5.

The proposed design includes the installation of a sheet pile weir 32 ft in length with a 12 ft wide face and 10 ft wide sides. The weir will be driven into the ground upstream of the culvert and riprap will be placed at the base of the weir inside of the sheet pile structure.

As shown in Figure 3, the sand/iron filter is proposed to be 10 ft in width by 50 ft length and will be installed west of the channel upstream of the weir. As shown in Figures 4 and 5, the filter will be installed by excavating 20 inches below the existing grade and installing the filter materials. The filter cell will consist of three layers of material. The bottom layer will have a perforated 6 inch PVC pipe surrounded by coarse aggregate. A filter fabric will be placed on top of the coarse aggregate and the second layer will consist of 6 inches of sand. The top layer will consist of 8 inches of coarse sand mixed with 7% iron filings by weight.

Project Purpose

The proposed project is identified by the CRWD as a priority project in its TMDL Implementation Plan and Comprehensive Water Management Plan, with the goal of progressing towards meeting water quality goals in downstream water bodies.

Clear Lake is listed as an Impaired Water body due to phosphorus concentrations in excess of the State standards. A reduction of external phosphorus loading is necessary to meet water quality goals. Since a large portion of the particulate phosphorus is removed in large wetland complexes upstream of the site, it is necessary to target the removal of soluble phosphorus in order to progress towards water quality goals. Since the lake flows into the Clearwater River, an improvement in Clear Lake water quality will also improve water quality in the Clearwater River and other downstream water bodies.

Wetland Impacts

Wetland Impact Summary

- Area of Wetland Fill: 64 ft² of shallow marsh (Type 3)
- Area of Temporary Impacts: 500 ft² of shallow marsh (Type 3)
- The wetland fill is associated with the installation of the sheet pile weir and riprap. The installation of the sand iron filter is a temporary impact since neither the grade or hydrologic conditions of the wetland will not be altered by the installation of the filter.
- The Applicant proposes to start construction in Spring 2012.
- The Applicant submits that the proposed impacts do not require a replacement plan under the provisions of the Wetland Conservation Act, specifically Minnesota Rules 8420.0415 (No-Loss) and Minnesota Rules 8420.0420, Subp. 8(A) (De minimis Exemption).
- There will be no work conducted below the Ordinary High Water level of MN DNR Public Waters.

A Type 3 shallow marsh was identified on the proposed project site. The stream channel within the proposed project boundaries is not listed as a DNR Public Water. Clear Lake is listed as a DNR Public Water downstream of the proposed project site. All wetlands within and adjacent to the proposed project site appear to be tributary to “Waters of the US” and are therefore likely subject to Army Corps of Engineers jurisdiction.

According to Minnesota Rules 8420.0420, Subp. 8 (De minimis exemption), the de minimis amount of fill for a Type 3 wetland in a less than 50 percent area is 100 ft². Since the proposed fill amount of 64 ft² is less than the de minimis amount allowed without a replacement plan, a replacement plan is not required for this activity.

A 500 ft² area of wetland would also have temporary impacts from the installation of the sand iron filter. According to Minnesota Rules 8420.0415, temporary impacts do not require a replacement plan as long as the area of temporary impact is restored according to the conditions listed in Subpart H of the rule. This area is currently dominantly canary grass and occasionally mowed. The area will be allowed to return to this condition.

There would be no significant changes to the hydrology of the upstream wetland or Clear Lake downstream as a result of the project. The project does not change the runout elevation of the wetland. The project does not significantly change the volume of flow to the lake.

All necessary and appropriate erosion control measures will be taken during construction to prevent sedimentation or other impacts to wetlands or receiving waters adjacent to the project area.

Appendix C-Status of Other Approvals

Agency	Permit	Status of Approval
Meeker County	Public Works	Pending
Minnesota Pollution Control Agency	NPDES/SWPP	Pending
Department of Natural Resources	NA	NA
Army Corps of Engineers	Wetland Permit	Pending

Appendix D – HydroCAD Results

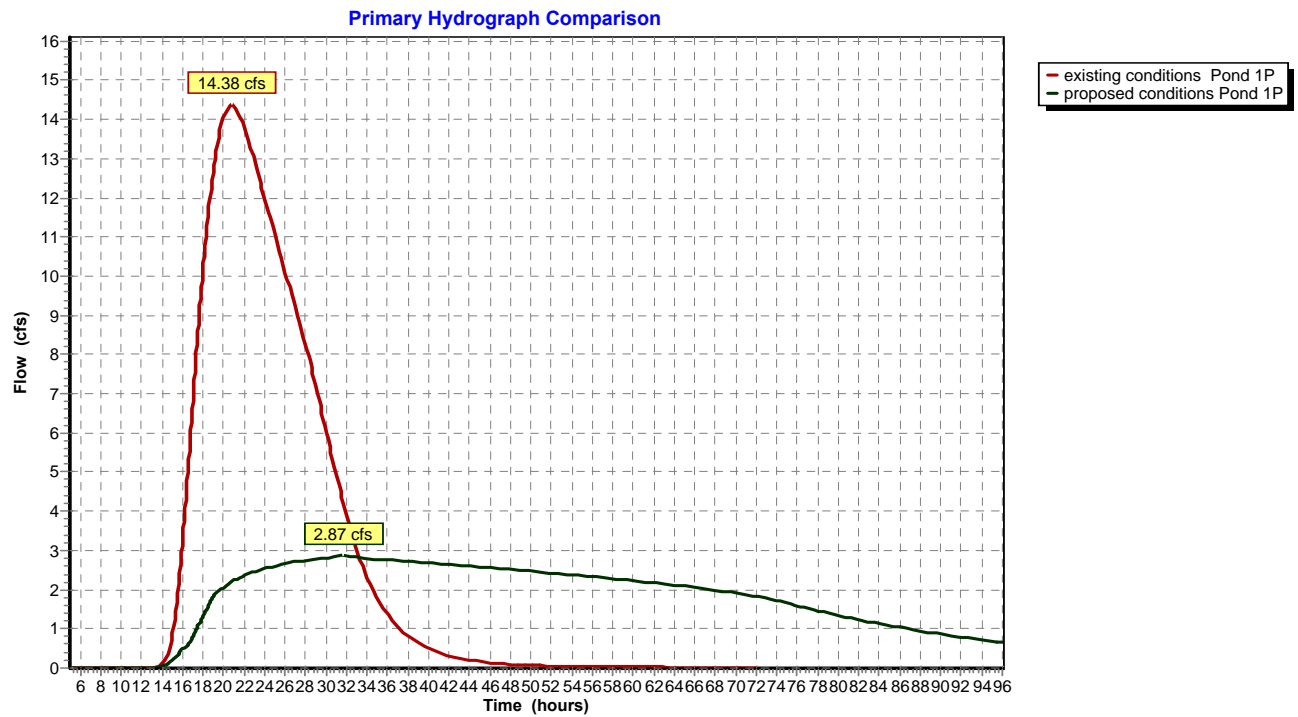
Weir comps proposed conditions

Prepared by Wenck Associates, Inc

HydroCAD® 9.10 s/n 02901 © 2010 HydroCAD Software Solutions LLC

Type II 24-hr 1.25" Rainfall=1.25"

Printed 12/14/2011



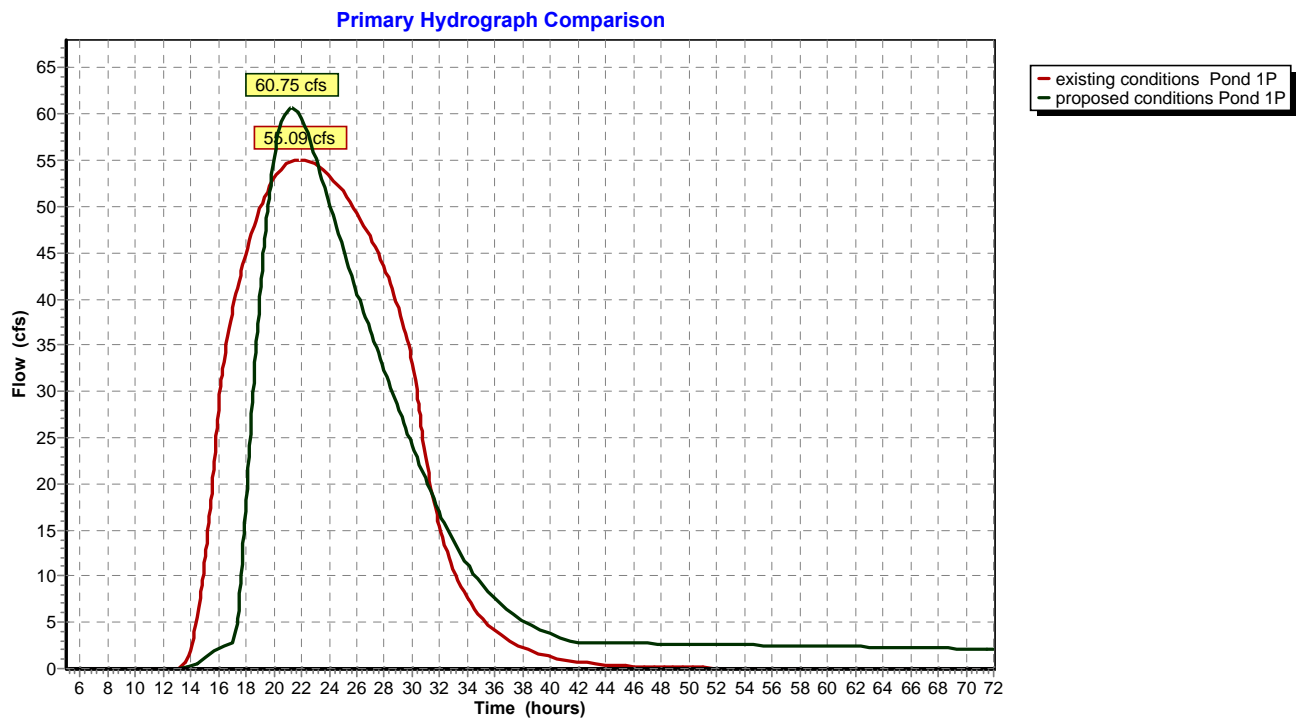
Weir comps proposed conditions

Prepared by Wenck Associates, Inc

HydroCAD® 9.10 s/n 02901 © 2010 HydroCAD Software Solutions LLC

Type II 24-hr 1yr Rainfall=2.20"

Printed 11/30/2011



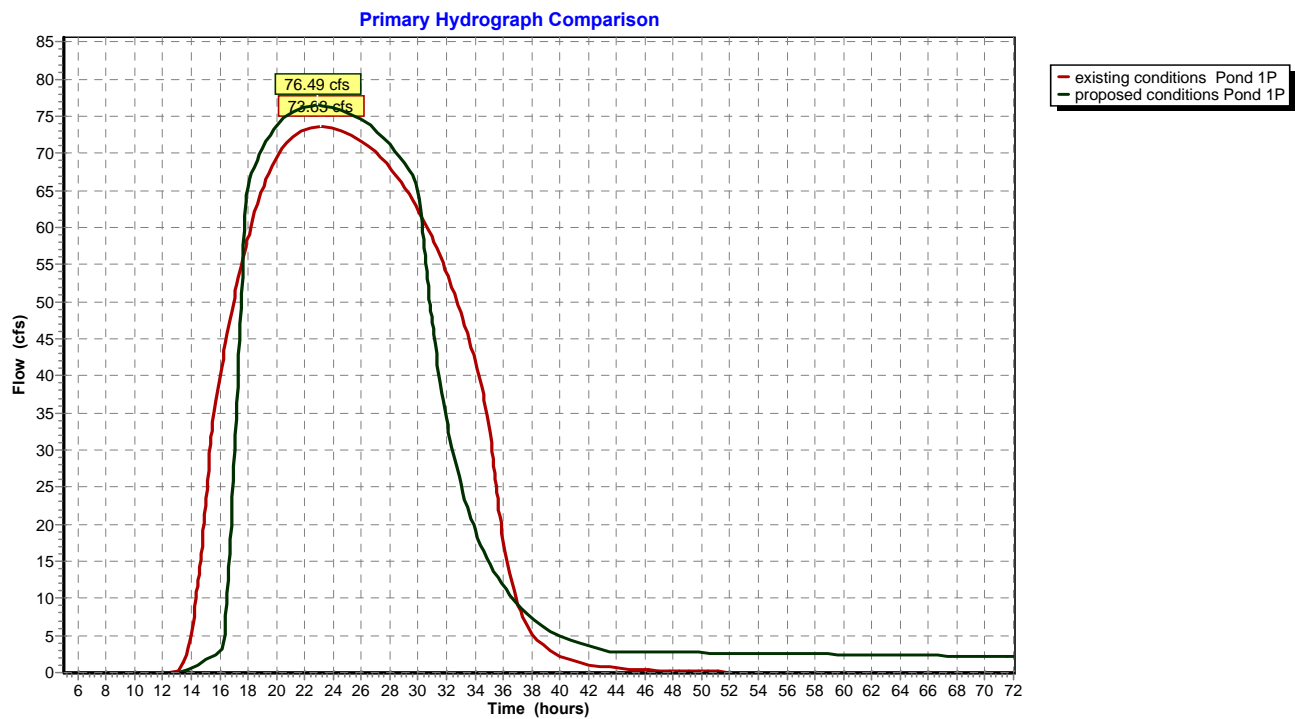
Weir comps existing conditions

Prepared by Wenck Associates, Inc

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Type II 24-hr 2yr Rainfall=2.80"

Printed 11/30/2011



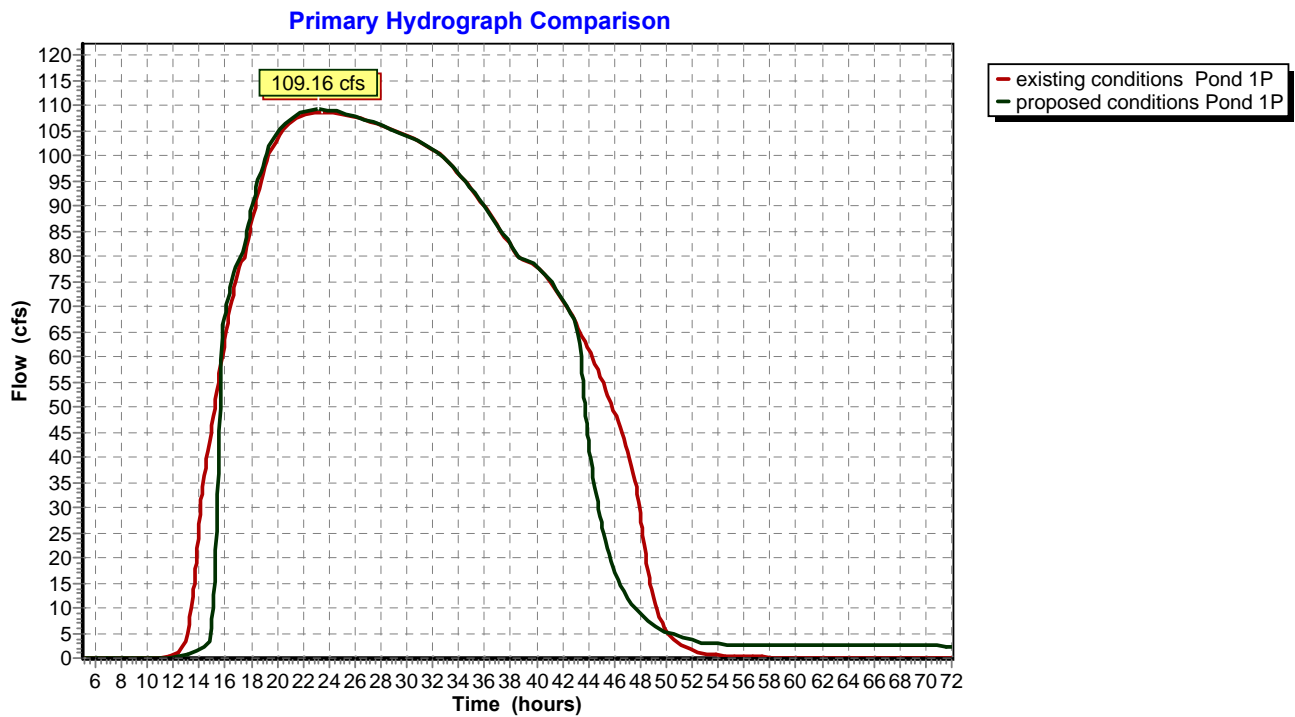
Weir comps proposed conditions

Prepared by Wenck Associates, Inc

HydroCAD® 9.10 s/n 02901 © 2010 HydroCAD Software Solutions LLC

Type II 24-hr 10yr Rainfall=4.80"

Printed 11/30/2011



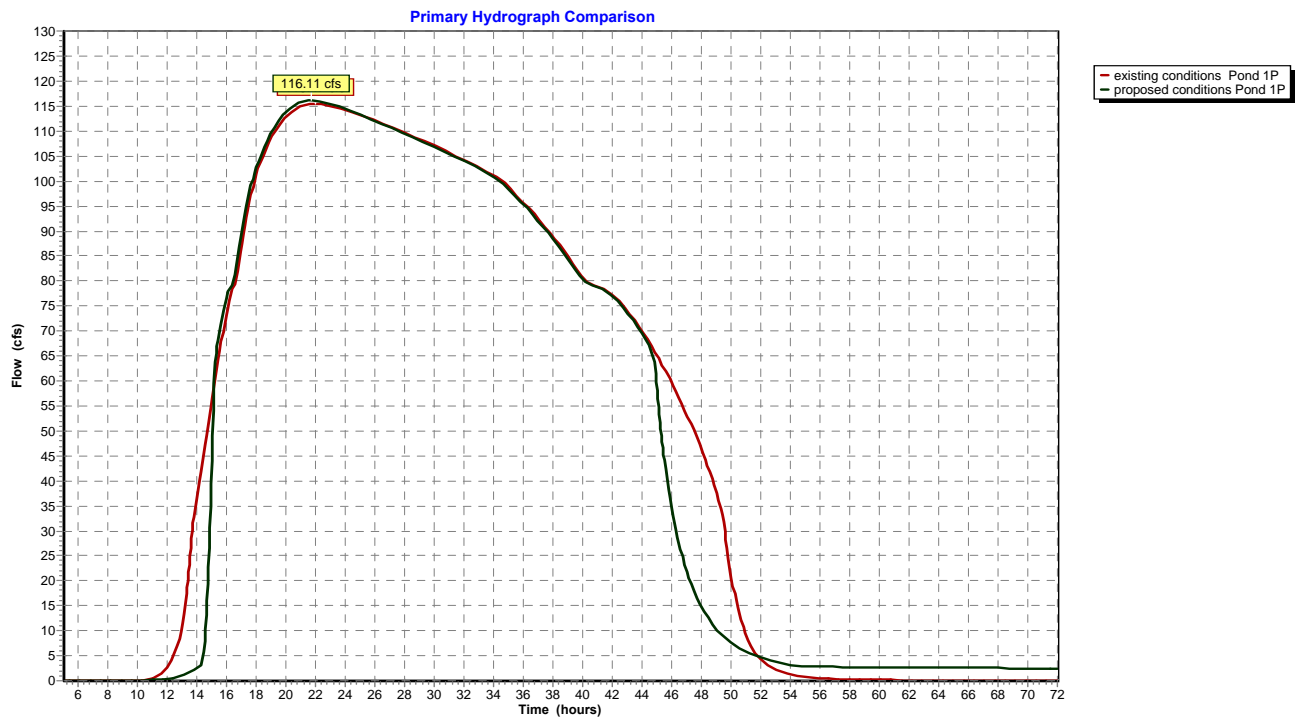
Weir comps existing conditions

Prepared by Wenck Associates, Inc

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Type II 24-hr 100yr Rainfall=6.00"

Printed 11/30/2011



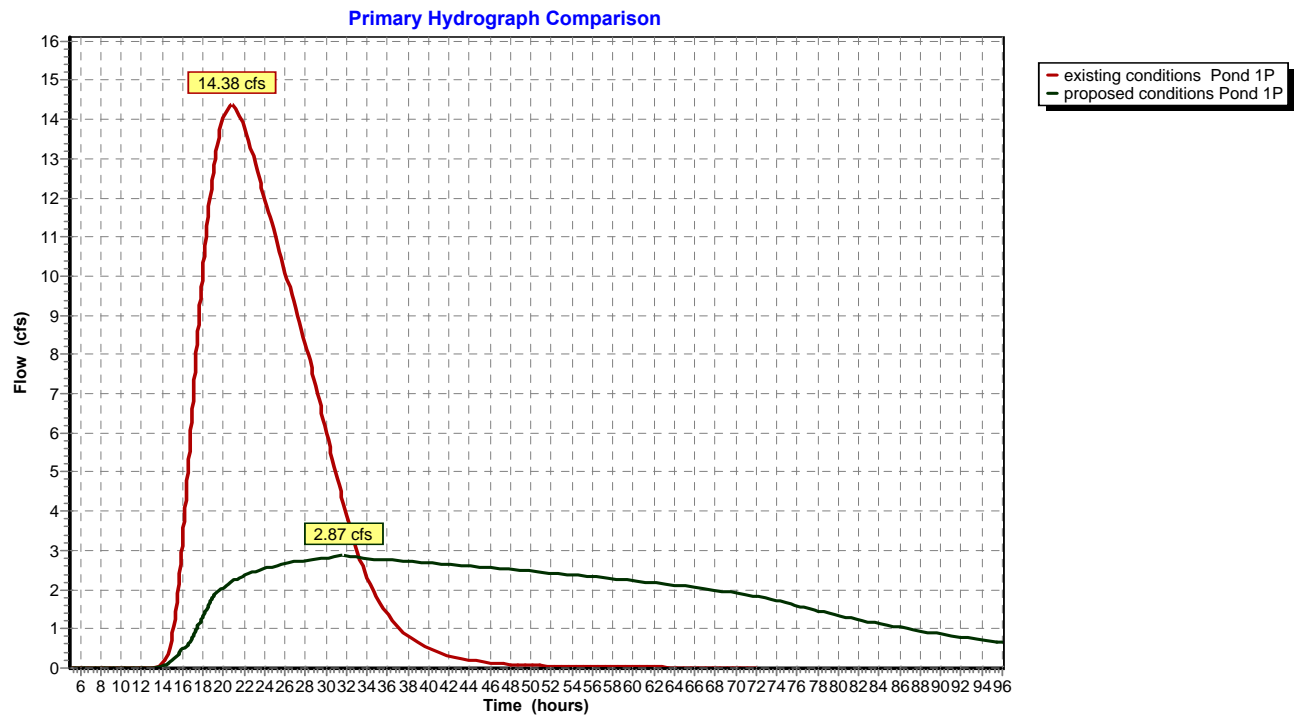
Weir comps proposed conditions

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Type II 24-hr 1.25" Rainfall=1.25"

Printed 12/14/2011



Figures



CLEARWATER RIVER WATERSHED DISTRICT
Site Location Map


 Engineers - Scientists
 Business Professionals
www.wenck.com

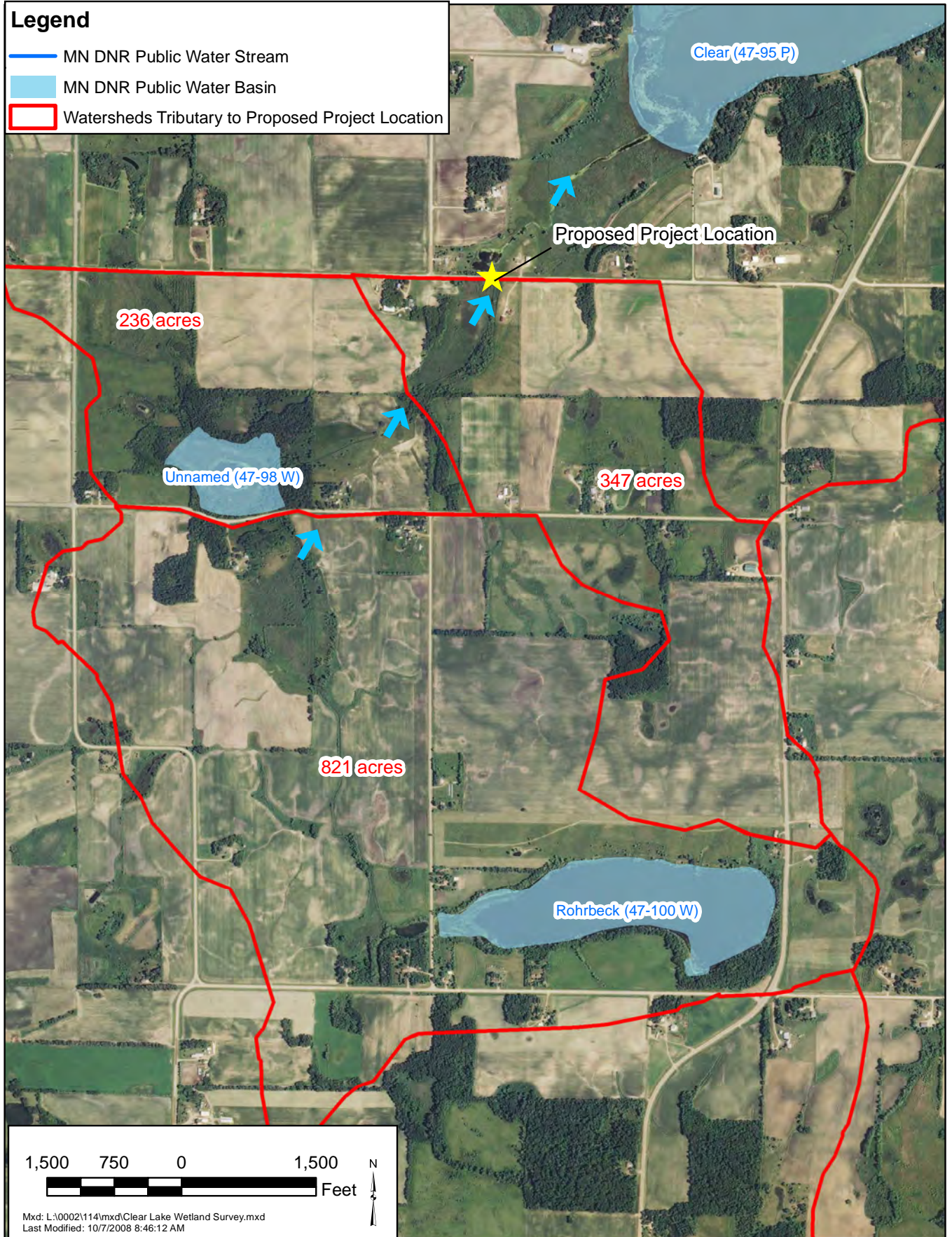
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 Maple Plain, MN 55359-0429
 1-800-472-2232

DEC 2011

Figure 1

Legend

- MN DNR Public Water Stream
- MN DNR Public Water Basin
- Watersheds Tributary to Proposed Project Location



CLEARWATER RIVER WATERSHED DISTRICT

MN DNR Public Waters and Tributary Subwatersheds

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Wenck

Wenck Associates, Inc. 1800 Pioneer Creek Center
Environmental Engineers Maple Plain, MN 55359-0429

DEC 2011


Figure 2

Legend

-  Proposed Weir
-  Proposed Sand Iron Filter
-  Approximate Wetland Boundary
-  County Ditch 44



2010 Aerial Photograph (Source: MN GEO)

150 75 0 150
 Feet



Path: L:\0002157\mxd\Figure 3-Project Overview.mxd
 Date: 12/14/2011 Time: 6:46:42 AM User: BolWD0186

CLEARWATER RIVER WATERSHED DISTRICT

Project Overview



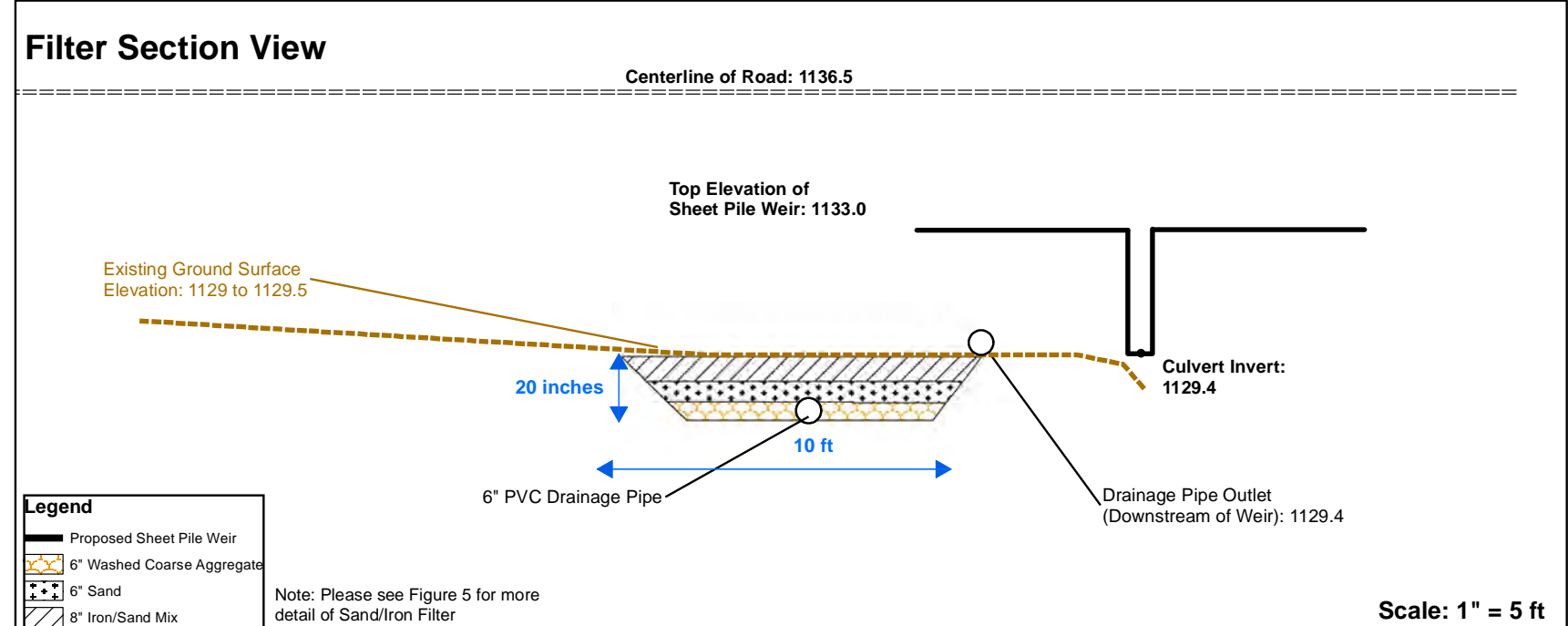
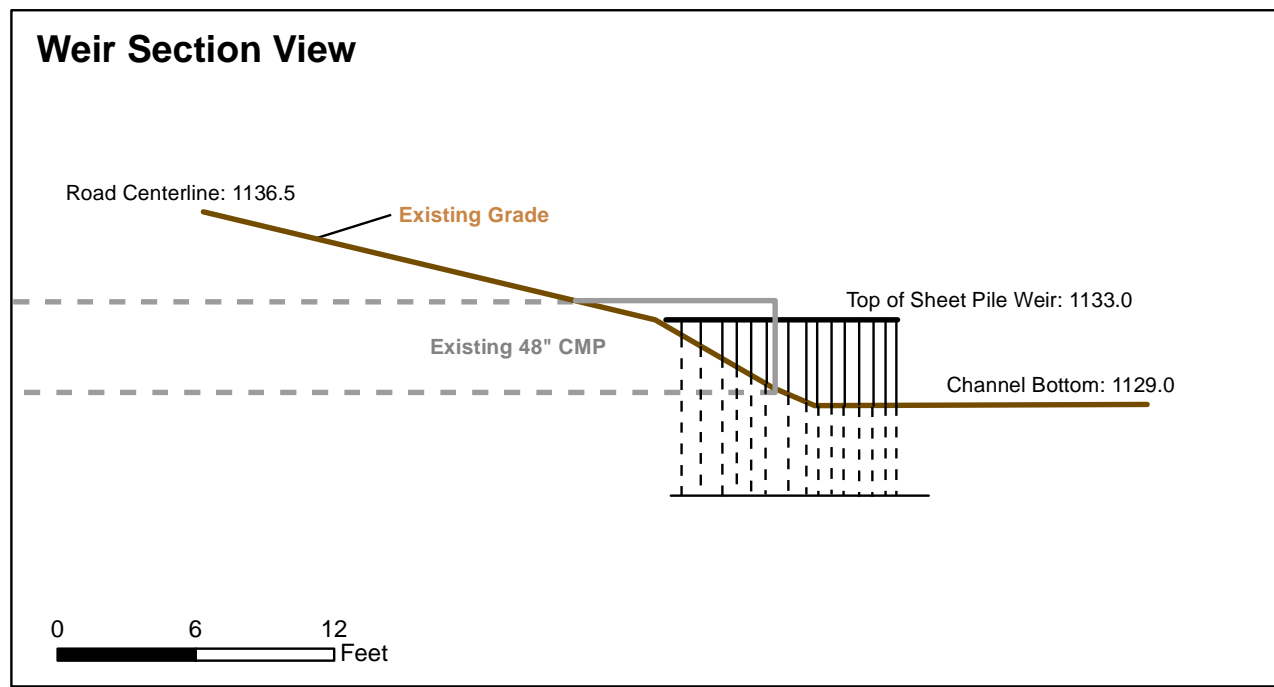
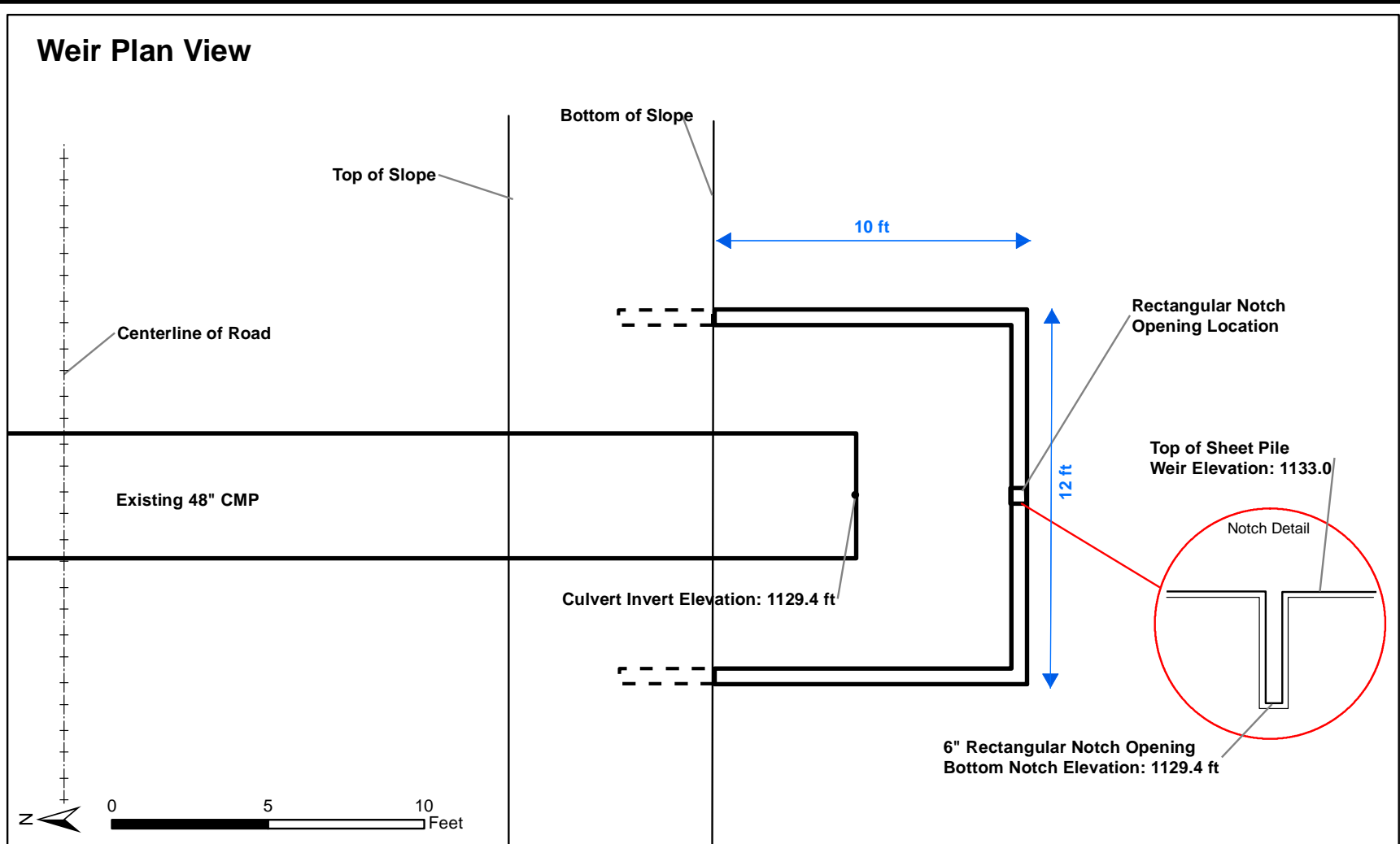
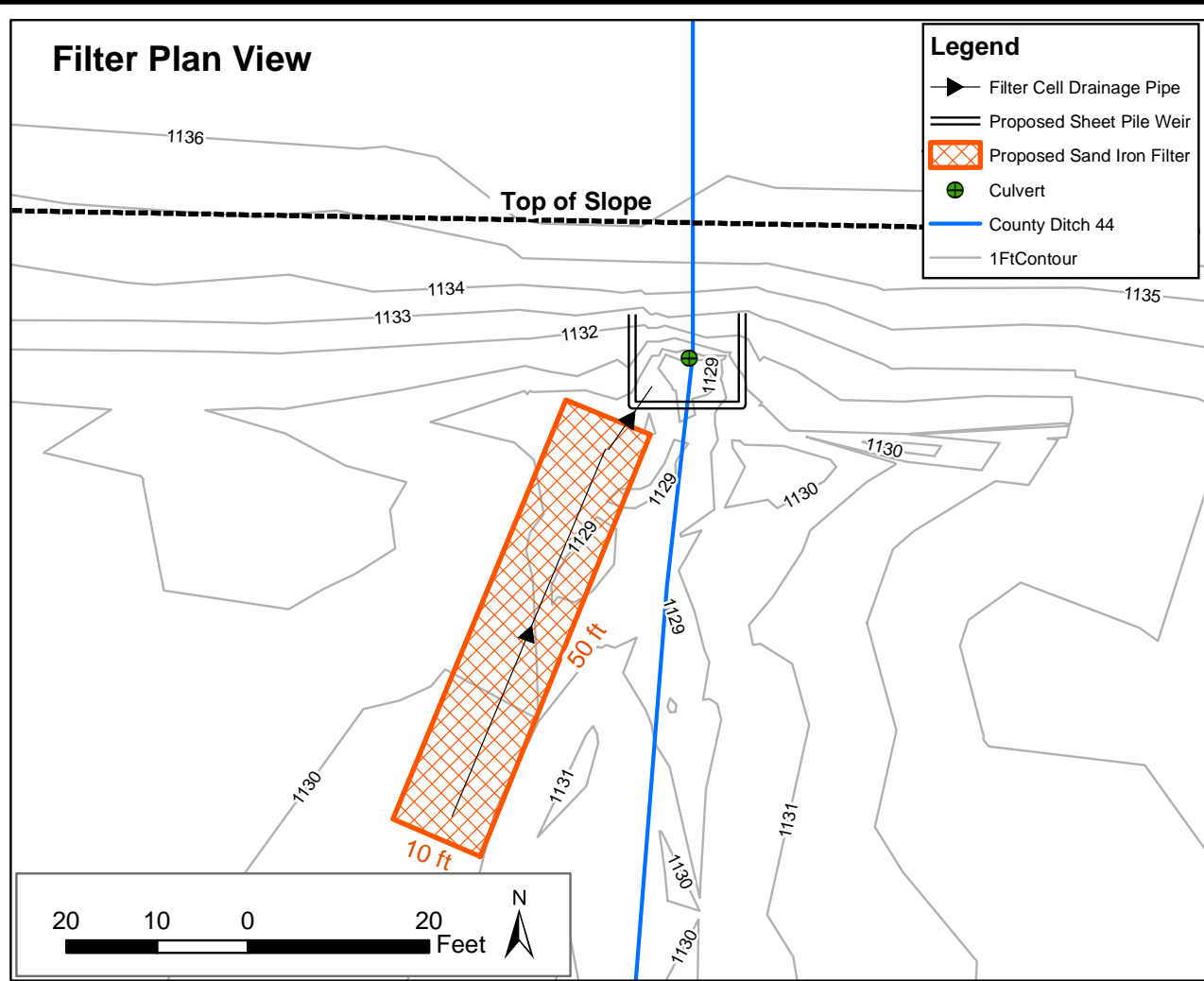
Engineers - Scientists
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DEC 2011

Figure 3



Path: L:\0002\157\mxd\Figure 4-Weir Detail.mxd

CLEARWATER RIVER WATERSHED DISTRICT

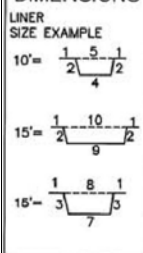
Project Details


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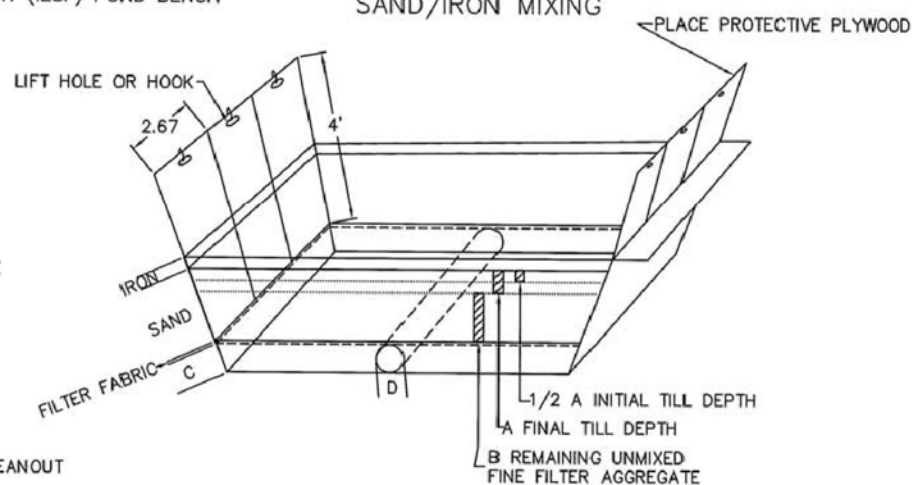
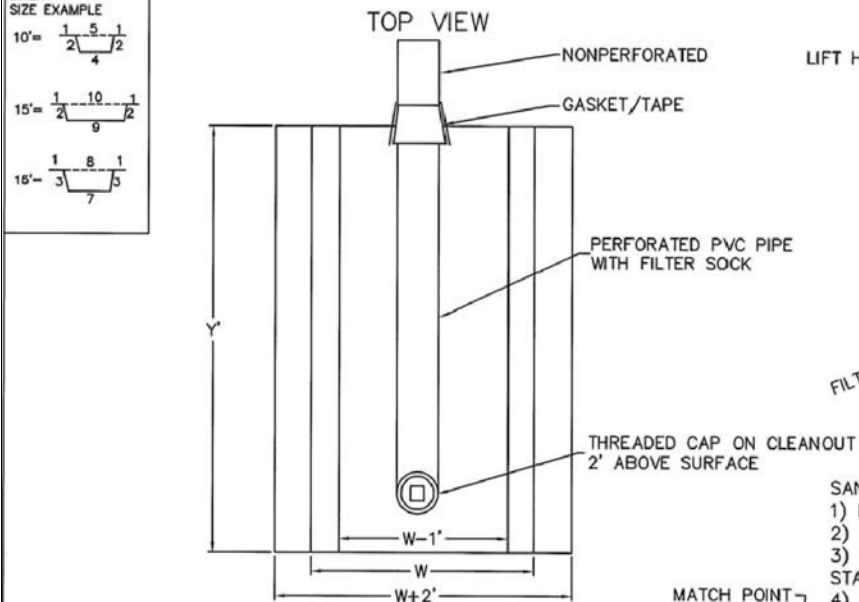
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Maple Plain, MN 55359-0429
1-800-472-2232

NOV 2011

Figure 4

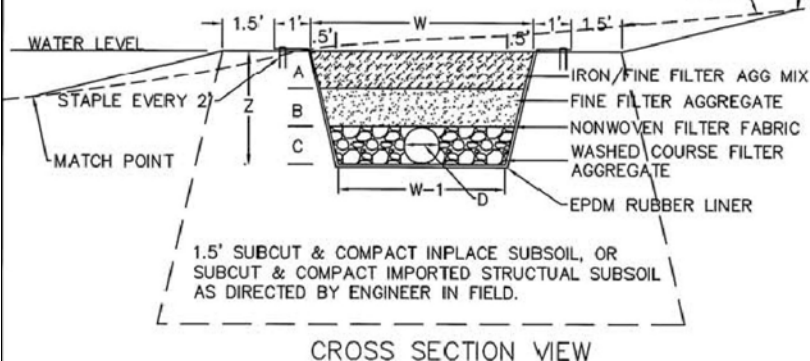


SAND/IRON MIXING



- 1) PUMP DOWN POND
- 2) IMPORT STRUCTURAL SUBSOIL (COMMON BORROW (CY)) (IF NEEDED)
- 3) SUBCUT & COMPACT SUBSOIL, TO 1.5' BELOW IESF BOTTOM TO 95% STANDARD PROCTOR (COMMON EX. CY (EV)) (IF NEEDED)
- 4) GRADE IN W+5' BENCH (COMMON EX. CY(EV)) OR ALTERNATE SHAPE SHOWN ON PLAN
- 5) EXCAVATE 'W' WIDE x 'Z' DEPTH BENCH (COMMON EX. CY(EV))
- 6) ROLL OUT 45 MIL EPDM LINER (EPDM LINER (SF))
- 7) INSTALL 'D' DIAMETER PVC PIPE & CLEANOUTS ('D' INCH PVC PIPE (LF))
- 8) PLACE COURSE FILTER AGGREGATE ON BOTTOM 'C' FEET (COURSE FILTER AGGREGATE 3149.2H (CY))
- 9) LAY FILTER FABRIC OVER TOP OF COURSE FILTER AGGREGATE AND PIPE (NONWOVEN FILTER FABRIC (SY))
- 10) PUT TEMPORARY PROTECTIVE PLYWOOD IN PLACE (OR OTHER METHOD APPROVED BY ENGINEER TO PREVENT PUNCTURE OF EPDM)
- 11) PLACE FINE FILTER AGGREGATE TO TOP OF BENCH (FINE FILTER AGGREGATE 3149.2J (CY))
- 12) PLACE 0.925 LBS/SF PER 2" DEPTH 'A' (3.7 LBS/SF FOR 8 INCH 'A' DIMENSION) IRON FILINGS ON TOP OF SAND (ETI-CC-1004(-8+50) CONNELLY GPM, INC. OR APPROVED EQUAL (TONS))
- 13) TILL IN IRON FILINGS TO $\frac{1}{2}$ 'A' DEPTH USING SMALL GARDEN STYLE TILLER
- 14) HAND MIX SIDES NEAR 2.67x4' PROTECTIVE PLYWOOD
- 15) SET TILLER DEPTH TO 'A' AND MIX AGAIN WITH SAME PROCESS
- 16) REMOVE PROTECTIVE PLYWOOD & RAKE SURFACE FLAT
- 17) STAKE LINER DOWN EVERY 2'

NOTE: ALL ITEMS LISTED WITHOUT A PAY ITEM ARE CONSIDERED INCIDENTAL INCLUDING: PUMPING POND, PLACING PLYWOOD, STAPLING LINER, TILLING, PIPE CLEANOUTS, RAKING SURFACE, ETC.



TYPICAL DIMENSION: A=8", B=6", C=6", D=6"
W=5' or 10'

Note: Design details developed by City of Prior Lake and the University of MN St. Anthony Falls Laboratory