FINAL REPORT

US Army Corps of Engineers
St. Paul District
Mississippi Valley Division

Feasibility Report Appendices

Marsh Lake Ecosystem Restoration Project

Minnesota River

Big Stone, Lac qui Parle, and Swift Counties, Minnesota

Photo by Ron Bolduan

Completed in conjunction with the Minnesota Department of Natural Resources

July 2011

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Appendix A – Project Management Plan

MARSH LAKE ECOSYSTEM RESTORATION PROJECT
Minnesota River
FEASIBILITY STUDY

PROJECT MANAGEMENT PLAN

Revised: December 10, 2010

1. Purpose.

a. The purpose of this document is to identify the scope, schedule and budget for the Marsh Lake Ecosystem Restoration Feasibility Study. The study will evaluate a variety of measures to restore the ecosystem in Marsh Lake, an impoundment on the Minnesota River near Appleton, Minnesota. This document will serve as the Project Management Plan attached to the Feasibility Cost Sharing Agreement (FCSA) between the Corps and the non-federal Sponsor. (Note: the FCSA refers to this document as the "Project Study Plan.") This document also establishes quality control expectations and procedures to ensure that the study products meet applicable standards.

b. This project management plan, hereinafter referred to as the PMP, defines the planning approach, activities to be accomplished, schedule, and associated costs that the Federal Government, the non-federal Sponsor, and other non-federal study partners will be supporting financially. The PMP, therefore, defines a contract between the Corps and the non-federal Sponsor, and reflects a "buy in" on the part of all the financial backers, as well as those who will be performing and reviewing the activities involved in the feasibility study. The PMP describes the initial tasks of the feasibility phase, continues through the preparation of the final feasibility report, the project management plan for project implementation and design agreement, and concludes with support during the Washington-level review of the final feasibility report.

c. The PMP is a basis for change. Because planning is an iterative process without a predetermined outcome, more or less time and costs may be required to accomplish reformulation and evaluations of the alternatives. Changes in scope will occur as the technical picture unfolds. With clear descriptions of the scopes and assumptions outlined in the PMP, deviations are easier to identify, the impact in either time or money is easily assessed, and decisions can be made on how to proceed.

d. The PMP is a basis for the review and evaluation of the feasibility report. Since the PMP represents a contract between the Corps and the non-federal Sponsors, it will be used as the basis to determine if the draft feasibility report has been developed in accordance with established procedures and previous agreements. The PMP reflects mutual agreements of the district, division, Sponsor and HQUSACE into the scope, critical assumptions, methodologies, and level of detail for the activities that are to be conducted during the feasibility study. Review of the draft report will be to insure that the study has been developed consistent with these agreements. The objective is to provide early assurance that the project is developed in a way that can be supported by higher headquarters.

e. The PMP is a study management tool. It includes scopes of work that are used for funds allocation by the project manager. It forms the basis for identifying commitments between the non-Federal Sponsor and the Federal government and serves as a basis for performance measurement.

2. Applicability. This PMP covers the feasibility stage of the project.

3. References.

a. Minnesota River Basin Reconnaissance Study, Section 905(b) (WRDA 1986) Analysis, Minnesota, South Dakota, North Dakota, and Iowa, dated December 2004 and approved January 13, 2005.

b. Feasibility Cost Sharing Agreement, Marsh Lake Feasibility Study, (Draft as of 02-May-07)

4. General/Background.

a. The Marsh Lake Feasibility Study was recommended in the December 2004 Minnesota River Reconnaissance study (approved January 13, 2005) and is authorized by a May 10, 1962 resolution of the House Committee on Public Works. Federal (Corps of Engineers) interest in Marsh Lake is based on the potential benefits of aquatic ecosystem restoration and the fact that the existing Marsh Lake Dam is owned and operated by the Corps of Engineers.

b. The Minnesota Department of Natural Resources (DNR) is sponsoring the study. The official Sponsor must sign the Feasibility Cost Sharing Agreement and provide 50% of all study costs through non-federal cash and in-kind contributions. The Corps of Engineers funds the remaining 50% of study costs.

c. The planning objectives are to restore aquatic and riparian habitat in Marsh Lake and restore connectivity between Lac qui Parle and the Pomme de Terre River. Marsh Lake is a shallow 5,000 acre reservoir with an average depth of approximately 3 feet. The Marsh Lake Dam, built by the Works Progress Administration in 1938, has a fixed crest elevation. The dam increased lake-like fish and wildlife habitat and created new colonial waterbird habitat, but it also disrupted natural flood plain functions and processes and blocked fish movement. The lack of natural flooding and drying cycles combined with increased sedimentation in the reservoir have caused a decline in plant diversity, water quality and associated fish and wildlife benefits over the years since the dam was built.

d. The study will evaluate a wide range of measures, including but not limited to those described in the "Agreement in Principle" signed by DNR Senior Managers in June 2003 (see Attachment A). The major features include modifying the Marsh Lake Dam to allow for periodic drawdowns, fish passage and more natural variation in water surface; returning the Pomme de Terre River to its pre-dam alignment; installation of breakwater structures to reduce sediment resuspension within the lake; and developing a management plan to define how the new features would be used. The study will also investigate policy issues and cost sharing requirements for implementation, considering the current Federal ownership of the dam and implications for future operation and maintenance responsibilities. The study team recognizes that many of the problems in Marsh Lake are symptoms of larger watershed issues. However, the team has chosen to limit the scope of this study to actions within the Lac qui Parle Wildlife Management Area. The study team believes that modifications in the vicinity of the dam and Marsh Lake are critical to restoring more natural habitat conditions. Opportunities to further enhance Marsh Lake habitat using actions in the greater watershed will be explored outside of this study.

e. The study will be conducted as outlined below. See Attachment B for a more detailed workflow plan.

1) Specify Problems and Opportunities: Meet with study team and others to refine problems and opportunities identified in the Reconnaissance Report and prior planning documentation. Conduct the National Environmental Policy Act (NEPA) scoping process.

2) Inventory and Forecast Future Conditions: Assess the existing condition of the Marsh Lake Dam and reservoir: foundation, structural integrity, hydraulic conditions, biodiversity, habitat conditions, water quality, etc. Obtain necessary field data, including but not limited to topographic surveys, sediment samples, and borings. Determine the "without project condition" of the Marsh Lake ecosystem.

3) Formulate Alternative Plans: Identify a system of structural and/or non-structural measures, strategies, or programs to alleviate problems or take

advantage of specific opportunities associated with water and related land activities within the project area.

4) Evaluate Effects of Alternative Plans: Assess the effects of combinations of measures to meet the planning objectives. Identify significant effects from institutional, public and technical perspectives. Conduct public involvement activities, coordinate with State and Federal agencies, and meet NEPA process requirements.

5) Compare Alternative Plans: Contrast the merits of identified alternatives with benefits, costs, effectiveness, and efficiency in meeting planning objectives .

6) Select a recommended plan: Select plan from identified alternatives and document.

7) Complete engineering investigations, geotechnical designs, mapping, hydraulics and hydrology, structural design, etc.

8) Prepare the feasibility study report and appendices for submission to Corps higher authorities to support a project recommendation to Congress.

   a. The study is estimated to cost $1,072,000,000 as detailed in Attachment C.

5. Technical Criteria Statement. This study will be conducted in accordance with Corps of Engineers criteria for Feasibility studies contained in the planning guidance notebook, ER 1105-2-100, and other applicable regulations and guidance. The final product will be a feasibility report documenting the study findings and National Environmental Policy Act (NEPA) determinations and making appropriate recommendations to Higher Authorities.

6. Quality Control.

a. This document is intended to serve as the Project Management Plan and the Quality Control Plan. The coordination, preparation and vertical team review of this scope of work assists in maintaining quality control.

b. Agency Technical Review (ATR) is the primary method of quality control. ATR review will be ongoing through product development, rather than a cumulative review performed at the end of the investigation. The ATR review will be performed by a sister Corps District in coordination with the Ecosystem Restoration Planning Center of Expertise. The ATR team will include one person from a Division other than Mississippi Valley Division. The expertise and technical backgrounds of the ATR team members will qualify them to provide a comprehensive technical review of the product. The following disciplines will be required for the ATR team: hydraulics/hydrology, geotechnical engineering, general engineering/layout, structural engineering, cost engineering, plan formulation and environmental.

c. ATR comments and responses will be recorded in the online Dr. Checks system (www.projnet.org). Documentation of the independent technical review will be included with the submission of the reports to Mississippi Valley Division and HQUSACE. All comments resulting from the independent technical review will be resolved prior to forwarding the feasibility study to higher authority and local interests. The report will be accompanied by a certification, indicating that the independent technical review process has been completed and that all technical issues have been resolved.

d. Value Engineering Plan. Value Engineering (VE) evaluations provide another method for ensuring quality. The goal of VE on this project is to ensure that a full array of alternatives is considered in

order to maximize cost effectiveness. A VE study will be conducted during the plan formulation before the final array of alternatives has been defined. The VE study objectives will be to build upon the design team's preliminary plan formulation efforts, clarify the functional requirements of project features, and recommend additional conceptual alternatives to meet those requirements. The same team that performs ATR will conduct the VE study with additional technical representatives from the Sponsor. Sponsor participation will be an item of in-kind services.

e. Quality control will also be monitored via internal/District functional element reviews, Local Sponsor reviews, and Higher Authority/vertical team conferences and reviews.

f. The Sponsor will be responsible for quality control over deliverables provided as in-kind contributions. The Corps will verify that such contributions meet negotiated requirements and standards before granting cost-sharing credit for those contributions.

g. Review Plan. This feasibility study will not be subject to Independent External Peer Review (IEPR). The study is not anticipated to generate influential scientific information that would be either controversial or of sufficient risk and magnitude as to require Independent External Peer Review as described in Engineering Circular 1165-2-209. The draft feasibility report and environmental assessment will be distributed for public review as part of the normal NEPA review process. The review will be scheduled after the Alternative Formulation Briefing and before submitting the report to the Civil Works Review Board in accordance with the study schedule defined in the Project Management Plan.

7. Risk Assessment. The following issues could lead to delays or increased costs:

a. Inadequate funding: Less funding is likely to be available each year than would be necessary for optimal progress on study tasks. Delays in funding (either federal or non-federal) will result in inefficiencies in the planning process and overall increased cost.
b. Sensitive environmental or cultural resources: Particular attention will be paid to environmental issues throughout the study to ensure that project recommendations are implementable.

c. Weather conditions: certain tasks, including but not limited to surveying, archeological investigations, biological surveys and similar assessments are weather-sensitive. These tasks will be scheduled to take advantage of anticipated weather conditions. If these tasks are delayed due to funding or other issues, the delay may significantly impact completion of the study on schedule.

8. Acquisition Plan. Work required for this study will be accomplished mainly by in-house Corps staff and non-federal in-kind services. Portions of the study will be accomplished by private firms under existing Indefinite Delivery Contracts with the Corps of Engineers. Services may also be obtained through small purchase actions when appropriate. The following major contracted acquisitions are anticipated:

a. Sediment sampling and testing ($20,000)
b. Geotechnical borings and testing ($50,000)

9. Communication Plan. The communication plan addresses internal project delivery team (PDT) and external communications.

a. Internal PDT Communications: PDT distribution lists will be established that include all in-house team members, Sponsors, and other stakeholders. All general project notifications will be delivered using these distribution lists. The project manager will determine which correspondence is appropriate for each audience. E-mail will be the primary mode of communication within the PDT.

b. External communications: All news releases will be coordinated with St. Paul District Public Affairs. An initial release announcing the start of the study will be made after the cost-sharing agreement is signed. Subsequent releases to announce public meetings will be made as needed. Other releases will be considered as the study develops. Postings on the St. Paul District's website and the DNR's sites will also be used to communicate to the general public.

c. A pre-product customer survey will be conducted at the initial team meeting. A post-product customer survey will be completed after the study is finalized.

d. Public Involvement: Public involvement will include one NEPA scoping meeting early in the study and an informational meeting after the draft report has been distributed for public review. These meetings will be planned, facilitated, publicized and documented by the Sponsor as work-in-kind. Additional public involvement will include hosting additional meetings as appropriate, and preparing news releases, on-line newsletter articles, and web pages. The Sponsor will perform the majority of these activities as work-in-kind and coordinate with St. Paul District Public Affairs.

10. Change Management Plan.

a. All changes to the scope, schedule or budget for this study must be coordinated with the Project Manager. Whenever it becomes apparent that the current budget or schedule is likely to be inadequate, project delivery team (PDT) members must notify the Project Manager so appropriate actions can be taken. The PMP is intended to be a living, flexible document, but it also represents a contract between the Corps and the non-federal Sponsor; therefore, changes must be coordinated before obligations are incurred by any party.

b. The Project Manager, in consultation with the Study Management Team and Executive Committee, will decide whether proposed changes are acceptable. The Project Manager will revise the PMP as necessary to reflect approved changes.

11. Project Delivery Team.

a. Executive Committee: The Sponsor and the Government will appoint named senior representatives to an Executive Committee, according to the Feasibility Cost Sharing Agreement (FCSA). The executive committee will include the St. Paul District's Chief, Planning, Programs and Project Management Division and the Director of the Fish and Wildlife Division, Minnesota Department of Natural Resources. The Executive Committee will function as described in the FCSA.

b. Study Management Team: The Executive Committee will appoint representatives to serve on a Study Management Team. The Study Management Team will keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PMP. The Study Management Team will include the St. Paul District's project manager and appropriate counterparts from the Minnesota Department of Natural Resources.

c. Sponsor and key study stakeholders:

Name	Organization	Phone	E-mail
Sponsor's Primary Representatives			
Varland, Ken	MN DNR, Wildlife	(507) 359-6030	ken.varland@dnr.state.mn.us
Aadland, Luther	MN DNR, Ecological Services	(218) 739-7449	luther.aadland@dnr.state.mn.us
Haukos, Norm	MN DNR Fisheries	(320) 839-2656	norm.haukos@dnr.state.mn.us
Trauba, David	MN DNR, Wildlife	(320) 734-4451	david.trauba@dnr.state.mn.us
John Schladweiler	MN DNR, Wildlife	(507) 359-6031	john.schladweiler@dnr.state.mn.us
Key Stakeholders			
Gelvin-Innvaer, Lisa	MN DNR	(507) 359-6033	lisa.gelvin-innvaer@dnr.state.mn.us
Fouchi, Cathi	MN DNR	(507) 359-6034	cathi.fouchi@dnr.state.mn.us
Lauer, Jack	MN DNR	(507) 359-6047	jack.lauer@dnr.state.mn.us
Popp, Walt	MN DNR	(651) 345-3331	walter.popp@dnr.state.mn.us
Kolander, Todd	MN DNR, Ecological Services		todd.kolander@dnr.state.mn.us
Kavanagh, Josh	Ducks Unlimited	(320) 220-1718	jkavanagh@duck.org
Kroger, Dick	CURE	(507) 768-3608	kroger@frontiernet.net
Moore, Patrick	CURE Executive Director	(320) 269-2984	cure-ed@info-link.net

d. St. Paul District Project Delivery Team:

Name	**Discipline**	**ORG**	**Phone***	**E-mail****
Thury, Theresa	PM-P, Programs	B6H4100	5309	theresa.j.thury
Wyatt, Michael	PD-F, Planning/Project Mgmt	B6H4200	5216	michael.d.wyatt
	PM-E, Env and Econ	**B6H4300**		
Awsumb, Lance	Economics		5379	lance.g.awsumb
Wilcox, Dan	Environmental		5276	daniel.b.wilcox
Gnabasik, Virginia	Cultural		5262	virginia.r.gnabasik
LeClaire, Keith	GIS		5491	keith.r.leclaire
	EC-D, Cost&Specs&General	**B6L1DCS**		
Bray, Matt	Cost & Specs		5647	matthew.m.bray
Tschida, David	General Engineering		5585	david.m.tschida
Behling, Chris	EC-D, Geotech	B6L1DGG	5572	christopher.w.behling
	EC-D, SMEA	**B6L1DSM**		
Sauser, Phillip	Structures		5722	phillip.w.sauser
TBD	Mechanical			
TBD	Electrical			
Lewis, Corby	EC-H, Hydraulics	B6L1HHC	5635	corby.r.lewis
Chamberlin, Ferris	EC-H, Water Control & Hydrology	B6L1HWC	5619	ferris.w.chamberlin
Peterson, Ken	RE-PA, Planning & Appraisal	B6N0PA0	5359	kenneth.j.peterson
Linder, Dawn	CT-C, Contracts	B6P0A00	5407	dawn.m.linder
Bertschi, Tim	OP-RNW, Recreation and NR Project Office		701-232-1894	tim.s. bertschi
Melby, Randy	OP-RNW, Lac Qui Parle Project		320-269-6303	randy.d.melby

* All Phone numbers begin with "**651-290**" unless shown otherwise.
** All e-mail addresses end with "**@usace.army.mil**"

12. Customer Involvement/in-kind services. The Sponsor and other stakeholders will be intimately involved in this study. Some of that involvement may qualify for credit against the non-federal cost-share as in-kind services, as detailed below.

a. In-kind services (work-in-kind) are locally provided services and/or supplies that the Sponsor may provide to offset a portion of their cost share for the feasibility study. The use of in-kind services in lieu of cash for feasibility studies is authorized by Section 105 of the Water Resources Development Act of 1986, as amended. Work-in-kind is an option for the Sponsor within certain guidelines, and the value of the actual costs of negotiated in-kind services can reduce the Sponsor's cash requirement. Work-in-kind is allowable when it: 1) provides value added, and/or 2) results in completing necessary work faster, cheaper, or better than the Corps of Engineers could alone or by contract. Work-in kind must be identified and documented clearly in the PMP before the work is begun. In-kind services must be in accordance with federal regulations, including OMB Circular A-87.

b. Work-in-kind must be performed by the Sponsor or by another non-federal partner under an approved third-party agreement with the Sponsor. All third-party agreements must be in accordance with the Feasibility Cost Sharing Agreement and be approved by the Corps of Engineers.

c. The process for claiming credit for in-kind services is:
   1) Negotiate the scope of services and associated costs between the Sponsor and the Corps,
   2) Sponsor performs the work and produces the required product,
   3) Sponsor documents the actual expenditures made to accomplish the work-in-kind,
   4) Corps verifies acceptability of the product relative to negotiated requirements,
   5) Corps credits the local Sponsor with an in-kind service credit.

d. Marsh Lake is integral to the Sponsors' Lac qui Parle Wildlife Management Area. Because the DNR is currently managing this resource, it is uniquely qualified to perform much of the analyses required in the study. This project management plan will not attempt to precisely scope or quantify every task to be completed as in-kind services. Rather, only those tasks that could reasonably be done by the Corps will be estimated in detail (such as topographic and archeological surveys). Cost estimates for other tasks that are less defined but clearly "add value" will be treated with great flexibility to allow for full collaboration during the study.

e. The value of in-kind services is estimated to be $234,000 from the Minnesota Department of Natural Resources as described in Paragraph 13—Scope of Work and the attached study cost estimate spreadsheets. (Note: as the study progresses, it is likely that additional in-kind services will be added via PDT recommendations and Executive Committee approval actions).

13. Scope of Work. The scope of work for each task and discipline is described in the attached study cost estimate spreadsheet. Major tasks and deliverables are described below and assigned to either the Corps or Minnesota DNR for primary responsibility:

a. Public Involvement:
   1) (DNR) Host, publicize and facilitate two public meetings:
      a. Public coordination meeting early in the study, and
      b. during the public review of the draft report, collect public input resulting from the meetings and provide written summaries for inclusion in study documents.
   2) (DNR) Maintain current project information for the public on the Internet, prepare newsletters, press releases, etc. as deemed appropriate throughout the study.
   3) (Corps) Participate at public meetings. Review and approve newsletters, press releases and proposed Internet content.

b. Institutional Studies:
   1) (Corps) Investigate project history, intergovernmental relations, and cost-sharing arrangements for implementing project recommendations

c. Social Studies:
    1) (DNR) Conduct recreation needs analysis and justification for recreation features, possibly including a bike trail and bridge, boat ramps, and other amenities. Tasks may include:
        a. Compile Corps and MN DNR recreation visitation records over last 10 years
        b. Meet with Corps LQP project manager, recreation specialist to obtain data
        c. Compile MN DNR LQP State Park visitation data, creel survey data, etc.
        d. Forecast future recreational activity in the project area
    2) (DNR) Write draft Feasibility report sections to document existing, future without-project, and future with-project recreation conditions. Provide documentation to support all recreation features included in the recommended plan.

d. Cultural Studies:
    1) (Corps) Provide scope of work for cultural resources survey, and coordinate with SHPO
    2) (DNR) Perform field archeology/cultural resources survey

e. Environmental Studies: Environmental design and NEPA process
    1) (Corps) Prepare the Environmental Assessment and Section 404(b) evaluation
    2) (Corps) Edit and finalize feasibility report sections, environmental appendix and management plan/operation manual
    3) (Corps) Prepare GIS products for EA, displays for public meetings
    4) (Corps) Obtain sediment testing for 404(b) evaluation & State Water Quality Certification
    5) (Corps) Coordinate approval of planning models with Corps Planning Centers of Expertise
    6) (Corps) Assist DNR in setting goals, objectives and constraints.
    7) (Corps) Assist DNR in assessing existing conditions, developing operation plans and forecasting future conditions.
    8) (DNR) Inventory existing conditions in Marsh Lake, Pomme de Terre River and Lac qui Parle, including all items noted in Attachment B, Workflow plan. Use existing information where possible, and collect any new information necessary to document conditions that is not included in other specific deliverables.
    9) (DNR) Forecast future conditions without project. Use professional judgment and approved models.
    10) (DNR) Develop operating plans for proposed features/changes.
    11) (DNR) Forecast future conditions with-project, define effects of proposed changes and assess project benefits/impacts. Use professional judgment and approved models.
    12) (DNR) Write draft Feasibility report sections describing existing, future without-project and future with-project conditions and proposed operation plans.

f. Fish and Wildlife: (Corps) Fulfill Fish and Wildlife Coordination Act requirements

g. Economic Studies: (Corps) Cost effectiveness and incremental cost analysis of alternatives

h. Surveying and Mapping:
    1) (DNR) Obtain field surveys including:
        a. Pomme de Terre cross sections: approximately 34 sections with soundings, avg. 1000 feet per section
        b. Embankment profile and sections:
            i. Complete road/embankment profile (9900 feet);
            ii. 99 cross sections, define embankment and areas within 100 feet upstream and downstream of embankment toes (upstream area is under water)
        c. Soundings and surveys near outlet structures

i. Complete topo mapping at existing structures and parking area
ii. Soundings above and below existing spillways: 10 foot grid within 100 feet upstream and 200 feet downstream of structures.

2) (DNR) Prepare mapping, digital terrain models, and cross sections for use in engineering design and GIS applications

i. Hydrology and Hydraulics:
1) (DNR) Lead the effort to refine problems and opportunities, project goals, objectives and constraints as described in Attachment B, Workflow plan. Conduct discussions and analyses necessary to finalize design parameters for features to be constructed.
2) (DNR) Participate in hydrologic design discussions and review Corps HMS modeling
3) (DNR) Participate in field inspections of the Pomme de Terre River existing and proposed channels
4) (DNR) Assist with designing fish passage structures: review Corps HEC-RAS
5) (Corps) Perform hydrologic and hydraulic analyses: Marsh Lake and Pomme de Terre hydrology (discharge duration, frequency analyses)
6) (Corps) Route historic hydrographs through Marsh Lake using a simple HMS model
7) (Corps) Produce stage duration relationships for different outlet weir configurations
8) (Corps) Design outlet weirs and other hydraulic features of outlet structures
9) (Corps) Design hydraulic features of Pomme de Terre re-alignment (diversion, bridge, new channel, scour protection, etc.)
10) (Corps) Determine Rosgen class of Pomme de Terre cross sections
11) (Corps) Conduct field inspections of Pomme de Terre geomorphology (existing and proposed channels)
12) (Corps) Design fish passage structures using HEC-RAS
13) (Corps) Design wave protection for the entire Marsh Lake Dam
14) (Corps) Prepare GIS information as needed to display hydrologic and hydraulic conditions
15) (Corps) Write hydraulics appendix for the feasibility report and pertinent portions of the main report and environmental assessment.

j. Foundations and Materials:
1) (Corps) Geotechnical design
2) Borings and testing
3) Stability issues at all structures and embankment
4) Review Periodic Inspection issues
5) Geotechnical appendix for report

k. Designs and Cost Estimates: (Corps) Structural and layout issues, construction cost estimates
l. Structural designs
1) Primary outlet (modify or replace)
2) Variable-crest outlet/emergency spillway
3) Fish passage
4) Pomme de Terre re-alignment
1. Bridge
2. Diversion structure
5) Incorporate pedestrian/bike traffic across the project
6) Structural appendix to report
7) Modify abandoned fish rearing pond
8) Modify Lewisberg Road Culverts

m. Mechanical designs
1) Operable gates

n. General Engineering
    1) Drawings
        1. Site plans for structures
        2. Typical sections
        3. Pomme de Terre re-alignment layout
        4. Fish passage layout
    2) Quantities

o. Cost estimating
    1) Estimates for all alternatives (assume 4 alternatives)
    2) Appendix to report

p. Real Estate Studies: (Corps and DNR) Assess real estate needs for project site, borrow and disposal areas

q. Study Management: (Corps and DNR) Administration, cost tracking, general coordination, Project Cooperation Agreement development

r. Plan Formulation: Developing, comparing and assessing alternatives
    1) (Corps) Assist in establishing problems/opportunities/goals/constraints
    2) (Corps) Assist in establishing future without-project condition
    3) (Corps) Lead alternative formulation and screening efforts
    4) (Corps) Conduct Milestone meetings: Feasibility scoping meeting, Alternative Formulation Briefing, and Civil Works Review Board (in Washington, DC)
    5) (Corps) Independent Technical Review
    6) (Corps) Value Engineering study
    7) (DNR) Participate in Milestone meetings
    8) (DNR) Participate in a Value Engineering study

s. Report Preparation:
    1) (Corps) Future without-project analysis
    2) (Corps) Feasibility scoping meeting package
    3) (Corps) Alternatives analysis for AFB meeting
    4) (Corps) Draft report for public review and Civil Works Review Board
    5) (Corps) Final report
    6) (DNR) Review draft report before public review

14. Budget By Discipline: See Attachment C.

15. Deliverable and Prerequisite Schedule:

Activity ID	Activity Name	Duration (Days)	Start	Finish
Plan Formulation		2113.0d	02-May-07 A	27-Sep-13
FEA2420	Plan Formulation - Federal	670.0d	02-May-07 A	4-May-10
FEA2429	Feasibility Scoping Meeting	0.0d		11-Dec-07 A
FEA2430	AFB Project Doc	10.0d	05-May-10*	18-May-10
FEA2440	AFB Tech Review	19.0d	19-May-10	15-Jun-10
FEA2450	AFB Policy Compl	30.0d	19-May-10	30-Jun-10
FEA2460	Feas Alternative Formulation Briefing (AFB)	0.0d		19-Jul-10*
FEA2470	AFB Guid. Memo	10.0d	20-Jul-10	2-Aug-10
Feasibility Report		970.0d	23-Jul-07 A	18-Jul-11
FEA2480	Draft Feasibility Rpt/NEPA	38.0d	19-Aug-10	13-Oct-10
FEA2490	Conduct ITR	148.0d	23-Jul-07 A	11-Jan-08 A
FEA2492	Conduct ATR (Future)	90.0d	19-May-10	24-Sep-10
FEA2500	Submit Draft Feasibility Report	0.0d		13-Oct-10
FEA2505	HQ Policy Compliance Review	30.0d	14-Oct-10	26-Nov-10
FEA2570	Feas Review Conference (FRC)	0.0d		26-Nov-10
FEA2571	Feasibility Proj Guide Memo (PGM)	0.0d		26-Nov-10
FEA2575	Feasibility Public Review Period Start	0.0d	14-Oct-10	
FEA2577	Public Review Comments	30.0d	14-Oct-10	26-Nov-10
FEA2580	Prepare Final Report & Summary	19.0d	29-Nov-10	23-Dec-10
FEA2590	Issue Division Engineer's Transmittal Letter	0.0d		23-Dec-10
FEA2640	Washington Level Policy Review	19.0d	27-Dec-10	24-Jan-11
FEA2650	CWRB Briefing/Approval	0.0d		24-Jan-11
FEA2655	Prepare Draft Chief's Report	5.0d	25-Jan-11	31-Jan-11
FEA2657	State & Agency Review	48.0d	1-Feb-11	8-Apr-11
FEA2658	Feas State/Agency Review Complete	0.0d		8-Apr-11
FEA2660	Sign Feas Chief 's Report	0.0d		8-Apr-11
FEA2670	ASA(CW) Review	9.0d	11-Apr-11	21-Apr-11
FEA2700	ASA(CW) Memo to OMB	0.0d		21-Apr-11
FEA2709	OMB Review & Comment	60.0d	22-Apr-11	18-Jul-11
FEA2710	Feas Report to Congress	0.0d		18-Jul-11
Planning, Engineering & Design (PE&D)		161.0d	3-Oct-11	22-May-12
115058.300001.30AX0	PE&D Prog & Proj Mgmt	161.0d	3-Oct-11	22-May-12
A1400	Future FY planning - Fed	161.0d	03-Oct-11*	23-May-12
Construction		288.0d	1-Oct-12	22-Nov-13
115058.30D001.30DS0	Construction - Contract	288.0d	1-Oct-12	22-Nov-13

16. Statement of Approval: As of May 21, 2010, this PMP has been coordinated with the Project Delivery Team and has been adjusted based on resolution of comments received and is approved.

_____

Michael Wyatt
Planner/Project Manager

ATTACHMENTS

A. Minnesota Department of Natural Resources "Agreement in Principle," executed June 12, 2003
B. Workflow Plan
C. Feasibility Study Cost Estimate
    a. Total Project Detail (2 pages)
    b. DNR Detail (2 pages)

ATTACHMENT A
MINNESOTA DNR “AGREEMENT IN PRINCIPLE”

Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-40

July 11, 2003

Mr. Craig Evans, P.E.
U.S. Army Corps of Engineers
190 East Fifth Street
Saint Paul, Minnesota 55101-1638

Dear Mr. Evans:

This letter is to formally convey to the U.S. Army Corps of Engineers (USACE) the framework decision that has been agreed upon by the Minnesota Department of Natural Resources' (DNR) Divisions of Ecological Services, Fisheries, and Wildlife regarding the Marsh Lake Dam modification that will result in definite improvements to Marsh Lake's biological values. We are proposing that both the primary spillway and the emergency spillway be modified. We are also proposing that the Pomme de Terre River be restored to its pre-1938 channel. The attached Agreement in Principal outlines those proposed modifications. It also provides particular terms and constraints regarding the management of the facility.

There are several additional steps that the DNR needs to take, these include: communication with the public regarding our framework decision, development of a more detailed management plan, continue to evaluate other potentially interesting restoration strategies, and then determine and pursue the most appropriate means of funding for this project.

It has been our approach all along that once we can identify and agree upon the strategies that will have the greatest benefit for the resource and resource users, we will focus on financing and implementation. We recognize that the Marsh Lake dam is owned and managed by the USACE, and so we plan to work closely with the USACE to determine how best to pursue the funding and implementation. As a first step, the DNR would like to see the Marsh Lake dam modifications included in the Minnesota River Basin Reconnaissance study.

Sincerely,

TIMOTHY P. BREMICKER, Director
Division of Wildlife
DNR Building – 500 Lafayette Road
Saint Paul, Minnesota 55155-4007
(651) 297-4960

TPB/KV/jls; Attachment
c Bradley M. Moore, Assistant Commissioner for Operations
Ron Payer, Director, Division of Fisheries
Lee Pfannmuller, Director, Division of Ecological Services
Cheryl Heide, Regional Director, New Ulm

Agreement in Principle

Preamble

Marsh Lake is a 5,000 acre, shallow impoundment on the upper Minnesota River. It is located at the borders of Big Stone, Lac qui Parle and Swift Counties. Because of the nature of the existing fixed crest the basin is not subject to the dynamic variation in water levels that healthy wetland systems require. This facility is part of the US Army Corps of Engineers Lac qui Parle Flood Control Project. However, its origins predate the flood control project as a WPA water conservation project. The USACE has notified the Department of Natural Resources that the facility provides no flood control benefit. The USACE has requested the Minnesota DNR recommend appropriate modifications to the facility in order to enhance ecological and recreational values of the basin and the Minnesota River. A work group of six DNR staff have been working on developing a set of recommendations to the USACE since January 2001. This framework carefully balances a number of potentially competing natural resource and recreational values associated with Marsh Lake and the Minnesota River. We, the undersigned Senior Managers, agree in principle to the below described framework to improve and enhance Marsh Lake.

Modifications to the Marsh Lake Dam

The Marsh Lake Dam is an earthen berm 11,800 feet long, with a primary spillway 112 feet wide set at a run out elevation of 937.6 feet. It also has a 90 foot wide emergency spillway with a run out elevation of 940 feet. The DNR would propose to the USACE the following modifications to the Marsh Lake Dam.

Primary Outlet: The primary spillway would be modified to maintain a water surface elevation of 938.3 feet or higher 70% of the time in August, and 937.6 feet or higher 70% of the time in September and October, excluding years in which a draw down is completed. A design, based on returning the Pomme de Terre River to its 1938 channel, would incorporate both a low flow notch cut into the spillway and a narrowing of the spillway above the current run out elevation. The low flow notch would be approximately 2 feet wide with a bottom elevation of 935.5 feet. In addition, the spillway would be narrowed from 112 feet to approximately 30 feet between the elevations of 937.6 to 938.3. The spillway would then widen back out to 112 feet above the 938.3 feet elevation. A fish passage structure consisting of rock riffles would also be constructed at the outlet.

Emergency Spillway: The emergency spillway would be replaced with a variable crest structure. The structure's final dimensions will be set to pass a May Q70 flow at a draw down elevation of 936. A fish passage structure consisting of rock riffles would also be constructed at this outlet. The structure will continue to function as an emergency spillway at water surface elevations above 940 feet.

Pomme de Terre River: The Pomme de Terre River will be restored to its 1938 Channel and flood plain. As a result, the Pomme de Terre will flow directly into the Minnesota River/Lac qui

Parle Lake downstream of the Marsh Lake dam. During some flood events, a portion of the Pomme de Terre's flow may spill over into Marsh Lake.

Management Plan

The above modifications are contingent upon a management plan being developed that includes the following core points.

- The maximum targeted drawdown will be to an elevation of 936.
- Clear triggers and constraints will be established that govern when a draw down will be attempted including: vegetation, sufficient year classes of northern pike present, and sufficiently small snow pack to predict a reasonable probability of success.
- When active drawdowns are conducted, the basin will remain in drawdown condition through the fall and winter. Refill will be accomplished during spring floods. However, refill or partial refill in the fall could be accomplished if precipitation results in a spike in the Minnesota River's flow, such that a "normal" discharge hydrograph can be maintained while raising pool levels.
- Consecutive attempts at drawdowns over a multiple year period will not be made.
- Fish passage will be available at one or both of the outlets 100% of the time.
- A monitoring program will be developed which includes: vegetation, fish populations, waterfowl populations, and flows.
- In the event of unanticipated water levels or vegetative responses, appropriate modifications could be made to the primary spillway or the management plan.

Agreement

While additional detailed management plans and construction designs will needed to be developed, we agree in principal to the above described framework for modifying and managing the Marsh Lake Dam

Tim Bremicker, Director — Date 6/12/2003
Division of Wildlife

Ron Payer, Director — Date 6/12/03
Division of Fisheries

Cheryl Heide, Regional Director — Date 6/11/03
Southern Region

Lee Pfannmuller, Director — Date 6/12/03
Division of Ecological Services

ATTACHMENT B
WORKFLOW PLAN

The following outline describes the general workflow expected for the study. Bullets indicate the types of information that will be needed and questions that will be asked. These planning steps are iterative, so the actual order of task completion will evolve with the study and will depend on funding and staff availability over the life of the study.

1. Gather all existing planning documentation from prior MN DNR efforts

- Meeting notes
- Preliminary plans
- Public comments

2. Specify problems and opportunities: This task will be a refinement of the work that led to the Agreement in Principle. It will involve group discussion and integration of data from the inventory of existing conditions.

- State problems and opportunities (See Agreement in Principle)
- Determine project goals (what are we shooting for?)
    - Target species (fish, pelicans, waterfowl, other?)
    - Habitat types to be developed and maintained
    - Water quality standards
        - (seasonally different?—i.e. is winterkill desirable?)
- Determine project objectives and constraints (what changes are needed to meet the goals? What do we need to avoid?)
    - Desirable water levels, fluctuation and timing
        - Normal operations
        - During a drawdown
        - How low is too low?
        - *How will we determine these? What models are needed to predict outcomes of specific measures?*
    - Fish passage—define parameters
        - When do fish need to pass?
        - Access to spawning areas in PdT and Marsh Lake with various measures
    - Water quality—nutrient balance, determine what actions can we really control?
    - Recreation needs
        - Access to the lake(s)
        - Pomme de Terre canoeing?
        - Future bike trail?

3. Hold a NEPA scoping meeting

- Make sure the public has input into the current study process and can identify any special concerns to be addressed. (Do this as soon as we have sufficient Federal funding.)

4. Inventory existing conditions

- Water quality
    - Marsh Lake
    - Pomme de Terre
    - Lac qui Parle
        - DO
        - N, P
        - Chlorophyll A, algal density
        - Suspended solids
- Fish & mussel populations (in all three water bodies)
    - Mussel survey
    - Assemble existing fish survey info
- Macro-invertebrates

- Wildlife populations (waterfowl, pelicans, uplands)
- Rare and endangered species
- Aquatic vegetation (submersed, emergent, and algal)
- Land use/land cover in study area
- Bathymetry (provide most recent data available)
- Assess Pomme de Terre channel (i.e. Rosgen, existing and old alignment)
- Sediment budgets—Marsh Lake and Lac qui Parle
- Recreational usage, hunting, birding, fishing, access for all, biking, canoeing
- Safety history
- Obtain topographic surveys, cross sections, soundings, etc.
- Cultural resources
- Real estate needs
- Hydrologic records
- Sediment sampling and testing for dredging disposal/permitting
- Corps and State authorities and responsibilities

5. Forecast future conditions in all three water bodies <u>without</u> the project

- Water quality
- Water levels and fluctuations—impacts of upstream reservoirs, i.e. Bigstone
- Fish and mussel populations
- Wildlife populations
- Aquatic vegetation
- Sedimentation
- Recreation

6. Preliminary plan formulation: Formulate alternative plans

- Define <u>measures</u> to achieve objectives
    - Re-assess details of the Agreement in Principle
    - Value Engineering study to identify possible enhancements or additional measures
- Hydrologic and Hydraulic design of structures to achieve target water levels
- Preliminary ITR to check future without project conditions analyses and preliminary H&H

<u>7. Hold a Feasibility Scoping Meeting (FSM) with vertical team</u>

8. Advanced plan formulation: Formulate alternative plans

- Preliminary design and refining of measures (mostly engineering tasks with guidance from all)
    - Pomme de Terre realignment
        - Diversion structure
        - Bridge or structure to cross roadway
        - Determine new alignment
    - Variable crest structure
    - Fixed crest structure (elliptical profile)
    - Fish passage structures
    - Provide bike crossing capability
    - Earth dam issues
    - Other (Islands, recreation features)
- Geotechnical borings and analyses
- Structural design
- Cost estimating
- Prepare operating plans

9. Evaluate effects of alternative plans

- Describe future conditions with project in place (mostly environmental discussion—includes obtaining sufficient data and modeling to document assumptions)

10. Compare alternative plans

- Prepare a matrix (use IWR Plan software) to conduct cost-effectiveness and incremental cost analyses

11. Select Tentatively Recommended plan

- Prepare AFB documentation package/draft report
- Independent Technical Review
- Study team review

12. Hold Alternative Formulation Briefing (AFB) with Corps vertical team

- Either by telephone or on site

13. Final plan formulation and design details for recommended plan

- Develop detail sufficient for baseline cost estimate (engineering tasks)
- Prepare plates and design calculations for engineering appendixes

14. Prepare final draft report

- Finalize draft report
- Study team review
- Independent Technical Review
- Incorporate comments

15. Public review of final draft report per MEPA and NEPA

- 30-day review period
- Hold a Public meeting
- Incorporate comments/address issues/finalize MEPA
- Sign FONSI (unless EIS is required)
- Final ITR signoff (to verify acceptability of final changes)

16. Submit draft report to MVD and HQUSACE for policy review

17. Conduct Civil Works Review Board briefing

- Key study team members travel to Washington, D.C.

18. Prepare Chief of Engineers' report
19. NEPA State and Agency review of Chief's report
20. HQUSACE submit signed Chief's report to ASA(CW)
21. ASA(CW) sign Record of Decision and submit signed Chief's report to OMB
22. OMB review and submit ROD and Chief's report to Congress

ATTACHMENT C
ESTIMATED STUDY COSTS

Marsh Lake Aquatic Ecosystem Restoration
Feasibility Study Cost Estimate
August 2009

Total Project Detail

	Task Description	Estimated Cost ($ Thousands) Corps	In-kind*	Study Total	Notes:	Thru 06/09 Estimates	FY 2009 4 Qtr Jul-Sep	FED FY 2010 1 Qtr Oct-Dec	2 Qtr Jan-Mar	3 Qtr Apr-Jun	4 Qtr Jul-Sep	FY 2011 1 Qtr Oct-Dec	Total
A	**Public Involvement**	**0**	**9**	**9**	Public meetings, newsletters, etc.	0							
	Public Meetings (arrange and facilitate)		4		Assume 2 meetings: scoping and draft review	0			0		4		$4
	Prepare record of comments		2			0			0		2		$2
	News releases and Newsletters		3			0			0		2	1	$3
	Corps participation at meetings	0	0		Assume included in numbers below	0					0		$0
			0			0							
B	**Institutional Studies**	**5**	**0**	**5**	Project history, intergovernmental relations. Determine appropriate program/cost-sharing policy.	3			2				$5
			0			0							
C	**Social Studies**		**7**	**7**	Recreation, etc.	0							
	Conduct recreation needs analyses		5			5							$5
	Draft report sections for recreation		2			2							$2
			0			0							
D	**Cultural Studies**	**5**	**16**	**21**	Cultural resources survey, coordination	0							
	Corps admin and report writing	5	0		Admin, analysis, coordination with SHPO	2	0	3					$5
	Field surveys		16		To be done by DNR staff archaeologists	0	16						$16
			0			0							
			0			0							
E	**Environmental Studies**	**97**	**52**	**149**	Environmental design and NEPA process	0							
	GIS products for EA	6	4			0	6	2	2				$10
	Write EA, Feas report, ops plan & appendix	55	0			17	10	10	6	3	6	3	$55
	Coordination & meetings	16	0			8			2	2	2	2	$16
	Sediment testing	20	0		Contracted	0		20					$20
	(DNR) Inventory existing conditions		20		Gather existing info, collect data if needed	20							$20
	(DNR) Forecast future with- and without-project		18		DNR lead team discussion and modeling	8					10		$18
	(DNR) Write draft report sections		10		Describe existing, future-without and future with-project conditions for Feasibility report	10							$10
			0			0							
			0			0							
F	**Fish and Wildlife**	**5**	**0**	**5**	Coordination Act Requirements W/FWS	0	5						$5
			0			0							
G	**Economic Studies**	**15**	**0**	**15**	Recreation benefits, economic justification, incremental cost analysis	3	2	2	2	2	2	2	$15
			0			0							
H	**Surveying and Mapping**	**5**	**20**	**25**	Topography, cross sections, soundings	0							
	Coordination and admin		3			3							$3
	Pomme de Terre River cross sections		4		Most done December 2006. Re-do portions originally out of tolerance.	4							$4
	Embankment cross sections		0		Done December 2006	0							$0
	Outlet structures and site topography		0		Done December 2006	0							$0
	Soundings/bathymetry near outlet		3		Most done Dec 2006 except u.s. soundings	3							$3
	Reducing/plotting/mapping		10		Office caculations	10							$10
	Corps coordination	5	0			5							$5
			0			0							
J	**Hydrology and Hydraulics**	**84**	**42**	**126**	Hydraulic design of channel and dam mods	0							
	(Corps) Hydrology	12	2		Marsh lake and PdT discharge/duration history	7		5	2				$14
	(Corps) Terre RAS modeling of PDT, Marsh Lk, LQP	30	2		Existing and proposed conditions	8		23	1				$32
	(Corps) Pomme de Terre Geomorphology	6	2		Rosgen classification, field inspections	6		1	1				$8
	(Corps) Fish Passage (1-D modeling)	0	2			0	0	1	1				$2
	(Corps) Scour protection	9	2		Wave protection and stream erosion protection	0		6	5				$11
	(Corps) Feasibility appendix, coord & GIS	27	2			2	2	2	5	6	6	6	$29
	(DNR) Determine goals, objectives, constraints		6		DNR lead team discussion	5		1					$6
	(DNR) Hydrology		5		DNR participate and review	0	2	2	1				$5
	(DNR) Pomme de Terre Geomorphology		4		DNR field inspections with Corps	2		1	1				$4
	(DNR) Fish Passage		3		DNR assist design, review models	0	0	2	1				$3
	(DNR) Develop operation plans for alternatives		11		DNR lead team discussion and modeling	4			6	1			$11
	(DNR) Review H&H appendix		1			0			1				$1
						0							
						0							
						0							
						0							
K	**Foundations and Materials**	**138**	**3**	**141**	Geotechnical design	0							
	Review existing data	6	1			0	6	1					$7

	Borings and testing	60	1		Contracted	0	0	61					$61
	Assess stability/ geotechnical design	60	1			0	0		21	27	13		$61
	Feasibility report appendix	12	0			0			0		12		$12
			0			0							
M	**Designs and Cost Estimates**	**181**	**20**	**201**	Structural and layout issues, construction cost estimates	0							
			0			0							$0
	Structural design		0		All designs to feasibility level of detail.	0							$0
	PdT diversion and road bridge	8	2			0	6	4					$10
	Emergency spillway new operable structure	12	2			0	3	3	8				$14
	Existing spillway modifications	5	2			0	2	2	3				$7
	Pedestrian/bike bridge	6	1		To accommodate future bike trail	0	2	2	3				$7
	Feasibility appendix and coord	18	2			0	5	2	13				$20
	Fish Passage	0	3			0		2	1				$3
	Fish Pond Mods (Inlet and Outlet)	0	1			0		1					$1
	Lewisberg Road Culverts	0	3			0		2	1				$3
			0			0							$0
	Mechanical design	6	0			0	2	3	1				$6
			0			0							$0
	General engineering/layout		0			0							$0
	Site plans, typical sections, layout	84	2			7	15	23	10	25	4	2	$86
	Quantity calculations	12	2			0		4	3	7			$14
			0			0							
	Cost estimates	30	0		Establish alternative costs and final baseline cost for authorization	0	12	6	6	3	1	2	$30
			0			0							
N	**Real Estate Studies**	**10**	**3**	**13**	Project site, borrow and disposal areas	0							
	Corps staff activities	10	0		Real Estate Plan and appraisals	0	7		2	1			$10
	DNR staff activities		3		Assist with local knowledge	0	3						$3
			0			0							
P	**Study Management**	**92**	**16**	**108**	Administration, cost tracking, coordination	0							
	General coordination	52	0		Includes Executive Committee time	22	5	5	5	5	5	5	$52
	Study funds control	38	0			14	4	4	4	4	4	4	$38
	Project Cooperation Agreement for construction	2	0			0					2		$2
	DNR in-kind for study management		16		Includes Executive Committee time	3	2	2	2	2	2	3	$16
			0			0							
Q	**Plan Formulation**	**74**	**13**	**87**	Developing and assessing alternatives, milestone meetings, ITR review	0							
	Corps PM guide early planning tasks	2	0			2							$2
	Preliminary formulation & screening	2	0			2							$2
	Feasibility Scoping Meeting	2	0			2							$2
	Alternative Formulation Briefing	6	0			0				6			$6
	CWRB meeting (in Washington, D.C.)	12	0			0					3	9	$12
	Independent Technical Review (ongoing) & VE	50	0		Performed by another MVD District	15				24	11		$50
	Value Engineering Study (in-kind participation)		6		Assume 3 people for 3 days	3						3	$6
	DNR in-kind attendance at milestone meetings		7		Feasibility Scoping Meeting, AFB & CWRB	1				3		3	$7
			0			0							
R	**Report Reviews**	**52**	**16**	**68**	Prepare draft and final reports of findings	0							
	Without-project analysis	5	0			5							$5
	Feasibility scoping meeting documents	8	0			8							$8
	Alternative analysis for AFB meeting	21	0			5	5	5	6				$21
	Draft report for public review & CWRB	12	0			0				6	6		$12
	(DNR) review draft reports		16		Assume 2 rounds of review	0		3	5	3	2		$13
	Final report	6	0			0						9	$9
			0			0							$0
S	**Expenses**		**17**	17	Project expenses related to travel, fleet, etc.	0	3	3	3	3	3	2	$17
	Column Totals	**763**	**234**	**997**	Quarterly Subtotals	226	125	219	136	133	102	56	$997
	CADD	**54**		**54**	CADD	2	11	10	14	12	5	0	$54
	Miscellaneous & Contingency	**21**		**21**	Miscellaneous & Contingency	0	0	1	3	3	5	6	$21
					Quarterly Subtotals	231	**136**	**230**	**153**	**148**	**112**	**62**	**$1,072**
	TOTAL	**$838**	**$234**	**$1,072**									
					Cumulative Subtotals		**$367**	**$597**	**$750**	**$898**	**$1,010**	**$1,072**	

FUNDING SUMMARY			$1,072,000	Total
Federal Funds	$536,000		$536,000	
Non-federal In-kind Services		$234,000	$234,000	
Non-federal Cash	$302,000		$302,000	

* In-kind data comes from the "DNR Detail" spreadsheet.

Assumptions:

1. Two year study (with optimal funding)
2. DNR in-kind estimate based on aggregated average daily cost of $650 per day. Actual value for in-kind credit will be based on official DNR accounting.

Marsh Lake Aquatic Ecosystem Restoration
Feasibility Study Cost Estimate
August 2009

DNR Detail

$650 Estimated DNR daily cost

	Task Description	Corps***	DNR $ Costs** Distributed	DNR $ Costs** Cost	DNR DAYS*	Notes:	Estimated Person-days: Wildlife	Fisheries	Eco	L&M/Eng	Waters	Regional Admin
A	**Public Involvement**		**$9**	**$9**	14	Public meetings, newsletters, etc.	4	2	2		2	4
	Public Meetings (arrange and facilitate)		$4			Assume 2 meetings: scoping and draft review						
	Prepare record of comments		$2			0						
	News releases and Newsletters		$3			0						
	Corps participation at meetings					Assume included in numbers below						
						0						
B	**Institutional Studies**	**$5**		**$0**	**0**	Project history, intergovernmental relations. Determine appropriate program/cost-sharing policy.						
						0						
C	**Social Studies**		**$7**	**$7**	**10**	Recreation, etc.	7	2	1			
	Conduct recreation needs analyses		$5			0						
	Draft report sections for recreation		$2			0						
						0						
D	**Cultural Studies**	**$5**	**$16**	**$16**	**25**	Cultural resources survey, coordination						25
	Corps admin and report writing	$5				Admin, analysis, coordination with SHPO						
	Field surveys		$16			To be done by DNR staff archaeologists						
						0						
						0						
E	**Environmental Studies**	**$97**	**$52**	**$52**	**80**	Environmental design and NEPA process	20	6	54			
	GIS products for EA	$6	$4			0						
	Write EA, Feas report, ops plan & appendix	$55				0						
	Coordination & meetings	$16				0						
	Sediment testing	$20				Contracted						
	(DNR) Inventory existing conditions		$20			Gather existing info, collect data if needed						
	(DNR) Forecast future with- and without-project		$18			DNR lead team discussion and modeling						
	(DNR) Write draft report sections		$10			Describe existing, future-without and future with-project conditions for Feasibility report						
						0						
						0						
F	**Fish and Wildlife**	**$5**		**$0**	**0**	Coordination Act Requirements W/FWS						
						0						
G	**Economic Studies**	**$15**		**$0**	**0**	Recreation benefits, economic justification, incremental cost analysis						
						0						
H	**Surveying and Mapping**	**$5**	**$20**	**$20**	**31**	Topography, cross sections, soundings	1	2		28		
	Coordination and admin		$3			0						
	Pomme de Terre River cross sections		$4			Most done December 2006. Re-do portions originally out of tolerance.						
	Embankment cross sections					Done December 2006						
	Outlet structures and site topography					Done December 2006						
	Soundings/bathymetry near outlet		$3			Most done Dec 2006 except u.s. soundings						
	Reducing/plotting/mapping		$10			Office caculations						
	Corps coordination	$5				0						
						0						
J	**Hydrology and Hydraulics**	**$84**	**$42**	**$42**	65	Hydraulic design of channel and dam mods	17	17	20	4	7	
	(Corps) Hydrology	$12	$2			Marsh lake and PdT discharge/duration history						
	(Corps) Pomme de Terre RAS modeling	$30	$2			Existing and proposed conditions						
	(Corps) Pomme de Terre Geomorphology	$6	$2			Rosgen classification, field inspections						
	(Corps) Fish Passage (1-D modeling)		$2			0						
	(Corps) Scour protection	$9	$2			Wave protection and stream erosion protection						
	(Corps) Feasibility appendix, coord & GIS	$27	$2			0						
	(DNR) Determine goals, objectives, constraints		$6			DNR lead team discussion						
	(DNR) Hydrology		$5			DNR participate and review						
	(DNR) Pomme de Terre Geomorphology		$4			DNR field inspections with Corps						
	(DNR) Fish Passage		$3			DNR assist design, review models						
	(DNR) Develop operation plans for alternatives		$11			DNR lead team discussion and modeling						

	(DNR) Review H&H appendix		$1			0						
						0						
K	**Foundations and Materials**	**$138**	**$3**	**$3**	**4**	Geotechnical design	1	1	1	1		
	Review existing data	$6	$1			0						
	Borings and testing	$60	$1			Contracted						
	Assess stability/ geotechnical design	$60	$1			0						
	Feasibility report appendix	$12				0						
						0						
M	**Designs and Cost Estimates**	**$181**	**$20**	**$20**	**30**	Structural and layout issues, construction cost estimates	9	9	6	4	2	
						0						
	Structural design					All designs to feasibility level of detail.						
	PdT diversion and road bridge	$8	$2			0						
	Emergency spillway new operable structure	$12	$2			0						
	Existing spillway modifications	$5	$2			0						
	Pedestrian/bike bridge	$6	$1			To accommodate future bike trail						
	Feasibility appendix and coord	$18	$2			0						
	Fishways		$3									
	Fish Pond Mods (Inlet and Outlet)		$1									
	Lewisberg Road Culverts		$3									
						0						
	Mechanical design	$6				0						
						0						
	General engineering/layout					0						
	Site plans, typical sections, layout	$84	$2			0						
	Quantity calculations	$12	$2			0						
						0						
	Cost estimates	$30				Establish alternative costs and final baseline cost for authorization						
						0						
N	**Real Estate Studies**	**$10**	**$3**	**$3**	**5**	Project site, borrow and disposal areas	2	1	1	1		
	Corps staff activities	$10				Real Estate Plan and appraisals						
	DNR staff activities		$3			Assist with local knowledge						
						0						
P	**Study Management**	**$92**	**$16**	**$16**	**25**	Administration, cost tracking, coordination	14	4	4	1	1	1
	General coordination	$52				Includes Executive Committee time						
	Study funds control	$38				0						
	Project Cooperation Agreement for construction	$2				0						
	DNR in-kind for study management		$16			Includes Executive Committee time						
						0						
Q	**Plan Formulation**	**$74**	**$13**	**$13**	**20**	Developing and assessing alternatives, milestone meetings, ITR review	5	5	5	2	2	1
	Corps PM guide early planning tasks	$2				0						
	Preliminary formulation & screening	$2				0						
	Feasibility Scoping Meeting	$2				0						
	Alternative Formulation Briefing	$6				0						
	CWRB meeting (in Washington, D.C.)	$12				0						
	Independent Technical Review (ongoing) & VE	$50				Performed by another MVD District						
	Value Engineering Study (in-kind participation)		$6			Assume 3 people for 3 days						
	DNR in-kind attendance at milestone meetings		$7			Feasibility Scoping Meeting, AFB & CWRB						
						0						
R	**Report Preparation**	**$52**	**$16**	**$16**	**25**	Prepare draft and final reports of findings	5	5	5	5	5	
	Without-project analysis	$5				0						
	Feasibility scoping meeting documents	$8				0						
	Alternative analysis for AFB meeting	$21				0						
	Draft report for public review & CWRB	$12				0						
	(DNR) review draft reports		$16			Assume 2 rounds of review						
	Final report	$6				0						
						0						
S	**Expenses**		$17	$17		Project expenses related to travel, fleet, etc.						
	Column Totals	**$763**	**$234**	**$234**	**334**	(Actual estimated person-days)	**85**	**54**	**99**	**46**	**19**	**31**
					360.0	(Re-calculated person-days after rounding $)						

* DNR DAYS column contains the DNR's estimated man-days
** Estimated cost ($Thousands) is calculated based on DNR's estimated man-day cost and distributed to tasks by Corps' PM.
*** Data in the "Corps" column comes from the "Corps Detail" spreadsheet

Appendix B – Feasibility Cost-Share Agreement

AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES
FOR THE
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION FEASIBILITY STUDY

THIS AGREEMENT is entered into this 2nd day, of May, 2007, by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the Minnesota Department of Natural Resources (hereinafter the "Sponsor"),

WITNESSETH, that

WHEREAS, the Congress (Senate and/or House Committees) has requested the Board of Engineers for Rivers and Harbors to conduct a study of "the advisability of further improvements in the Minnesota River Basin for navigation, flood control, recreation, low flow augmentation, and other related land and water resources" pursuant to a May 10, 1962 resolution of the House Committee on Public Works; and

WHEREAS, the U.S. Army Corps of Engineers has conducted a reconnaissance study of the Minnesota River Basin pursuant to this authority, and has determined that further study in the nature of a "Feasibility Phase Study" (hereinafter the "Study") is required to fulfill the intent of the study authority and to assess the extent of the Federal interest in participating in a solution to the identified problem; and

WHEREAS, Section 105 of the Water Resources Development Act of 1986 (Public Law 99-662, as amended) specifies the cost sharing requirements applicable to the Study;

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in study cost sharing and financing in accordance with the terms of this Agreement; and

WHEREAS, the Sponsor and the Government understand that entering into this Agreement in no way obligates either party to implement a project and that whether the Government supports a project authorization and budgets it for implementation depends upon, among other things, the outcome of the Study and whether the proposed solution is consistent with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and with the budget priorities of the Administration;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "*S*tudy *C*osts" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor, and all negotiated costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term “estimated Study Costs” shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term “excess Study Costs” shall mean Study Costs that exceed the estimated Study Costs and that do not result from mutual agreement of the parties, a change in Federal law that increases the cost of the Study, or a change in the scope of the Study requested by the Sponsor.

D. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers St. Paul District of initial Federal feasibility funds following the execution of this Agreement and ending when the Assistant Secretary of the Army (Civil Works) submits the feasibility report to the Office of Management and Budget (OMB) for review for consistency with the policies and programs of the President.

E. The term "PSP" shall mean the Project Study Plan, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government, in consultation with the Sponsor.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the PSP.

G. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF PARTIES

A. The Government, using funds and in-kind services provided by the Sponsor and funds appropriated by the Congress of the United States, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III.A., III.B. and III.C. of this Agreement, the Sponsor shall contribute cash and in-kind services equal to fifty (50) percent of Study Costs other than excess Study Costs. The Sponsor may, consistent with applicable law and regulations, contribute up to 50 percent of Study Costs through the provision of in-kind services. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided are specified

in the PSP. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability, and allowability.

C. The Sponsor shall pay a fifty (50) percent share of excess Study Costs in accordance with Article III.D. of this Agreement.

D. The Sponsor understands that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning costs and services specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

E. If, upon the award of any contract or the performance of any in-house work for the Study by the Government or the Sponsor, cumulative financial obligations of the Government and the Sponsor would result in excess Study Costs, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed. Should the Government and the sponsor require time to arrive at a decision, the Agreement will be suspended in accordance with Article X., for a period of not to exceed six months. In the event the Government and the sponsor have not reached an agreement to proceed by the end of their 6 month period, the Agreement may be subject to termination in accordance with Article X.

F. No Federal funds may be used to meet the Sponsor's share of Study Costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

G. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of this Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs, and current projections of the amount of Study Costs that will result in excess Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this information. As of the effective date of this Agreement, estimated Study Costs are $900,000 and the Sponsor's share of estimated Study Costs is $450,000. In order to meet the Sponsor's cash payment requirements for its share of estimated Study Costs, the Sponsor must provide a cash contribution currently estimated to be $302,000. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the PSP, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Sponsor by March 30 of each year of the estimated funds that will be required from the Sponsor to meet the Sponsor's share of Study Costs for the upcoming fiscal year.

2. No later than 30 calendar days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for the first fiscal year of the Study. No later than 15 calendar days thereafter, the Sponsor shall provide the Government with the full amount of such required funds by delivering a check payable to "FAO, USAED, ST. PAUL DISTRICT (B6)" to the District Engineer, or verifying to the satisfaction of the Government that the Non-Federal Sponsor has deposited such required funds in an escrow or other account acceptable to the Government, with interest accruing to the Non-Federal Sponsor, or by presenting the Government with an irrevocable letter of credit acceptable to the Government for such required funds, or by providing an Electronic Funds Transfer of such required funds in accordance with procedures established by the Government.

3. For the second and subsequent fiscal years of the Study, the Government shall, no later than 60 calendar days prior to the beginning of the fiscal year, notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for that fiscal year, taking into account any temporary divergences identified under Article II.D of this Agreement. No later than 30 calendar days prior to the beginning of the fiscal year, the Sponsor shall make the full amount of the required funds available to the Government through the funding mechanism specified in paragraph B.2. of this Article.

4. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house fiscal obligations attributable to the Study as they are incurred.

5. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 calendar days after receipt of such notice, the Sponsor shall make the full amount of the additional required funds available through the funding mechanism specified in paragraph B.2. of this Article.

C. Within ninety (90) days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor, the amount of any excess Study Costs, and credits for the negotiated costs of the Sponsor, and shall furnish the Sponsor with the results of this accounting. Within thirty (30) days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of Study Costs, other than excess Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required share of Study Costs other than excess Study Costs.

D. The Sponsor shall provide its cash contribution for excess Study Costs as required under Article II.C. of this Agreement by delivering a check payable to "FAO, USAED, ST. PAUL DISTRICT (B6)" to the District Engineer as follows:

1. After the project that is the subject of this Study has been authorized for construction, no later than the date on which a Project Cooperation Agreement is entered into for the project; or

2. In the event the project that is the subject of this Study is not authorized for construction by a date that is no later than 5 years of the date of the final report of the Chief of Engineers concerning the project, or by a date that is no later than 2 years after the date of the termination of the study, the Sponsor shall pay its share of excess costs on that date (5 years after the date of the Chief of Engineers or 2 year after the date of the termination of the study).

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

A. To provide for consistent and effective communication, the Sponsor and the Government shall appoint named senior representatives to an Executive Committee. Thereafter, the Executive Committee shall meet regularly until the end of the Study Period.

B. Until the end of the Study Period, the Executive Committee shall generally oversee the Study consistently with the PSP.

C. The Executive Committee may make recommendations that it deems warranted to the District Engineer on matters that it oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider such recommendations. The Government has the discretion to accept, reject, or modify the Executive Committee's recommendations.

D. The Executive Committee shall appoint representatives to serve on a Study Management Team. The Study Management Team shall keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PSP.

E. The costs of participation in the Executive Committee (including the cost to serve on the Study Management Team) shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE V - DISPUTES

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. The parties shall each pay 50 percent of any costs for the services provided by such a third party as such costs are incurred. Such costs shall not be included in Study Costs**.** The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VI - MAINTENANCE OF RECORDS

A. Within 60 days of the effective date of this Agreement, the Government and the Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total Study Costs. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to state and local governments at 32 C.F.R. Section 33.20. The Government and the Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures for a minimum of three years after completion of the Study and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsor is required to conduct under the Single Audit Act of 1984, 31 U.S.C. Sections 7501-7507. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in total Study Costs and shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsor act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsor's rights and obligations under this Agreement, the Sponsor agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

ARTICLE X - TERMINATION OR SUSPENSION

A. This Agreement shall terminate at the conclusion of the Study Period, and neither the Government nor the Sponsor shall have any further obligations hereunder, except as provided in Article III.C.; provided, that prior to such time and upon thirty (30) days written notice, either party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon any failure of the parties to agree to extend the study under Article II.E. of this agreement, or upon the failure of the sponsor to fulfill its obligation under Article III. of this Agreement. In the event that either party elects to terminate this Agreement, both parties shall conclude their activities relating to the Study and proceed to a final accounting in

accordance with Article III.C. and III.D. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to both parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out or transferring any existing contracts.

ARTICLE XI - OBLIGATIONS OF FUTURE APPROPRIATIONS

A. Nothing herein shall constitute, nor be deemed to constitute, an obligation of future appropriations by the Department of Natural Resources of the State of Minnesota, where creating such an obligation would be inconsistent with the Minnesota Constitution Article XI, Section 1 and Minnesota Statutes Sections 16A.138 and 16A.15 Subd.3 of the State of Minnesota.

B. The Non-Federal Sponsor intends to fulfill its obligations under this Agreement. The Non-Federal Sponsor shall include in its budget request or otherwise propose appropriations of funds in amounts sufficient to fulfill these obligations for that biennium, and shall use all reasonable and lawful means to secure those appropriations. The Non-Federal Sponsor reasonably believes that funds in amounts sufficient to fulfill these obligations lawfully can and will be appropriated and made available for this purpose. In the event funds are not appropriated in amounts sufficient to fulfill these obligations, the Non-Federal Sponsor shall use its best efforts to satisfy any requirements for payments or contributions of funds under this Agreement from any other source of funds legally available for this purpose. Further, if the Non-Federal Sponsor is unable to fulfill these obligations, the Government may exercise any legal rights it has to protect the Government's interests related to this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the District Engineer for the U.S. Army Corps of Engineers, St. Paul District.

DEPARTMENT OF THE ARMY

BY _____
~~Colonel~~, Corps of Engineers
Deputy District Engineer for PM
St. Paul District

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

BY _____
Commissioner

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Mark Holsten
Commissioner, Minnesota Department of Natural Resources

DATE: 4/20/07

Appendix C – Correspondence

Agenda

Marsh Lake Ecosystem Restoration Project
Sponsor Coordination Meeting
December 18, 2009
Start: 9:00 AM

Purpose: Review and resolve outstanding issues related to the project Feasibility Study Report, update sponsor on status of project work items, coordinate efforts to complete study

1. **Recreational Project Features** (Bollman, conference call)
    a. Overview
    b. Pedestrian Bridge at Marsh Lake Spillway
    c. USACE Day Use Facility Improvements
    d. Pomme de Terre Canoe Access
    e. Interpretive Signage/Kiosks at Landings
    f. Other Features for Consideration?
2. **Project Status Update** (Wyatt)
    a. Funds Status
    b. Project Schedule/Upcoming Deadlines
3. **Feasibility Study Overview** (Wilcox)
    a. Review of Feasibility Study Draft
    b. Discussion Regarding Roles/Responsibilities in Completing the Report
4. **Breakwater Structure Discussion** (Open Discussion)
    a. Discussion of Form/Function
    b. Optimized Locations
    c. Decision
5. **Identification of Regulatory Issues** (Open Discussion)
    a. Overview of Project Partnership
    b. Identification of Issues
    c. Discussion

Marsh Lake Feasibility Study			
Activity ID	Activity Name	Start	Planned Finish
FEA2420	Plan Formulation - Federal	02-May-07 A	4-Jan-10
FEA2429	Feas Scoping Meeting		11-Dec-07
FEA2430	**AFB Project Doc**	**04-Jan-10***	**15-Jan-10**
FEA2440	AFB Tech Review	19-Jan-10	12-Feb-10
FEA2450	AFB Policy Compl	19-Jan-10	2-Mar-10
FEA2460	**Feas Alternative Formulation Briefing (AFB)**		**16-Apr-10**
FEA2470	AFB Guid. Memo	16-Apr-10	30-Apr-10
FEA2480	Draft Feas Rpt/NEPA	18-May-10	13-Jul-10
FEA2492	Conduct ITR (Future)	19-Jan-10	25-May-10
FEA2500	**Submit Draft Feas Report**		**13-Jul-10**
FEA2505	HQ Policy Compl Review	13-Jul-10	24-Aug-10
FEA2570	Feas Review Conference (FRC)		24-Aug-10
FEA2571	Feas Proj Guide Memo (PGM)		24-Aug-10
FEA2575	Feas Public Review Period Start	13-Jul-10	
FEA2577	Public Review Comments	13-Jul-10	24-Aug-10
FEA2580	Prepare Final Report & Summary	24-Aug-10	21-Sep-10
FEA2590	Issue Division Engineer's Transmittal Letter		21-Sep-10
FEA2600	All Other Final Feas	21-Sep-10	21-Sep-10
FEA2640	Wash. Level Policy Review	21-Sep-10	19-Oct-10
FEA2650	**CWRB Briefing/Approval**		**19-Oct-10**
FEA2655	Prepare Draft Chief's Report	19-Oct-10	26-Oct-10
FEA2657	State & Agency Review	26-Oct-10	6-Jan-11
FEA2658	Feas State/Agency Review Complete		6-Jan-11
FEA2660	Sign Feas Chief 's Report		6-Jan-11
FEA2670	ASA(CW) Review	6-Jan-11	20-Jan-11
FEA2700	ASA(CW) Memo to OMB		20-Jan-11
FEA2709	OMB Review & Comment	20-Jan-11	15-Apr-11
FEA2710	Feas Report to Congress		15-Apr-11

CEMVP-PD-F 21 December 2009

MEMORANDUM FOR RECORD

SUBJECT:	Marsh Lake Feasibility Study – December 18, 2009 Sponsor Meeting
LOCATION:	DNR Regional Office, New Ulm, MN
ATTENDEES:	David Trauba (DNR, WMA), Josh Kavanagh (Ducks Unlimited), Ken Varland (DNR, Wildlife), John Schladweiler (DNR, Eco), Kristy Rice (DNR, Parks/Trails), Renee McGarvey (USACE), Chris Domeier (DNR, Fisheries), Michael Wyatt (USACE), Dan Wilcox (USACE), Skip Wright (DNR, Waters), Dorie Bollman (USACE, via conference call), Wendy Frohlich (USACE, via conference call)

INTRODUCTION: Wyatt introduced the USACE Team Members and provided a brief overview of the project, the partnership and the goals of the meeting which focused on resolving several outstanding issues in order to complete a draft of the Feasibility Study Report. The current draft was distributed to the project sponsor prior to the meeting along with a meeting agenda outlining topics for discussion.

1. RECREATIONAL PROJECT FEATURES: Bollman previously conducted a conference call with several DNR Staff to explore alternatives for recreational features associated with the project. Prior to the meeting, Bollman distributed a narrative for three sections of the report for review and comment. Bollman provided a recap of her discussions with DNR Staff as well as an overview of the initial list of recreational alternatives which included a pedestrian bridge at the Marsh Lake spillway, improvements to the USACE Day Use facilities, canoe access on the Pomme de Terre River, and interpretive signage around access points to Marsh Lake.

   Domeier indicated that through discussions with Norm Haukos (DNR, Fisheries; not present), that there is interest to increase access to shore fishing opportunities around the lake. Domeier noted that fishing access should consist of constructed access points that include a variety of rustic, natural access points as well as fishing areas that are universally accessible and Americans with Disabilities Act (ADA) compliant. A visual representation of a floating dock was presented to the group, however, it was agreed that shoreline fishing access should consist of a simpler design. Domeier suggested that a gravel footpath and slab rock along the shoreline would suffice for rustic access and that at other sites, the DNR has previously constructed ADA-compliant access composed of a design similar to a 8'x10' box culvert positioned vertically at the shoreline, filled with compacted gravel.

   NEXT STEPS: DNR Staff will identify locations and preferred designs for shore fishing opportunities for inclusion in the project. This will likely consist of one access point at Lewisburg Grade Road, three access points off of the upstream side of the spillway and one access point on the downstream side of the spillway. A map will be provided with locations for use in the study report. DNR will specify which of these access points should be ADA compliant.

   The group also discussed the pedestrian bridge over the spillway and the potential for a trail crossing Marsh Lake at the spillway to connect bike trails on either side of the Wildlife

Management Area (WMA). DNR Staff indicated that the current alternative should focus solely on the construction of a bridge over the spillway which is the primary impediment to pedestrian traffic through the area. Any future trail system will be constructed through a future project and will not be included for consideration in the current Marsh Lake Feasibility Study.

The group discussed canoe access at two locations on the site. Canoe access on the Pomme de Terre River will consist of a pull off area on the existing road-way, gravel footpath and rustic canoe launch along the rerouted river channel. It was also noted that portage opportunities should be provided for those traveling from Marsh Lake to lower Lac qui Parle. It was agreed that portage could be allowed through the parking lot at the USACE Day Use Facility on site.

NEXT STEPS: As a new alternative USACE will include a canoe portage at the Day Use Facility parking lot consisting of signage formalizing the portage path, rustic steps downstream of the parking lot, a gravel footpath and an access point on Marsh Lake.

The group reviewed proposed improvements to the existing USACE Day Use Facilities on the site. Incorporation of restrooms on site at the parking lot is the primary feature under consideration. USACE must coordinate with Staff on-site to gauge maintenance requirements capabilities for any improvements.

While not on the initial list of potential improvements, the group also discussed including constructed wildlife observation areas into the project. The group concluded that no such features would be considered within the current Feasibility Study.

NEXT STEPS: The final list of recreational alternatives to be considered in the Feasibility Study includes the following:

a. **Pedestrian bridge at the Marsh Lake spillway – this includes a bridge only, no trail at this time**
b. **USACE Day Use Facility improvements – USACE will discuss options internally to gauge maintenance capabilities on site for potential improvements**
c. **Canoe access – includes canoe access on the Pomme de Terre River and a portage site between Marsh Lake and Lac qui Parle**
d. **Interpretive signage/kiosks at landing sites – five access points were identified around the lake for signage; improvements would include a map referencing location and information regarding the ecology of the area**

2. PROJECT STATUS UPDATE: Wyatt reviewed the current project budget and schedule. A spreadsheet of key milestones was distributed in advance of the meeting. A draft of the Feasibility Study is scheduled to be completed and submitted for internal review within the USACE hierarchy on January 15, 2010. Wyatt noted that the project is currently on schedule however there is a significant amount of material such as construction quantities and cost estimates that must be completed prior to submittal of the draft report for the Alternatives Formulation Briefing. General review and comment by the DNR was requested for the current report draft. Other key milestones highlighted in the schedule included the submittal

of the full draft Feasibility Report on July 13, 2010 and the Civil Works Review Board Briefing on October 19, 2010.

Wyatt noted that all funds from the DNR required for the project have been received and in-kind service records will be important to track throughout the remainder of the study.

The group inquired about critical deadlines for future funding of a potential construction project. Wyatt explained that the Presidential Budget is typically submitted to Congress in February of each year. Congress coordinates with local constituencies regarding budget priorities from February through March and appropriations bills are subsequently drafted following the spring of each year. Wyatt cautioned that few appropriations bills have been approved prior to the September 30th (end of Federal Fiscal Year) deadline in recent years, however, this year the Corps received notice of appropriations fairly early, on November 1, 2009. It was suggested that while on-going coordination with Congressional representatives is important throughout the life of a project, that February to March period is the critical portion of the year in regards to upcoming project appropriations.

3. FEASIBILITY STUDY OVERVIEW: Wilcox provided an overview of the ecosystem restoration project components and issues covered in the Feasibility Study report. Wilcox noted that several of the inherent characteristics of the lake such as average depth, length of wind fetch and management of water levels contribute to sediment suspension and lack of water transparency which is in turn reflective of the degraded ecosystem condition of the lake. The overall goal of the project is to improve the water quality, ecosystem state, and fish and wildlife habitat for Marsh Lake. The alternatives evaluated in the report are targeted at achieving the stated goals and optimizing the benefits incurred with the project.

   Wilcox reviewed the current project designs as well as the narrative of the various sections of the report, focusing on areas where more information is required from the DNR in order to complete the report.

   NEXT STEPS: DNR will provide information related to:

   - **Endangered and threatened species in and around the site; species includes both State and Federal listings (Schladweiler)**
   - **Future land use (Trauba)**
   - **DNR will identify a target elevation for a winter drawdown (Trauba/Varland)**

   DNR Staff identified three issues of concern regarding downstream risks to public safety from the presence of a low-head dam, the application of the Habitat Evaluation Procedure (HEP) model and also inquired as to the design for the Lewisburg Road culverts. The Corps will likely design the Lewisburg Grade Road structure to function with removable stop logs, but will clarify the design in the coming weeks.

   NEXT STEPS: USACE will investigate ways to minimize the risks to public safety with the low-head dam and finalize a draft design of the Lewisburg Grade Road site. A conference call will be conducted between USACE Staff and DNR (Trauba) to clarify the application of various HEP models for the project.

Wilcox identified project performance criteria (starting on page 109) and requested review and comment from DNR Staff. Performance criteria addresses objectives related to water quality, geomorphology, hydrology/hydraulics, habitat, biota, recreation and public safety.

NEXT STEPS: DNR will review and comment on performance criteria identified within the report.

Wilcox provided a detailed description of the USACE Planning Process identifying all of the alternatives considered for the project and the process by which alternatives were discarded or retained for further consideration within the report. It was generally agreed upon that the existing list of alternatives should be retained for further consideration in the report.

NEXT STEPS: The Feasibility Study will include the following alternatives:

- **Restore the Pomme de Terre River to its historic channel**
- **Modify Marsh Lake dam to attain target water levels/construct fishway**
- **Growing season drawdowns to restore emergent aquatic plants**
- **Winter drawdowns to reduce carp abundance**
- **Install gated culverts, Lewisburg Grade Road**
- **Breach dike at abandoned fish pond**
- **Construct islands in Marsh Lake**
- **Recreational project features (discussed above)**

4. BREAKWATER STRUCTURE DISCUSSION: In November, Wilcox arranged for a site visit for Varland and Trauba at Pool 10 on the Mississippi River where the Corps (in conjunction with the U.S. Fish & Wildlife Service) had previously constructed breakwater structures similar to those considered for Marsh Lake. Varland provided a photo-journal of the site visit to illustrate how the structures looked and functioned in the river ecosystem. The consensus between Varland and Trauba was that the breakwater structures on the Mississippi River appeared to serve the intended beneficial purpose to the wildlife habitat of the area and the application could be transferrable to Marsh Lake. Kavanagh noted that Ducks Unlimited had previously voiced concerns regarding the costs of the breakwater structures, but does not dispute the use of structures in principle. It was suggested that there is a significant supply of granite slabs in close vicinity to the project area that may suffice as a base to the breakwater structures and given the availability, it is likely the slabs could be acquired at a discount. Wilcox noted that islands were constructed in Mud Lake in conjunction with the Lake Traverse project in the winter by a contractor for Ducks Unlimited. Islands in Marsh Lake could also be constructed in winter after the lake is drawn down using locally-procured rock. The USACE will investigate appropriate construction methods.

   NEXT STEPS: USACE will include the breakwater structures as an alternative measure in the overall ecosystem restoration plan for the project (included above). A plan-view layout will be provided which identifies wildlife feeding and resting areas throughout the lake. In the design criteria, USACE will investigate whether granite slabs (3'x4') could be utilized at the base of the breakwater structures.

5. IDENTIFICATION OF REGULATORY ISSUES: Wyatt inquired as to any regulatory concerns with the project. It was suggested that changes to the dam operation may result in changes to the Ordinary High Water (OHW) elevation, a legal jurisdictional elevation established by the State of Minnesota.

   RESOLVED: DNR Waters will evaluate any necessary changes to the OHW or operations requirements during the design phase of the project.

   Wyatt also noted that based on a previous conversation between USACE and DNR Staff, it was unclear how impacts to mussel communities should be addressed with the rerouting of the Pomme de Terre River. USACE had previously proposed that mussels affected by the reroute could be harvested with a mussel dredge and relocated in upstream areas of the Pomme de Terre River. Downstream areas within the historic river channel would be monitored as an experiment to evaluate the distribution of mussels over time as mussels recolonize the historic river channel. This approach has been documented in the Draft Feasibility Report for DNR consideration and targets are identified in the performance criteria section of the report.

   NEXT STEPS: DNR will review and comment on the report language and performance criteria related to mussels. Wilcox will prepare a draft experimental design and cost estimate for the mussel relocation, monitoring and evaluation. This will be provided to the DNR for review.

If there are any questions, please contact the Project Manager, Michael Wyatt at 651.290.5216 or email at michael.d.wyatt@usace.army.mil.

Minnesota Historical Society

STATE HISTORIC PRESERVATION OFFICE

June 3, 2010

Attn: Terry Birkenstock
Environmental & Economic Analysis Branch
U.S. Army Corps of Engineers
190 5th Street East
St. Paul, MN 55101-1638

RE: Marsh Lake Ecosystem Restoration, Lac Qui Parle WMA
Big Stone, Lac Qui Parle, and Swift counties
SHPO Number: 2009-0850

Dear Mr. Birkenstock.

Thank you for the opportunity to review and comment on recent revisions to the above project. They have been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800).

We have the following comments on the revised proposal:

1. We note that the bank stabilization measures initially planned as part of this project have been deleted. Therefore, we find that the project will have **no adverse effect on archaeological resources** eligible for listing or included in the National Register of Historic places.

2. The Marsh Lake Dam has previously been determined eligible for inclusion in the National Register of Historic Places. We find that any of the **proposed spillway modification alternatives would constitute an adverse effect on the dam** because these modifications will substantially change the way the dam operates. Further, **the proposed channel modifications will adversely affect the historic setting of the dam.**

If you have not already done so, please notify the Advisory Council on Historic Preservation (ACHP) of the adverse effect, per the requirements of 36CFR800, to begin the consultation process.

From our standpoint, the stipulation we would like to see in the anticipated Memorandum of Agreement for this project would simply be the requirement to document the historic dam in its original condition, prior to making the proposed habitat improvement alterations. For this purpose, we ask that you use the Minnesota Property Record Guidelines, which were revised and updated last year. A Level II documentation should be sufficient for this purpose.

Virginia Gnabasik had suggested a conference call to further discuss the MOA contents. However, by dropping the bank stabilization aspects, you have simplified the project from an historic resource standpoint. Once the ACHP is contacted, and appropriate public outreach efforts are made, I think the MOA itself can be very straightforward and focus on documentation of the historic dam.

We look forward to working with you to complete this review. Contact us at (651) 259-3456 with questions or concerns.

Sincerely,

Mary Ann Heidemann, Manager
Government Programs & Compliance Unit

cc: Virginia Gnabasik, Corps of Engineers

Minnesota Historical Society

STATE HISTORIC PRESERVATION OFFICE

June 3, 2010

Attn: Terry Birkenstock
Environmental & Economic Analysis Branch
U.S. Army Corps of Engineers
190 5th Street East
St. Paul, MN 55101-1638

RE: Marsh Lake Ecosystem Restoration, Lac Qui Parle WMA
Big Stone, Lac Qui Parle, and Swift counties
SHPO Number: 2009-0850

Dear Mr. Birkenstock:

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Sincerely,

Mary Ann Heidemann, Manager
Government Programs & Compliance Unit

cc: Virginia Gnabasik, Corps of Engineers

Minnesota Historical Society

STATE HISTORIC PRESERVATION OFFICE

October 21, 2010

Attn: Randall D. Devendorf
Environmental and GIS Branch
U.S. Army Corps of Engineers
180 5th Street East, Suite 700
St. Paul, MN 55101-1638

RE: Marsh Lake Ecosystem Restoration, Lac Qui Parle WMA
Big Stone, Lac Qui Parle, and Swift counties
SHPO Number: 2009-0850 Draft MOA

Dear Mr. Devendorf:

Thank you for the opportunity to review and comment on the draft Memorandum of Agreement prepared for the above project. It has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800).

We have the following comments:

1. We are satisfied with the draft language as proposed. You may send a signature copy here when you are ready to proceed.

2. You mentioned that you have contacted the Advisory Council about the MOA, but had received no reply. We received a back copy of an ACHP reply dated April 9, 2010. A copy of that letter is enclosed for your reference. Unfortunately, the ACHP reply mentions a Programmatic Agreement, not an MOA. This is because your original Corps contact letter, dated March 22, 2010, mentioned a PA, rather than an MOA. I would advise contacting the ACHP and getting another letter with the correct reference.

3. Please be aware that the Minnesota Department of Transportation has just finished a major research document prepared to identify and evaluate the Lac Qui Parle Flood Control Historic District, as part of a bridge project in the area. This document includes much of the historic context information you will need in order to write the narrative portion of the documentation for the Marsh Lake Dam that is required by this MOA. You can probably save your historian time and money by getting a copy of the MnDOT study, and incorporating appropriate portions of that study into the Marsh Lake Dam documentation. The MnDOT project manager for the Lac Qui Parle Flood Control Historic District study is Jackie Sluss in the MnDOT Cultural Resources Unit. Jackie's phone number is (651) 366-3624. No sense reinventing the wheel with taxpayer dollars.

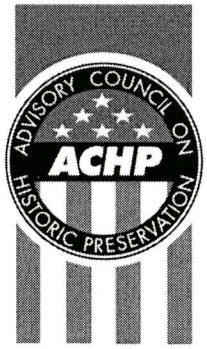
We look forward to working with you on the execution of this MOA, and completion of the required documentation. Contact us at (651) 259-3456 with any questions or concerns you may have.

Sincerely,

Mary Ann Heidemann, Manager
Government Programs & Compliance Unit

enclosure

cc: Virginia Gnabasik, Corps of Engineers



Preserving America's Heritage

April 9, 2010

Mr. Terry J. Birkenstock
Chief, Environmental and Economic Analysis Branch
Department of the Army
St. Paul District, Corps of Engineers
190 Fifth Street East, Suite 401
St. Paul, MN 55101-1638

Ref: Proposed Marsh Lake Dam Ecosystem Restoration Project
Swift, Lac qui Parle, and Big Stone Counties, Minnesota

Dear Mr. Birkenstock:

On March 26, 2010, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the development of a Programmatic Agreement (PA) for the referenced undertaking. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to develop this agreement is needed. However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), a Tribal Historic Preservation Officer, an affected Indian tribe, a consulting party or other party, we may reconsider this decision. Additionally, should circumstances change and you determine that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final PA, developed in consultation with the Minnesota SHPO and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the PA and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with the opportunity to review this undertaking. If you have any questions or need assistance, please contact Tom McCulloch at 202-606-8554, or via email at tmcculloch@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Office of Federal Agency Programs

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
180 FIFTH STREET EAST, SUITE 700
ST. PAUL, MN 55101-1678

REPLY TO
ATTENTION OF

October 29, 2010

Regional Planning and Environment Division North
Environmental and GIS Branch

SUBJECT: Marsh Lake Dam Ecosystem Restoration Project, Minnesota River, Swift, Lac qui Parle, and Big Stone Counties, Minnesota

Dr. Tom McCulloch
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office Building, Suite 803
1100 Pennsylvania Avenue, NW
Washington, D.C. 20004

Dear Dr. McCulloch:

On March 22, 2010, the St. Paul District, U.S. Army Corps of Engineers sent you a letter describing their proposed Marsh Lake Dam Ecosystem Restoration Project on the Minnesota River in Swift, Lac qui Parle, and Big Stone Counties, Minnesota. In that letter we inquired per 36 CFR Part 800, section 800.11, whether the Advisory Council on Historic Preservation wished to become involved with this undertaking and its associated programmatic agreement. The Advisory Council's response letter, dated April 9, 2010, indicated that their participation in the consultation to develop the programmatic agreement was not needed (copy attached).

Since that date, the proposed Marsh Lake Dam Ecosystem Restoration Project has changed in that the shoreline protection measure has been dropped from consideration due to a natural armoring of the reservoir's shoreline area by glacial rocks previously eroded out and deposited along that shoreline. With this change in project plans, unevaluated archeological site 21BS67 on the shoreline of an island in lower Marsh Lake will not be affected by shoreline protection construction. In addition, the proposed stoplog or gated structures on the Louisburg Grade Road culverts will be used to maintain the existing pool level on upper Marsh Lake during any future drawdowns on lower Marsh Lake. Water level drawdowns are not necessary on upper Marsh Lake as it already has an abundance of aquatic vegetation for waterfowl use. Thus, unevaluated archeological sites 21LP36, 21BS42, 21BS47, and the historic granite quarry on upper Marsh Lake will not be affected by future drawdowns of either upper or lower Marsh Lake. All other proposed ecosystem restoration measures remain unchanged from our original coordination letter.

Marsh Lake Dam, which has been determined eligible to the National Register under criterion A, is now the only historic property which will be adversely affected by the proposed ecosystem restoration measures. As a result of this change in the proposed project, a Memorandum of Agreement (MOA) between the St. Paul District, U.S. Army Corps of

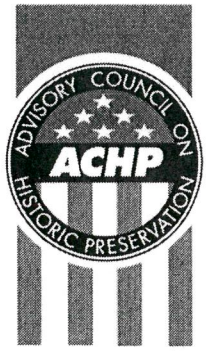
Engineers and the Minnesota State Historic Preservation Officer will be negotiated to cover mitigation of the impacts to Marsh Lake Dam, instead of the previously stated Programmatic Agreement. The Minnesota Department of Natural Resources, who is the non-Federal sponsor of this ecosystem restoration project, will be a concurring party to the MOA.

Because the potential impacts to possible National Register eligible archeological sites along the Marsh Lake shoreline will no longer occur as a result of the revised Marsh Lake Dam Ecosystem Restoration Project, the St. Paul District, U.S. Army Corps of Engineers is hereby asking if the Advisory Council wishes to be involved with the revised undertaking and its associated Memorandum of Agreement to cover mitigation of adverse effects to National Register-eligible Marsh Lake Dam. Please provide your response by November 30, 2010. If you have any questions on any of the ecosystem restoration measures, please contact St. Paul District Corps archeologist Virginia Gnabasik at (651) 290-5262 or by email at virginia.r.gnabasik@usace.army.mil.

Sincerely,

Randall D. Devendorf
Acting Chief, Environmental and GIS Branch

Enclosure
ACHP ltr dated 4/9/10



Preserving America's Heritage

April 9, 2010

Mr. Terry J. Birkenstock
Chief, Environmental and Economic Analysis Branch
Department of the Army
St. Paul District, Corps of Engineers
190 Fifth Street East, Suite 401
St. Paul, MN 55101-1638

Ref: Proposed Marsh Lake Dam Ecosystem Restoration Project
Swift, Lac qui Parle, and Big Stone Counties, Minnesota

Dear Mr. Birkenstock:

On March 26, 2010, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the development of a Programmatic Agreement (PA) for the referenced undertaking. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to develop this agreement is needed. However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), a Tribal Historic Preservation Officer, an affected Indian tribe, a consulting party or other party, we may reconsider this decision. Additionally, should circumstances change and you determine that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final PA, developed in consultation with the Minnesota SHPO and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the PA and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with the opportunity to review this undertaking. If you have any questions or need assistance, please contact Tom McCulloch at 202-606-8554, or via email at tmcculloch@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Office of Federal Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 803 □ Washington, DC 20004
Phone: 202-606-8503 □ Fax: 202-606-8647 □ achp@achp.gov □ www.achp.gov

Preserving America's Heritage

November 15, 2010

Mr. Randall D. Devendorf
Acting Chief, Environmental and GIS Branch
Department of the Army
St. Paul District, Corps of Engineers
190 Fifth Street East, Suite 401
St. Paul, MN 55101-1638

Ref: Proposed Modifications to the Marsh Lake Dam Ecosystem Restoration Project Swift, Lac qui Parle, and Big Stone Counties, Minnesota

Dear Mr. Devendorf:

On November 2, 2010, the Advisory Council on Historic Preservation (ACHP) received your notification and additional supporting documentation regarding the adverse effects of the referenced undertaking on properties listed or eligible for listing in the National Register of Historic Places. Based upon this additional information you have provided, we continue to believe that out participation to resolve adverse effects and develop an agreement document is not needed for this project. However, should circumstances change, and you determine that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final Memorandum of Agreement (MOA), developed in consultation with the Minnesota State Historic Preservation Office (SHPO) and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the MOA and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with the opportunity to review this undertaking. If you have any questions or need assistance, please contact Tom McCulloch at 202-606-8554, or via email at tmcculloch@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Office of Federal Agency Programs

MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT,
AND THE MINNESOTA STATE HISTORIC PRESERVATION OFFICER
REGARDING MITIGATION OF ADVERSE EFFECTS TO MARSH LAKE DAM
RESULTING FROM THE MARSH LAKE ECOSYSTEM RESTORATION PROJECT,
SWIFT, LAC QUI PARLE AND BIG STONE COUNTIES, MINNESOTA

[Final – November 2010]

WHEREAS, the St. Paul District, U.S. Army Corps of Engineers (Corps) is conducting a feasibility study of ecosystem restoration measures at Marsh Lake on the Minnesota River in Swift, Lac Qui Parle, and Big Stone Counties, Minnesota; and

WHEREAS, the State of Minnesota, Department of Natural Resources (DNR) is the main landowner around Marsh Lake, as the Lac Qui Parle Wildlife Management Area, and is the non-Federal sponsor of this ecosystem restoration feasibility study; and

WHEREAS, the Corps and Minnesota DNR are proposing an ecosystem restoration project at Marsh Lake on the Minnesota River (Project) with the following primary features (a-g) and optional features (h-j) (see Figures 1 and 2):

a. Restoring the Pomme de Terre River to its former (pre-dam) channel by excavating an opening through the Marsh Lake Dam embankment and constructing three earthen berms or cutoff dikes across two low areas and the abandoned diverted river channel above the dam embankment to prevent Marsh Lake from spilling into the restored river channel;

b. Constructing a bridge over the restored Pomme de Terre River channel at the embankment to allow continued vehicle access to the dam;

c. Modifying Marsh Lake Dam at its outlet by excavating a 2.1-foot-deep, 30-foot-wide notch into the existing fixed ogee crest spillway and constructing a nine-tier rock-ramp fishway to allow fish passage between Marsh Lake and the Lac Qui Parle Reservoir downstream;

d. Constructing a new 90-foot-wide gated water control structure with 12 bays at the existing emergency spillway to enable future water level management of Marsh Lake;

e. Adding walkways over the existing fixed crest spillway and fishway and over the gated water control structure to allow access across the entire dam, which walkways could serve a secondary recreational purpose as part of the Minnesota River State Trail for pedestrian and bicycle traffic;

f. Breaching the abandoned fish rearing pond levee below the dam embankment to allow it to change water level with the rest of upper Lac Qui Parle Reservoir to provide seasonally variable habitat for fish and shorebirds;

g. Constructing three linear, rock wave-barrier islands in Marsh Lake between the dam and Louisburg Grade Road to reduce wind fetch and thereby shoreline erosion;

h. Adding stoplog structures to the six concrete culverts through Louisburg Grade Road to enable separate water level management in upper Marsh Lake;

i. Improving the recreation area at Marsh Lake Dam, including adding an interpretive kiosk, adding a canoe and kayak landing/launch area near the spillway for access to the Pomme

de Terre River and Minnesota River/upper Lac qui Parle Reservoir, and adding shoreline fishing and wildlife viewing platforms; and,

j. Improving recreational and educational features at six existing boat ramps (Upper Pool Landing, Minnesota River Landing, Correll Landing, Killen Landing, Cabin Site Landing, and Peterson Landing) on Marsh Lake by adding interpretative kiosks and shoreline fishing/wildlife viewing platforms. Additional parking would also be provided at the Minnesota River Landing.

WHEREAS, Marsh Lake Dam (SW-APT-003) has been determined individually eligible to the National Register of Historic Places under Criterion A for its association with the Lac Qui Parle Flood Control Project, a Works Progress Administration project of the Federal Relief Programs following the Great Depression in 1929, and retains its integrity of original location, design, setting, materials, workmanship, feeling and association, and will be directly affected by proposed ecosystem restoration features a, b, c, and d, and restoration/recreation feature e, which will substantially change the historic setting of the dam and the way the dam operates and;

WHEREAS, proposed ecosystem restoration features c and d will also change the way Marsh Lake Dam is operated;

NOW, THEREFORE, the Corps, the Minnesota Department of Natural Resources, and the Minnesota State Historic Preservation Officer (SHPO) agree that upon filing this Memorandum of Agreement (MOA) with the Advisory Council on Historic Preservation, and upon the Corps' decision to proceed with the Marsh Lake ecosystem restoration project, the Corps shall ensure that the following stipulations are implemented prior to construction in order to mitigate the effects of the undertaking on the National Register eligible Marsh Lake Dam and comply with Section 106 of the National Historic Preservation Act, as amended.

STIPULATIONS

The Corps, as the Federal agency undertaking the Project, shall ensure the following stipulations are complied with prior to construction of ecosystem restoration features a, b, c, d, and e to mitigate adverse effects to Marsh Lake Dam's integrity of design, setting, and feeling. The proposed spillway modifications will also substantially change the way the dam operates.

A. The Corps or its contractor will document the historic Marsh Lake Dam property in its original and present condition, using Level II documentation as described in the *Minnesota Historic Property Record Guidelines* (updated June 2009 version). Level II documentation consists of: 1) a Minnesota Historic Property Record (MHPR) Background Data Form; 2) a brief two-page narrative description of the historic property (i.e., Marsh Lake Dam, SW-APT-003), its history, and a bibliography; and 3) documentation photography (black-and-white, 35 mm Kodak TMAX ISO 100 print film) covering historic photographs of Marsh Lake Dam, of the existing dam with its embankment and related features, and of historic plans and drawings of Marsh Lake Dam. Photographic documentation will follow the requirements given in Appendix E in the MHPR Guidelines.

B. The Corps will provide copies of the completed MHPR Level II documentation for Marsh Lake Dam to the Minnesota SHPO, to the Minnesota DNR's Regional Office, to the Lac qui

Parle Wildlife Management Refuge, and to the Swift, Big Stone, and Lac Qui Parle County Historical Societies.

C. Dispute Resolution. Should any of the signatory parties to this MOA object to any plans, documents, or reports prepared under the terms of this MOA within 30 days after receipt, the Corps shall consult with the objecting party to resolve the objection. If the Corps determines that the objection cannot be resolved, the Corps shall forward all documentation on the dispute to the Advisory Council on Historic Preservation. Any recommendation or comment provided by the Advisory Council will be understood to pertain only to the subject of the dispute. The Corps' and the Minnesota DNR's responsibilities to carry out all actions under this MOA that are not the subject of the dispute will remain unchanged.

D. Amendments. Any signatory party to this MOA may request that it be amended, whereupon the parties will consult to consider such amendment.

E. Termination. Any signatory party to this MOA may terminate it by providing thirty (30) days notice to the other parties, provided that the parties will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination.

F. Anti-Deficiency Provision. All obligations on the part of the Corps shall be subject to the availability and allocation of appropriated funds for such purposes. Should the Corps be unable to fulfill the terms of this agreement, it will immediately notify the Minnesota SHPO and the Minnesota DNR and consult to determine whether to amend or terminate the MOA pending the availability of resources.

G. Sunset Clause. This MOA will continue in full force and effect until the mitigation of adverse effects to the National Register-eligible Marsh Lake Dam by the proposed ecosystem restoration features has been completed as stipulated above, unless the proposed features are not constructed or authorization for their construction is rescinded.

Execution and implementation of this Memorandum of Agreement evidences that the Corps has satisfied its Section 106 responsibilities for all aspects of this undertaking.

ST. PAUL DISTRICT, U.S. ARMY CORPS OF ENGINEERS

BY: _____ Date: 22 November 2010
Col. Michael J. Price, District Engineer

MINNESOTA STATE HISTORIC PRESERVATION OFFICER

BY: _____ Date: 11/30/10
Britta Bloomberg, Deputy State Historic Preservation Officer

Concur:

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

BY: _____ Date: _____
Mark Matuska, Regional Director

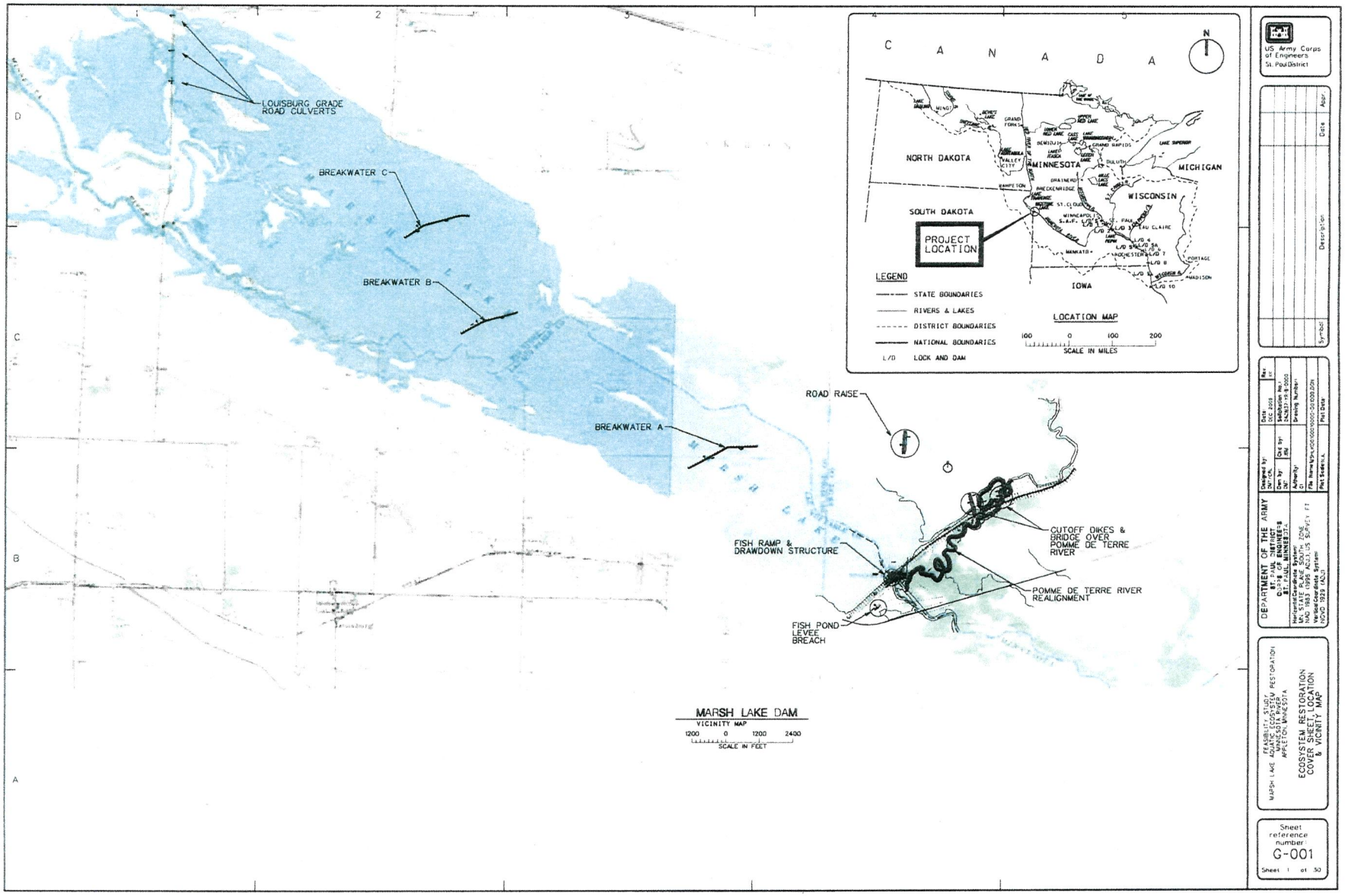


Figure 1. Marsh Lake Ecosystem Restoration Project, location of features a through h.

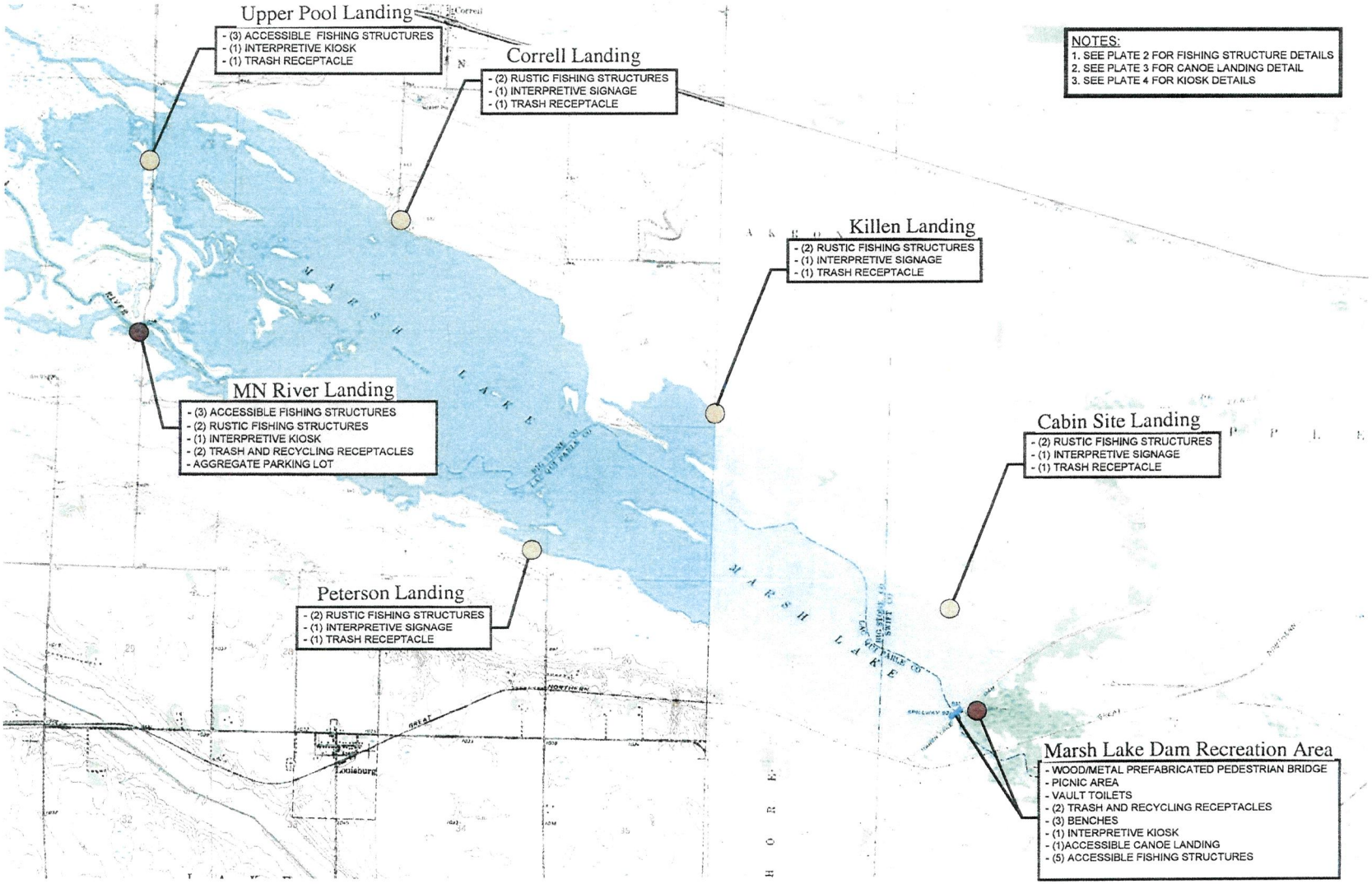


Figure 2. Marsh Lake Ecosystem Restoration Project, location of recreation features i and j.

Wyatt, Michael MVP

Subject: FW: Marsh Lake MN River Ecosystem Restoration Project (UNCLASSIFIED)

-----Original Message-----
From: Wilcox, Daniel B MVP
Sent: Monday, January 24, 2011 3:09 PM
To: Richard Davis (Richard_Davis@fws.gov)
Cc: Wyatt, Michael MVP; Clark, Steven J MVP; Ken Varland (Ken.Varland@dnr.state.mn.us); David Trauba (David.Trauba@dnr.state.mn.us)
Subject: Marsh Lake MN River Ecosystem Restoration Project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Richard,

Good to talk to you today. This is a request for ESA coordination.

The St. Paul District is preparing a feasibility report about an ecosystem restoration project at Marsh Lake, part of the Lac Qui Parle Flood Control Project on the Minnesota River. The Minnesota DNR is the non-federal cost share partner on this project. The primary project area is in the Lac Qui Parle Wildlife Management Area. Ken Varland (telephone 507/359-6030) and Dave Trauba (telephone 320-734-4451 x227) are our primary contacts with the MN DNR. Alice Hanley (telephone 320-273-2191), Refuge Manager of the Big Stone National Wildlife Refuge has participated in the planning of this project. An initial draft of the feasibility report/EA is available on our .ftp server at:
ftp://ftp.usace.army.mil/pub/mvp/MarshLakeFeasibilityReportEA/

I would like to coordinate ESA for this project with you by email. If you need a formal letter, please let me know.

The project within the MN DNR Lac qui Parle Wildlife Management Area. There are no federally-listed threatened or endangered species that may be found in the project area.

Please provide a response to this determination. We would like to have documentation of ESA coordination from you by email by February 9 for the Alternatives Formulation Briefing (a planning policy review of the project with our Division and Headquarters).

Also please advise on anything else we need to provide to fulfill our requirements for the project under the federal ESA and the FWCA.

Please call if you have any questions. Thanks for your help with this promising project.

Dan

Daniel B. Wilcox
Fisheries Biologist
Environmental and GIS Branch
US Army Corps of Engineers
St. Paul District
180 5th St. East
Suite 700
St. Paul MN 55101-1678

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Twin Cities Field Office
4101 American Blvd E.
Bloomington, Minnesota 55425-1665

July 12, 2011

Terry Birkenstock, Chief
Environmental and GIS Branch
St. Paul District Corps of Engineers
180 5th Street East, Suite 700
St. Paul, Minnesota 55101-1678

Re: Draft Marsh Lake Ecosystem Restoration Project Feasibility Report
Fish and Wildlife Coordination Act Correspondence
FWS TAILS #32410-2011-CPA-0088

Dear Mr. Birkenstock:

Pursuant to the Fish and Wildlife Coordination Act (FWCA), the Service and the U.S. Army Corps of Engineers (Corps) must coordinate and determine potential biological and ecological impacts of proposed projects. To date, Manger Alice Hanley of the Big Stone National Wildlife Refuge has participated with the Corps staff in the planning process for this project. This letter is intended to provide a singular document identifying the Service's input to date.

The following comments are being provided pursuant to the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, and the Fish and Wildlife Coordination Act. This information is being provided to assist the Corps in making an informed decision regarding wildlife issues, site selection, project design, and compliance with applicable laws.

Federally-listed Threatened, Endangered, and Candidate Species

Currently, the Dakota skipper (Candidate) is present within Big Stone, Lac qui Parle, and Swift Counties, Minnesota. Our records do not indicate any Dakota skippers within the proposed project area. The Poweshiek skipper is currently under consideration to be listed as a Candidate species under the Endangered Species Act, and there are records of Poweshiek skippers within the proposed project area. Dakota and Poweshiek skippers prefer native prairie habitats. It is our understanding that the proposed project will not affect, directly or indirectly, any native prairie areas.

If at any point during project planning, construction, or operation, additional information on listed or proposed species becomes available, or new species are listed that may be affected by the project, consultation should be reinitiated with the Twin Cities Field Office.

Migratory Birds

The Migratory Bird Treaty Act (16 U.S.C. 703-712; MBTA) implements four treaties that provide for international protection of migratory birds. The MBTA prohibits taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior. Bald and golden eagles are afforded additional legal protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d). Unlike the Endangered Species Act, neither the MBTA nor its implementing regulations at 50 CFR Part 21 provide for permitting of "incidental take" of migratory birds.

Our records indicate the presence of one bald eagle nest in close proximity to the abandon fish-rearing pond referenced in the Draft Report, which could be affected by the project. Verification of the location and the activity status of the nest should be completed prior to completing any construction within 660 feet of the nest site.

Records indicate the past and/or current use of Marsh Lake by several colonial water-nesting bird species; American pelican, great blue heron, great egret, double crested cormorant, Forester's tern, black crowned night heron, and ring billed gulls. Development of a construction timeline to minimize impacts to these areas during prime nesting times should be considered. The Service recommends that proposed construction and excavation within potential bird nesting habitat be completed outside of the primary nesting period (April 1to August 31) when possible and feasible. Attempts to minimize impacts to potential migratory bird nesting habitats should be made at all times during construction and excavation.

Service-owned Lands

The Hastad, Hegland, and Plover Waterfowl Production Areas (WPAs) are within the proposed project area. Several private land tracts held under Conservation and Wetland Easement by the Service are also within the project area. Proposed project activities are not anticipated to have a negative impact on Service-owned or easement lands.

The proposed project should provide benefits in the way of wetland habitat improvement, aquatic vegetation establishment, increased fish passage, and increased species diversity. Thank you for the opportunity to provide comments on this proposed project. Please contact Fish and Wildlife Biologist Rich Davis at 612-725-3548 (ext. 2214) or me (ext. 2201) if we may be of further assistance.

Sincerely,

Tony Sullins
Field Supervisor

Cc: Alice Hanley, Project Leader - Big Stone NWR/WMD

CORPS OF ENGINNEERS RESPONSE TO FISH AND WILDLIFE SERVICE FWCA RECOMMENDATIONS

The U.S. Fish and Wildlife Service made two recommendations regarding avoiding or minimizing effects on Migratory Bird:

1. Verify the location and activity status of the currently known Bald Eagle nest that is in proximity of the abandoned fish rearing ponds before initiating any construction within 660 feet of the nest.

Response: The location and status of any known eagle nests in the project area will be evaluated prior to initiating construction. Coordination will be initiated with the USFWS if active eagle nests are located in or near proposed construction area.

2. Construction timing should be developed to minimize impacts of colonial nesting bird that may use the area.

Response: If possible/feasible, construction will be timed to avoid disturbance during critical nesting/rearing periods. BMP's will be used to minimize impacts to migratory bird nesting habitats during construction.

Appendix D – Section 404 Certification

Appendix D

Section 404(b)(1) Evaluation

Marsh Lake Ecosystem Restoration Project
Minnesota River

Big Stone, Lac qui Parle, and Swift Counties, Minnesota

June 2011

I. PROJECT DESCRIPTION

A. Location - The proposed fill activity would take place in Marsh Lake on the Minnesota River and in the Lower Pomme de Terre River located in western Minnesota (Figures 1 and 2). Lac qui Parle and Marsh Lake Reservoirs form boundaries for Lac qui Parle, Chippewa, Swift, and Big Stone Counties.

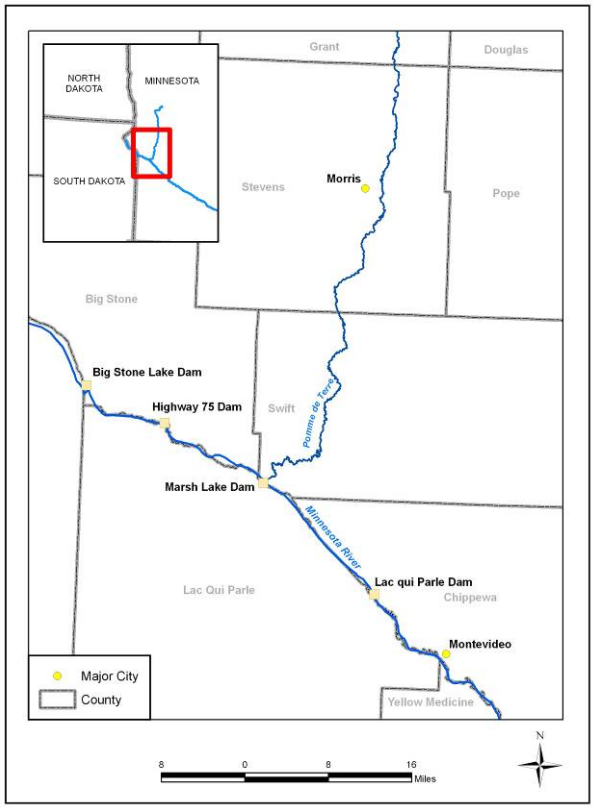


Figure 1. Marsh Lake Dam location on the Minnesota River in western Minnesota.

B. General Description - The proposed fill activities would consist of modifications to the Marsh Lake Dam to enable passive and active water level management and provide for fish passage between Lac qui Parle Lake and Marsh Lake and the Pomme de Terre River. This would include construction of a fishway in the overflow spillway and a stoplog water control structure in the embankment adjacent to the spillway (Figures 3 and 4).

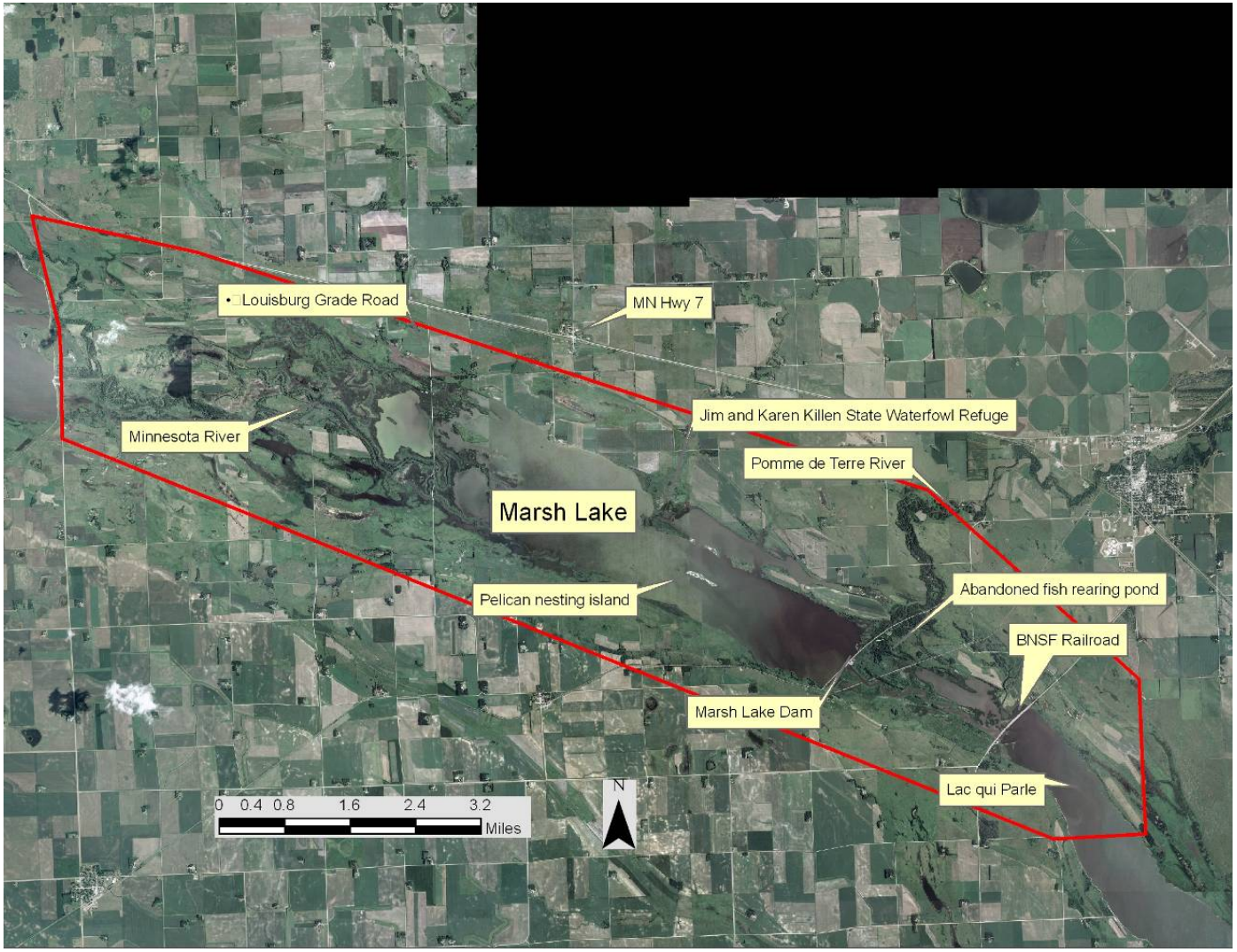


Figure 2. Marsh Lake project area boundary. Minnesota River flowing left to right. Marsh Lake Dam at right center. Pomme de Terre River entering from upper right. Farm Service Agency 2003 photo.

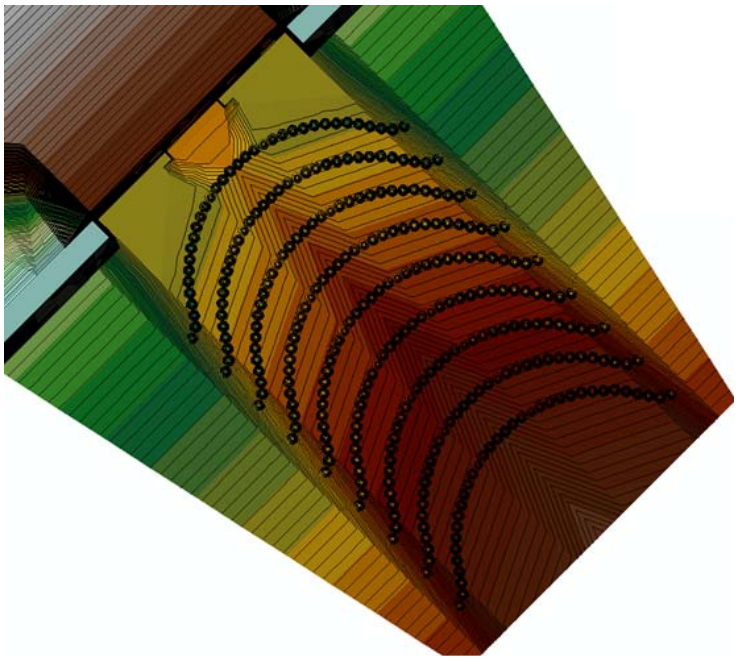


Figure 3. Conceptual design of a Marsh Lake fishway. Flow from upper left to lower right.

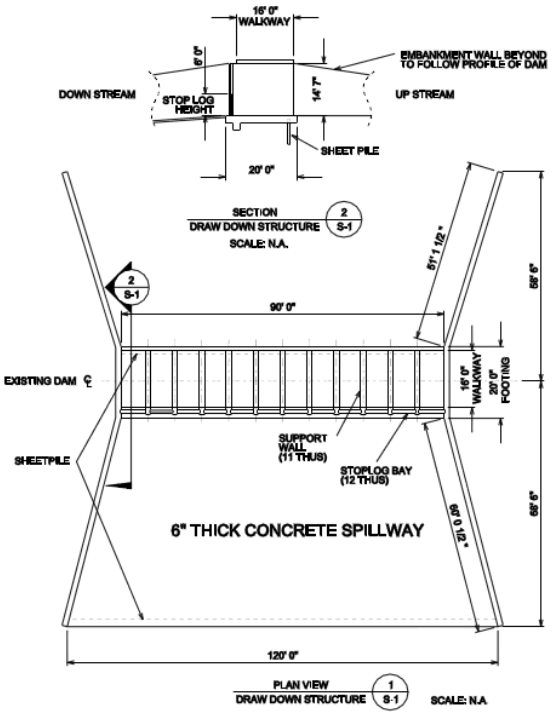


Figure 4. Conceptual design of a stop log water control structure for the Marsh Lake Dam.

Restoring the Pomme de Terre River to its former channel near its confluence with the Minnesota River would include construction of three cut-off berms and a bridge over the Pomme de Terre River to maintain access to the Marsh Lake Dam (Figure 5).

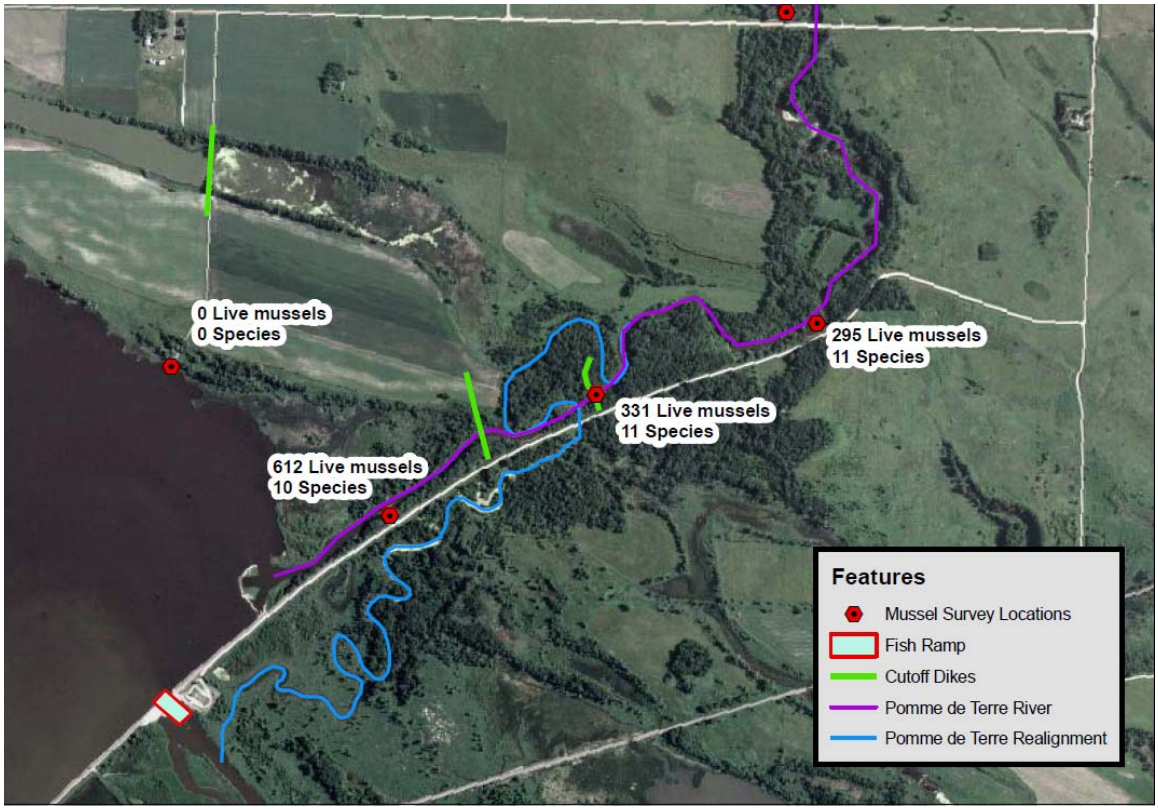


Figure 5. Pomme de Terre River existing channel (purple), realignment into former channel (blue), earthen cut-off dikes (green)

The abandoned fish rearing pond next to the Marsh Lake Dam would be reconnected with the upper end of Lac qui Parle. Breaching the fish pond dike on the downstream side of the Marsh Lake Dam would provide connectivity between the fish pond area and the upper end of Lac qui Parle, allowing native floodplain vegetation to become established and providing seasonally variable habitat for fish and shorebirds.

Installing gated culverts in the Louisburg Grade Road would enable water level management in upper Marsh Lake (Figures 6 and 7) during years when Marsh Lake is intentionally drawn down to restore aquatic vegetation.

Figure 6. Existing culverts under the Louisburg Grade Road at the upper end of Marsh Lake.

Figure 7. Location of culverts under the Louisburg Grade Road at the upper end of Marsh Lake.

Recreational and educational features would be constructed, including a trail bridge over Marsh Lake Dam to connect with the Minnesota State Trail, shore fishing access sites at six locations on Marsh Lake, canoe access on the Pomme de Terre River, and an improved recreation area at Marsh Lake Dam.

Figure 8. Example of an accessible shore fishing platform.

C. Authority and Purpose - The Marsh Lake feasibility study was authorized by a Resolution of the Committee on Public Works of the U.S. House of Representatives, May 10, 1962. The resolution reads as follows:

> "Resolved by the Committee on Public Works of the House of Representatives, United States, that the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the report of the Chief of Engineers on the Minnesota River, Minnesota, published as House Document 230, 74th Congress, First Session and other pertinent reports, with a view to determining the advisability of further improvements in the Minnesota River Basin for navigation, flood control, recreation, low flow augmentation, and other related water and land resources."

The purpose of this document is to comply with Section 404(b)(1) of the Clean Water Act pertaining to guidelines for placement of dredged or fill material into the waters of the United States. This evaluation also provides information and data to the Minnesota Pollution Control Agency demonstrating compliance with State water quality standards for the decision-making process about State 401 water quality certification.

D. Description of Dredged or Fill Material

Project Features Including Dredged or Fill Material

Modifications to the Marsh Lake Dam would include modifying the fixed crest spillway by constructing a fishway and construction of a gated stoplog structure. 1900 tons of large (1.6 ft diameter and larger boulders for weirs) rock would be used in the fishway channel. Riprap and bedding (10,000 tons) would be used to armor the fishway channel tying in to the existing

embankment and in the downstream scour hole. The gated stoplog structure would also be armored with riprap and bedding (16,144 tons) tying in to the existing embankment and in the tailwater connecting to the Minnesota River. The embankments on the sides and downstream of the fishway and stoplog structure would be constructed with 23,350 cy of impervious fill. Material excavated from the work area for the fishway and stoplog structure would be transported to an upland placement site.

Restoring the Pomme de Terre River to its former channel would involve constructing two new sections of embankment to separate the Marsh Lake pool from the re-routed section of the Pomme de Terre River (left two green lines in Figure 5 above). The new embankments would be constructed to an elevation equal to spillway design flow elevation plus 5 feet of freeboard, or an elevation of 952.1 ft. Rock riprap against wave action would be necessary for the lake side of the new embankments. Rock riprap would be placed to a top elevation equal to rock riprap on the existing embankment (942.0 ft). A diversion plug is needed to divert the Pomme de Terre River into its historic channel in the area upstream of Marsh Lake Dam (right green line in Figure 5 above). Impervious clay fill material for the new embankments and diversion plug (31,596 cy) would be borrowed from a nearby upland site (Figure 9).

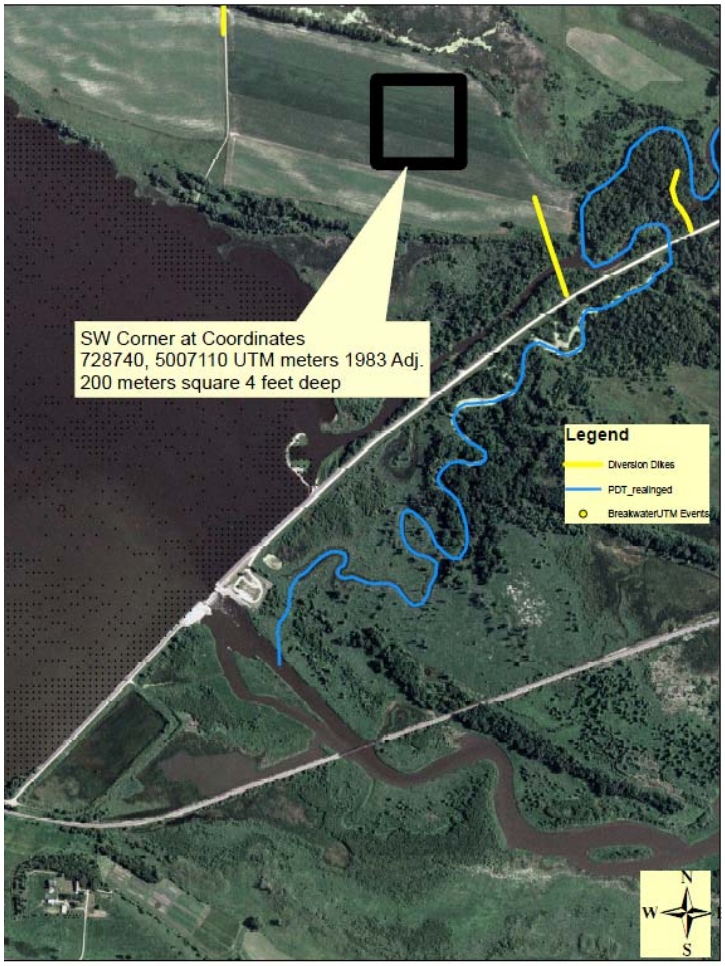


Figure 10. Borrow location for material to construct new embankments and diversion plug for re-routing the Pomme de Terre River to its former channel.

A five-span concrete bridge 450 ft long would be constructed over the Pomme de Terre River where it is re-routed through the Marsh Lake Dam embankment. The bridge piers would contain 90 cubic yards (cy) of concrete and footings, of which approximately one half would be in the water.

In-channel erosion control structures would be necessary to prevent head-cutting in the Pomme de Terre River channel that could threaten the Marsh Lake embankment and new bridge. Four erosion control structures (Figure 11) would be constructed near the mouth of the Pomme de Terre River and the highest located slightly upstream of the re-routed reach. Fill for these structures would be approximately 2000 cy of granite rock from local quarries. The rock would not be obtained by mining native prairie areas.

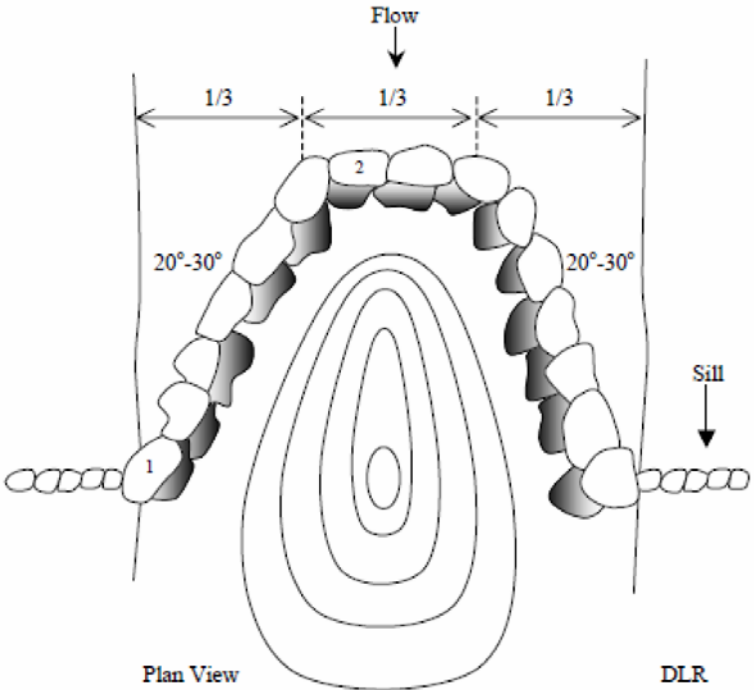


Figure 11. Rock erosion control structures to be constructed in the re-routed Pomme de Terre River Channel.

The abandoned fish rearing pond dike would be breached by removing 650 cy of fill and transporting it to an upland site.

The seven existing culverts under the Louisburg Grade Road would be removed and replaced with gated culverts. Approximately 210 cy of granite rock approximately 1 ft in diameter would be obtained from local quarries to armor the upstream and downstream ends of the culverts.

Shore fishing sites at six locations around Marsh Lake would be constructed. Two of the sites would be handicapped-accessible and constructed with pre-cast 8 ft x 8 ft concrete box culverts (Figure 9 above). The other recreational fishing shoreline accesses would be constructed with 4 ft x 8 ft slabs of locally quarried granite rock.

E. Description of the Proposed Discharge Sites

The fishway and stoplog control structure would be constructed in the Marsh Lake Dam at the existing fixed crest spillway. This construction activity would affect a 5.0 acre area of the existing dam and Minnesota River tailwater. Modifications to the Marsh Lake Dam would also alter 1.1 acres of Marsh Lake with excavation to deepen the approach to the fishway, scour of the lake bed in the approach to the stop log structure, and placement of new riprap to protect the structures. The existing aquatic habitat near the Marsh Lake Dam was altered by construction and operation of the dam. The lake bed material is sandy with scattered boulders and riprap along the lake side of the dam.

Based on the construction drawings, the new east embankment for restoring the Pomme de Terre River to its former channel would cover 1.3 acres of floodplain and river channel area. The Pomme de Terre River floodplain has scattered green ash, black willow and cottonwood trees with reed canary grass in the lower areas. The Pomme de Terre River channel is sandy with patches of gravel.

The cut-off dike for re-routing the Pomme de Terre River would cross the Pomme de Terre River floodplain and channel. Based on the construction drawings, the cut-off dike would have a footprint of 0.96 acres.

Replacing the existing culverts under the Louisburg Grade Road with new gated culverts would not change the footprint of the structures. New 1 ft diameter rock riprap would be placed to armor the upstream and downstream ends of the culverts. The area of this fill would total approximately 2800 square feet, or 0.06 acres.

Breaching the dike on the abandoned fish pond would not involve placing fill. Material excavated from the breach area would be removed and placed on an upland site.

Installation of shoreline fishing access structures would affect small areas approximately 20 x 20 ft in the immediate vicinity of the six new structures. The shoreline fishing structures would be located on the shoreline of Marsh Lake adjacent to deeper water suitable for fishing. Most of these structures would be along the already riprapped Marsh Lake Dam.

F. Timing and Duration

Subject to approval and funding, construction could begin in the year 2013. Construction for this project would take 1 to 2 years, depending on when construction is initiated. The culverts on Louisburg Grade Road, the fishway, the fish pond notch, the recreation features and the road raise can be constructed any time during the open water season when water levels allow. The order of construction the diversion dikes and bridge over the Pomme de Terre River along Marsh Lake Dam is important. The bridge should be done first. Then either of the diversion dikes can be constructed next. The cutoff dike that forces the water of the Pomme de Terre River to flow through the bridge needs to be constructed out of impervious fill and needs to be compacted to be stable.

G. Description of the Proposed Borrow Site

The 9.88 acre borrow site is in an agricultural field on the Lac qui Parle Wildlife Management area near the north end of the Marsh Lake Dam (figure 10). Rock would be obtained from local quarries.

H. Description of Material Placement Method

The material would be moved and placed mechanically.

II. FACTUAL DETERMINATIONS

A. Physical Substrate Determinations

Substrate Elevation and Slope - The average annual water level on Marsh Lake is 938.3 ft. The bed of Marsh Lake in the vicinity of the proposed modifications to Marsh Lake Dam is fairly flat and approximately 935.2 ft . The sill elevation of the stop log water control structure would be set at 935.0 ft to enable drawdown of most of the lake. At this sill elevation, no approach channel dredging would be required. Some scour of the lake bed would be expected near the dam when the stop logs are removed.

As the historic Pomme de Terre River channel was originally formed by the geomorphic conditions of the river and its watershed, it is expected that the channel plan form dimensions would result in a stable natural channel once the fine sediments that have accumulated in the former channel are washed out. The reconnection of the Pomme de Terre to its historic channel would require some excavation of material that now blocks this flow path, particularly through the existing embankment and near the mouth where it would meet the Minnesota River. It would also require that fill be placed in two channelized reaches of the current flow path. Some erosion control structures would also be necessary to prevent head cutting. However, the general philosophy would be to connect the river to its original flow path and allow natural processes to form to channel.

Cross section surveys of the Pomme de Terre below Appleton, MN indicate that the average bank full width of channel is approximately 90-110 feet. This width was verified with aerial photos. Steady flow modeling of the Pomme de Terre River with a bankfull discharge (850 cfs) shows that hydraulic depth varies from 3-5 feet in the reach between Appleton and the mouth. An average depth of 4 feet is therefore considered the typical depth for the Pomme de Terre River at bank full flow in the project reach. Based on the stream slope upstream of the project area, a typical slope of 0.0005 ft/ft is considered representative of the reach to be restored.

Sediment Type - Sediment in Marsh Lake is sandy silt. Sediment in the Pomme de Terre River is sandy gravel. Sediment in the former channel of the Pomme de Terre River is approximately six inches of silt and organic matter overlying the former sand and gravel of the river bed.

Dredged/Fill Material Movement – The embankments and cut-off dike to re-route the Pomme de Terre River are designed with riprap armoring to limit erosion by wave action and river current.

B. Water Circulation, Fluctuation, and Salinity Determinations

Water Salinity – Water in the project area has naturally high total dissolved solids, influenced by calcium sulfate in the soils. The fill activities would not affect salinity.

Water Chemistry - The use of clean fill material and mechanical placement would preclude any significant impacts on water chemistry.

Water Clarity - Minor, short-term reductions in water clarity are expected from sediment resuspension associated with the proposed fill activities. Long term, the project is expected to increase water clarity in Marsh Lake.

Water Color - The proposed fill activities should have no impact on water color.

Water Odor – Dense summer blue green algae blooms and windrows of scenescent algae on Marsh Lake produce foul odors and toxicity. The project should reduce foul odors in the summer due to algae blooms.

Water Taste – Marsh Lake and the Pomme de Terre River are not used for water supply.

Dissolved Gas Levels – Modification of the Marsh Lake Dam would allow winter drawdown, intentionally inducing hypoxia (low dissolved oxygen concentration) to kill carp. The project would not otherwise have any effect on dissolved oxygen concentrations.

Nutrients - The proposed fill activities should have no impact on nutrient (nitrogen and phosphorus) concentrations in the water.

Eutrophication - The proposed modifications to Marsh Lake Dam and rerouting the Pomme de Terre River would reduce nutrient loading to Marsh Lake, encourage the growth of aquatic vegetation and reduce the density and duration of blue-green algae blooms.

Temperature - The proposed fill activities would have no impact on water temperature.

Current Patterns and Water Circulation - Re-routing the Pomme de Terre River to its former channel would change the pattern of Pomme de Terre River flow. The river was channelized to enter Marsh Lake above the Marsh Lake Dam when the project was first constructed.

Current Velocity – Modifying the Marsh Lake Dam fixed crest spillway with a fishway would provide a variety of current velocities that would enable upstream fish passage and eliminate the public safety hazard of the hydraulic backroller below the existing spillway.

Restoring the Pomme de Terre River to its former channel would restore a more natural pattern of current velocity in the river.

Stratification – Because Marsh Lake is shallow and thoroughly wind-mixed, the lake does not stratify.

Hydrologic Regime - The proposed fill activities would have no impact on the hydrologic regime of inflows to the project area.

Water Level Fluctuations - Re-routing the Pomme de Terre River to its former channel would change the pattern of Pomme de Terre River flow. The river was channelized to enter Marsh Lake above the Marsh Lake Dam when the project was first constructed. The combined project features would alter the water level regime in Marsh Lake. The overall effect would be increased water level variability, minimal changes during flood events, and occasional managed water level drawdowns.

Salinity Gradient – The project area is not in a coastal estuary.

Actions Taken to Minimize Impact - Standard construction procedures in compliance with Federal and State requirements would be used. The material would be placed mechanically. Silt barriers would be deployed during construction to limit mobilization and transport of sediment in the Pomme de Terre River. Mussels in the Pomme de Terre River have been quantitatively surveyed and recolonization of mussels in the restored channel would be monitored (see Section 4.1.4 in the Feasibility Report).

C. Suspended Particulate/Turbidity Determination - Some temporary and localized increases in suspended sediment would result from construction of the project features.

Restoring the Pomme de Terre River to its former channel would reduce sediment loading to Marsh Lake by about half and improve conditions for growth of submersed aquatic plants. Pomme de Terre River flow at higher levels of river discharge would spread overbank into the vegetated floodplain before reaching the Minnesota River, removing sediment and nutrients before flowing into Lac qui Parle.

Modification of Marsh Lake Dam and restoring a more natural stage hydrograph would allow emergent and submersed aquatic vegetation to expand in Marsh Lake. The vegetation would reduce sediment resuspension and trap suspended sediment resulting in increased water clarity. Winter drawdowns would limit the abundance of common carp that resuspend bottom sediment.

D. Flood Profiles - The changes to large flood levels on Marsh Lake from the proposed project were evaluated with two methods (see Appendix H Hydraulics and Hydrology):

1) For water level simulations over 20 years (1983 – 2003), results for the two largest flood events (1997 & 2001) with & without project features were compared and,

2) Estimated 100 year flood hydrographs for with and without project conditions were routed through the reservoir.

Simulated with project water levels were on the order of 1.5 foot lower than modeled existing conditions for the 1997 & 2001 flood events. This is primarily attributed to reduced inflows to Marsh Lake due to the altered Pomme De Terre flow path.

Marsh Lake is expected to experience lower peak flood elevations due to the project as designed in this feasibility study. Note that the current 100-year Pool Elevation on Marsh Lake

of 947.4 feet is above the maximum pool elevation and is not relied upon for flood control downstream.

E. Effects on Chemical and Physical Properties of the Water Column - No effects are expected on light penetration, dissolved oxygen, toxic metals and organisms, pathogens, or the aesthetics of the water column after the project is in place.

F. Aquatic Ecosystem and Organism Determinations:

Effects on Plankton and Fish

Construction of the project features would result in temporary and localized increases in suspended solids that are not expected to adversely affect plankton or fish. Silt curtains will be used where practicable to limit sediment resuspension during construction.

The project is expected to increase water clarity in Marsh Lake, resulting in increased extent and abundance of submersed aquatic plants. Increased water clarity and aquatic plants would improve habitat conditions for native fish, zooplankton and macroinvertebrates.

Modifying the Marsh Lake Dam with a stop log water control structure would allow drawdowns that would reduce the abundance of common carp and favor native fish species.

Restoring the Pomme de Terre River to its former channel would provide fish from Lac qui Parle access to the river for spawning. Construction of a fishway in Marsh Lake Dam would allow northern pike access to high quality spawning habitat in upper Marsh Lake.

Effects on Benthos

Construction of the new embankment to re-route the Pomme de Terre River would bury macroinvertebrates including native mussels and fingernail clams in the Pomme de Terre River (see Section 4.1.4 in the Feasibility Report/EA) where the new embankment crosses the channel. This would affect a 0.18- acre area of river bed. In addition, mussels in the lower reach of the channelized Pomme de Terre River below the new embankment would no longer be in a flowing river and would probably die.

Benthos, primarily chironomid and ceratopogonid midge larvae living in the silt substrate in the former Pomme de Terre River would washed away when the river is diverted back into its former channel. The former channel area would scour down to the historic sand/gravel substrate and would rapidly recolonize with benthic macroinvertebrates from upstream. Native mussels are expected to recolonize the restored river channel.

Effects on Wildlife

The proposed project is expected to increase water clarity in Marsh Lake, resulting in increased extent and abundance of submersed aquatic plants. Increased water clarity and aquatic plants would improve habitat conditions for native fish, muskrats, mink, fish-eating birds like

pelicans, herons and egrets, and breeding waterfowl. One of the primary benefits of the project would be increased food (sago pondweed tubers) for fall-migrating waterfowl.

Effects on Aquatic Food Web

The project features in combination and associated management of Marsh Lake water levels are intended to change the ecosystem state of Marsh Lake from a turbid shallow lake with sparse vegetation to a clearer water vegetated condition.

Effects on Special Aquatic Sites

Sanctuaries and Refuges

The project area is within the Lac qui Parle Wildlife Management Area owned and managed by the Minnesota DNR. Parts of Marsh Lake serve as a refuge for migrating waterflowl in the fall. The DNR is the project cost-share partner for this project.

Wetlands, Mud Flats and Vegetated Shallows

Marsh Lake is a shallow lake with an extensive littoral zone. All of Marsh Lake is a wetland area. The project would allow for water level management on Marsh Lake to restore emergent and submersed aquatic vegetation, consolidate sediment, reduce sediment resuspension and reduce abundance of carp. There would be extensive mud flat areas in Marsh Lake in years when it would be drawn down to restore emergent aquatic vegetation. The mud flats would provide excellent habitat for shorebirds.

The Pomme de Terre River floodplain that would be affected by the new embankment and cut-off berm to restore the river to its former channel is also a wetland area.

Natural Floodplain Areas

Restoring the Pomme de Terre River to its former channel would restore floodplain processes in the floodplain at the confluence with the Minnesota River.

Effects on Threatened and Endangered Species

As discussed in the Feasibility Report and EA, no federally-listed threatened or endangered species occur in the project area. The USFWS concurred with this conclusion during the coordination process (Appendix C).

Re-routing the Pomme de Terre River would result in temporary adverse impacts on state-listed mussel species. Native mussels in the Pomme de Terre River are expected to re-colonize the restored river channel and result in a net gain in the abundance and spatial extent of native mussels in the river over time.

G. Contaminant Determinations - The fill material would be clean impervious fill from an upland site and rock and that would not introduce contaminants. Neither the material nor its placement would cause relocation or increases of contaminants in the water.

H. Proposed Disposal Sites Determinations

Mixing Zone Determination - The proposed fill activities would have minimal mixing zones for resuspended sediment. The mixing zones would be small and would not constitute a significant problem because of the nature of the fill material and its placement by mechanical means.

Determination of Compliance with Applicable Water Quality Standards - The nature of the fill material and the type of construction should avoid violation of State water quality standards. The long-term effects of the project would be to increase compliance with state water quality standards in Marsh Lake.

I. Potential Effects on Human Use Characteristics - Because of the present and projected human use characteristics, the existing physical conditions, the proposed construction methods, and the nature of the fill material, this proposed action would have no adverse effects on human use characteristics. The project would improve conditions in the Marsh Lake ecosystem for human uses like hunting, fishing, and wildlife viewing.

J. Determination of Cumulative Effects on the Aquatic Ecosystem - Implementation of the proposed actions would have positive effects of restoring the Marsh Lake and lower Pomme de Terre River aquatic ecosystems.

K. Determination of Secondary Effects on the Aquatic Ecosystem – Secondary effects of the project on the aquatic ecosystem would include increased abundance of emergent and submersed aquatic plants, reduced abundance of common carp, clearer water in Marsh Lake, increased populations of native fish, increased use by breeding waterfowl and migrating waterfowl, and increased recreational use of the area.

III. FINDING OF COMPLIANCE WITH RESTRICTIONS ON DISCHARGE

1. The proposed fill activity would comply with Section 404(b)(1) guidelines of the Clean Water Act of 1972, as amended. No significant adaptations of the guidelines were made for this evaluation. As discussed in the Feasibility Report and Environmental Assessment, the placement of fill for the proposed project is required to achieve the project purpose, which is to benefit the aquatic ecosystem. Therefore, none of the alternatives is environmentally damaging to the aquatic ecosystem.

2. The proposed fill activities would comply with all State water quality standards, Section 307 of the Clean Water Act of 1972, as amended, and the Endangered Species Act of 1973, as amended. The proposed fill activity would not have significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity, and stability and on recreational, aesthetic, and economic values would not occur.

3. Certification under Section 401 of the Clean Water Act would be obtained from Minnesota prior to implementation.

4. The project would not introduce hazardous or toxic substances into the waters of the United States or result in appreciable increases in existing levels of toxic materials.

5. The project would have no impact on federally listed threatened or endangered species. Re-routing the Pomme de Terre River would result in temporary adverse impacts on state-listed mussel species. Native mussels in the Pomme de Terre River are expected to re-colonize the restored river channel and result in a net gain in the abundance and spatial extent of native mussels in the river over time.

6. No municipal or private water supplies would be affected. The project would have no significant adverse impacts on recreational or commercial fishing. The effect of this project on human uses of the Marsh Lake ecosystem would be positive.

7. No contamination of the Minnesota or Pomme de Terre Rivers is anticipated. The proposed actions would cause only minimal adverse environmental effects during construction and would have positive cumulative effects on the environment.

8. On the basis of this evaluation, I conclude that the proposed discharges would comply with the Section 404(b)(1) Guidelines for the discharge of dredged or fill material.

15 July 2011
Date

Michael J. Price
Colonel, Corps of Engineers
District Engineer

Appendix E – Habitat Evaluation Procedure

Appendix E

Habitat Benefits Evaluation

Marsh Lake Ecosystem Restoration Project

Introduction

An ecosystem restoration measure is a feature or activity that addresses one or more of the planning objectives. A wide variety of alternative measures were considered for March Lake ecosystem restoration project. The Marsh Lake ecosystem restoration alternative measures are described in Section 4 of the main report. The full range of alternative measures is described in Section 4.1. In Section 4.2 of the main report, each measure was assessed and a determination was made regarding whether it should be retained for further consideration in the formulation of alternative plans.

The Corps is required to consider the option of “No Action” as one of the alternatives. With the No Action plan, which is synonymous with the “Future Without Project Condition,” we assumed that no project would be implemented by the Federal Government or by local interests to achieve the planning objectives. The No Action plan forms the basis from which the other alternative plans are compared.

Estimated annualized costs of the alternative measures retained for further consideration are provided below are based on March 2010 price levels. They include costs for detailed engineering design, construction and operation and maintenance over the 50-year planning time horizon.

Table 1. Alternative measures retained for further consideration.

Measure Number	Alternative Measures	First Cost of Construction	Interest During Construction	Total Investment	Annualized Cost	Annual O+M Costs	Total Annual Costs
1	No Action	$0	$0	$0	$0	$0	$0
2	Restore Pomme de Terre River to its former channel	$3,741,500	$249,117	$3,990,617	$197,843	$5,622	$203,466
3	Modify Marsh Lake Dam to attain target water levels, construct fishway	$1,217,400	$81,057	$1,298,457	$64,374	$6,207	$70,581
4	Growing season drawdowns to restore emergent aquatic plants, modify Marsh Lake Dam with stoplog structure	$2,605,900	$173,506	$2,779,406	$137,795	$13,926	$151,721
5	Install gated culverts in Louisburg Grade Road	$414,200	$27,578	$441,778	$21,902	$952	$22,854
6	Breach dike at abandoned fish pond	$7,000	$0	$7,000	$347	$0	$347
7	Construct islands in Marsh Lake	$3,946,500	$262,766	$4,209,266	$208,683	$15,190	$223,874

Alternative Plans

Alternative plans are combinations of alternative measures that would contribute to attaining the planning objectives. A stand alone or independent measure can be implemented independently of others, resulting in some positive amount of ecosystem restoration output. Optional or dependent measures are measures that must be implemented along with other measures. Optional measures may be combined with each other as well as with the stand alone measures. Brief descriptions of the measures considered in this study are presented below. More detailed descriptions of the measures are in Section 4.1 of the main report.

Alternative Measures

Measure 1 – No Action

The No Action alternative is a stand-alone measure that could be implemented independently. The Corps is required to consider the option of “No Action” as one of the alternatives. With the No Action plan, which is synonymous with the “Without Project Future Condition,” we assume that no project would be implemented by the Federal Government or by local interests to achieve the planning objectives. The No Action plan forms the basis from which the other alternative plans are compared.

Measure 2 – Restore the Pomme de Terre River to its former channel

This is a stand-alone measure that could be implemented independently of other restoration alternatives. Earthen berms would be constructed to re-route the river into its

former channel both upstream and downstream of the Marsh Lake Dam embankment. Approximately 11,500 feet and 21 acres of former river channel would be restored. This alternative would include a bridge over the river to maintain access to the Marsh Lake Dam and monitoring of the native mussel community.

Measure 3 - Modify Marsh Lake Dam to attain target water levels, construct fishway

This is a stand-alone measure that could be implemented independently of other restoration alternatives. Marsh Lake Dam would be modified with a fixed-crest weir fishway that would allow passive attainment of target water levels in most years and also allow continuous fish passage between Lac qui Parle and Marsh Lake.

Measure 4 - Growing season drawdowns to restore emergent aquatic plants, reduce carp abundance and modify Marsh Lake Dam with a stoplog structure

This is a stand-alone measure that could be implemented independently of other restoration alternatives. Marsh Lake Dam would be modified with a stop log water control structure to enable water level management. Growing season drawdowns to elevation 936.0 ft would be done to encourage reestablishment of emergent aquatic plants and to increase the extent of submersed aquatic plants. Following growing season drawdowns, winter drawdowns to elevation 935.0 ft could be done to reduce carp abundance. The drawdowns would be conducted as needed to maintain objectives for aquatic vegetation in Marsh Lake. We assume that drawdowns would be done on average once every five years.

Measure 6 – Breach dike at abandoned fish pond

This is a stand-alone measure that could be implemented independently of other restoration alternatives. Breaching the fish pond dike on the downstream side of the Marsh Lake Dam would provide connectivity between the fish pond area and the upper end of Lac qui Parle, allowing native floodplain vegetation to become established, fish access and providing seasonally variable habitat for fish and wading birds.

Measure 7 – Construct islands in Marsh Lake

This is a stand-alone measure that could be implemented independently. Constructing islands to break up wave action and reduce sediment resuspension would

improve conditions for submersed aquatic plant growth. Although this is a stand-alone measure, it would be best to construct islands in Marsh Lake in conjunction with growing season and winter drawdowns (Measure 4) and modifying Marsh Lake Dam to attain target water levels (Measure 3). Growing season drawdowns would consolidate lake bed sediment, reducing sediment resuspension. Growing season drawdowns would allow germination of emergent aquatic plants, increasing their extent, reducing wave action and sediment resuspension. Winter drawdowns would reduce carp abundance, sediment resuspension and grazing on submersed aquatic plants. It may require implementation of all these measures in combination to change the ecosystem state of Marsh Lake from the current unvegetated turbid condition to clearer water with submersed aquatic plants.

Optional Measures

Measure 5 – Install gated culverts in Louisburg Grade Road

This is an optional measure because it would not need to be implemented unless Measure 4 was implemented with growing season drawdowns on Marsh Lake. Measure 5 is dependent on implementing Measure 4 and would enhance its performance. Installing stoplog control structures on the Louisburg Grade Road culverts would enable holding water in upper Marsh Lake in years when a growing season drawdown was conducted, allowing northern pike to successfully spawn in the flooded marsh vegetation and the young to grow into juveniles. This measure should be combined with Measure 4.

HEP Analyis of the Alternative Measures

The Marsh Lake project area is described in Section 2.8 of the main report. The alternative measures would affect a variety of habitats in the project area (Table 2). Representative species and guilds of organisms that occur in the Marsh Lake project area were selected for Habitat Evaluation Procedures (HEP) analyses to estimate ecosystem restoration benefits.

The HEP models applied to estimate ecosystem outputs of the Marsh Lake Project are USFWS “Blue Book” models and a waterfowl habitat model developed for use on the Upper Mississippi River System. The Diving Duck Migration Habitat Model is currently undergoing planning model certification with the Corps Ecosystem Restoration

Center of Expertise. The Diving Duck Migration Habitat Model has been used extensively since 1994 to quantify habitat benefits for habitat restoration projects on the Upper Mississippi River. It has stood the test of time and was developed consistent with USFWS's standards for HEP.

Devendorf, R.D. 2001. A migratory habitat model for diving ducks using the Upper Mississippi River. St. Paul District, U.S. Army Corps of Engineers.

Short, H.L and R.J. Cooper. 1985. Habitat suitability index models - Great blue heron FWS/OBS82-10.99.43 pp.

McMahon, T. E., J. W. Terrell, and P. C. Nelson. 1984. Habitat suitability information: Walleye. U.S. Fish and Wildlife Service. FWS/OBS-82/10.56. 43 pp.

Inskip, P.D. 1982. Habitat suitability index models: Northern pike. FWS/OBS-82/10.17. 40 pp.

Table 2. Habitat area types that would be restored by the alternative measures and representative species and guilds used in the habitat benefits analysis.

Alternative Measures	**Habitat Models**	Marsh Lake Aquatic	Pomme de Terre River Aquatic	Upper Marsh Lake Shallow Aquatic	Lac qui Parle Aquatic	Abandoned Fish Pond
1) No Action	Walleye - Lacustrine				+	
	Northern Pike - Lacustrine	+		+	+	
	Diving Ducks	+				
	Great Blue Heron					+
2) Restore Pomme de Terre River to its former channel	Walleye - Lacustrine		+		+	
3) Modify Marsh Lake Dam to attain target water levels, construct fishway	Northern Pike - Lacustrine			+	+	
4) Growing season drawdowns to restore emergent aquatic plants, modify Marsh Lake Dam	Diving Ducks	+				
5) Install gated culverts in Louisburg Grade Road	Northern Pike - Lacustrine	+		+		
6) Breach dike at abandoned fish pond	Great Blue Heron					+
7) Construct islands in Marsh Lake	Diving Ducks	+				

Areas Affected by the Alternative Measures

Each of the alternative measures would affect different areas of habitat (Table3). The habitat areas in Marsh Lake and Lac qui Parle were estimated using the

land cover GIS and bathymetry data developed by the DNR. The area of Pomme de Terre River aquatic habitat was estimated by calculating the area in acres using stream length (Marsh Lake to Morris Minnesota Dam) and stream widths from DNR stream survey data. The additional area of the re-routed Pomme de Terre River was estimated using GIS. The area affected by drawdowns and island construction was estimated using GIS using the lake bathymetry map prepared from DNR survey data, and a wind-fetch / wave action / sediment resuspension model described in the Hydraulics Appendix J.

Table 3. Area (acres) of habitat types affected by alternative measures for the Marsh Lake project.

Alternative Measures	Marsh Lake Aquatic Unvegetated	Marsh Lake Aquatic Vegetated	Marsh Lake Emergent Vegetation	Pomme de Terre River Aquatic	Pomme de Terre River Delta Floodplain	Upper Marsh Lake Shallow Aquatic	Lac qui Parle Aquatic	Abandoned Fish Pond
1) No Action	6100	<610	1032	454	293	1,715	7,700	15
2) Restore Pomme de Terre River to its former channel				454	293		7,700	
3) Modify Marsh Lake Dam to attain target water levels, construct fishway	6100	>3050						
4) Growing season drawdowns to restore emergent aquatic plants, modify Marsh Lake Dam			2625					
5) Install gated culverts in Louisburg Grade Road						1,715	7,700	
6) Remove dike at abandoned fish pond								15
7) Construct islands in Marsh Lake	<3050	>3050						

1. Average WSEL of Marsh Lake during growing season: 938.6 ft
2. Area of Marsh Lake at 938.6 ft: 6100 Acres
3. Area of Marsh Lake at 936.0 ft: 3475 acres
4. Area of Marsh Lake dewatered at 936.0 ft: 2625 acres
5. Water Surface Elevation of Marsh Lake during Winter Drawdown: 935.0 ft
6. Area of Marsh Lake during Winter Drawdown 935.0 ft: 2425 acres
7. Area of Marsh Lake upstream of the Louisburg Grade Road (northern pike spawning habitat) = 1,715 acres
8. Area of Pomme de Terre River between Marsh Lake and Marshall Dam = 454 acres
9. Area of Pomme de Terre River channel proposed for restoration = 11,500 lineal feet, 21 acres
10. Area of the Pomme de Terre River delta area below Marsh Lake Dam (between RR grade and the dam) = 293 acres.
11. Area of the abandoned fish rearing pond = 15.6 acres including dike, 15.0 acres within dike

Marsh Lake covers 6100 acres when at the average growing season water level of 938.6 ft. This area is the main part of Marsh Lake between the Louisburg Grade Road and the dam. Upper Marsh Lake upstream of the Louisburg Grade Road is a complex of wetlands that covers 1715 acres.

As of 1999 there were 1032 acres of emergent aquatic vegetation within the 6100 acres in the main part of Marsh Lake. Based on recent aerial photography, the area of emergent aquatic vegetation has not changed since then. The forecasted future without-project extent of emergent aquatic vegetation in Marsh Lake is also 1032 acres.

The existing and forecasted without-project future extent of submersed aquatic vegetation is estimated to be less than 610 acres, approximately 10 percent or less of the lake area. This is based on a 2007 submersed aquatic plant survey that monitored frequency of occurrence of submersed aquatic plants. Frequency of occurrence of sago pondweed was 11 percent (n = 165) but the plants were sparse and found mainly in protected bays and shallow areas.

The following narrative and the Marsh Lake HEP analysis spreadsheets are provided to describe calculation of the habitat benefits of the alternative measures quantified as Average Annual Habitat Units (AAHUs). The AAHUs are habitat suitability indices from the HEP models x acres x years, divided by 50 years, the project planning period.

Alternative Measure 1 – No Action The No Action future condition is described in Section 2.10 in the main report. Five habitat areas were selected for the HEP analysis (Table 2).

Diving ducks were selected as the representative guild for Marsh Lake, given their significance in the project area and the potential for improving fall diving duck migration habitat through restoring aquatic vegetation in Marsh Lake. The analysis area is the main body of Marsh Lake between the dam and the Louisburg Grade Road, a total of 6100 acres.

Table 4. Diving duck migration habitat in Marsh Lake for the No Action future condition.

Diving duck migration habitat

Assume : There would be no change over time in the area of Marsh Lake = 6100 acres average growing season area
There will be no change over time in average annual extent of SAV = <10% cover
Diving duck migration feeding habitat for EAV = ~17% cover
Values of all HSI variables will remain the same over time in the without-project future condition.

Lake Migration Habitat for Diving Ducks	Existing Conditions Year 0	Future Without Project - Year 1	Future Without Project - Year 5	Future Without Project - Year 25	Future Without Project - Year 50
HSI	0.61	0.61	0.61	0.61	0.61
Acreage	6100	6100	6100	6100	6100
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	3721.0	14884.0	74420.0	93025.0
				Total	186050.0
				AAHU	3721

Diving duck habitat in Marsh Lake would be limited in the future primarily by the low abundance and diversity of submersed and emergent aquatic vegetation. The current and future habitat suitability index is 0.61. Over the 50-year planning time period, there would be 3721 average annual habitat units (AAHU) of diving duck habitat on Marsh Lake (Tables 4 and 5).

Table 5. HEP model for diving duck habitat in Marsh Lake for the future without-project condition.

DIVING DUCK MIGRATION HABITAT MODEL
MARSH LAKE MINNESOTA RIVER - **WITHOUT-PROJECT FUTURE CONDITIONS**

VARIABLE		VALUE		COMMENTS
1) Size of Water Body				
a. Less than 100 acres	1			
b. 100 to 200 acres	5	ENTER		
c. 200 to 1,000 acres	7	VALUE=	10	Marsh Lake is >1000 acres
d. Greater than 1,000 acres	10			
2) Water Depth - Percent of Area 18" to 5'				
a. Less than 10 percent	1			
b. 10 to 40 percent	3	ENTER		
c. 40 to 70 percent	5	VALUE=	10	
d. Greater than 70 percent	10			Water depth is >70% area 18" to 5'
3) Percent Submergent Vegetation Cover				
a. Less than 10 percent	1			
b. 10 to 30 percent	3	ENTER		
c. 30 to 50 percent	6	VALUE=	1	Extent of SAV cover <10%
d. Greater than 50 percent	10			
4) Species of Submergent Vegetation Present (Key species: wild celery, sago pondweed, and other pondweeds)				
a. None of the key species present or less than 10 percent of aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	10	SAV is mostly sago pondweed
c. At least one key species covers 30 to 60 percent of the aquatic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
5) Percent Emergent Vegetation Cover				
a. Less than 10 Percent or greater than 50 percent	1			Approximately 17% EAV cover
b. 10 to 20 percent or 30 to 50 percent	5	ENTER		
c. 20 to 30 percent	10	VALUE=	5	
6) Species of Emergent Vegetation Present (Key species: arrowhead (S. rigida), soft-stem bulrush, wild rice)				
a. None of the key species present or less than 10 percent fo aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	1	EAV will remain mostly cattail
c. At least one key species covers 30 to 60 percent of the aqutaic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
7) Invertebrate Populations Present (Key Species: Sphaeriidae, Gastropoda,Hexegenia spp,Chironomidae)				
a. None of the key taxonomic groups present or present but not abundant	1			
b. At least 1 key taxonomic group present and is moderately abundant	5	ENTER VALUE=	5	dominated by chironomids, oligochaetes
c. At least 1 key taxonomic group present and is very abundant	10			
8) Disturbance				
a. Access uncontrolled - Considerable human activity during migration	1			
b. No hunting activity occurs, or closed to hunting only, but considerable human activity occurs during migration (such as fishing/boating)	3	ENTER VALUE=	4	Assume continued non-motorized zone
c. No hunting activity occurs, or closed to hunting only, and human activity during migration is minimal	4			
d. No human activity occurs, or closed to human entry	5			
		TOTAL=	46	
MAXIMUM POSSIBLE TOTAL =			75	
		HSI =	0.61	

The primary sport fish species in the project area and the selected fish species for aquatic habitat analysis are walleye and northern pike. Walleye occur in Lac qui Parle and in the Pomme de Terre River. Habitat for walleye in Marsh Lake is marginal due to the shallow depth, turbid conditions and winter hypoxia. According to the DNR, walleye are recruited into Lac qui Parle from Bigstone Lake upstream on the Minnesota River and by stocking walleye fry. Walleye rarely naturally reproduce in Lac qui Parle. Walleye occur in the Pomme de Terre River and there is evidence that they naturally reproduce there by the presence of young-of-year walleye. There is good water quality and an abundance of suitable walleye habitat in the Pomme de Terre River. Walleye in Lac qui Parle will be limited in the future by their ability to repro(duce given the habitat conditions available. The future habitat suitability index is 0.2 resulting in an AAHU of 1540 over the 50-year project planning period (Tables 6 and 7).

Table 6. Walleye habitat in Lac qui Parle for the without-project future condition.

Walleye habitat - Lac qui Parle

Assume : Lac qui Parle covers 7700 acres
Walleye from Lac qui Parle cannot get into Marsh Lake and up the Pomme de Terre River in most years
Walleye rarely successfully reproduce in Lac qui Parle. Last strong recruitment was in 2001
Walleye in Lac qui Parle are stocked and recruited from Bigstone Lake
Values of all HSI variables will remain the same over time in the without-project future condition.
Walleye habitat evaluated for Lac qui Parle without-project future conditions

Habitat for Walleye in Lac qui Parle	Existing Conditions Year 0	Future Without Project - Year 1	Future Without Project - Year 5	Future Without Project - Year 25	Future Without Project - Year 50
HSI	0.2	0.2	0.2	0.2	0.2
Acreage	7700.0	7700.0	7700.0	7700.0	7700.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	1540.0	6160.0	30800.0	38500.0
				Total	77000.0
				AAHU	1540

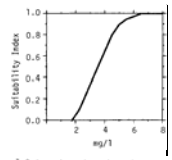
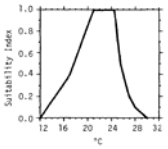
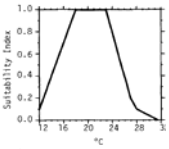
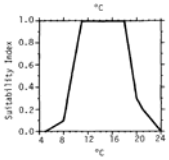
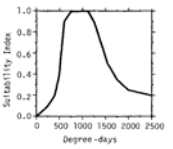
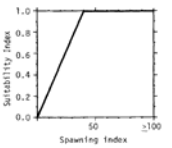
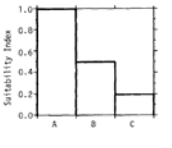
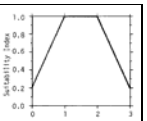
Table 7. HEP model of walleye habitat in Lac qui Parle for the without-project future condition.

Walleye Lacustrine Habitat Model
Without-Project Future Conditions

Assume : Walleye occur in Marsh Lake and in Lac qui Parle
Marsh Lake habitat is marginal for walleye due to turbidity and shallow depth
Assessed walleye habitat is in Lac qui Parle
Walleye from Lac qui Parle cannot get into Marsh Lake and up the Pomme de Terre River in most years
Walleye rarely successfully reproduce in Lac qui Parle. Last strong recruitment was in 2001
Walleye in Lac qui Parle are stocked or recruited from Marsh and Bigstone Lake

V1	Average Secchi transparency during summer Average Secchi transparency in Lac qui Parle in summer is 1.7 ft (MN DNR lake survey report) Note: Low transparency in LqP does not impose limitation on walleye, which exhibit fast growth	0.2
V2	Relative abundance of small (<12 cm) forage fish during spring and summer Assume abundant forage fish - fathead minnows, spotfin minnows, emerald shiners, white suckers	1
V3	Percent of area with cover (boulders, logs, brush, SAV) and D.O. >3 mg/l in spring and summer Some boulders, adequate D.O. Note: Cover does not impose limitation on walleye in LqP which exhibit fast growth	0.2
V4	Least suitable pH during year Lac qui Parle maximum pH is ~8.7 (Corps data)	1
V5	Minimum D.O.above thermocline in summer D.O. is adequate according to Corps data	1
V6	Minimum D.O. during summer-fall in shallow shoreline areas D.O. is adequate according to Corps data	1

Table 7 (continued). HEP model of walleye habitat in Lac qui Parle for the without-project future condition.

V7 Minimum D.O. in spawning areas in spring D.O. is adequate in spring Note: Walleye reproduction rarely occurs in Lac qui Parle Probably a combination of water level and substrate limitations	1	V_7 Minimum dissolved oxygen level measured in spawning areas during spring (embryo). 
V8 Mean weekly water temperature above thermocline during summer Temperature is adequate according to Corps data	1	V_8 Mean weekly water temperature in pools (R) or above thermocline (L) during summer (adult and juvenile). 
V9 Mean weely water temperature in shallow shoreline areas during late spring, earl D.O. is adequate according to Corps data	1	V_9 Mean weekly water temperature in shallow shoreline areas during late spring-early summer (fry). 
V10 Mean weekly water temperature during spawning in spring D.O. is adequate according to Corps data Note: Walleye reproduction rarely occurs in Lac qui Parle Probably a combination of water level and substrate limitations	1	V_{10} Mean weekly water temperature during spawning in spring (embryo). 
V11 Degree days between 4 and 10C October 30 to April 16 ok according to Corps data	1	V_{11} Degree days between 4 and 10° C from October 30 to April 15. (Calculate by multiplying water temperatures in the range of 4 to 10° C by number of days that are in this temperature range. For example, 160 days of 6° C = 960 degree-days = 51 of ; 0). 
V12 Spawning habitat index Highly variable depending on water level Portion of LqP littoral area >0.3m but <1.5m = 0.1 Subatrate index = 2 (5% gravel, rubble) + (3% boulders) + 0.5 (10% sand) + 0 (85% silt) = 18 Spawning habitat index = 0.1 x 18 = 1.8	0	V_{12} Spawning habitat index. Calculated by multiplying the proportion of the water body composed of riffle or littoral areas > 0.3 m but < 1.5 m deep by the substrate index where the substrate index is defined by the following equation: Substrate Index = 2(% gravel/rubble 2.5 to 15 cm in diameter) + (% boulders/bedrock) + 0.5(% sand) + 0.5(% dense vegetation) + 0(% silt/detritus). 
V13 Water level during spawning Highly variable. Often flooding during walleye spawning	0.2	V_{13} Water level during spawning and embryo development (embryo). A) Rising or normal and stable abundance of shallow shoreline or shoal areas for spawning. B) Low: many spawning areas are exposed, and never inundated. C) Fluctuating: fluctuations sufficient to alternately expose and flood spawning areas. 
V14 Trophic status of lake Lac qui Parle is eutrophic Lac qui Parle supports a popular walleye fishery, so the eutrophic conditions (low water transparency, blue-green algae) may not limit the walleye population	1	V_{14} Trophic status of lake or lake section. Note: The following list of parameter levels can be used to classify a water body according to trophic status (adapted from Leach et al. 1977).  Trophic status 0=1 (Oligotrophic)[1] | 1=2 (Mesotrophic) | 2=3 (Eutrophic) Primary production rate: low | moderate | high Organic matter in sediments: low | moderate | high Hypolimnetic O_2 loss: low | moderate | high Nutrient loading rates (phosphorus, nitrogen): low | moderate | high Morphoedaphic Index (MEI) (metric): < 5.9 | 6.0-7.2 | > 7.3 Transparency (Secchi depth): high (> 6 m) | moderate (1-6 m) | low (< 1m)

Component Suitability Indices Lacustrine Model

Food = (V1+V2)/2	0.6
Cover = (3V1 + V3)/4	0.2
Water Quality = lowest of V4,V5,V6,V8,V9	1.0
Reproduction = lowest of V7, V10, V11, V12, V13	0.2
Other = V14	1.0

Lowest Component Value = Overall Habitat Suitability 0.2

Note: Food (V1, V2) and cover (V1, V3) are not limiting the walleye population in Lac qui Parle. Reproduction imposes limitation on walleye in LqP

Northern pike occur in Marsh Lake and in Lac qui Parle. Northern pike spawn in the upper end of Marsh Lake upstream of the Louisburg Grade Road. Northern pike in Marsh Lake have access to upper Marsh Lake and good flooded vegetation habitat for spawning and early life history. The habitat suitability index for northern pike in the future in Marsh Lake is 0.8, resulting in 4880 AAHUs. Northern pike in Lac qui Parle would not have access to as much suitable spawning habitat, resulting in a future habitat suitability index of 0.6 and 4620 AAHUs (Tables 8, 9 and 10).

Table 8. Northern pike habitat in Marsh Lake and Lac qui Parle for the without-project future condition.

Northern pike habitat - Marsh Lake

Assume : There would be no change in the area of upper Marsh Lake = 1715 acres
There would be no change in the area of Marsh Lake = 6100 acres
Northern pike would have unobstructed access to upper Marsh Lake for spawning
Values of all HSI variables will remain the same over time in the without-project future condition.

Northern Pike Habitat - Marsh Lake	Existing Conditions Year 0	Future Without Project - Year 1	Future Without Project - Year 5	Future Without Project - Year 25	Future Without Project - Year 50
HSI	0.8	0.8	0.8	0.8	0.8
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	4880.0	19520.0	97600.0	122000.0
				Total	244000.0
				AAHU	4880

Northern pike habitat - Lac qui Parle

Assume : There would be no change in the area of Lac qui Parle = 7700 acres
Northern pike would not access to upper Marsh Lake for spawning, would spawn in former Pomme de Terre River delta area
Values of all HSI variables will remain the same over time in the without-project future condition.

Northern Pike Habitat - Marsh Lake	Existing Conditions Year 0	Future Without Project - Year 1	Future Without Project - Year 5	Future Without Project - Year 25	Future Without Project - Year 50
HSI	0.6	0.6	0.6	0.6	0.6
Acreage	7700.0	7700.0	7700.0	7700.0	7700.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	4620.0	18480.0	92400.0	115500.0
				Total	231000.0
				AAHU	4620

Table 10. HEP model of northern pike habitat in Marsh Lake for the without-project future condition.

Northern Pike Model (Lacustrine) Marsh Lake
Without-Project Future Conditions

Assume : Northern pike occur in Marsh Lake, spawn in flooded vegetation in upper Marsh Lake

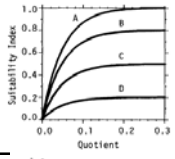
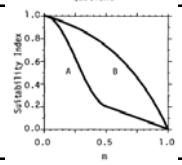
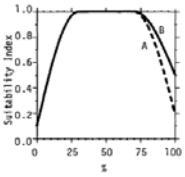
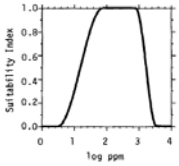
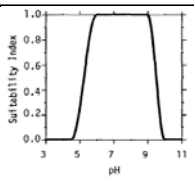
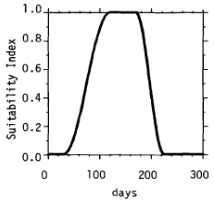
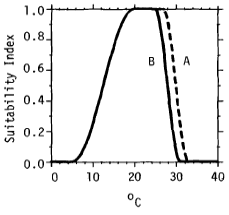
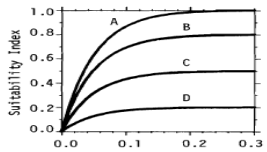
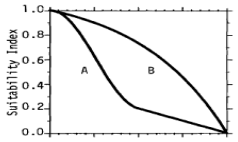
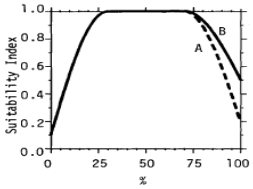
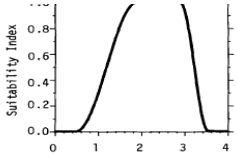
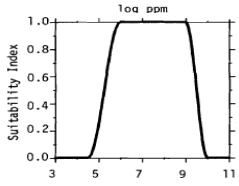
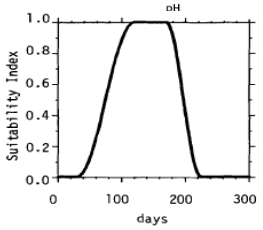
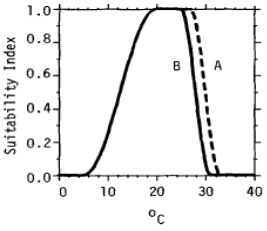
	VARIABLE	VALUE	COMMENTS
V1	Ratio of spawning habitat area to midsummer habitat area Upper Marsh Lake = 1715 acres Marsh Lake = 6100 acres Ratio = 0.28, curve A = good vegetation	1.0	
V2	Drop in water level during embryo (A) and fry (b) stage, whichever is lowest Typically, Marsh Lake water levels during northern pike spawning are high and remain high for weeks	0.8	
V3	Percent of midsummer area with SAV or EAV Marsh Lake EAV area = 1032 acres Marsh Lake SAV area = ~10% of 6100 acres = 610 26.9	1.0	
V4	Log10 summer TDS Mean Marsh Lake summer TDS = 675 mg/l Log10 of 675 = 2.829304	1.0	
V5	Least suitable pH during embyro and fry stages pH is ok - Corps data	1.0	
V6	Average length of frost-free season 135 days average at Milan MN R.H. Skaggs and D.G. Baker 1985 Fluctuations in the length of the growing season in Minnesota Climate Change http://www.springerlink.com/content/g65g3wl9k074w840/	1	
V7	Maximal weekly water temperature in summer A = unstratified lake 28C Corps data	0.8	
	Habitat Suitability Index = lowest of the habitat suitability ratings	0.8	

Table 11. HEP model for northern pike habitat in Lac qui Parle for the without-project future condition.

Northern Pike Model (Lacustrine) Lac qui Parle
Without-Project Future Conditions
Assume : Northern pike spawn in the former Pomme de Terre River delta area in upper Lac qui Parle

	VARIABLE	VALUE	HABITAT SUITABLITY
V1	Ratio of spawning habitat area to midsummer habitat area Former PdT River delta = 293 acres Lac qui Parle = 7700 acres Ratio = 0.038, curve A = good vegetation	0.6	
V2	Drop in water level during embryo (A) and fry (b) stage, whichever is lowest Typically, Lac qui Parle water levels during northern pike spawning are high and remain high for weeks	0.8	
V3	Percent of midsummer area with SAV or EAV Lac qui Parle EAV area assumed to be ~1000 acres Lac qui Parle SAV area = ~5% of 7700 acres = 385 acres 17.8 %	0.6	
V4	Log10 summer TDS Lac qui Parle summer TDS = ~ 675 mg/l Log10 of 675 = 2.829304	1.0	
V5	Least suitable pH during embyro and fry stages pH is ok - Corps data	1.0	
V6	Average length of frost-free season 135 days average at Milan MN R.H. Skaggs and D.G. Baker 1985 Fluctuations in the length of the growing season in Minnesota Climate Change http://www.springerlink.com/content/g65g3wl9k074w840/	1	
V7	Maximal weekly water temperature in summer A = unstratified lake 28C Corps data	0.8	
	Habitat Suitability Index = lowest of the habitat suitability ratings	0.6	

Great blue heron was selected as the representative species for the abandoned fish pond area downstream of the Marsh Lake Dam. The fish pond area has potential to be restored to be a connected shallow marsh and aquatic habitat more suitable for fish-eating birds like great blue heron. The abandoned fish pond area covers 15 acres. Future habitat suitability index would be 0.31, providing 5 AAHUs (Tables 12 and 13). Foraging habitat quality is the primary factor limiting great blue heron habitat in the abandoned and isolated fish pond area.

Table 12. Blue heron habitat in the abandoned fish pond area adjacent to Marsh Lake Dam for the without-project future condition.

Great Blue Heron Habitat - Abandoned Fish Pond Area

Assume: Values of all HSI variables will remain the same over time in the without-project future condition.
Area of abandoned fish pond = 15 acres

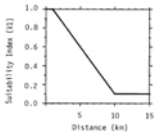
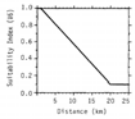
Wetland Habitat for Great blue heron in 500 ft wide band	Existing Condition Year 0	Future Without Project - Year 1	Future Without Project - Year 5	Future Without Project - Year 25	Future Without Project - Year 50
HSI	0.31	0.31	0.31	0.31	0.31
Acreage	15.0	15.0	15.0	15.0	15.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0.0	4.6	18.6	93.0	116.2
				Total	232.4
				AAHU	5

Table 13. HEP model of great blue heron habitat in the abandoned fish pond area for the without-project future condition.

Great Blue Heron Model
Without-Project Future Conditions

Assume :
Heron foraging area in abandoned fish pond
Heron nesting areas are available in wooded floodplain nearby

V1 distance between foraging and nesting areas SI = 1.0
V2 foraging areas quality SI = 0.5
V3 disturbance in foraging areas SI = 1.0
V4 nesting trees SI = 1.0
V5 disturbance during nesting SI = 0.9
V6 distance between potential and active nest sites (<2km) SI = 1.0
HSI = (V1 x V2 x V3 x V4 x V5 x V6) exp 0.5 = 0.67

	VARIABLE	VALUE	HABITAT SUITABILITY
V1	Distance between foraging areas and existing or potential heronries Assumed to be close < 5 km	0.6	
V2	Foraging area quality Heron foraging area in abandonded fish pond is marginal habitat for blue herons with no flow through, limited small fish abundance	0.2	V2 = 1.0 if potential foraging habitats usually have shallow, clear water with a firm substrate and a huntable population of small fish. V2 = 0.0 if potential foraging habitats usually do not provide the desirable combination of conditions.
V3	Disturbance in foraging areas Little human disturbance	1	V3 = 1.0 if there usually is no human disturbance near the potential foraging zone during the 4 hours following sunrise or preceding sunset or the foraging zone is generally about 100 m from human activities and habitation or about 50 m from roads with occasional, slow-moving traffic. V3 = 0.0 if the above conditions are not usually met.
V4	Potential nesting areas Assume potential nesting areas are available and suitable	1	Variable 4 (V4) in the model defines a potential nest site as a grove of trees at least 0.4 ha in area located over water or within 250 m of water. These potential nest sites may be on an island within a river or lake, within a woodland dominated swamp, or in vegetation near a river or lake. Trees used as nest sites are at least 5 m high and have many branches at least 2.5 cm in diameter that are capable of supporting nests. Trees may be alive or dead but must have an "open canopy" that allows an easy access to the nest. V4 = 1.0 if potential treeland habitats usually fulfill all of these conditions. V4 = 0.0 if potential treeland habitats usually do not fulfill all of these conditions.
V5	Disturbance in nesting areas Assume nesting areas receive little human disturbance	1	V5 = 1.0 if the exclusion zone is usually free from human disturbances during the nesting season. V5 = 0.0 if the exclusion zone is usually not free from human disturbance during the nesting season.
V6	Distance between potential and active nest sites Assume distance is < 5 km	0.8	 Figure 3. Distance between a potential nest site and an active nest site modifies SI values.
	HSI = (V1 x V2 x V3 x V4 x V5 x V6) exp 0.5 HSI = (0.6 x 0.2 x 1 x 1 x 1 x 0.8) exp 0.5	0.31	

Alternative Measure 2 – Restoring the Pomme de Terre River to its Former Channel would provide fish in Lac qui Parle access to approximately 454 acres of high quality Pomme de Terre River habitat in the 52 miles of river between Lac qui Parle and the dam at Marshall, Minnesota. Restoring the Pomme de Terre River to its former channel would also restore 11,500 lineal feet and 21 acres of former river channel habitat between Marsh Lake Dam and the Minnesota River in the upper end of Lac qui Parle. Walleye were selected as the representative species for the habitat benefits analysis for this alternative measure. Lac qui Parle covers 7,700 acres at the average annual water level. The limitation of spawning habitat suitability would be removed in that walleye would have access to high quality spawning habitat in the Pomme de Terre River. Future average annual habitat units would be 8107, resulting in a net gain over the without project condition of 6567 AAHUs (Tables 14 and 15).

Table 14. Walleye habitat in Lac qui Parle with the Pomme de Terre River restored to its former channel.

Walleye Habitat - Lac qui Parle and Pomme de Terre River

Assume : Walleye occur in Lac qui Parle
Marsh Lake habitat is marginal for walleye due to turbidity and shallow depth
Walleye from Lac qui Parle will be able to migrate between Lac qui Parle and the Pomme de Terre River
Walleye rarely successfully reproduce in Lac qui Parle. Last strong recruitment was in 2001
Walleye successfully reproduce in the Pomme de Terre River as evidenced by presence of YOY
Walleye in Lac qui Parle are stocked and recruited from Marsh and Bigstone Lake
Restoration benefits to walleye will be in Pomme de Terre River and in Lac qui Parle
Lac qui Parle area = 7700 acres, Pomme de Terre River to Morris = 454 acres
Restored Pomme de Terre River channel = 21 acres

Habitat for Walleye	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.2	1	1	1	1
Acreage	7700	8175	8175	8175	8175
Year	0	1	5	25	50
Cumulative Annual Habitat Units	0	4794	32700	163500	204375
				Total	405369
				AAHU	**8107**

Alternative 2 Total AAHU	**8107**
Minus No Action for Walleye	**1540**
Alternative 2 Net Gain AAHU	**6567**

Table 15. HEP model of walleye habitat in Lac qui Parle with the Pomme de Terre River restored to its former channel.

Walleye Lacustrine and Riverine Habitat Model
With-Project Future Conditions - Pomme de Terre River restored to its former channel

Assume : Marsh Lake habitat is very marginal for walleye due to turbidity, winter hypoxia and shallow depth
Walleye occur in Lac qui Parle
Walleye in Lac qui Parle are stocked or recruited from Marsh and Bigstone Lake
Walleye rarely successfully reproduce in Lac qui Parle. Last strong recruitment was in 2001
Walleyes will be able to move freely between the Pomme de Terre River and Lac qui Parle
Walleye successfully reproduce in the Pomme de Terre River as evidenced by presence of YOY
Benefits to walleye will be in Pomme de Terre River and Lac qui Parle

	VARIABLE	VALUE	COMMENTS
V1	Average Secchi transparency during summer Assume average 2 - 3 ft Secchi transparency, based on stream survey data	1	
V2	Relative abundance of small (<12 cm) forage fish during spring and summer Assume abundant forage fish - fathead minnows, spotfin minnows, emerald shiners, white suckers	1	
V3	Percent of area with cover (boulders, logs, brush, SAV) and D.O. >3 mg/l in spring and summer The Pomme de Terre River has good cover and D.O. based on stream survey data	1	
V4	Least suitable pH during year pH 7.9 based on stream survey data	1	
V5	Minimum D.O. in pools and runs in summer D.O. is adequate based on stream survey data	1	
V6	Minimum D.O. during summer-fall in shallow shoreline areas D.O. is adequate based on stream survey data	1	

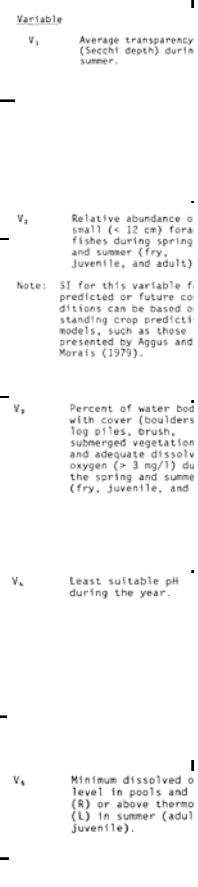


Table 15 (continued). HEP model of walleye habitat in Lac qui Parle with the Pomme de Terre River restored to its former channel.

V7	Minimum D.O. in spawning areas in spring D.O. is adequate based on stream survey data	1	V_4 Minimum dissolved o level during summer along shallow shore areas (fry).
V8	Mean weekly D.O. in pools during summer D.O. is adequate based on stream survey data	1	V_7 Minimum dissolved o level measured in spawning areas duri spring (embryo).
V9	Mean weely water temperature in shallow shoreline areas during late spring, early summer Water temperature ok based on stream survey data	1	V_8 Mean weekly water temperature in pool (R) or above thermo cline (L) during summer (adult and juvenile).
V10	Mean weekly water temperature during spawning in spring Water temperature presumed to be ok	1	V_9 Mean weekly water temperature in shallow shoreline areas during late spring-early summe (fry).
V11	Degree days between 4 and 10C October 30 to April 16 Don't have data to calculate, presumed to be OK	1	V_{10} Mean weekly water temperature durin spawning in sprin (embryo).
V12	Spawning habitat index Abundant suitable spawning habitat	1	V_{11} Degree days between 4 and 10° C from October 30 to April (Calculate by multi plying water temper tures in the range 4 to 10° C by numbe of days that are in this temperature ra For example, 160 da of 6° C = 960 degre days = SI of 1.0).
V13	Water level during spawning Variable but good. Upstream lakes and wetlands maintain spring flow.	1	V_{12} Spawning habitat in Calculated by multiplying th proportion of the water body composed of riffle or littor areas > 0.3 m but < 1.5 m de by the substrate index where the substrate index is defin by the following equation: Substrate Index = 2(% gravel rubble 2.5 to 15 cm in diameter) + (% boulders/ bedrock) + 0.5(% sand) + 0.5(% dense vegetation) + 0(% silt/detritus).
V14	Trophic status of lake Lac qui Parle is eutrophic Lac qui Parle supports a popular walleye fishery, so the eutrophic conditions (low water transparency, blue-green algae) may not limit the walleye population	1	V_{13} Water level during spawning and embryo development (embryo A) Rising or norma and stable: abundance of shallow shorel or shoal areas for spawning. B) Low: many spawning areas are exposed, ar never inundate

Component Suitability Indices Lacustrine/Riverine Model	
Food = (V1+V2)/2	1.0
Cover = (3V1 + V3)/4	1.0
Water Quality = lowest of V4,V5,V6,V8,V9	1.0
Reproduction = lowest of V7, V10, V11, V12, V13	1.0
Other = V14	1.0
Lowest Component Value = Overall Habitat Suitability	1.0

Restoring the Pomme de Terre River to its former channel would provide additional benefits by restoring river channel and floodplain structure, function and processes. The restored 21 acres of river channel would positively affect 292 acres of floodplain habitat in the upper end of Lac qui Parle. Additional benefits would accrue to floodplain vegetation, wading birds like great blue heron, to resident fish, macroinvertebrates and to freshwater mussels.

Alternative Measure 3 – Modifying Marsh Lake Dam to passively attain target water levels by constructing a fishway would be primarily done to attain Objective 4a to restore a more natural hydrologic regime, in order to attain Objective 7b, increased submersed aquatic plants in Marsh Lake and Objective 8A, increased waterfowl use on Marsh Lake. Diving ducks were selected as the representative guild for the habitat analysis benefits for this alternative measure. Marsh Lake covers 6100 acres at the average annual water level. Modifying the Marsh Lake Dam with a fishway would provide passive water level management with somewhat lower water levels in late summer, but the average annual water level and lake acreage would remain the same.

This measure would increase the extent of submersed and emergent aquatic vegetation but significant inter-annual variation in the extent of submersed aquatic vegetation would occur. Sediment loading from the Pomme de Terre River, wind-driven sediment resuspension, sediment resuspension and grazing by carp would combine to limit submersed aquatic vegetation under this stand-alone alternative to an estimated three years out of ten of abundant SAV. The Alternative Measure 2 net gain would be 483 AAHUs (Tables 18 and 19).

Modifying Marsh Lake Dam spillway with a fishway would also provide benefits to fish in Lac qui Parle. Northern pike from Lac qui Parle could gain access to prime spawning habitat in the upper end of Marsh Lake.

Table 18. Diving duck habitat in Marsh Lake with dam modification with fishway to achieve target water levels.

Diving duck migration habitat

Assume : There would be no change over time in the area of Marsh Lake = 6100 acres average growing season area
Habitat value will increase by year 2

Lake Migration Habitat for Diving Ducks	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.61	0.69	0.69	0.69	0.69
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	3965.0	16836.0	84180.0	105225.0
				Total	210206.0
				AAHU	**4204**

Alternative 3 Total AAHU	**4204**
Minus No Action for diving ducks	**3721**
Alternative 3 Net Gain AAHU	**483**

Table 19. HEP model of diving duck habitat in Marsh Lake with dam modification with fishway to achieve target water levels.

DIVING DUCK MIGRATION HABITAT MODEL
MARSH LAKE MINNESOTA RIVER - **WITH-PROJECT FUTURE CONDITIONS**
ALTERNATIVE MEASURE 3 DAM MODIFICATION WITH FISHWAY TO ACHIEVE TARGET WATER LEVELS

VARIABLE		VALUE		COMMENTS
1) Size of Water Body				
a. Less than 100 acres	1			
b. 100 to 200 acres	5	ENTER		
c. 200 to 1,000 acres	7	VALUE=	10	
d. Greater than 1,000 acres	10			
2) Water Depth - Percent of Area 18" to 5'				
a. Less than 10 percent	1			
b. 10 to 40 percent	3	ENTER		
c. 40 to 70 percent	5	VALUE=	10	
d. Greater than 70 percent	10			
3) Percent Submergent Vegetation Cover				
a. Less than 10 percent	1			Target water levels would allow SAV to grow to 30 to 50% cover 3 out of 10 years on average, limited by sediment
b. 10 to 30 percent	3	ENTER		
c. 30 to 50 percent	6	VALUE=	2	resuspension and carp grazing
d. Greater than 50 percent	10			
4) Species of Submergent Vegetation Present (Key species: wild celery, sago pondweed, and other pondweeds)				
a. None of the key species present or less than 10 percent of aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	10	Assume SAV is mostly sago pondweed
c. At least one key species covers 30 to 60 percent of the aquatic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
5) Percent Emergent Vegetation Cover				
a. Less than 10 Percent or greater than 50 percent	1			
b. 10 to 20 percent or 30 to 50 percent	5	ENTER		
c. 20 to 30 percent	10	VALUE=	10	Assume dam modifications will increase extent of EAV to >20%
6) Species of Emergent Vegetation Present (Key species: arrowhead (S. rigida), soft-stem bulrush, wild rice)				
a. None of the key species present or less than 10 percent fo aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	1	Assume EAV will remain mostly cattail
c. At least one key species covers 30 to 60 percent of the aqutaic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
7) Invertebrate Populations Present (Key Species: Sphaeriidae, Gastropoda,Hexegenia spp,Chironomidae)				
a. None of the key taxonomic groups present or present but not abundant	1			
b. At least 1 key taxonomic group present and is moderately abundant	5	ENTER VALUE=	5	Assume invert community will remain dominated by chironomids, oligochaetes
c. At least 1 key taxonomic group present and is very abundant	10			
8) Disturbance				
a. Access uncontrolled - Considerable human activity during migration	1			
b. No hunting activity occurs, or closed to hunting only, but considerable human activity occurs during migration (such as fishing/boating)	3	ENTER VALUE=	4	Assume continued non-motorized zone
c. No hunting activity occurs, or closed to hunting only, and human activity during migration is minimal	4			
d. No human activity occurs, or closed to human entry	5			
		TOTAL=	52	
		MAXIMUM POSSIBLE TOTAL =	75	
		HSI =	0.69	

Alternative Measure 4 - Growing season drawdowns to restore emergent aquatic plants by modifying Marsh Lake Dam with a stop log structure would enable active water level management to restore a more natural stage hydrograph on Marsh Lake. This measure would provide the Lac qui Parle Wildlife Management Area managers considerable flexibility to positively affect the ecosystem conditions in Marsh Lake. Growing season drawdowns could be conducted to reestablish emergent aquatic plants, followed by winter drawdown to kill carp that feed on submersed aquatic plants. This measure would result in increased extent of emergent aquatic plants by exposing lake bottom and consolidating sediment, allowing EAV to germinate from seed and persist for a number of years before another drawdown is needed.

This stand-alone measure would increase the extent of submersed aquatic vegetation but significant inter-annual variation in the extent of submersed aquatic vegetation would occur. Sediment loading from the Pomme de Terre River and wind-driven sediment resuspension would combine to limit submersed aquatic vegetation under this stand-alone alternative to an estimated three years out of ten of abundant SAV. This measure would result in a net gain of 725 AAHUs for diving ducks (Tables 20 and 21).

In addition to improving habitat for diving ducks, drawdowns would contribute to maintaining a vegetated and clear-water ecosystem state. Drawdowns would improve habitat conditions for dabbling ducks and marsh birds like yellow-headed blackbird and wading birds like herons and bitterns. Increased emergent vegetation would benefit furbearers like muskrat and mink. The winter drawdowns would suppress carp abundance, reducing sediment resuspension and grazing by carp.

Table 20. Diving duck habitat in Marsh Lake with drawdowns to restore aquatic vegetation.

Diving duck migration habitat

Assume : There would be no change in the area of Marsh Lake = 6100 acres average growing season area
Growing season drawdowns would dewater up to 2625 acres, increase extent of EAV and SAV
SAV would increase after first year of drawdown
Additional future drawdowns would be conducted to maintain the extent of SAV
Average annual extent of SAV will increase to >50% cover by year 2

Lake Migration Habitat for Diving Ducks	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.61	0.73	0.73	0.73	0.73
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	4087.0	17812.0	89060.0	111325.0
				Total	222284.0
				AAHU	4446

Alternative 4 Total AAHU	4446
Minus No Action for Diving Ducks	3721
Alternative 4 Net Gain AAHU	725

Table 21. HEP model of diving duck habitat in Marsh Lake with drawdowns to restore aquatic vegetation.

DIVING DUCK MIGRATION HABITAT MODEL
MARSH LAKE MINNESOTA RIVER - MEASURE 4 **WITH-DRAWDOWNS FUTURE CONDITIONS**

VARIABLE		VALUE		COMMENTS
1) Size of Water Body				
a. Less than 100 acres	1			
b. 100 to 200 acres	5	ENTER		
c. 200 to 1,000 acres	7	VALUE=	10	Marsh Lake is >1000 acres
d. Greater than 1,000 acres	10			
2) Water Depth - Percent of Area 18" to 5'				
a. Less than 10 percent	1			
b. 10 to 40 percent	3	ENTER		
c. 40 to 70 percent	5	VALUE=	10	Water depth is >70% area 18" to 5'
d. Greater than 70 percent	10			
3) Percent Submergent Vegetation Cover				
a. Less than 10 percent	1			Drawdowns would allow SAV
b. 10 to 30 percent	3	ENTER		to grow to 30 to 50% cover 3 out of 10
c. 30 to 50 percent	6	VALUE=	2	years on average, limited by PdT River
d. Greater than 50 percent	10			sediment loading, wind driven sediment resuspension
4) Species of Submergent Vegetation Present (Key species: wild celery, sago pondweed, and other pondweeds)				
a. None of the key species present or less than 10 percent of aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	10	SAV is mostly sago pondweed
c. At least one key species covers 30 to 60 percent of the aquatic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
5) Percent Emergent Vegetation Cover				
a. Less than 10 Percent or greater than 50 percent	1			
b. 10 to 20 percent or 30 to 50 percent	5	ENTER		
c. 20 to 30 percent	10	VALUE=	10	Drawdowns will increase EAV to >20%
6) Species of Emergent Vegetation Present (Key species: arrowhead (S. rigida), soft-stem bulrush, wild rice)				
a. None of the key species present or less than 10 percent fo aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aquatic bed (add one point if more than one key species is present)	3	ENTER VALUE=	4	Drawdowns will increase EAV diversity
c. At least one key species covers 30 to 60 percent of the aqutaic bed (add one point if more than one key species is present)	6			EAV will remain dominated by cattail
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
7) Invertebrate Populations Present (Key Species: Sphaeriidae, Gastropoda,Hexegenia spp,Chironomidae)				
a. None of the key taxonomic groups present or present but not abundant	1			
b. At least 1 key taxonomic group present and is moderately abundant	5	ENTER VALUE=	5	Macroinvertebrate community will remain dominated by chironomids, oligochaetes
c. At least 1 key taxonomic group present and is very abundant	10			
8) Disturbance				
a. Access uncontrolled - Considerable human activity during migration	1			
b. No hunting activity occurs, or closed to hunting only, but considerable human activity occurs during migration (such as fishing/boating)	3	ENTER VALUE=	4	Assume continued non-motorized zone
c. No hunting activity occurs, or closed to hunting only, and human activity during migration is minimal	4			
d. No human activity occurs, or closed to human entry	5			
		TOTAL=	55	
	MAXIMUM POSSIBLE TOTAL =		75	
		HSI =	0.73	

Alternative Measure 5 - Northern pike in Marsh Lake migrate into the flooded marsh area in upper Marsh Lake to spawn. Installing gated culverts in the Louisburg Grade Road would allow northern pike from Marsh Lake to successfully spawn during years when Marsh Lake is drawn down. Assuming that Marsh Lake would be drawn down once every five years to restore aquatic vegetation, the net gain in habitat units would be 610 AAHUs (Tables 22 and 23).

Table 22. Northern pike habitat in Marsh Lake with gated culverts in the Louisburg Grade Road, allowing successful northern pike reproduction in years when Marsh Lake is drawn down.

Northern pike habitat - Marsh Lake

Assume : There would be no change in the area of upper Marsh Lake = 1715 acres
There would be no change in the area of Marsh Lake = 6100 acres
Northern pike would have unobstructed access to upper Marsh Lake for spawning in all years except drawdown years
Increased SAV and EAV with Marsh Lake Dam modifications and drawdowns would improve habitat, but not the HS model value
No stoplog structures would be installed in the culverts under Louisburg Grade Road
Marsh Lake would be drawn down 10 times in 50 years

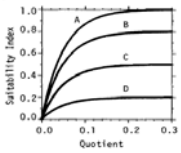
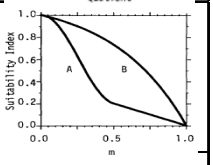
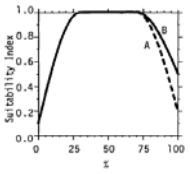
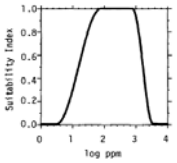
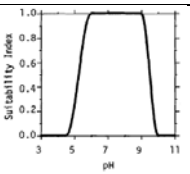
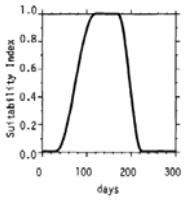
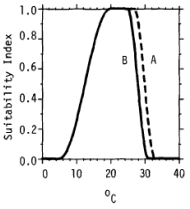
Northern Pike Habitat - Marsh Lake	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.8	0.8	0.8	0.8	0.8
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	4880.0	19520.0	97600.0	122000.0
				Total	244000.0
	No Action for Northern Pike			**AAHU**	4880
SI for years with drawdowns w/o gated culverts = 0.3, resulting in 1830 AHUs in drawdown years					4270
AAHU with drawdowns and without gated culverts					
= ((244000 - (4880 x 10) + (1830 x 10))/50					
			Alternative 5 Net Gain AAHU		610

Table 23. HEP model of northern pike habitat in Marsh Lake without gated culverts in the Louisburg Grade Road in years when Marsh Lake is drawn down.

Northern Pike Model (Lacustrine) Marsh Lake

With drawdowns future condition, without gated culverts in the Louisburg Grade Road

Assume : Northern pike occur in Marsh Lake, spawn in flooded vegetation in upper Marsh Lake
Northern pike would not successfully reproduce in Marsh Lake in drawdown years

	VARIABLE	VALUE	COMMENTS
V1	Ratio of spawning habitat area to midsummer habitat area Upper Marsh Lake = 1715 acres Marsh Lake = 6100 acres Ratio = 0.28, curve A = good vegetation	1.0	
V2	Drop in water level during embryo (A) and fry (b) stage, whichever is lowest Typically, Marsh Lake water levels during northern pike spawning are high and remain high for weeks During a drawdown, water levels during the fry stage would fall by approximately 0.75 m	0.3	
V3	Percent of midsummer area with SAV or EAV Marsh Lake EAV area = 1032 acres Marsh Lake SAV area = ~10% of 6100 acres = 610 26.9	1.0	
V4	Log10 summer TDS Mean Marsh Lake summer TDS = 675 mg/l Log10 of 675 = 2.829304	1.0	
V5	Least suitable pH during embyro and fry stages pH is ok - Corps data	1.0	
V6	Average length of frost-free season 135 days average at Milan MN R.H. Skaggs and D.G. Baker 1985 Fluctuations in the length of the growing season in Minnesota Climate Change http://www.springerlink.com/content/g65g3wl9k074w840/	1	
V7	Maximal weekly water temperature in summer A = unstratified lake 28C Corps data	0.8	
	Habitat Suitability Index = lowest of the habitat suitability ratings	0.3	

Alternative Measure 6 – Breaching the embankment enclosing the abandoned fish pond would provide aquatic habitat connectivity between the fish pond area and upper Lac qui Parle. Water levels in the fish pond area would fluctuate in concert with water levels in Lac qui Parle. Fish would gain access to the shallow aquatic habitat in the fish pond, improving foraging habitat for fish-eating birds like great blue herons. Great blue heron was selected as the representative species for habitat benefits analysis of this alternative measure. Breaching the abandoned fish pond would provide 5 additional AAHUs of blue heron habitat (Tables 24 and 25).

Table 24. Great blue heron habitat in the abandoned fish pond area with breached embankment.

Great Blue Heron Habitat

Assume : Heron nesting areas are available in wooded floodplain nearby
Habitat in abandoned fish pond area would improve (more forage fish) within one year after breaching dike
Area of abandonded fish pond = 15 acres

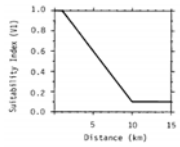
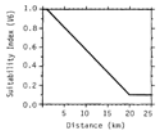
Wetland Habitat for Great blue heron in 500 ft wide band	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.31	0.69	0.69	0.69	0.69
Acreage	15.0	15.0	15.0	15.0	15.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0.0	7.5	41.4	207.0	258.8
				Total	514.6
				AAHU	10
			Minus No Action for Herons		5
		Alternative 6 Net Gain AAHUs			5

Table 25. HEP model of great blue heron habitat in the reconnected abandoned fish pond area.

Great Blue Heron Model
With-Project Future Conditions

Assume : Heron foraging area in abandoned fish pond
Heron nesting areas are available in wooded floodplain nearby

V1 distance between foraging and nesting areas SI = 1.0
V2 foraging areas quality SI = 0.5
V3 disturbance in foraging areas SI = 1.0
V4 nesting trees SI = 1.0
V5 disturbance during nesting SI = 0.9
V6 distance between potential and active nest sites <2km SI = 1.0
HSI = (V1 x V2 x V3 x V4 x V5 x V6) exp 0.5 = 0.69

	VARIABLE	VALUE	COMMENTS
V1	Distance between foraging areas and existing or potential heronries < 5 km	0.6	
V2	Foraging area quality Heron foraging area in abandoned fish pond improved by connection to upper Lac qui Parle, forage fish gain access	1	V2 = 1.0 if potential foraging habitats usually have shallow, clear water with a firm substrate and a huntable population of small fish. V2 = 0.0 if potential foraging habitats usually do not provide the desirable combination of conditions.
V3	Disturbance in foraging areas Little human disturbance in these areas	1	V3 = 1.0 if there usually is no human disturbance near the potential foraging zone during the 4 hours following sunrise or preceding sunset or the foraging zone is generally about 100 m from human activities and habitation or about 50 m from roads with occasional, slow-moving traffic. V3 = 0.0 if the above conditions are not usually met.
V4	Potential nesting areas Assume potential nesting areas are available and suitable	1	Variable 4 (V4) in the model defines a potential nest site as a grove of trees at least 0.4 ha in area located over water or within 250 m of water. These potential nest sites may be on an island within a river or lake, within a woodland dominated swamp, or in vegetation near a river or lake. Trees used as nest sites are at least 5 m high and have many branches at least 2.5 cm in diameter that are capable of supporting nests. Trees may be alive or dead but must have an "open canopy" that allows an easy access to the nest. V4 = 1.0 if potential treeland habitats usually fulfill all of these conditions. V4 = 0.0 if potential treeland habitats usually do not fulfill all of these conditions.
V5	Disturbance in nesting areas Assume nesting areas receive little human disturbance	1	V5 = 1.0 if the exclusion zone is usually free from human disturbances during the nesting season. V5 = 0.0 if the exclusion zone is usually not free from human disturbance during the nesting season.
V6	Distance between potential and active nest sites Assume distance is < 5 km	0.8	 Figure 3. Distance between a potential nest site and an active nest site modifies SI values.
	HSI = (V1 x V2 x V3 x V4 x V5 x V6) exp 0.5 HSI = (0.6 x 1.0 x 1 x 1 x 1 x 0.8) exp 0.5	0.69	

Alternative Measure 7 – Constructing islands in Marsh Lake would reduce wind fetch, sediment resuspension, and increase submersed aquatic vegetation that provides food for migrating diving ducks.

This stand-alone measure would increase submersed aquatic vegetation but significant inter-annual variation in the extent of submersed aquatic vegetation would occur. Sediment loading from the Pomme de Terre River and sediment resuspension and grazing by carp would combine to limit submersed aquatic vegetation under this stand-alone alternative to an estimated three years out of ten of abundant SAV. This stand-alone alternative measure would provide a net gain of 239 AAHUs of diving duck migration habitat (Tables 26 and 27).

Table 26. Diving duck habitat in Marsh Lake with islands.

Diving duck migration habitat

Assume : There would be no change over time in the area of Marsh Lake = 6100 acres average growing season area
Islands would protect against sediment resuspension and increase extent of SAV in the first year following construction

Lake Migration Habitat for Diving Ducks	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.56	0.65	0.65	0.65	0.65
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	3690.5	15860.0	79300.0	99125.0
				Total	197975.5
				AAHU	3960

Alternative 7 Total AAHU	3960
No Action Total AAHU	3721
Alternative 7 Net Gain AAHU	239

Table 27. HEP model of diving duck habitat in Marsh Lake with islands.

DIVING DUCK MIGRATION HABITAT MODEL
MARSH LAKE MINNESOTA RIVER - **WITH ISLANDS FUTURE PROJECT CONDITION**

VARIABLE		VALUE		COMMENTS
1) Size of Water Body				
a. Less than 100 acres	1			
b. 100 to 200 acres	5	ENTER		
c. 200 to 1,000 acres	7	VALUE=	10	Marsh Lake is >1000 acres
d. Greater than 1,000 acres	10			
2) Water Depth - Percent of Area 18" to 5'				
a. Less than 10 percent	1			
b. 10 to 40 percent	3	ENTER		
c. 40 to 70 percent	5	VALUE=	10	Water depth is >70% area 18" to 5'
d. Greater than 70 percent	10			
3) Percent Submergent Vegetation Cover				
a. Less than 10 percent	1			Islands would allow SAV
b. 10 to 30 percent	3	ENTER		to grow to 30 to 50% cover 3 out of 10
c. 30 to 50 percent	6	VALUE=	2	years on average, limited by PdT River sediment loading, sediment
d. Greater than 50 percent	10			resuspension by carp and carp grazing
4) Species of Submergent Vegetation Present (Key species: wild celery, sago pondweed, and other pondweeds)				
a. None of the key species present or less than 10 percent of aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	10	SAV is mostly sago pondweed
c. At least one key species covers 30 to 60 percent of the aquatic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
5) Percent Emergent Vegetation Cover				
a. Less than 10 Percent or greater than 50 percent	1			
b. 10 to 20 percent or 30 to 50 percent	5	ENTER		Islands will shelter EAV,
c. 20 to 30 percent	10	VALUE=	5	increase to >10%
6) Species of Emergent Vegetation Present (Key species: arrowhead (S. rigida), soft-stem bulrush, wild rice)				
a. None of the key species present or less than 10 percent fo aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	3	Assume EAV will increase in diversity
c. At least one key species covers 30 to 60 percent of the aqutaic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
7) Invertebrate Populations Present (Key Species: Sphaeriidae, Gastropoda,Hexegenia spp,Chironomidae)				
a. None of the key taxonomic groups present or present but not abundant	1			
b. At least 1 key taxonomic group present and is moderately abundant	5	ENTER VALUE=	5	Invertebrate community will remain dominated by chironomids, oligochaetes
c. At least 1 key taxonomic group present and is very abundant	10			
8) Disturbance				
a. Access uncontrolled - Considerable human activity during migration	1			
b. No hunting activity occurs, or closed to hunting only, but considerable human activity occurs during migration (such as fishing/boating)	3	ENTER VALUE=	4	Assume continued non-motorized zone
c. No hunting activity occurs, or closed to hunting only, and human activity during migration is minimal	4			
d. No human activity occurs, or closed to human entry	5			
		TOTAL=	49	
	MAXIMUM POSSIBLE TOTAL =		75	
		HSI =	0.65	

Combinations of Alternative Measures

Alternative Measures 2, 3, 4, and 7

These measures implemented together would have synergistic effects. Given the difficulty in restoring shallow lakes it would be best to implement these measures together. These measures would in combination, contribute to restoring a vegetated clearer water ecosystem state in Marsh Lake, improving habitat conditions for migrating diving ducks, other waterfowl and shorebirds. Measure 4 implemented along with the others would provide water level management flexibility to adaptively respond to conditions in Marsh Lake, reducing the inter-annual variation in the abundance of aquatic vegetation and habitat conditions for waterfowl.

Restoring the Pomme de Terre River to its former channel would reduce sediment loading to Marsh Lake and reduce carp abundance, This would improve water clarity allowing increased growth of submersed aquatic vegetation and would reduce the abundance of carp that resuspend sediment and graze on aquatic vegetation by denying them winter dissolved oxygen refuge in the Pomme de Terre River.

Modifying Marsh Lake Dam with a fishway to attain target water levels would reduce the duration of high water events on Marsh Lake and provide more consistent water depth, allowing increased growth of submersed aquatic plants.

Conducting growing season drawdowns on Marsh Lake using a stop log water control structure would restore both emergent and submersed aquatic plants. Increased extent of emergent aquatic plants would reduce wind fetch and sediment resuspension. Winter drawdowns of Marsh Lake would reduce carp abundance, sediment resuspension and grazing by carp on submersed aquatic plants.

Constructing islands in Marsh Lake would increase submersed aquatic plants by significantly reducing wind fetch and sediment resuspension.

Considering the future ecosystem conditions in Marsh Lake with the combination of Alternative Measures 2, 3, 4, and 7, diving duck migration habitat conditions would be better than with the stand-alone alternative measures. Implementing these alternative measures together would result in 1326 AAHUs for diving duck migration habitat (Tables 28, 29).

Table 28. Diving duck migration habitat on Marsh Lake with combination of Alternative measures 2, 3, 4, and 7.

Diving duck migration habitat

Assume : There would be no change over time in the area of Marsh Lake = 6100 acres average growing season area
Alt 2 Re-routing PdT River to former channel will reduce sediment loading to Marsh Lake, increase water clarity, SAV growth
reduce over-winter survival of carp
Alt 3 Modify Marsh Lake Dam to attain target water levels, construct fishway will increase SAV growth
Alt 4 Drawdowns of Marsh Lake with stop log water control structure will increase EAV and SAV growth
Winter drawdowns of Marsh Lake will reduce carp abundance
Alt 7 Islands would protect against sediment resuspension and increase extent of SAV
If implemented together, these alternative measures would improve habitat condtiions in the first year following construction

Lake Migration Habitat for Diving Ducks	Existing Conditions Year 0	Future With Project - Year 1	Future With Project - Year 5	Future With Project - Year 25	Future With Project - Year 50
HSI	0.56	0.83	0.83	0.83	0.83
Acreage	6100.0	6100.0	6100.0	6100.0	6100.0
Year	0.0	1.0	5.0	25.0	50.0
Cumulative Annual Habitat Units	0	4239.5	20252.0	101260.0	126575.0
				Total	252326.5
				AAHU	5047

Combination Alternatives 2,3,4,7 Total AAHU	5047
No Action Total AAHU	3721
Alternative 7 Net Gain AAHU	1326

Table 29. HEP model of diving duck habitat in Marsh Lake with combination of alternative measures 2, 3, 4, and 7.

DIVING DUCK MIGRATION HABITAT MODEL

Marsh Lake with Pomme de Terre River restored to its former channel, attaining target water levels with a fishway, growing season and winter drawdowns using stoplog control structure, and with constructed islands

VARIABLE		VALUE		COMMENTS
1) Size of Water Body				
a. Less than 100 acres	1			
b. 100 to 200 acres	5	ENTER		
c. 200 to 1,000 acres	7	VALUE=	10	Marsh Lake is >1000 acres
d. Greater than 1,000 acres	10			
2) Water Depth - Percent of Area 18" to 5'				
a. Less than 10 percent	1			
b. 10 to 40 percent	3	ENTER		
c. 40 to 70 percent	5	VALUE=	10	Water depth is >70% area 18" to 5'
d. Greater than 70 percent	10			
3) Percent Submergent Vegetation Cover				
a. Less than 10 percent	1			Islands and drawdowns would allow SAV to grow to >50% cover most years
b. 10 to 30 percent	3	ENTER		
c. 30 to 50 percent	6	VALUE=	10	
d. Greater than 50 percent	10			
4) Species of Submergent Vegetation Present (Key species: wild celery, sago pondweed, and other pondweeds)				
a. None of the key species present or less than 10 percent of aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	10	SAV is mostly sago pondweed
c. At least one key species covers 30 to 60 percent of the aquatic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
5) Percent Emergent Vegetation Cover				
a. Less than 10 Percent or greater than 50 percent	1			
b. 10 to 20 percent or 30 to 50 percent	5	ENTER		Drawdowns will allow germination of EAV,
c. 20 to 30 percent	10	VALUE=	10	islands will shelter EAV, increase cover to >20%
6) Species of Emergent Vegetation Present (Key species: arrowhead (S. rigida), soft-stem bulrush, wild rice)				
a. None of the key species present or less than 10 percent fo aquatic bed	1			
b. At least one key species covers 10 to 30 percent of the aqutaic bed (add one point if more than one key species is present)	3	ENTER VALUE=	3	EAV will increase in diversity
c. At least one key species covers 30 to 60 percent of the aqutaic bed (add one point if more than one key species is present)	6			
d. Greater than 60 percent of aquatic bed is comprised of key food species	10			
7) Invertebrate Populations Present (Key Species: Sphaeriidae, Gastropoda,Hexegenia spp,Chironomidae)				
a. None of the key taxonomic groups present or present but not abundant	1			
b. At least 1 key taxonomic group present and is moderately abundant	5	ENTER VALUE=	5	Invertebrate community will remain dominated by chironomids, oligochaetes
c. At least 1 key taxonomic group present and is very abundant	10			
8) Disturbance				
a. Access uncontrolled - Considerable human activity during migration	1			
b. No hunting activity occurs, or closed to hunting only, but considerable human activity occurs during migration (such as fishing/boating)	3	ENTER VALUE=	4	Assume continued non-motorized zone
c. No hunting activity occurs, or closed to hunting only, and human activity during migration is minimal	4			
d. No human activity occurs, or closed to human entry	5			
		TOTAL=	62	
	MAXIMUM POSSIBLE TOTAL =		75	
		HSI =	0.83	

Net Habitat Benefits of the Alternative Measures

Table 32 provides the net habitat benefits of the alternative measures and combinations of alternative meausures expressed as AAHUs, based on the selected representative species, models, acres affected and timing of habitat improvements.

Table 32. Net habitat benefit of the alternative measures for the Marsh Lake project.

Measure Number	Alternative Measures	Net Benefit (AAHU)
1	No Action	0
2	Restore Pomme de Terre River to its former channel	6567
3	Modify Marsh Lake Dam to attain target water levels, construct fishway	483
4	Growing season drawdowns to restore emergent aquatic plants, modify Marsh Lake Dam with stoplog structure	725
5	Install gated culverts in Louisburg Grade Road	610
6	Breach dike at abandoned fish pond	5
7	Construct islands in Marsh Lake	239

Combinations of Measures

2,3,4,7	PdT River to former channel	1326
	Modify Marsh Lake Dam with fishway	
	Modify Marsh Lake Dam with stop log structure, drawdowns	
	Construct islands in Marsh Lake	

3,4,5	Modify Marsh Lake Dam to attain target water levels, construct fishway	1372
	Growing season drawdowns to restore emergent aquatic plants, modify Marsh Lake Dam with stoplog structure	
	Install gated culverts in Louisburg Grade Road	

Appendix F – Hazardous, Toxic, and Radioactive Waste Assessment

PHASE I
ENVIRONMENTAL SITE
ASSESSMENT REPORT

Project Site:

Marsh Lake Ecosystems Restoration
Minnesota River Valley, Big Stone and Swift Counties, Minnesota

Prepared by:

United States Army Corps of Engineers – St. Paul District
Geotechnical, Geology, and Surveys Section
190 5th Street E.
St. Paul, Minnesota 55101

31 March 2011

TABLE OF CONTENTS

List of Acronyms

- ACM - Asbestos Containing Material
- AST - Aboveground Storage Tank
- ASTM – American Society for Testing Materials
- CAT - Illinois State Category List
- CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System
- CONSENT - Superfund Consent Decrees
- CORRACTS - Corrective Action Sites
- EDI - Environmental Design International
- EDR - Environmental Data Resources
- ERNS - Emergency Response Notification System
- ESA - Environmental Site Assessment
- FINDS - Facility Index System
- FOIA - Freedom of Information Act
- FTTS INSP - Federal Insecticide, Fungicide, & Rodenticide Act/ TSCA Tracking System
- HMIRS - Hazardous Materials Information Reporting System
- LQG - Large Quantity Generators
- LUST - Minnesota Leaking Underground Storage Tank List
- MPCA – Minnesota Pollution Control Agency
- NPL - National Priorities List
- NPL LIENS - Federal Superfund Liens
- NWI - National Wetlands Inventory
- PADS - PCB Activity Database System
- PCBs - Polychlorinated Biphenyls
- PDF – Portable Digital Format
- RAATS - RCRA Administrative Action Tracking System
- RCRIS - Resource Conservation and Recovery Information System
- REC – Recognized Environmental Condition
- ROD - Records of Decision
- SHWS - Minnesota State Hazardous Waste Sites
- SQG - Small Quantity Generators
- SSTS - Section 7 Tracking Systems
- TRIS - Toxic Chemical Release Inventory System
- TSCA - Toxic Substances Control Act Inventory
- TSD - Treatment, Storage, and Disposal
- USGS – United States Geological Survey
- UST - Underground Storage Tank
- VIC – Minnesota Voluntary Investigation and Cleanup Program

EXECUTIVE SUMMARY

A Phase I Environmental Site Assessment (ESA) was conducted for property located in proposed mitigation areas located at Marsh Lake and the Marsh Lake Dam, Minnesota at Marsh Lake and the Pomme de Terre River in rural Swift and Big Stone Counties. Property reconnaissance was conducted at the site on 27 March, 2011. The inspection and review of available records revealed the following:

Site History

The subject properties are located at Marsh Lake, and on the Pomme de Terre River, southwest of the town of Appleton, Minnesota. The proposed mitigation areas encompass the Pomme de Terre river along the northern section of Marsh Lake Dam, and Louisberg Road at the north end of Marsh Lake.

The subject property and its environs up to a radius of 1 mile underwent a search of federal, state, local and tribal environmental databases in an effort to identify any potential environmental conditions of concern. No recognized environmental conditions were identified through the database search.

Historical land use and any potential environmental conditions may be identified through the study of fire insurance maps, aerial photographs, and U.S.G.S. topographic maps. A map and photo search was undertaken and no recognized environmental conditions were identified through this search.

The subject properties were visually inspected. No recognized environmental conditions were identified during the inspections and nothing was observed to constitute a significant environmental risk at the site.

The Executive Summary provides a brief overview of the findings of this environmental site assessment. It should be noted that the complete report must be read in order to fully understand the findings associated with the subject properties.

PURPOSE

The purpose of this assessment was to identify recognized environmental conditions and potential environmental conditions based on a visual inspection of the subject property and the surrounding operations, and a review of available public records relative the subject property. A recognized environmental condition is defined by ASTM Standard Practice E-1527 and E-2247 as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. This assessment does not intend to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

The Phase I ESA is in conformance with the scope of ASTM Standard Practice E-1527. The scope of work is further defined below.

A. COE has gathered and reviewed available historical data, including fire insurance mapping, plats of survey maps, soil survey aerial photography, topographic maps from the United States Geological Survey (USGS), and interviews with knowledgeable persons.

B. COE has reviewed state and federal environmental databases including UST, LUST, RCRA, CERCLA, NPL, Landfill, ERNS, CORRACTS, PADS, TRI, DOCKET, TSCA, SCL, SRP, and SWF.

C. COE has physically inspected the subject property via walking and windshield survey, looking for signs of recognized environmental conditions such as stressed vegetation, unusual staining, dumping, and evidence of ASTs and USTs.

D. COE has physically observed adjacent properties, paying particular attention to evidence of USTs, questionable housekeeping practices or unusual business practices.

E. COE has reviewed all available historical data, database information, received FOIA information, and the results of the site inspections.

The conclusions and recommendations stated in this report are based upon observations made by individuals working for the Corps of Engineers, and also upon information provided by others. We have accepted as true and accurate the information provided by other sources; therefore we cannot be held responsible for the accuracy of this information.

The Phase I Assessment was conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the environmental profession under similar

conditions. No other warranty or guarantee, express or implied, is included or intended in this report or otherwise.

The Scope of this Assessment does not purport to encompass every report, record, or other form of documentation relevant to the Property being evaluated. The observations contained herein are made during the site reconnaissance, review of ownership records, discussions with local officials, and review of readily accessible environmental databases. This Phase I Assessment is based on our professional judgment concerning the significance of the data collected and in no way attempts to forecast the future site conditions.

SITE DESCRIPTION

Property Location

The subject properties are located on the Minnesota River, southwest of the town of Appleton, Minnesota. The proposed mitigation areas encompass the Pomme de Terre River from approximately one mile upstream of the Marsh Lake Dam, to its confluence with Marsh Lake, and the Lake crossing at Louisburg Road at the upstream end of Marsh Lake, southwest of the town of Correll, Minnesota. The Louisburg road mitigation area is located in the USGS 7.5-minute quadrangle map Correll, Minnesota, township 120 north, range 44 west, sections 8 and 17 and the Pomme de Terre River mitigation are is located in the 7.5-minute quadrangle map Appleton, Minnesota, township 120 north, range 43 west, sections 29 and 30. The proposed borrow area for the mitigation efforts is located in the 7.5-minute quadrangle map Appleton, Minnesota, township 120 north, range 43 west, section 19. The site location map is provided as Figure 1.

General Site Setting

The COE owns most of the land in the area of the mitigation project. Land use in the area of the subject property is natural lake shore, marshes, and river flood plains. The proposed borrow area is an agricultural field currently unplanted for the winter season. The subject properties themselves are covered with native grasses and bottom land forest. The surficial soils are clayey. The closest town in proximity is Appleton, Minnesota with a population of approximately 2,683 (2007 census estimate), and a total population of 11,370 in all of Swift County. The nearest town in Big Stone county is Correll, Minnesota, with a population of 43 (2009).

Current Use of Adjoining Properties

The adjoining properties are limited in number and are agricultural in nature. The area is rural and has a relatively low surrounding population. No manufacturing or commercial business is located in the immediate vicinity.

Owner Provided Information

The COE owns most of the land in the area of the mitigation project. The COE has not yet conducted telephone interviews with local landowners. The purpose of the interviews will be to determine if there are any known past or present environmental concerns associated with the sites. No environmental concerns are expected to be identified from future interviews.

Any information from, and analysis of future interviews will be included in subsequent submittals.

HISTORICAL USE OF THE PROPERTY

Sanborn Fire Insurance Maps

Historical Fire Insurance Sanborn Maps were requested from Environmental Data Resources, Inc. (EDR), Southport, Connecticut. Historical maps are detailed drawings that show the locations and use of structures on a given property during a specific year. The maps were originally used by insurance companies to assess fire risk. EDR had no coverage for the Sanborn maps. This is consistent with the areas rural character.

Copies of the Sanborn reports are provided in Appendix F2.

Topographic Maps

Historical topographic map coverage of Marsh Lake was requested from EDR. USGS 7.5 Appleton quadrangle maps at the Marsh Lake Dam were obtained for the years 1958 and 1977. USGS 7.5 Correll quadrangle maps at the Louisburg road were obtained for the year 1958. The 1950 and 1974 topographic maps depict the subject property and adjacent properties as similar to what was observed at the time of the property reconnaissance.

Partial copies of the topographic maps are provided in Appendix F3.

No environmental conditions were identified from the topographic maps.

Aerial Photos

Historical photos of Marsh Lake mid-pool were requested from EDR. Photo coverage was available for the years 1938, 1955, 1968, 1991, 1996, 2005, and 2006. All photos reveal that the islands mid pool are uninhabited and natural, with only minor geomorphologic changes throughout the years. The photo from 1955 is the only one that covers some land to the south of the lake, and that land is agricultural in use, and rural in character.

Copies of the aerial photos are provided in Appendix F4.

No environmental conditions were identified from the aerial photographs.

Historical photos of Marsh Lake Dam and Louisburg road have been requested from the EDR and analysis of any documentation received will be included in subsequent submittals.

REGULATORY REVIEW

A Government Records Search Radius Map Report was requested for the subject property from Environmental Data Resources, Inc. (EDR). The EDR Radius Map Report maps sites with potential or existing environmental liabilities. The following is a list of the databases searched for the subject property accompanied by a summary of sites listings. Copies of the EDR Radius Map Reports are provided in Appendix F5.

Federal Records:

- **NPL -** National Priorities List
- **NPL Proposed**
- **NPL LIENS -** Federal Superfund Liens
- **NPL Delisted**
- **CERCLIS (Active)** - Comprehensive Environmental Response, Compensation, and Liability Information System
- **CERCLIS (NFRAP)** - No Further Remedial Action Planned Archive
- **CORRACTS -** Resource Conservation and Recovery Information System (RCRIS) list of Treatment, Storage, and Disposal (TSD) Facilities, Corrective Action Sites
- **RCRA – TSDF** Resource Conservation and Recovery Act Information
- **RCRA – LQG** Resource Conservation and Recovery Act Information
- **RCRA – SQG** Resource Conservation and Recovery Act Information
- **ERNS -** Emergency Response Notification System
- **HMIRS** - Hazardous Materials Information Reporting System
- **US ENGINEERING CONTROLS**
- **US INSTITUTIONAL CONTROLS**
- **DOD** – Department of Defense
- **FUDS –** Formerly Used Defense Sites
- **US BROWNFIELDS**
- **CONSENT -** Superfund Consent Decrees
- **ROD -** Records of Decision
- **UMTRA** – Uranium Mill Tailings Sites
- **ODI** – Open Dump Inventory
- **TRIS** – Toxic Chemical Release Inventory System

- **TSCA** – Toxic Substances Control Act
- **FTTS** - Federal Insecticide, Fungicide, & Rodenticide Act/ TSCA Tracking System
- **SSTS** – Section 7 Tracking Systems
- **RADINFO** – Radiation Information Database
- **LUCIS** – Land Use Control Information System
- **ICIS** – Integrated Compliance Information System
- **DOT OPS** – Incident and Accident Data
- **LIENS 2** – CERCLA Lien Information
- **US CDL** – Clandestine Drug Labs
- **HIST FTTS** – FIFRA/TSCA Tracking System Administrative Case Listing
- **PADS** – PCB Activity Database System
- **MLTS** – Material Licensing Tracking System
- **MINES** – Mines Master Index File
- **FINDS** – Facility Index System/Facility Registry System
- **RAATS** – RCRA Administrative Action Tracking System

State and Local Records:

- **SHWS** – Hazard Ranking List
- **BRRTS** – Bureau of Remediation & Redevelopment Tracking System
- **WI ERP** – Environmental Repair Program database
- **SWF/LF** – List of Licensed Landfills
- **WI WDS** – Registry of Waste Disposal Sites
- **LUST** – Leaking Underground Storage Tank Database
- **UST** – Registered Underground Storage Tanks
- **LAST** – Leaking Aboveground Storage Tank Listing
- **AST** – Tanks Database
- **WI MANIFEST** – Hazardous Waste Manifest Data
- **WI Spills** – Spills Database
- **AGSPILLS** – Agricultural Spill cases
- **CRS** – Closed Remediation Sites
- **AUL** – Deed Restriction at Closeout Sites
- **VCP** – Voluntary Party Liability Exemption Sites
- **DRYCLEANERS** – Five Star Recognition Program Sites
- **WI WRRSER** – Wisconsin Remedial Response Site Evaluation Report
- **BEAP** – Brownfields Environmental Assessment Program
- **AIRS** – Air Permit Program Listing
- **TIER 2** – Tier 2 Facility Listing
- **SHWIMS** – Solid & Hazardous Waste Information Management System
- **LEAD** – Lead Inspection Data

Tribal Records:

- **INDIAN RESERV** – Indian Reservations

- **INDIAN LUST** – Leaking Underground Storage Tanks on Indian Land
- **INDIAN UST** – Underground Storage Tanks on Indian Land

EDR Proprietary Records:

- **Manufactured Gas Plants** – EDR Proprietary Manufactured Gas Plants

The search was conducted for a radius of 2-miles from the mid-pool of Marsh Lake, 1.5 miles from Louisberg road, and 1.5 miles again from the Marsh Lake Dam. The target properties were not listed in any of the databases checked. No mapped sites were found in the search of available Government records within the search radius around the target properties.

PROPERTY RECONNAISSANCE

27 March, 2011

Ellen Engberg from the US Army Corps of Engineers, St. Paul District conducted the property reconnaissance. The weather at the time of the site visit was cold (approximately 30 degrees) and sunny.

The subject property is located along the northeast section of the Marsh Lake Dam. The Pomme de Terre River runs along the northwest side of the dam, and was flooded at the time of the site visit. The historical channel runs along the southeast side of the dam, and was also flooded at the time of the reconnaissance.

The land is covered in flood plain forest dominated by willow, silver maple, cottonwood, green ash, and box elder. Ground vegetation was not visible due to flooding.

Access to the borrow area was not possible due to snow cover, but was visually observed from a distance.

No structures were observed during the inspection.

The database search revealed no wells on the subject property. The entire site was free from litter or man-made debris.

No potential on-site recognized environmental conditions were observed during the property reconnaissance.

CONCLUSIONS and RECOMMENDATIONS

The Corps of Engineers have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527 of the Marsh Lake Mitigation area.

This assessment revealed no evidence of recognized environmental conditions in connection with any of the subject properties.

Agricultural activities have historically been conducted at adjacent sites. Agricultural chemicals, including herbicides and pesticides, are expected to have been applied to the crops and ground surface at various times throughout its history. The disseminated nature of these chemicals, when used properly, should not constitute a significant environmental risk at the site.

A Phase II environmental Site Assessment is not recommended for the subject properties.

QUALIFICATIONS of the PROFESSIONAL RESPONSIBLE FOR THIS REPORT

The professional responsible for the preparation of this Phase I Environmental Site Assessment is identified below.

_____

Grant A. Riddick P.G.
Geologist
Mr. Riddick has over 20 years experience in drilling, sampling, environmental and geotechnical engineering support.

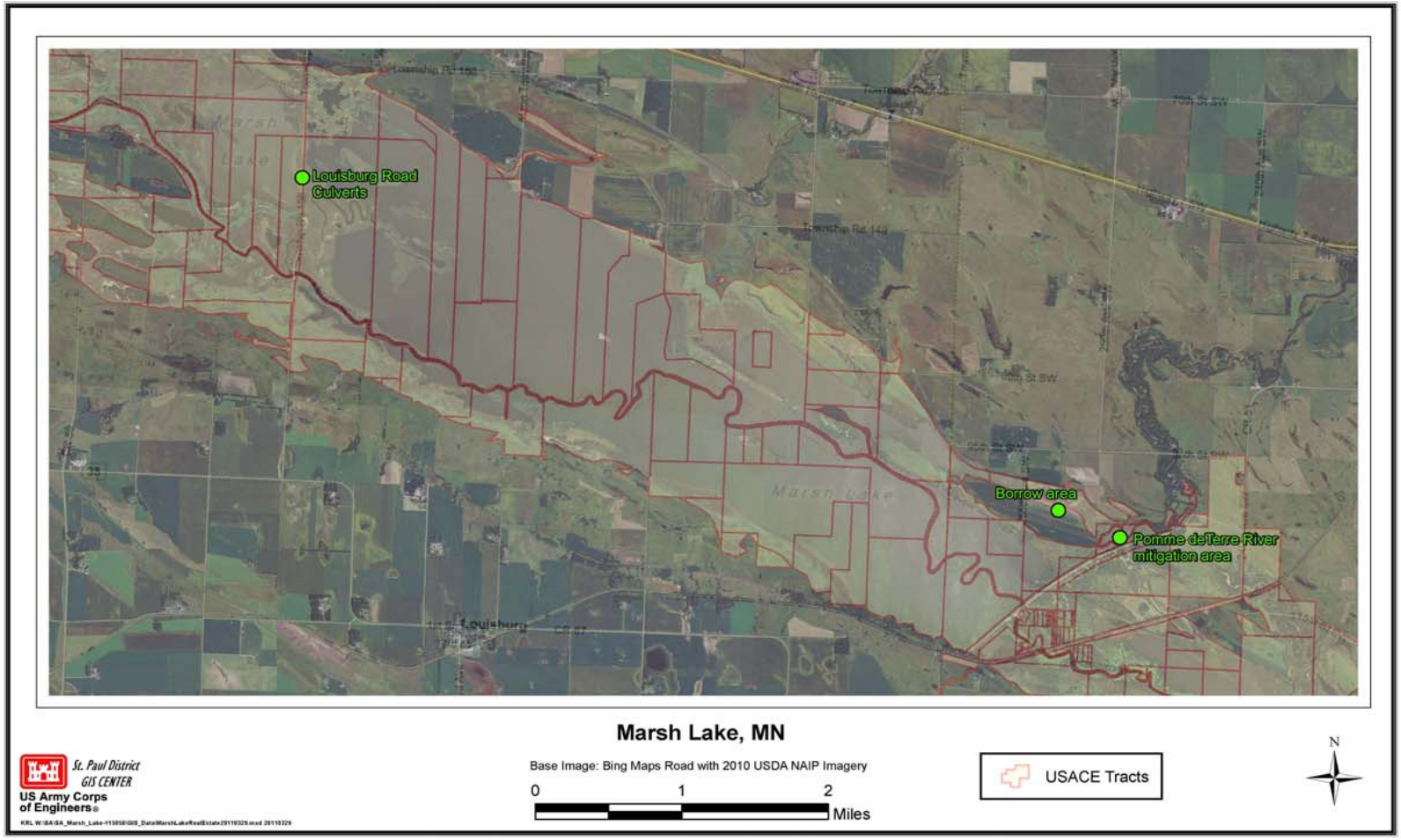


Figure 1. General Site Map / Marsh Lake / Proposed Mitigation Properties

Appendix F1

Site Photographs

SITE PHOTOGRAPHS

Photo #1

From Marsh Lake Dam looking west at approximate location of cut off dike

Photo #2

From Marsh Lake Dam looking southeast at approximate location of the new Pomme de Terre river crossing

Photo #3

From Marsh Lake Dam looking northwest at approximate location of the new Pomme de Terre river crossing

Photo #4

From Marsh Lake Dam looking east at the historic Pomme de Terre river channel

Appendix F2

EDR Sanborn Fire Insurance Map Reports

Marsh Lake
Louisburg Road
Appleton, MN 56208

Inquiry Number: 3028253.3
March 31, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

3/31/11

Site Name:
Marsh Lake
Louisburg Road
Appleton, MN 56208

Client Name:
Army Corp of Engineers
190 5th Street E
SAint Paul, MN 55101

EDR Inquiry # 3028253.3

Contact: Ellen Engberg

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Army Corp of Engineers were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Marsh Lake
Address: Louisburg Road
City, State, Zip: Appleton, MN 56208
Cross Street:
P.O. # NA
Project: Marsh Lake
Certification # E96B-4B8E-84DA

Sanborn® Library search results
Certification # E96B-4B8E-84DA

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Army Corp of Engineers (the client) is permitted to make up to THREE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Marsh Lake Dam
Marsh Lake
Madison, MN 56256

Inquiry Number: 2627945.3
October 30, 2009

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

10/30/09

Site Name:
Marsh Lake Dam
Marsh Lake
Madison, MN 56256

EDR Inquiry # 2627945.3

Client Name:
Army Corp of Engineers
190 5th Street E
SAint Paul, MN 55101

Contact: Grant Riddick

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Army Corp of Engineers were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Marsh Lake Dam
Address: Marsh Lake
City, State, Zip: Madison, MN 56256
Cross Street:
P.O. # #1
Project: Marsh Lake Dam
Certification # CD00-40D3-A823

Sanborn® Library search results
Certification # CD00-40D3-A823

UNMAPPED PROPERTY

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The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
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Louisburg Road
Louisburg Road
Correll, MN 56227

Inquiry Number: 3028253.11
March 31, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

3/31/11

Site Name:
Louisburg Road
Louisburg Road
Correll, MN 56227

Client Name:
Army Corp of Engineers
190 5th Street E
SAint Paul, MN 55101

EDR Inquiry # 3028253.11

Contact: Ellen Engberg

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Army Corp of Engineers were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Louisburg Road
Address: Louisburg Road
City, State, Zip: Correll, MN 56227
Cross Street:
P.O. # NA
Project: marsh lake
Certification # C051-4C81-8F6B

Sanborn® Library search results
Certification # C051-4C81-8F6B

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

Limited Permission To Make Copies

Army Corp of Engineers (the client) is permitted to make up to THREE photocopies of this Sanborn Map transmittal and each fire insurance map accompanying this report solely for the limited use of its customer. No one other than the client is authorized to make copies. Upon request made directly to an EDR Account Executive, the client may be permitted to make a limited number of additional photocopies. This permission is conditioned upon compliance by the client, its customer and their agents with EDR's copyright policy; a copy of which is available upon request.

Appendix F3

EDR Topographic Map Reports

Marsh Lake
Louisburg Road
Appleton, MN 56208

Inquiry Number: 3028253.4
March 31, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

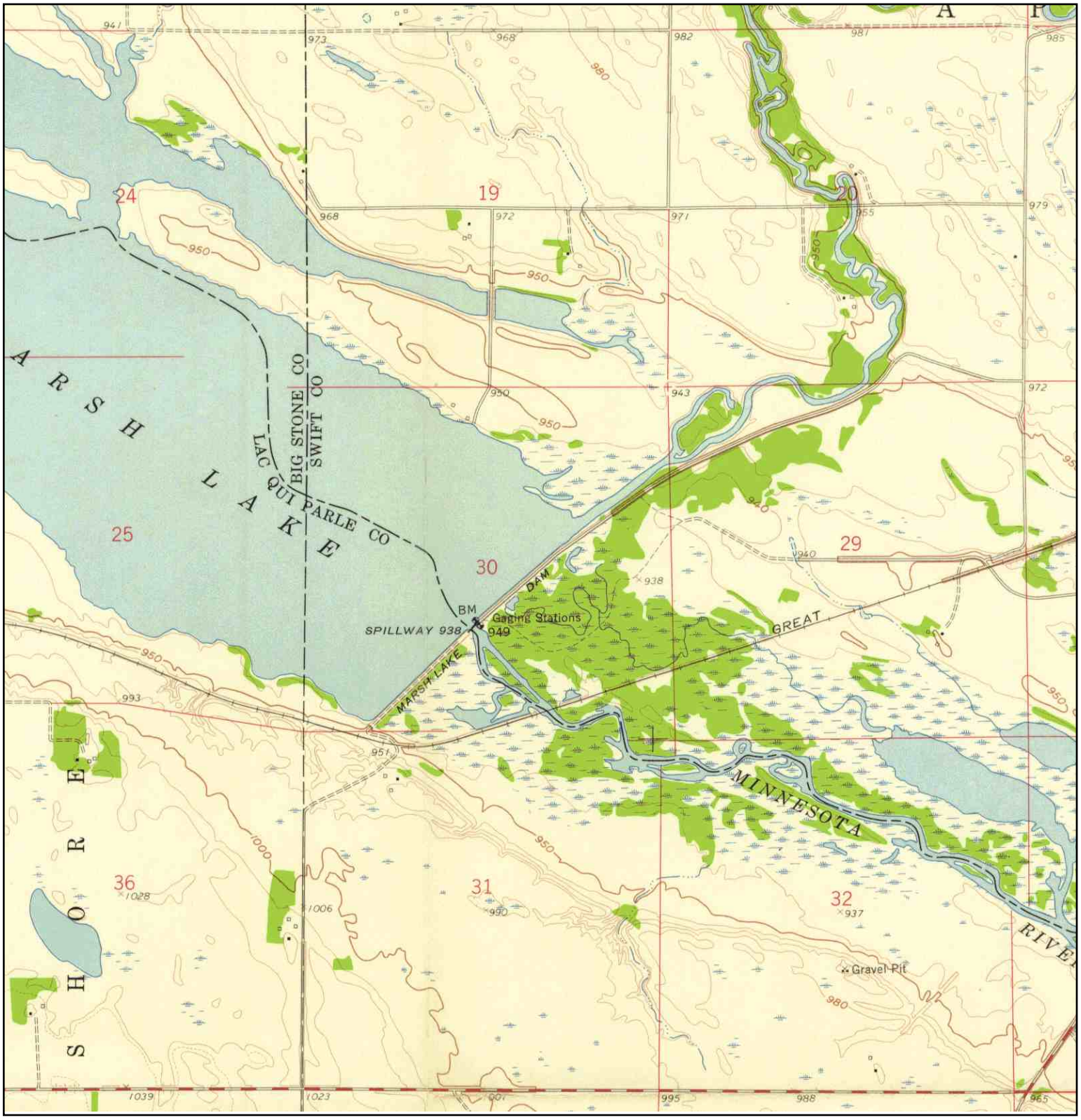
440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

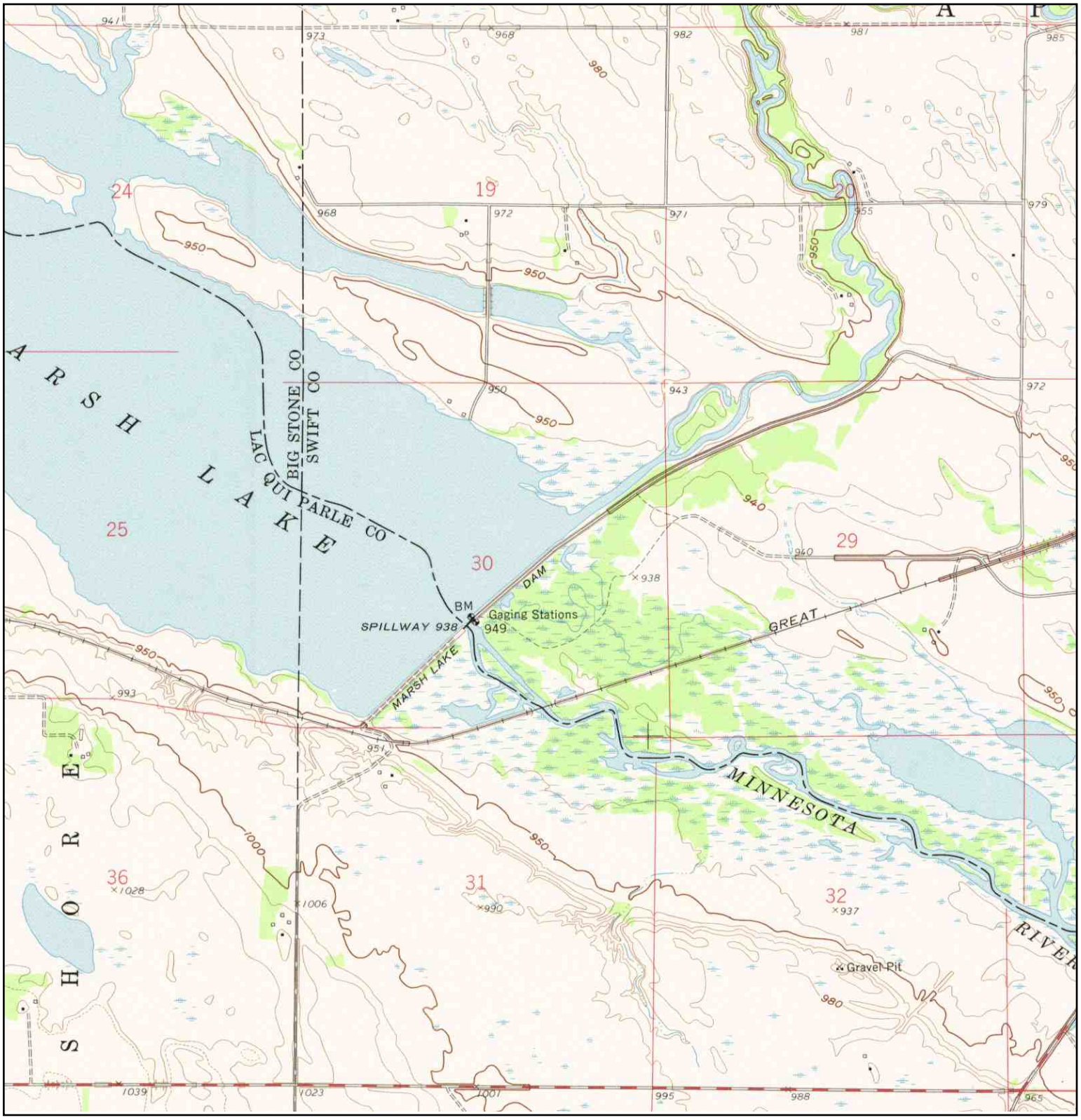
Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



N	TARGET QUAD NAME: APPLETON MAP YEAR: 1958 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Marsh Lake ADDRESS: Louisburg Road Appleton, MN 56208 LAT/LONG: 45.1739 / -96.0897	CLIENT: Army Corp of Engineers CONTACT: Ellen Engberg INQUIRY#: 3028253.4 RESEARCH DATE: 03/31/2011

Historical Topographic Map



N	TARGET QUAD NAME: APPLETON MAP YEAR: 1977 PHOTOINSPECTED: 1958 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Marsh Lake ADDRESS: Louisburg Road Appleton, MN 56208 LAT/LONG: 45.1739 / -96.0897	CLIENT: Army Corp of Engineers CONTACT: Ellen Engberg INQUIRY#: 3028253.4 RESEARCH DATE: 03/31/2011

Louisburg Road
Louisburg Road
Correll, MN 56227

Inquiry Number: 3028253.12
March 31, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

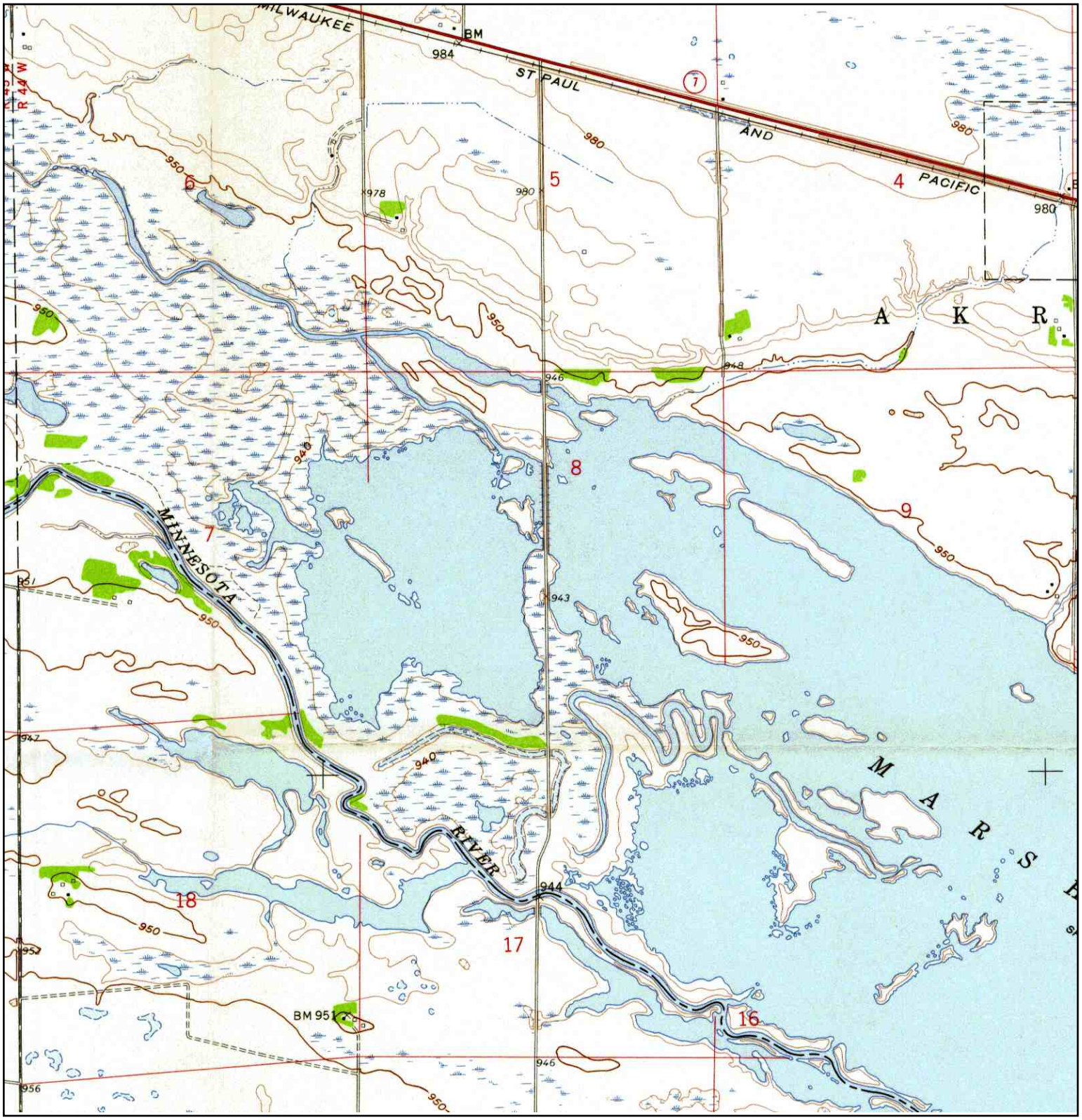
440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



N	TARGET QUAD NAME: CORRELL MAP YEAR: 1958 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Louisburg Road ADDRESS: Louisburg Road Correll, MN 56227 LAT/LONG: 45.2169 / -96.1957	CLIENT: Army Corp of Engineers CONTACT: Ellen Engberg INQUIRY#: 3028253.12 RESEARCH DATE: 03/31/2011

Appendix F4

EDR Aerial Photo Reports

Marsh Lake Dam
Marsh Lake
Madison, MN 56256

Inquiry Number: 2627945.5
November 04, 2009

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDRs professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography November 04, 2009

Target Property:

Marsh Lake

Madison, MN 56256

Year	***Scale***	***Details***	***Source***
1938	Aerial Photograph. Scale: 1"=500'	Flight Year: 1938 Best Copy Available from original source	ASCS
1955	Aerial Photograph. Scale: 1"=500'	Flight Year: 1955 Best Copy Available from original source	ASCS
1968	Aerial Photograph. Scale: 1"=500'	Flight Year: 1968	ASCS
1991	Aerial Photograph. Scale: 1"=500'	Flight Year: 1991	NAPP
1996	Aerial Photograph. Scale: 1"=500'	Flight Year: 1996	NAPP
2005	Aerial Photograph. 1" = 604'	Flight Year: 2005	EDR
2006	Aerial Photograph. 1" = 604'	Flight Year: 2006	EDR

INQUIRY #: 2627945.5

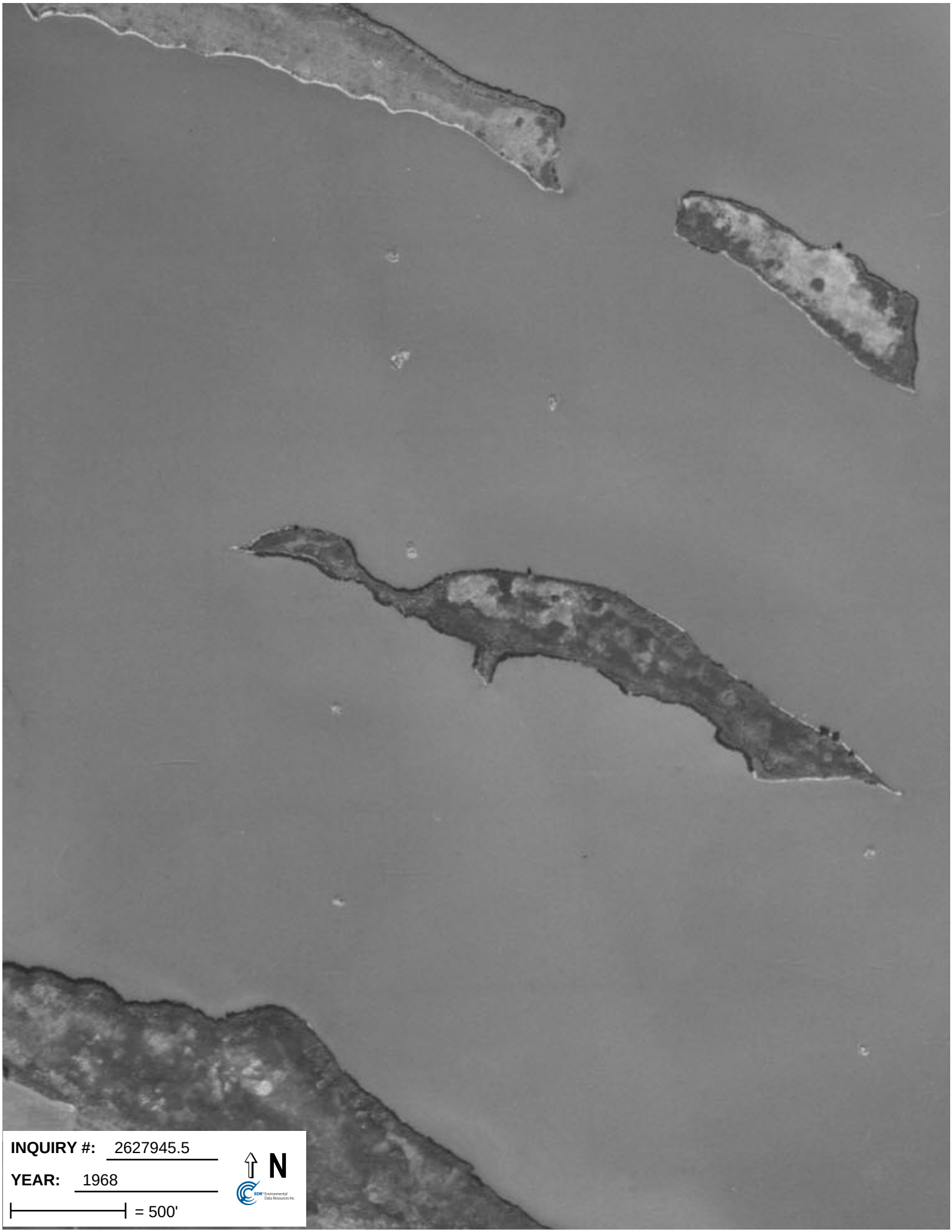
YEAR: 1938

= 500'

N

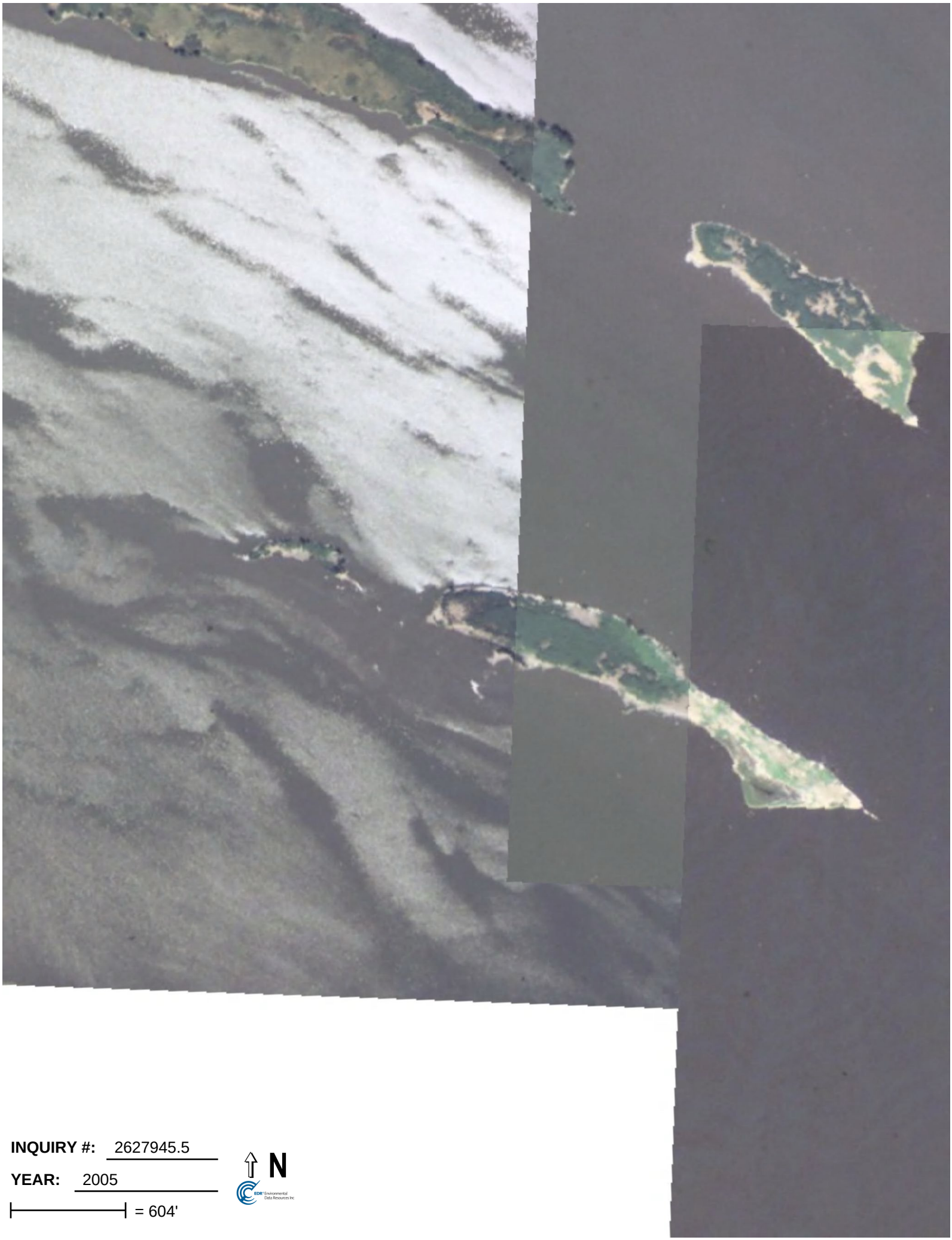
EDR Environmental Data Resources Inc


INQUIRY #: 2627945.5
YEAR: 1955
= 500'
N


INQUIRY #: 2627945.5
YEAR: 1968
= 500'
N


INQUIRY #: 2627945.5
YEAR: 1991
= 500'
N
EDR Environmental Data Resources Inc


INQUIRY #: 2627945.5
YEAR: 1996
= 500'
N
EDR Environmental Data Resources Inc

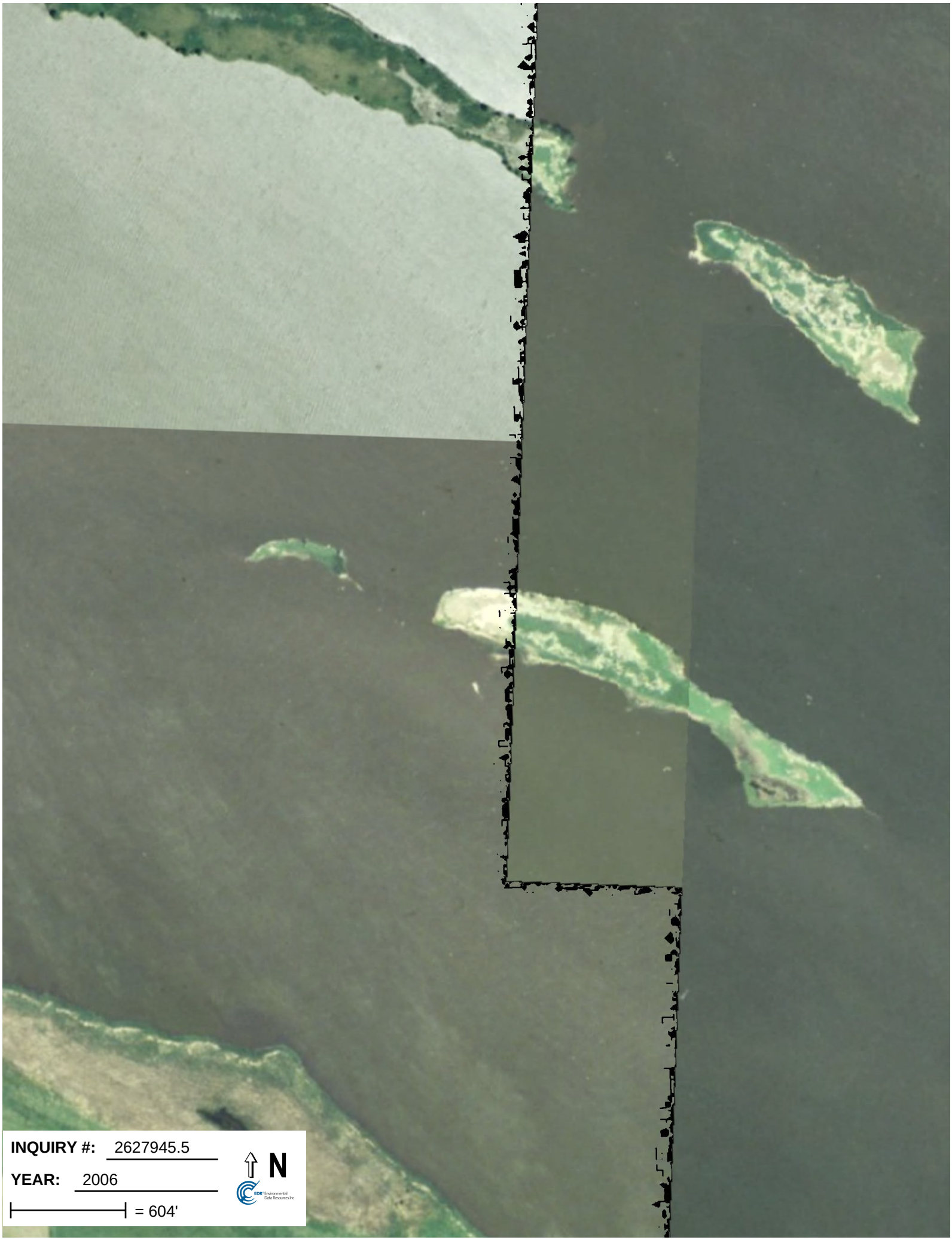


INQUIRY #: 2627945.5

YEAR: 2005

= 604'

N



INQUIRY #: 2627945.5

YEAR: 2006

= 604'

N

Appendix F5

EDR Radius Map Reports

Marsh Lake
Louisburg Road
Appleton, MN 56208

Inquiry Number: 3028253.2s
March 31, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

LOUISBURG ROAD
APPLETON, MN 56208

COORDINATES

Latitude (North):	45.173900 - 45° 10' 26.0''
Longitude (West):	96.089700 - 96° 5' 22.9''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	728687.6
UTM Y (Meters):	5006172.5
Elevation:	939 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	45096-B1 APPLETON, MN
Most Recent Revision:	1977

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

Federal CERCLIS list

CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ..... Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-SQG ..... RCRA - Small Quantity Generators
RCRA-CESQG ..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

MN PLP ..... Permanent List of Priorities

State- and tribal - equivalent CERCLIS

SHWS ..... Superfund Site Information Listing

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ..... Permitted Solid Waste Disposal Facilities
LCP ..... Closed Landfills Priority List
UNPERM LF ..... Unpermitted Facilities

State and tribal leaking storage tank lists

LUST ..... Leak Sites
LAST ..... Leaking Aboveground Storage Tanks
INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST ..... Underground Storage Tank Database

AST ---------- Aboveground Storage Tanks
INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL ---------- Site Remediation Section Database

State and tribal voluntary cleanup sites

VIC ---------- Voluntary Investigation and Cleanup Program
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
SWRCY ---------- Recycling Facilities
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
SRS ---------- Site Remediation Section Database
MN DEL PLP ---------- Delisted Permanent List of Priorities
CDL ---------- Clandestine Drug Labs
US HIST CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information
LUCIS ---------- Land Use Control Information System
LIENS ---------- Environmental Liens

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- Spills Database
AGSPILLS ---------- Department of Agriculture Spills

Other Ascertainable Records

RCRA-NonGen ---------- RCRA - Non Generators
DOT OPS ---------- Incident and Accident Data

FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
MN LS	List of Sites
BULK	Bulk Facilities Database
MANIFEST	Hazardous Waste Manifest Data
DRYCLEANERS	Registered Drycleaning Facilities
ENF	Generators Associated with Enforcement Logs
MN HWS Permit	Active TSD Facilities
AIRS	Permit Contact List
TIER 2	Tier 2 Facility Listing
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
MDA LIS	Licensing Information System Database Listing
AGVIC	Agricultural Voluntary Investigation & Cleanup Listing
WIMN	What's In My Neighborhood
COAL ASH	Coal Ash Disposal Site Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1.5 miles of the target property.

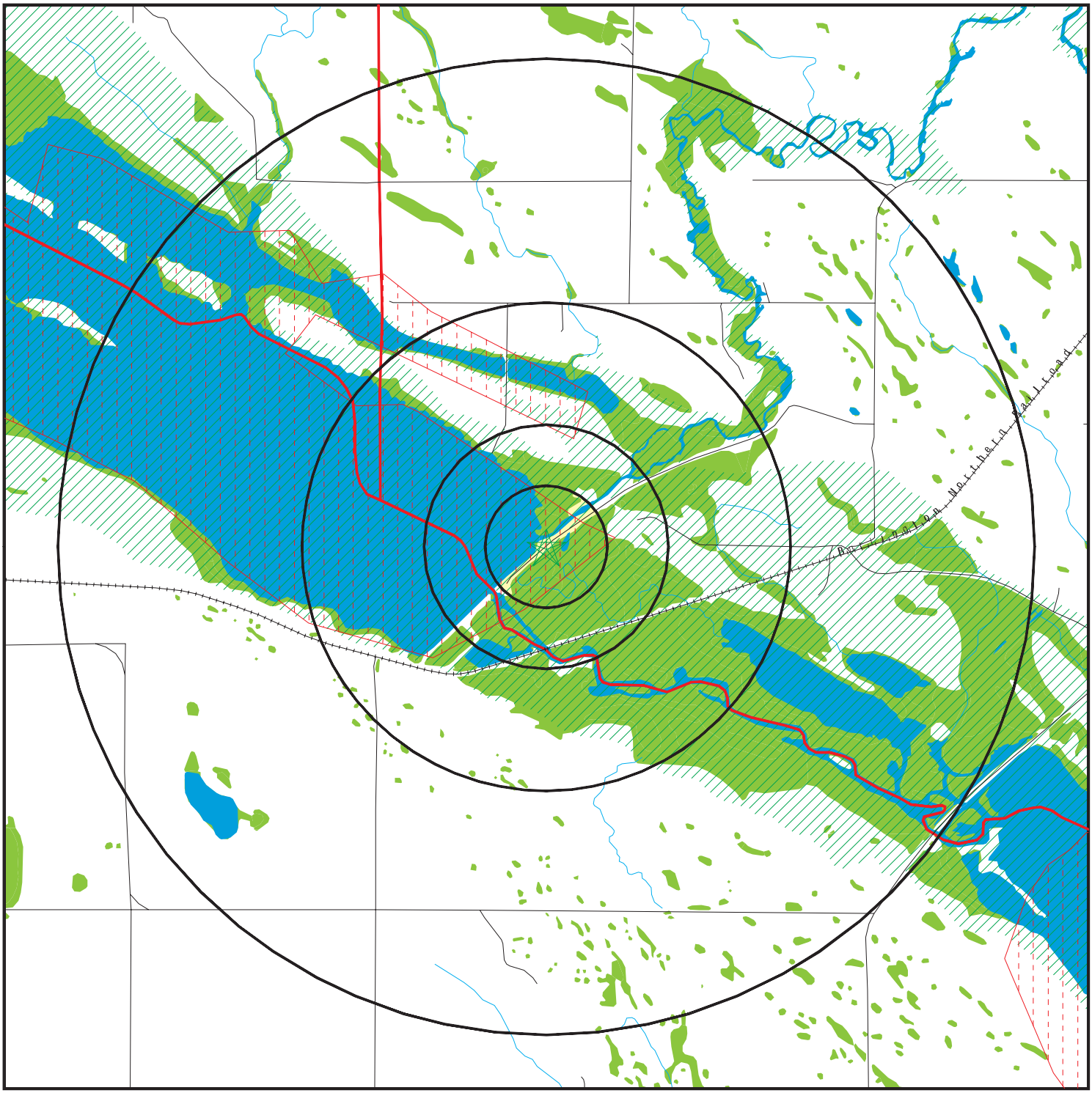
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MASH LAKE		0 - 1/8 (0.000 mi.)	0	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 40 records.

Site Name	Database(s)
LAC QUI PARLE SCHOOL BUS GARAGE	WIMN
FIEDLER FAMILY FARM APPLETON BARN	WIMN
APPLETON BUS GARAGE	AST,UST,WIMN
GERALD GIESE FARM	WIMN
DANIEL STRUXNESS FARM - SEC 27	WIMN
RANDY FRAGODT FARM - SEC 26	WIMN
RON'S SERVICE CENTER	WIMN
J & J AMOCO	WIMN
ASCHEMAN OIL - APPLETON	WIMN
VIVIAN KELLER RESIDENCE	WIMN
CORRELL CITY OF - SW	WIMN
HARVEY HASTAD FARM - SEC 8	WIMN
MIKE KEMEN FARM - SEC 21	WIMN
ROBERT GOERGER FARM - SEC 17	WIMN
ROBERT LUDVIGSON FARM - SEC 11	WIMN
DALE KEMEN FARM - SEC 22	WIMN
RODNEY WEBER FARM - SEC 21	WIMN
THEO NELSON - MAKIN BACON FARM	WIMN
LARRY CLARK FARM - SEC 22	WIMN
A FRAME FARM - SEC 22	WIMN
SCHMIEG OIL CO	WIMN
MNDOT TRUCK STATION	WIMN
RANDY & TODD MORTENSON FARM	WIMN
MADISON GAS & GRUB	WIMN
LUND IMPLEMENT CO	WIMN
JAMES HEGLAND	MDA LIS
RANDY ASCHEMAN	MDA LIS
LAC QUI PARLE SCHOOL BUS GARAGE	LUST
J & J AMOCO	LUST
MNDOT TRUCK STATION	AST,UST
MADISON GAS & GRUB	UST
VIVIAN KELLER RESIDENCE	LAST,SPILLS
SCHMIEG OIL CO	AST
RICHARD LARSON DBA LARSON AUTO BOD	RCRA-CESQG
WESTERN CONSOLIDATED COOPERATIVE	BULK
THOMPSON CHUCK DBA FARM ADVANTAGE	BULK
CITY OF APPLETON WASTEWATER FACILI	TIER 2
GLACIAL PLAINS COOP - LP PLANT	TIER 2
MNDOT	TIER 2
LAC QUI PARLE COOP OIL	TIER 2

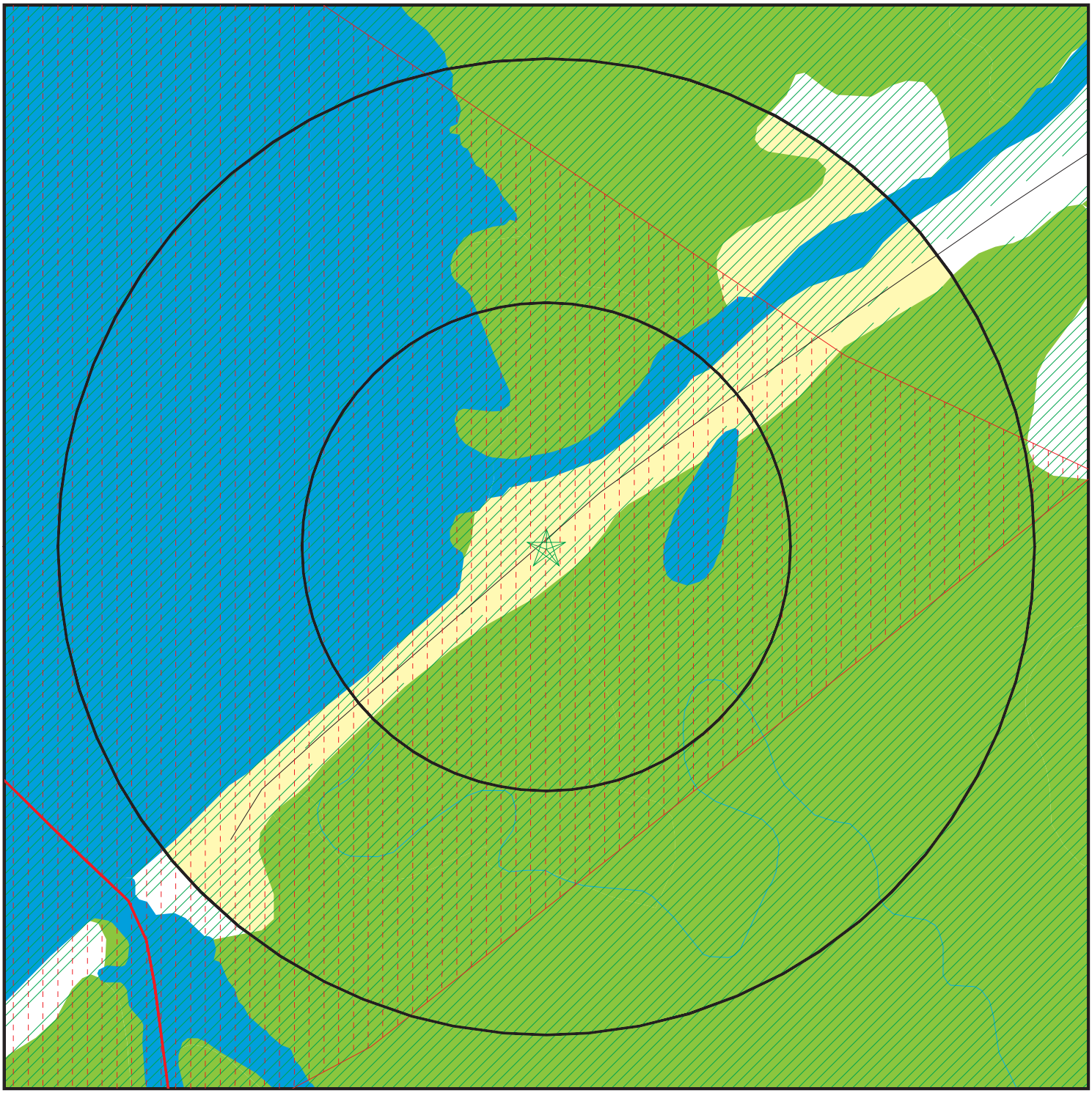
OVERVIEW MAP - 3028253.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

SITE NAME: Marsh Lake	CLIENT: Army Corp of Engineers
ADDRESS: Louisburg Road	CONTACT: Ellen Engberg
Appleton MN 56208	INQUIRY #: 3028253.2s
LAT/LONG: 45.1739 / 96.0897	DATE: March 31, 2011 1:49 pm

DETAIL MAP - 3028253.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

N

SITE NAME: Marsh Lake	CLIENT: Army Corp of Engineers
ADDRESS: Louisburg Road	CONTACT: Ellen Engberg
Appleton MN 56208	INQUIRY #: 3028253.2s
LAT/LONG: 45.1739 / 96.0897	DATE: March 31, 2011 1:50 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	0	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
MN PLP		1.000	0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS		1.500	0	0	0	0	0	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
LCP		1.000	0	0	0	0	NR	0
UNPERM LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LAST		1.000	0	0	0	0	NR	0
INDIAN LUST		1.000	0	0	0	0	NR	0
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VIC		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI		1.000	0	0	0	0	NR	0
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
SWRCY		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
SRS		0.500	0	0	0	NR	NR	0
MN DEL PLP		1.000	0	0	0	0	NR	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
LIENS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
AGSPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	1	0	0	0	0	1
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
MN LS		1.000	0	0	0	0	NR	0
BULK		0.750	0	0	0	0	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
ENF		0.500	0	0	0	NR	NR	0
MN HWS Permit		1.500	0	0	0	0	0	0
AIRS		0.500	0	0	0	NR	NR	0
TIER 2		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
MDA LIS		0.250	0	0	NR	NR	NR	0
AGVIC		1.000	0	0	0	0	NR	0
WIMN		1.000	0	0	0	0	NR	0
COAL ASH		1.000	0	0	0	0	NR	0

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

DOD **MASH LAKE** **DOD** **CUSA103642**
Region **N/A**

MASH LAKE (County), MN

< 1/8
1 ft.

DOD:

Feature 1:	Army Corps of Engineers DOD
Feature 2:	Not reported
Feature 3:	Not reported
URL:	Not reported
Name 1:	Mash Lake
Name 2:	Not reported
Name 3:	Not reported
State:	MN
DOD Site:	Yes
Tile name:	MNBIG_STONE

Count: 40 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
MADISON	1012211489	RICHARD LARSON DBA LARSON AUTO BOD	2356 HIGHWAY 75 S	56256	RCRA-CESQG
MADISON	A100026233	SCHMIEG OIL CO	HIGHWAY 40	56256	AST
APPLETON	S106348201	VIVIAN KELLER RESIDENCE	GUNDERSON & HIGHWAY 7		LAST,SPILLS
APPLETON	S106551299	LAC QUI PARLE SCHOOL BUS GARAGE	HIGHWAY 119 S		LUST
APPLETON	S106551905	J & J AMOCO	HIGHWAY 7 & HIGHWAY 59		LUST
MADISON	S107413285	THOMPSON CHUCK DBA FARM ADVANTAGE	1778 HWY 212	56256	BULK
APPLETON	S107727966	CITY OF APPLETON WASTEWATER FACILI	HWY 7 WEST	56208	TIER 2
APPLETON	S107729214	GLACIAL PLAINS COOP - LP PLANT	HWY 7 W	56208	TIER 2
MADISON	S107729877	LAC QUI PARLE COOP OIL	HWY 75 & HWY 40	56256	TIER 2
MADISON	S107730445	MNDOT	HWY 40 E	56256	TIER 2
APPLETON	S108411969	WESTERN CONSOLIDATED COOPERATIVE	NORTH HWY 59	56208	BULK
APPLETON	S109056542	JAMES HEGLAND	RTE 3 BOX 63	56208	MDA LIS
	S109057460	RANDY ASCHEMAN	HWY 12		MDA LIS
APPLETON	S110180791	ASCHEMAN OIL - APPLETON	HIGHWAY 7	56208	WIMN
MADISON	S110186108	RANDY & TODD MORTENSON FARM	1596 HIGHWAY 40	56256	WIMN
CORRELL	S110187400	CORRELL CITY OF - SW	119 HIGHWAY 7 E	56227	WIMN
MADISON	S110189042	DALE KEMEN FARM - SEC 22	2495 HIGHWAY 212	56256	WIMN
APPLETON	S110199273	GERALD GIESE FARM	2290 HIGHWAY 12 SW	56208	WIMN
MADISON	S110201656	HARVEY HASTAD FARM - SEC 8	3223 HIGHWAY 119	56256	WIMN
MADISON	S110214030	LUND IMPLEMENT CO	HIGHWAY 75 N	56256	WIMN
APPLETON	S110224239	RANDY FRAGODT FARM - SEC 26	3154 HIGHWAY 40	56208	WIMN
MADISON	S110226798	ROBERT LUDVIGSON FARM - SEC 11	1979 HIGHWAY 212	56256	WIMN
MADISON	S110227351	RODNEY WEBER FARM - SEC 21	1880 HIGHWAY 212	56256	WIMN
APPLETON	S110228164	RON'S SERVICE CENTER	HIGHWAY 59 E & HIGHWAY 7	56208	WIMN
APPLETON	S110433907	J & J AMOCO	HIGHWAY 7 & HIGHWAY 59	56208	WIMN
APPLETON	S110434910	LAC QUI PARLE SCHOOL BUS GARAGE	HIGHWAY 119 S	56208	WIMN
MADISON	S110435869	MADISON GAS & GRUB	HIGHWAY 75 & 40	56256	WIMN
MADISON	S110437043	MNDOT TRUCK STATION	HIGHWAY 40 E	56256	WIMN
MADISON	S110440655	SCHMIEG OIL CO	HIGHWAY 40	56256	WIMN
MADISON	S110442903	THEO NELSON - MAKIN BACON FARM	2199 HIGHWAY 2L2	56256	WIMN
APPLETON	S110443778	VIVIAN KELLER RESIDENCE	GUNDERSON & HIGHWAY 7	56208	WIMN
MADISON	S110594173	A FRAME FARM - SEC 22	2484 HIGHWAY 40	56256	WIMN
APPLETON	S110594597	DANIEL STRUXNESS FARM - SEC 27	3034 HIGHWAY 40	56208	WIMN
APPLETON	S110594806	FIEDLER FAMILY FARM APPLETON BARN	55100 HIGHWAY 119 SW	56208	WIMN
MADISON	S110595302	LARRY CLARK FARM - SEC 22	1884 HIGHWAY 40	56256	WIMN
MADISON	S110595475	MIKE KEMEN FARM - SEC 21	2375 HIGHWAY 212	56256	WIMN
MADISON	S110595818	ROBERT GOERGER FARM - SEC 17	2232 HIGHWAY 212	56256	WIMN
APPLETON	U003851795	APPLETON BUS GARAGE	HIGHWAY 119	56208	AST,UST,WIMN
MADISON	U003961465	MNDOT TRUCK STATION	HIGHWAY 40 E	56256	AST,UST
MADISON	U004016829	MADISON GAS & GRUB	HIGHWAY 75 & 40	56256	UST

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 11/30/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 57

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/11/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/28/2010
Date Data Arrived at EDR: 12/01/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 86

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/25/2010
Date Data Arrived at EDR: 06/02/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 124

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 01/05/2011
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 01/05/2011
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/07/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 73

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/07/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Annually

State- and tribal - equivalent NPL

MN PLP: Permanent List of Priorities

The list identifies hazardous waste sites where investigation and cleanup are needed, cleanup is underway, or cleanup has been completed and long-term monitoring or maintenance continues.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 12/16/2009
Date Made Active in Reports: 01/13/2010
Number of Days to Update: 28

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Superfund Site Information Listing

The SRS database includes all sites that the State Superfund Program is dealing with or has dealt with. The Superfund Program identifies, investigates and determines appropriate cleanup plans for abandoned or uncontrolled hazardous waste sites where a release or potential release of a hazardous substance poses a risk to human health or the environment.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Solid Waste Disposal Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7276
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

LCP: Closed Landfills Priority List

The Minnesota Legislature enacted a law to manage and clean up the state's closed Mixed Municipal Solid Waste Landfills. Under that law, the MPCA is required to create and periodically revise a priority list of qualified landfills, based on the relative health and environmental risks they present. The MPCA established the first such priority list in December, 1994.

Date of Government Version: 11/01/2009
Date Data Arrived at EDR: 01/08/2010
Date Made Active in Reports: 01/26/2010
Number of Days to Update: 18

Source: Minnesota Pollution Control Agency
Telephone: 651-296-9543
Source: Pollution Control Agency, GIS Section
Telephone: 651-296-7266
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

UNPERM LF: Unpermitted Facilities

These are facilities that have solid waste disposal yet are not permitted.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 13

Source: Pollution Control Agency
Telephone: 651-757-2665
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST: Leak Sites

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tanks.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 02/04/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/04/2010
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 11/05/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 84

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 02/16/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

State and tribal registered storage tank lists

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 03/02/2011
Number of Days to Update: 15

Source: Minnesota Pollution Control Agency
Telephone: 651-649-5451
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

AST: Aboveground Storage Tanks

Registered Aboveground Storage Tanks.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 03/02/2011
Number of Days to Update: 15

Source: Minnesota Pollution Control Agency
Telephone: 651-296-0930
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 02/11/2010
Date Data Arrived at EDR: 02/11/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 60

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 11/05/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 84

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 12/02/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 57

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 02/04/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 02/16/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 01/17/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Site Remediation Section Database

Sites that have an Institutional Control event.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Pollution Control Agency
Telephone: 512-296-6300
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 75

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 01/05/2010
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VIC: Voluntary Investigation and Cleanup Program
Voluntary Investigation and Cleanup (VIC) Program List.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7291
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Petroleum Brownfields Program Sites
Purchasing, selling, or developing property can present a special set of obstacles if the property is contaminated with chemicals. The Petroleum Brownfields Program is one of several programs within the Minnesota Pollution Control Agency (MPCA) designed to help people address these obstacles. The purpose of the Petroleum Brownfields Program is to provide the technical assistance and liability assurance needed to expedite and facilitate the development, transfer, investigation and/or cleanup of property that is contaminated with petroleum.

Date of Government Version: 09/30/2009
Date Data Arrived at EDR: 03/17/2010
Date Made Active in Reports: 03/31/2010
Number of Days to Update: 14

Source: Pollution Control Agency
Telephone: 651-296-7999
Last EDR Contact: 03/15/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 12/29/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 81
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/29/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: No Update Planned

SWRCY: Recycling Facilities

A listing of companies that accept commercial quantities of recyclable materials.

Date of Government Version: 10/07/2010
Date Data Arrived at EDR: 02/17/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 7
Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/08/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 12/03/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 48

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/08/2011
Next Scheduled EDR Contact: 06/20/2011
Data Release Frequency: Quarterly

SRS: Site Remediation Section Database

The database contains site information for sites monitored by the Site Remediation Section.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Pollution Control Agency
Telephone: 651-282-5988
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Quarterly

MN DEL PLP: Delisted Permanent List of Priorities

This generally means that either no more cleanup at a site is needed or that no state superfund funding is needed for long term monitoring activities.

Date of Government Version: 06/30/2010
Date Data Arrived at EDR: 08/27/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 53

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Annually

CDL: Clandestine Drug Labs

This data was passively gathered. That is, the DOH asks law enforcement and other agencies to notify them of Clandestine Drug Labs (CDLs). They do not require reporting of events. Therefore the data represents only a subset of all CDLs. This data has not been verified. The DOH has made no attempt to verify that reported CDLs actually occurred. They have no knowledge if the CDL was involved in cooking or just consisted of chemicals associated with Meth production. The reports they receive are that a suspected CDL was seized.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 20

Source: Department of Health
Telephone: 651-215-5800
Last EDR Contact: 01/10/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 11/09/2010
Date Data Arrived at EDR: 11/16/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/22/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Varies

LIENS: Environmental Liens

Sites included in the Site Remediation System Database that have Environmental Liens.

Date of Government Version: 07/06/2006
Date Data Arrived at EDR: 07/07/2006
Date Made Active in Reports: 08/14/2006
Number of Days to Update: 38

Source: Pollution Control Agency
Telephone: 602-282-5988
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/05/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Annually

SPILLS: Spills Database

Spills reported to the Pollution Control Agency.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-649-5451
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

AG SPILLS: Department of Agriculture Spills

This data is a list of pesticide/fertilizer incidents reported to have occurred in Minnesota.

Date of Government Version: 02/15/2011
Date Data Arrived at EDR: 02/16/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 12

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 10/13/2010
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/11/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/15/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 10/01/2010
Date Data Arrived at EDR: 10/29/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 91

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/03/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/16/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 5

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/16/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 03/04/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/09/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 84

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/09/2011
Next Scheduled EDR Contact: 06/20/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/29/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (312) 353-2000
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/25/2010
Date Made Active in Reports: 05/12/2010
Number of Days to Update: 76

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Biennially

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LS: List of Sites

The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory (METRO), 1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP).

Date of Government Version: 04/22/2009
Date Data Arrived at EDR: 07/14/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 10

Source: Minnesota Pollution Control Agency
Telephone: 651-297-2731
Source: Pollution Control Agency, GIS Section
Telephone: 651-297-2731
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Semi-Annually

BULK: Bulk Facilities Database

Facilities that use bulk pesticides and fertilizers

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 09/16/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 33

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

MANIFEST: Hazardous Waste Manifest Data

Hazardous waste manifest data.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/22/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 26

Source: Pollution Control Agency
Telephone: 651-296-7258
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

DRYCLEANERS: Registered Drycleaning Facilities

A listing of coin-operated laundries and drycleaning; drycleaning plants, except rug cleaning; and industrial launderers.

Date of Government Version: 12/21/2010
Date Data Arrived at EDR: 12/23/2010
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 41

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Varies

ENFORCEMENT: Generators Associated with Enforcement Logs

Regulatory Compliance, Hazardous Waste Enforcement Log and Hazardous Waste Permit Unit Project Identification List.

Date of Government Version: 12/20/2010
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 19

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8332
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Quarterly

MN HWS PERMIT: Active TSD Facilities

Active TSD Facilities.

Date of Government Version: 09/21/2010
Date Data Arrived at EDR: 09/24/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 25

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8470
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Permit Contact List
A listing of permitted AIRS facilities.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 12/02/2010
Date Made Active in Reports: 12/23/2010
Number of Days to Update: 21

Source: Pollution Control Agency
Telephone: 651-296-7351
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

TIER 2: Tier 2 Facility Listing
A listing of facilities which store or manufacture hazardous materials that submit a chemical inventory report.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 11/16/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 14

Source: Department of Public Safety
Telephone: 651-296-2233
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/22/2011
Next Scheduled EDR Contact: 05/09/2011
Data Release Frequency: Varies

WIMN: What's In My Neighborhood
Since 2003, the PCAa??s "Whata??s in My Neighborhood?" database provides information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality around Minnesota.

Date of Government Version: 01/17/2011
Date Data Arrived at EDR: 01/18/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 37

Source: Pollution Control Agency
Telephone: 651-757-2593
Last EDR Contact: 01/18/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 01/18/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

MDA LIS: Licensing Information System Database Listing

Information provided lists all individuals or companies who hold licenses, certificates and/or permits required by state law and regulated by the Department. Additionally, the LIS lists all companies who must register products with the Department before being used or sold in commercial channels within our state.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 09/16/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 33

Source: Department of Agriculture
Telephone: 651-201-6000
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Site Listing

A listing of coal ash disposal site locations.

Date of Government Version: 11/16/2010
Date Data Arrived at EDR: 11/19/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 11

Source: Pollution Control Agency
Telephone: 651-757-2740
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: N/A

AGVIC: Agricultural Voluntary Investigation & Cleanup Listing

A listing of agricultural voluntary investigation & cleanup site locations.

Date of Government Version: 02/15/2011
Date Data Arrived at EDR: 02/16/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 12

Source: Department of Agriculture
Telephone: 651-201-6400
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/04/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/25/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/22/2010
Date Made Active in Reports: 08/26/2010
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 03/04/2011
Number of Days to Update: 23

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/09/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 12/01/2009
Date Made Active in Reports: 12/14/2009
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 02/18/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/19/2010
Date Made Active in Reports: 08/26/2010
Number of Days to Update: 38

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/06/2010
Date Made Active in Reports: 07/26/2010
Number of Days to Update: 20

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Daycare Centers: Child Care Centers
Source: Department of Human Services
Telephone: 651-296-3971

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

MARSH LAKE
LOUISBURG ROAD
APPLETON, MN 56208

TARGET PROPERTY COORDINATES

Latitude (North):	45.17390 - 45° 10' 26.0''
Longitude (West):	96.0897 - 96° 5' 22.9''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	728687.6
UTM Y (Meters):	5006172.5
Elevation:	939 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	45096-B1 APPLETON, MN
Most Recent Revision:	1977

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

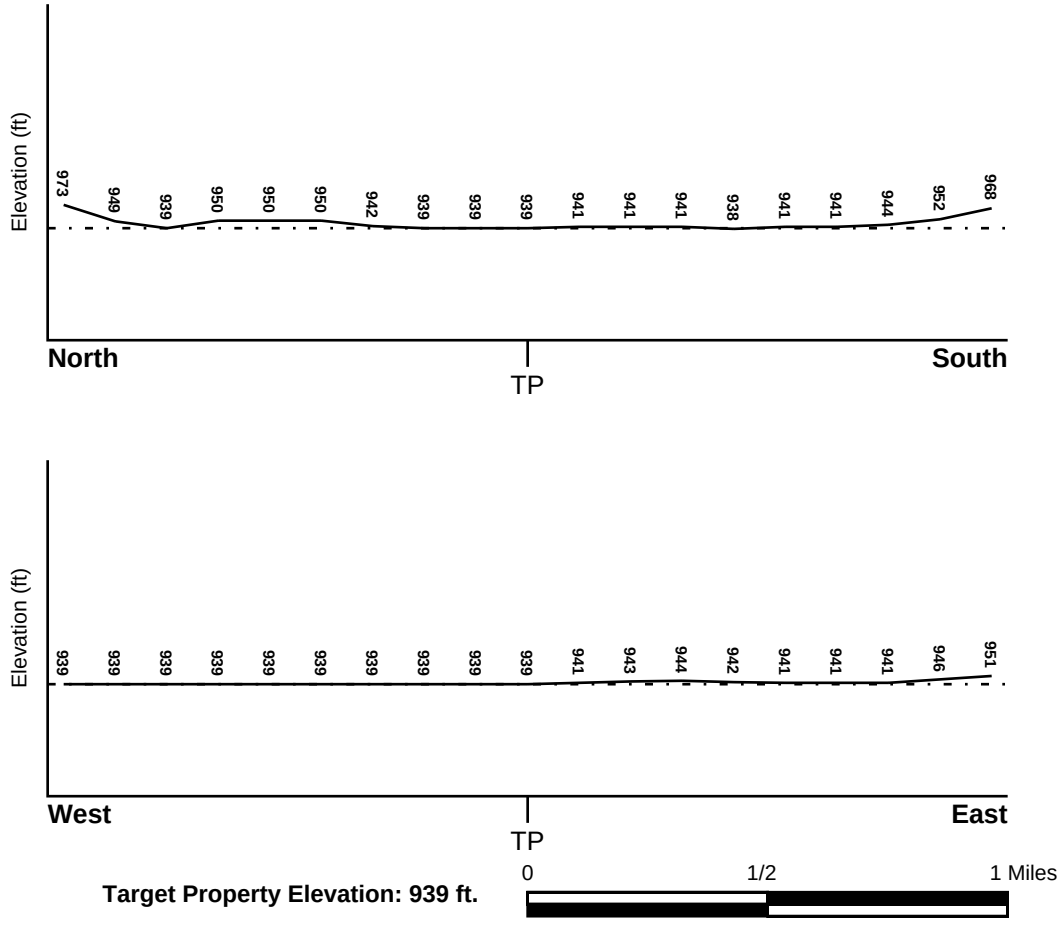
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General West

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
SWIFT, MN	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 27151C - FEMA DFIRM Flood data

Additional Panels in search area: 27011C - FEMA DFIRM Flood data
27073C - FEMA DFIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
APPLETON	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

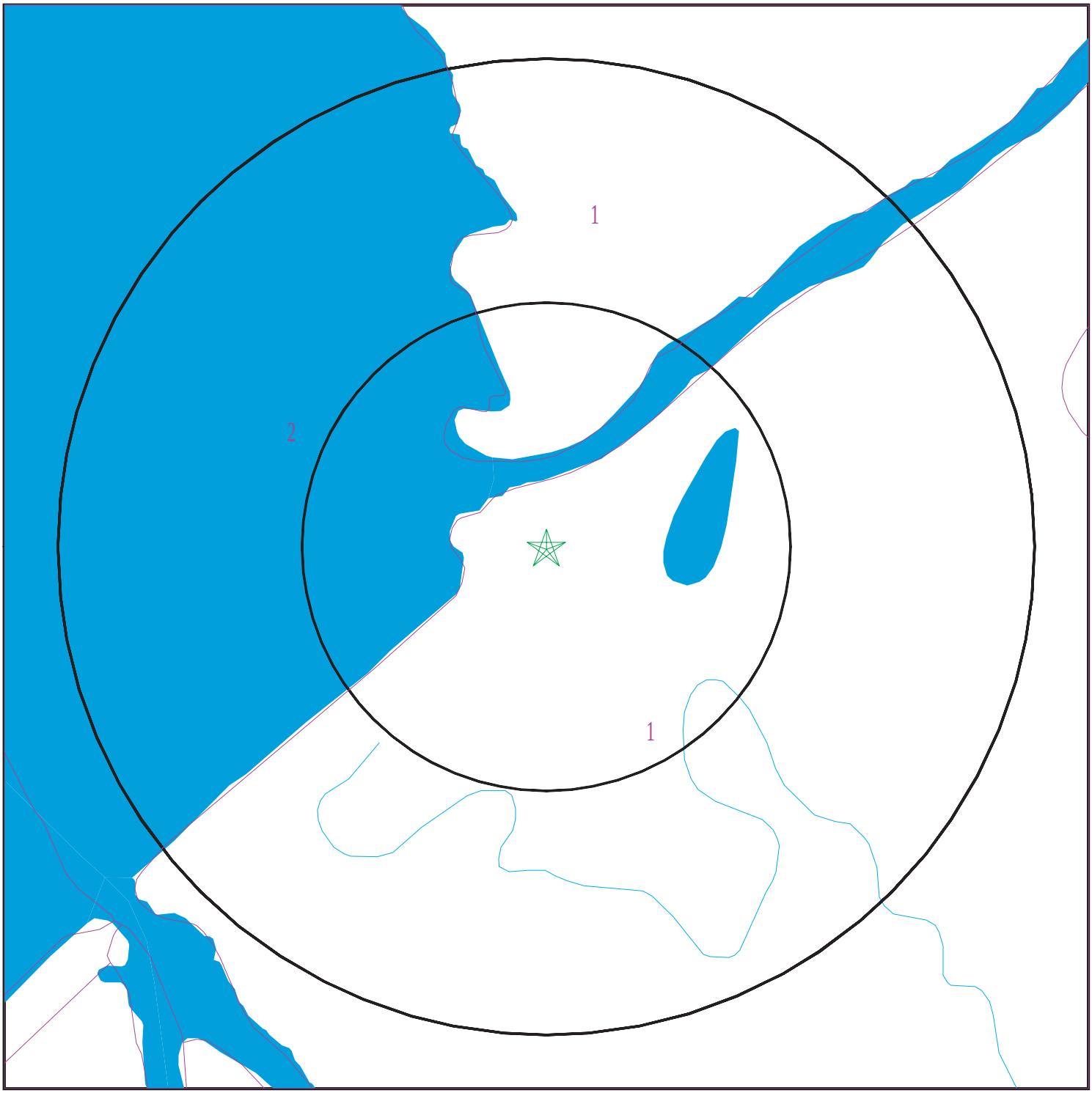
Era:	Precambrian
System:	Precambrian
Series:	Orthogneiss and paragneiss
Code:	Wgn *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Metamorphic Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3028253.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Marsh Lake	CLIENT:	Army Corp of Engineers
ADDRESS:	Louisburg Road Appleton MN 56208	CONTACT:	Ellen Engberg
LAT/LONG:	45.1739 / 96.0897	INQUIRY #:	3028253.2s
		DATE:	March 31, 2011 1:50 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Rauville

Soil Surface Texture: silty clay loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Very poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	27 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1.4	Max: 8.4 Min: 7.4
2	44 inches	59 inches	stratified sand to clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1.4	Max: 8.4 Min: 7.4
3	27 inches	44 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 1.4	Max: 8.4 Min: 7.4

Soil Map ID: 2

Soil Component Name:	Water
Soil Surface Texture:	silty clay loam
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:
Hydric Status: Unknown

Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

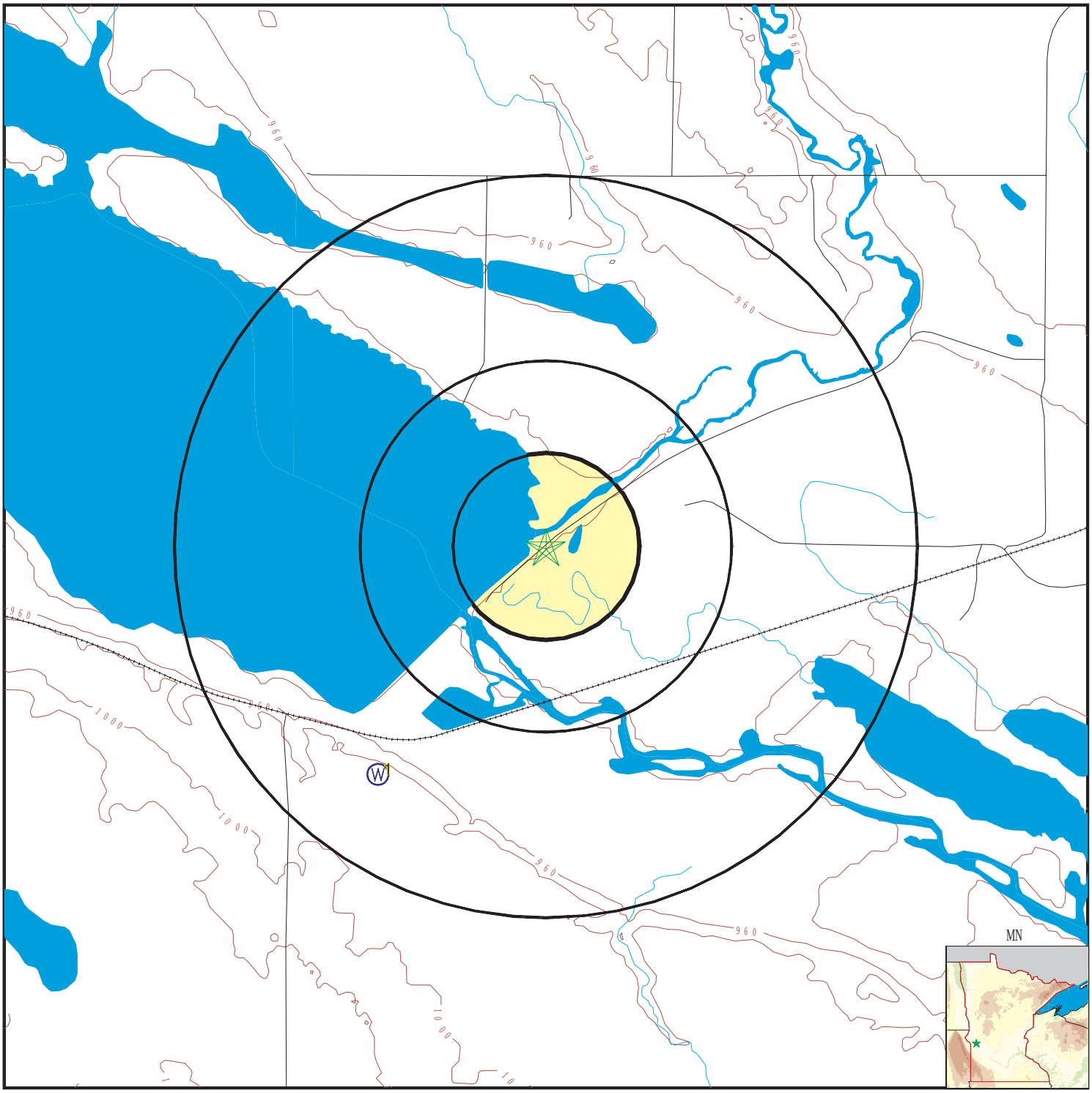
Note: PWS System location is not always the same as well location.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	MN3000000085404	1/2 - 1 Mile SW

PHYSICAL SETTING SOURCE MAP - 3028253.2s



County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location
HD Closest Hydrogeological Data

N

SITE NAME:	Marsh Lake	CLIENT:	Army Corp of Engineers
ADDRESS:	Louisburg Road Appleton MN 56208	CONTACT:	Ellen Engberg
LAT/LONG:	45.1739 / 96.0897	INQUIRY #:	3028253.2s
		DATE:	March 31, 2011 1:50 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

1
SW
1/2 - 1 Mile
Higher | **MN WELLS** | **MN3000000085404**

Relateid:	0000213844	County c:	Lacq.parle
Unique no:	00213844	Wellname:	MOEN, ROGER
Township:	120	Range:	43
Range dir:	W	Section:	31
Subsection:	BBADDD	Mgsquad c:	Appleton
Elevation:	987		
Elev mc:	7.5 minute topographic map (+/- 5 feet)		
Status c:	Active		
Use c:	Domestic	Loc mc:	Information from owner
Loc src:	Minnesota Geological Survey	Data src:	USGS
Depth drll:	166		
Depth comp:	166		
Date drll:	19610000		
Case diam:	4		
Case depth:	160		
Grout:	Not Reported	Pollut dst:	0
Pollut dir:	Not Reported	Pollut typ:	Not Reported
Strat date:	19970213		
Strat upd:	19970213		
Strat src:	Minnesota Geological Survey	Strat geol:	Dale Setterholm
Strat mc:	Geologic study 1:24k to 1:100k		
Depth2bdrk:	0		
First bdrk:	Not Reported	Last strat:	Sand
Ohtopunit:	QFUU	Ohbotunit:	QFUU
Aquifer:	QBAA	Cuttings:	Not Reported
Core:	Not Reported	Bhgeophys:	Not Reported
Geochem:	Not Reported	Waterchem:	Not Reported
Obwell:	Not Reported	Swl:	Not Reported
Igwis:	Not Reported	Input src:	Minnesota Geological Survey
Unused:	Not Reported		
Entry date:	19880411		
Updt date:	19970213		
Geoc type:	WW	Gcm code:	A
Geoc src:	MGS	Geoc prg:	CWI
Utme:	256458		
Utmn:	5005954		
Geoc entry:	0		
Geoc date:	19960410		
Geocupd en:	0		
Geocupd da:	0		
Rcvd date:	0		
Well label:	213844	Swlcount:	0
Swldate:	0		
Swlavgmeas:	0		
Swlavgelev:	0		
Site id:	MN3000000085404		

Address Information:

Relateid:	0000213844	Name:	MOEN, ROGER
Addtype c:	Both	House no:	Not Reported
Street:	Not Reported	Road type:	Not Reported
Road dir:	Not Reported	City:	LOUISBURG
State:	MN	Zipcode:	56254
Entry date:	19880411		
Updt date:	19970213		
Other:	Not Reported		

Construction 1 Information:

Relateid:	0000213844	Drill meth:	Cable Tool
Drill flud:	Not Reported	Hydrofrac:	Not Reported
Hffrom:	Not Reported		
Hfto:	Not Reported		
Case mat:	Steel (black or low carbon)	Case joint:	Not Reported
Case top:	0		
Drive shoe:	Not Reported	Case type:	Single casing
Screen:	N		
Ohtopfeet:	160		
Ohbotfeet:	160		
Screen mfg:	Not Reported	Screen typ:	Not Reported
Ptlss mfg:	Not Reported	Ptlss mdl:	Not Reported
Bsmt offst:	Not Reported	Csg top ok:	Not Reported
Csg at grd:	Not Reported	Plstc prot:	Not Reported
Disinfectd:	Not Reported	Pump inst:	Not Reported
Pump date:	Not Reported		
Pump mfg:	Not Reported	Pump model:	Not Reported
Pump hp:	0		
Pump volts:	Not Reported		
Dropp len:	Not Reported		
Dropp mat:	Not Reported		
Pump cpcty:	Not Reported		
Pump type:	Not Reported	Variance:	Not Reported
Drllr name:	Not Reported		
Entry date:	19880411		
Updt date:	19970213		

Construction 2 Information:

Relateid:	0000213844	Constype:	C
From depth:	0		
To depth:	160		
Diameter:	4		
Slot:	Not Reported		
Length:	Not Reported		
Material:	Not Reported		
Amount:	Not Reported		
Units:	Not Reported		

Remarks Information:

Relateid:	0000213844
Seq no:	1
Remarks:	NURE SAMPLE NO. 601321.

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: MN Radon

Radon Test Results

Zipcode	Num Tests	Minimum	Maximum	Average	# > 4 pCi/L	# < 4 pCi/L
56208	98	0.0	22.6	5.4	56	42

Federal EPA Radon Zone for SWIFT County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for SWIFT COUNTY, MN

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	2.925 pCi/L	75%	25%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Minnesota Groundwater Database
Source: Minnesota Geological Survey County Water Well Index (CWI)
Telephone: 612-627-4780

OTHER STATE DATABASE INFORMATION

RADON

State Database: MN Radon
Source: Department of Health
Telephone: 651-215-0909
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

STREET AND ADDRESS INFORMATION

Marsh Lake Dam
Marsh Lake
Madison, MN 56256

Inquiry Number: 2627945.2s
October 30, 2009

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

MARSH LAKE
MADISON, MN 56256

COORDINATES

Latitude (North):	45.188200 - 45° 11' 17.5''
Longitude (West):	96.132800 - 96° 7' 58.1''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	725244.4
UTM Y (Meters):	5007640.0
Elevation:	941 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	45096-B2 CORRELL, MN
Most Recent Revision:	1958
East Map:	45096-B1 APPLETON, MN
Most Recent Revision:	1977

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

Federal CERCLIS list

CERCLIS ..... Comprehensive Environmental Response, Compensation, and Liability Information System

Federal CERCLIS NFRAP site List

CERC-NFRAP ..... CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ..... Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ..... RCRA - Transporters, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ..... RCRA - Large Quantity Generators
RCRA-SQG ..... RCRA - Small Quantity Generators
RCRA-CESQG ..... RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

Federal ERNS list

ERNS ..... Emergency Response Notification System

State- and tribal - equivalent NPL

MN PLP ..... Permanent List of Priorities

State- and tribal - equivalent CERCLIS

SHWS ..... Superfund Site Information Listing

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ..... Permitted Solid Waste Disposal Facilities
LCP ..... Closed Landfills Priority List

State and tribal leaking storage tank lists

LUST ..... Leak Sites
LAST ..... Leaking Aboveground Storage Tanks
INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST ..... Underground Storage Tank Database
AST ..... Aboveground Storage Tanks

INDIAN UST ---- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

INST CONTROL ---- Site Remediation Section Database

State and tribal voluntary cleanup sites

VIC ---- Voluntary Investigation and Cleanup Program
INDIAN VCP ---- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---- Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ---- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---- Open Dump Inventory
INDIAN ODI ---- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---- Clandestine Drug Labs
SRS ---- Site Remediation Section Database
MN DEL PLP ---- Delisted Permanent List of Priorities
CDL ---- Clandestine Drug Labs
US HIST CDL ---- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---- CERCLA Lien Information
LUCIS ---- Land Use Control Information System
LIENS ---- Environmental Liens

Records of Emergency Release Reports

HMIRS ---- Hazardous Materials Information Reporting System
SPILLS ---- Spills Database
AGSPILLS ---- Department of Agriculture Spills

Other Ascertainable Records

RCRA-NonGen ---- RCRA - Non Generators
DOT OPS ---- Incident and Accident Data
FUDS ---- Formerly Used Defense Sites
CONSENT ---- Superfund (CERCLA) Consent Decrees
ROD ---- Records Of Decision

UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
MN LS	List of Sites
BULK	Bulk Facilities Database
DRYCLEANERS	Registered Drycleaning Facilities
ENF	Generators Associated with Enforcement Logs
MN HWS Permit	Active TSD Facilities
AIRS	Permit Contact List
TIER 2	Tier 2 Facility Listing
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH	Coal Ash Disposal Site Listing
MDA LIS	Licensing Information System Database Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

EXECUTIVE SUMMARY

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1.5 miles of the target property.

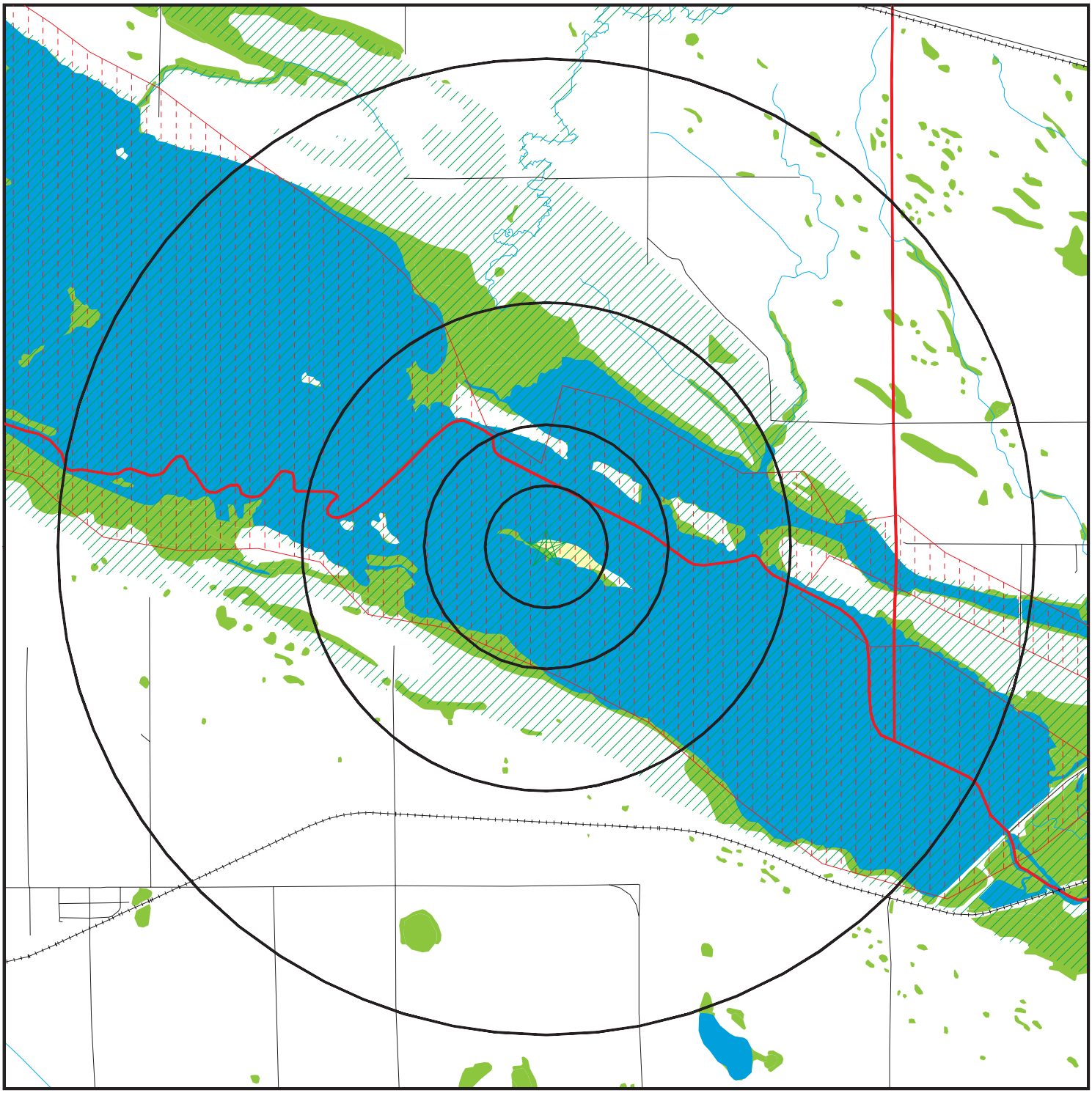
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MASH LAKE		0 - 1/8 (0.000 mi.)	0	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
MUNICIPAL CASTINGS	FTTS, HIST FTTS
MADISON COMPOST SITE PBR	SWF/LF
LAC QUI PARLE COUNTY DEMOLITION LA	FINDS, SWF/LF
MADISON INCINERATOR ASH LANDFILL	SWF/LF
GERHARD WITTNEBEL GRAVEL PIT	SWF/LF
BELLINGHAM FARMERS CO-OP ELEVATOR	LUST, LAST
CENEX (FORMER LAC QUI PARLE COOP)	LUST
GAS AND GRUB	LUST
MADISON AIRPORT	LUST
MN DEPT OF TRANSPORTATION TRUCK ST	LUST
WESTPHAL TRUCKING	LUST
MNDOT TRUCK STATION	UST, AST
MADISON GAS & GRUB	UST
MUNICIPAL CASTINGS INC	UST, AST
SCHMIEG OIL CO	AST
LUND IMPLEMENT CO	FINDS, RCRA-NonGen
MINN KOTA TRANSFER INC	FINDS, RCRA-CESQG
MADISON WELDING & REPAIR	FINDS, RCRA-CESQG
THOMPSON CHUCK DBA FARM ADVANTAGE	BULK
FIELDCREST FERT	ICIS
HALVORSON MYRON	ICIS
FIELDCREST FERTILIZER	SSTS
FIELDCREST FERT CO	SSTS
MNDOT	TIER 2
LAC QUI PARLE COOP OIL	TIER 2

OVERVIEW MAP - 2627945.2s



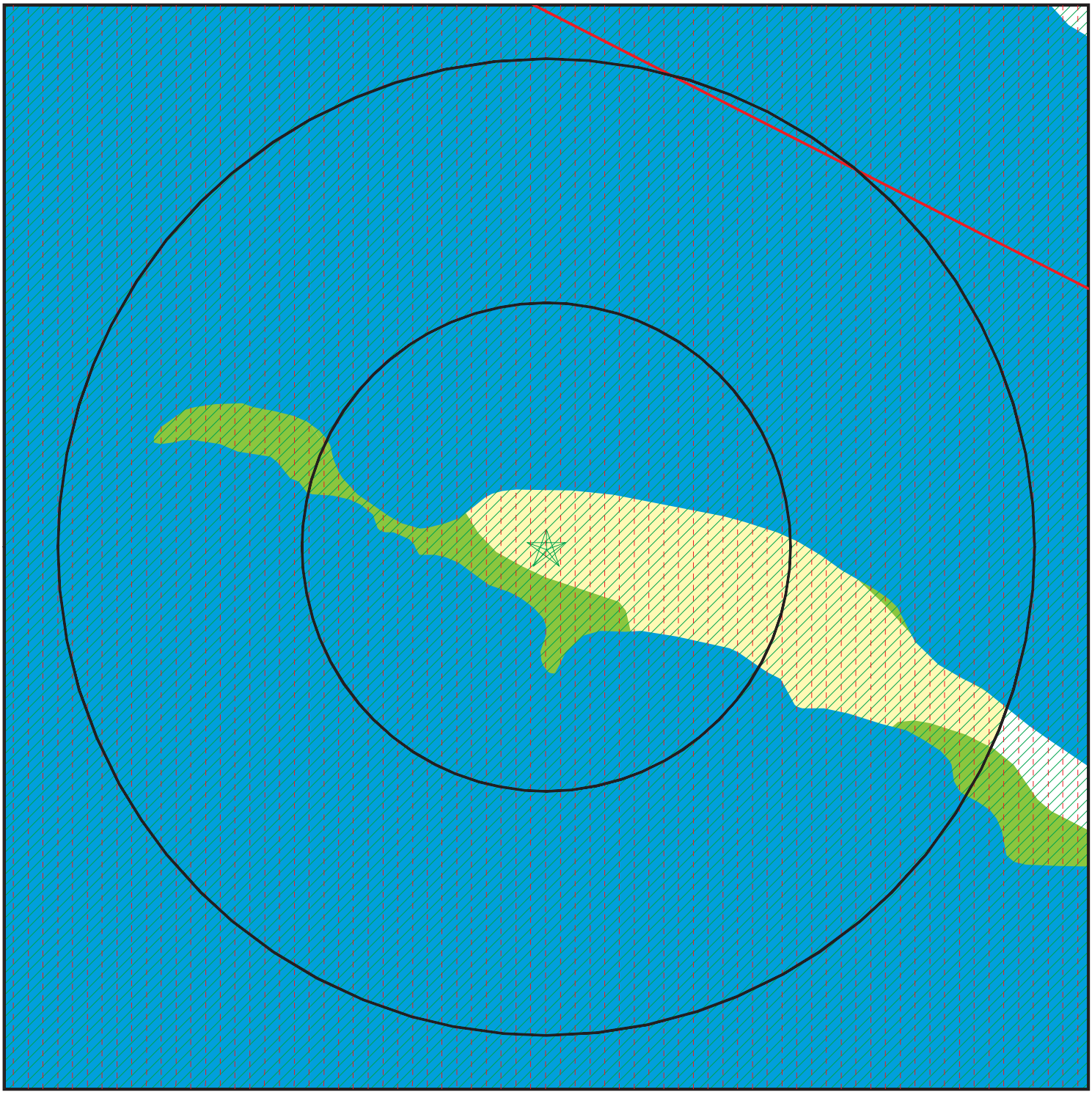
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

0 1/2 1 2 Miles

N

SITE NAME: Marsh Lake Dam ADDRESS: Marsh Lake Madison MN 56256 LAT/LONG: 45.1882 / 96.1328	CLIENT: Army Corp of Engineers CONTACT: Grant Riddick INQUIRY #: 2627945.2s DATE: October 30, 2009 5:19 pm

DETAIL MAP - 2627945.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

N

SITE NAME: Marsh Lake Dam	CLIENT: Army Corp of Engineers
ADDRESS: Marsh Lake	CONTACT: Grant Riddick
Madison MN 56256	INQUIRY #: 2627945.2s
LAT/LONG: 45.1882 / 96.1328	DATE: October 30, 2009 5:19 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	0	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
MN PLP		1.000	0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS		1.500	0	0	0	0	0	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
LCP		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	0	NR	0
LAST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
INDIAN LUST		1.000	0	0	0	0	NR	0
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VIC		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
ODI		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
SRS		0.500	0	0	0	NR	NR	0
MN DEL PLP		1.000	0	0	0	0	NR	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
LIENS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
AGSPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0
DOT OPS		0.500	0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOD		1.500	1	0	0	0	0	1
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
MN LS		1.000	0	0	0	0	NR	0
BULK		0.750	0	0	0	0	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
ENF		0.500	0	0	0	NR	NR	0
MN HWS Permit		1.500	0	0	0	0	0	0
AIRS		0.500	0	0	0	NR	NR	0
TIER 2		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH		1.000	0	0	0	0	NR	0
MDA LIS		0.250	0	0	NR	NR	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

DOD **MASH LAKE** **DOD** **CUSA103642**
Region **N/A**

MASH LAKE (County), MN

< 1/8
1 ft.

DOD:

Feature 1:	Army Corps of Engineers DOD
Feature 2:	Not reported
Feature 3:	Not reported
URL:	Not reported
Name 1:	Mash Lake
Name 2:	Not reported
Name 3:	Not reported
State:	MN
DOD Site:	Yes
Tile name:	MNBIG_STONE

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
MADISON	S106666160	BELLINGHAM FARMERS CO-OP ELEVATOR	RR 2 BOX 122A HIGHWAY 75 N	56256	LUST, LAST
MADISON	S107413285	THOMPSON CHUCK DBA FARM ADVANTAGE	1778 HWY 212	56256	BULK
MADISON	1005429304	FIELDCREST FERTILIZER	RT. 3 BOX 1C	56256	SSTS
MADISON	1011590033	FIELDCREST FERT	RT 3 MADISON MN 56256	56256	ICIS
MADISON	1011595197	HALVORSON MYRON	RTE 3 BOX 40 MADISON MN 5	56256	ICIS
MADISON	1009518678	MUNICIPAL CASTINGS	HWY 40 EAST	56256	FTTS, HIST FTTS
MADISON	A100026233	SCHMIEG OIL CO	HIGHWAY 40	56256	AST
MADISON	S106548741	CENEX (FORMER LAC QUI PARLE COOP)	HIGHWAY 40 / 75	56256	LUST
MADISON	S107730445	MNDOT	HWY 40 E	56256	TIER 2
MADISON	U003961465	MNDOT TRUCK STATION	HIGHWAY 40 E	56256	UST, AST
MADISON	S109841097	MADISON COMPOST SITE PBR	2351 HIGHWAY 40		SWF/LF
MADISON	1000183235	LUND IMPLEMENT CO	HWY 75 N	56256	FINDS, RCRA-NonGen
MADISON	1004729794	MINN KOTA TRANSFER INC	2368 HIGHWAY 75	56256	FINDS, RCRA-CESQG
MADISON	1004731426	MADISON WELDING & REPAIR	2350 HIGHWAY 75	56256	FINDS, RCRA-CESQG
MADISON	S106550168	GAS AND GRUB	HIGHWAY 75 / 40	56256	LUST
MADISON	S107729877	LAC QUI PARLE COOP OIL	HWY 75 / HWY 40	56256	TIER 2
MADISON	U004016829	MADISON GAS & GRUB	HIGHWAY 75 & 40	56256	UST
MADISON	1006197688	LAC QUI PARLE COUNTY DEMOLITION LA	2451 241ST AVE	56256	FINDS, SWF/LF
MADISON	S106548968	MADISON AIRPORT	S HIGHWAY 75	56256	LUST
MADISON	1000624242	MUNICIPAL CASTINGS INC	INDUSTRIAL PARK HIGHWAY 40 E	56256	UST, AST
MADISON	1004535106	FIELDCREST FERT CO	RURAL ROUTE 3 BOX 1 C	56256	SSTS
MADISON	S106404558	MADISON INCINERATOR ASH LANDFILL	SEE LOCATION DESCRIPTION	56256	SWF/LF
MADISON	S109167922	GERHARD WITTNEBEL GRAVEL PIT	SEE LOCATION DESCRIPTION	56256	SWF/LF
MADISON	S106550368	MN DEPT OF TRANSPORTATION TRUCK ST	TH YO E ROUTE 2 BOX 6	56256	LUST
OLIVIA	S106551601	WESTPHAL TRUCKING	W HIGHWAY 212	56227	LUST

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/31/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 52

Source: EPA
Telephone: N/A
Last EDR Contact: 10/14/2009
Next Scheduled EDR Contact: 01/25/2010
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/31/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 52

Source: EPA
Telephone: N/A
Last EDR Contact: 10/14/2009
Next Scheduled EDR Contact: 01/25/2010
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/17/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: No Update Planned

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/31/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 52

Source: EPA
Telephone: N/A
Last EDR Contact: 10/14/2009
Next Scheduled EDR Contact: 01/25/2010
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 06/30/2009
Date Data Arrived at EDR: 08/11/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 41

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/30/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 06/23/2009
Date Data Arrived at EDR: 09/02/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 19

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/09/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/30/2009
Date Data Arrived at EDR: 07/01/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 82

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/31/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Transporters, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/22/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/18/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/31/2009
Date Data Arrived at EDR: 04/22/2009
Date Made Active in Reports: 05/05/2009
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/18/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 05/15/2009
Date Data Arrived at EDR: 07/21/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 62

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 10/06/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Annually

State- and tribal - equivalent NPL

MN PLP: Permanent List of Priorities

The list identifies hazardous waste sites where investigation and cleanup are needed, cleanup is underway, or cleanup has been completed and long-term monitoring or maintenance continues.

Date of Government Version: 08/06/2007
Date Data Arrived at EDR: 09/07/2007
Date Made Active in Reports: 10/11/2007
Number of Days to Update: 34

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 08/31/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Superfund Site Information Listing

The SRS database includes all sites that the State Superfund Program is dealing with or has dealt with. The Superfund Program identifies, investigates and determines appropriate cleanup plans for abandoned or uncontrolled hazardous waste sites where a release or potential release of a hazardous substance poses a risk to human health or the environment.

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 07/02/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 22

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Solid Waste Disposal Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 32

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7276
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

LCP: Closed Landfills Priority List

The Minnesota Legislature enacted a law to manage and clean up the state's closed Mixed Municipal Solid Waste Landfills. Under that law, the MPCA is required to create and periodically revise a priority list of qualified landfills, based on the relative health and environmental risks they present. The MPCA established the first such priority list in December, 1994.

Date of Government Version: 10/01/2008
Date Data Arrived at EDR: 03/27/2009
Date Made Active in Reports: 05/01/2009
Number of Days to Update: 35

Source: Minnesota Pollution Control Agency
Telephone: 651-296-9543
Source: Pollution Control Agency, GIS Section
Telephone: 651-296-7266
Last EDR Contact: 09/18/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Leak Sites

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 32

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Semi-Annually

LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tanks.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 32

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 08/20/2009
Date Data Arrived at EDR: 08/21/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 31

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 08/24/2009
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 26

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/24/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 42
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/20/2009
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 57
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Semi-Annually

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 08/21/2009
Date Data Arrived at EDR: 10/06/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 16
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 03/24/2009
Date Data Arrived at EDR: 05/20/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 28
Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/21/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: Varies

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/22/2009
Number of Days to Update: 25
Source: Minnesota Pollution Control Agency
Telephone: 651-649-5451
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

AST: Aboveground Storage Tanks
Registered Aboveground Storage Tanks.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/23/2009
Number of Days to Update: 26
Source: Minnesota Pollution Control Agency
Telephone: 651-296-0930
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/21/2009
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 57

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/24/2009
Date Data Arrived at EDR: 09/10/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 42

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2008
Date Data Arrived at EDR: 12/30/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 76

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/21/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 08/20/2009
Date Data Arrived at EDR: 08/21/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 31

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/19/2009
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 25

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 08/24/2009
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 26

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/20/2009
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 57

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 10/30/2009
Next Scheduled EDR Contact: 02/15/2010
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 09/08/2008
Date Data Arrived at EDR: 09/19/2008
Date Made Active in Reports: 10/16/2008
Number of Days to Update: 27

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 10/22/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Site Remediation Section Database

Sites that have an Institutional Control event.

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 07/02/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 22

Source: Pollution Control Agency
Telephone: 512-296-6300
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

VIC: Voluntary Investigation and Cleanup Program

Voluntary Investigation and Cleanup (VIC) Program List.

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 07/02/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 22

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7291
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 04/02/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 10/05/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

State and tribal Brownfields sites

BROWNFIELDS: Petroleum Brownfields Program Sites

Purchasing, selling, or developing property can present a special set of obstacles if the property is contaminated with chemicals. The Petroleum Brownfields Program is one of several programs within the Minnesota Pollution Control Agency (MPCA) designed to help people address these obstacles. The purpose of the Petroleum Brownfields Program is to provide the technical assistance and liability assurance needed to expedite and facilitate the development, transfer, investigation and/or cleanup of property that is contaminated with petroleum.

Date of Government Version: 09/30/2008
Date Data Arrived at EDR: 12/09/2008
Date Made Active in Reports: 02/26/2009
Number of Days to Update: 79

Source: Pollution Control Agency
Telephone: 651-296-7999
Last EDR Contact: 06/09/2009
Next Scheduled EDR Contact: 09/07/2009
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 10/01/2008
Date Data Arrived at EDR: 11/14/2008
Date Made Active in Reports: 12/23/2008
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/11/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39

Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137

Source: EPA, Region 9
Telephone: 415-972-3336
Last EDR Contact: 09/23/2009
Next Scheduled EDR Contact: 12/21/2009
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/26/2009
Next Scheduled EDR Contact: 11/23/2009
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 03/01/2009
Date Data Arrived at EDR: 06/22/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 91

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/26/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: Quarterly

SRS: Site Remediation Section Database

The database contains site information for sites monitored by the Site Remediation Section.

Date of Government Version: 05/20/2009
Date Data Arrived at EDR: 07/02/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 22

Source: Pollution Control Agency
Telephone: 651-282-5988
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

MN DEL PLP: Delisted Permanent List of Priorities

This generally means that either no more cleanup at a site is needed or that no state superfund funding is needed for long term monitoring activities.

Date of Government Version: 07/23/2009
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 08/19/2009
Number of Days to Update: 12

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 08/31/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Annually

CDL: Clandestine Drug Labs

This data was passively gathered. That is, the DOH asks law enforcement and other agencies to notify them of Clandestine Drug Labs (CDLs). They do not require reporting of events. Therefore the data represents only a subset of all CDLs. This data has not been verified. The DOH has made no attempt to verify that reported CDLs actually occurred. They have no knowledge if the CDL was involved in cooking or just consisted of chemicals associated with Meth production. The reports they receive are that a suspected CDL was seized.

Date of Government Version: 07/29/2009
Date Data Arrived at EDR: 07/30/2009
Date Made Active in Reports: 08/19/2009
Number of Days to Update: 20

Source: Department of Health
Telephone: 651-215-5800
Last EDR Contact: 10/13/2009
Next Scheduled EDR Contact: 01/25/2010
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 08/18/2009
Date Data Arrived at EDR: 08/21/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 08/17/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 09/08/2009
Next Scheduled EDR Contact: 12/07/2009
Data Release Frequency: Varies

LIENS: Environmental Liens

Sites included in the Site Remediation System Database that have Environmental Liens.

Date of Government Version: 07/06/2006
Date Data Arrived at EDR: 07/07/2006
Date Made Active in Reports: 08/14/2006
Number of Days to Update: 38

Source: Pollution Control Agency
Telephone: 602-282-5988
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 07/16/2009
Date Data Arrived at EDR: 07/16/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 67

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 10/05/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Annually

SPILLS: Spills Database

Spills reported to the Pollution Control Agency.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 08/28/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 32

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8617
Last EDR Contact: 08/28/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Quarterly

AG SPILLS: Department of Agriculture Spills

This data is a list of pesticide/fertilizer incidents reported to have occurred in Minnesota.

Date of Government Version: 09/01/2009
Date Data Arrived at EDR: 09/01/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 28

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 08/31/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 11/12/2008
Date Data Arrived at EDR: 11/18/2008
Date Made Active in Reports: 03/16/2009
Number of Days to Update: 118

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 05/14/2008
Date Data Arrived at EDR: 05/28/2008
Date Made Active in Reports: 08/08/2008
Number of Days to Update: 72

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/27/2009
Next Scheduled EDR Contact: 11/23/2009
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 10/23/2009
Next Scheduled EDR Contact: 02/01/2010
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 09/05/2008
Date Made Active in Reports: 09/23/2008
Number of Days to Update: 18

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/30/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 04/24/2009
Date Data Arrived at EDR: 05/19/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 125

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 10/06/2009
Next Scheduled EDR Contact: 01/18/2010
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 09/01/2009
Date Data Arrived at EDR: 09/22/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 30

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/22/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 01/05/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 05/08/2009
Number of Days to Update: 1

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 09/14/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/28/2009
Date Data Arrived at EDR: 06/23/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 90

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/18/2009
Next Scheduled EDR Contact: 12/21/2009
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 04/09/2009
Date Made Active in Reports: 06/17/2009
Number of Days to Update: 69

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 09/14/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2002
Date Data Arrived at EDR: 04/14/2006
Date Made Active in Reports: 05/30/2006
Number of Days to Update: 46

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 10/07/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 09/10/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 09/10/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 05/19/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 125

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 09/29/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 08/21/2009
Date Data Arrived at EDR: 08/27/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 56

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 09/28/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 08/05/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 55

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 10/21/2009
Next Scheduled EDR Contact: 02/01/2010
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 07/06/2009
Date Data Arrived at EDR: 07/13/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 70

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/21/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/28/2009
Date Data Arrived at EDR: 07/28/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 55

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 10/16/2009
Next Scheduled EDR Contact: 01/25/2010
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/23/2009
Date Data Arrived at EDR: 07/28/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 55

Source: EPA
Telephone: (312) 353-2000
Last EDR Contact: 09/18/2009
Next Scheduled EDR Contact: 12/28/2009
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/19/2009
Date Made Active in Reports: 05/22/2009
Number of Days to Update: 92

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/09/2009
Next Scheduled EDR Contact: 12/07/2009
Data Release Frequency: Biennially

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LS: List of Sites

The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory (METRO), 1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP).

Date of Government Version: 04/22/2009
Date Data Arrived at EDR: 07/14/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 10

Source: Minnesota Pollution Control Agency
Telephone: 651-297-2731
Source: Pollution Control Agency, GIS Section
Telephone: 651-297-2731
Last EDR Contact: 10/08/2009
Next Scheduled EDR Contact: 01/11/2010
Data Release Frequency: Semi-Annually

BULK: Bulk Facilities Database

Facilities that use bulk pesticides and fertilizers

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 6

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 09/21/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Semi-Annually

DRYCLEANERS: Registered Drycleaning Facilities

A listing of coin-operated laundries and drycleaning; drycleaning plants, except rug cleaning; and industrial launderers.

Date of Government Version: 09/24/2009
Date Data Arrived at EDR: 09/24/2009
Date Made Active in Reports: 10/21/2009
Number of Days to Update: 27

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 09/23/2009
Next Scheduled EDR Contact: 01/04/2010
Data Release Frequency: Varies

ENFORCEMENT: Generators Associated with Enforcement Logs

Regulatory Compliance, Hazardous Waste Enforcement Log and Hazardous Waste Permit Unit Project Identification List.

Date of Government Version: 07/09/2009
Date Data Arrived at EDR: 07/27/2009
Date Made Active in Reports: 08/19/2009
Number of Days to Update: 23

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8332
Last EDR Contact: 09/23/2009
Next Scheduled EDR Contact: 01/04/2010
Data Release Frequency: Quarterly

MN HWS PERMIT: Active TSD Facilities

Active TSD Facilities.

Date of Government Version: 04/01/2009
Date Data Arrived at EDR: 04/28/2009
Date Made Active in Reports: 05/01/2009
Number of Days to Update: 3

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8470
Last EDR Contact: 09/23/2009
Next Scheduled EDR Contact: 01/04/2010
Data Release Frequency: Annually

AIRS: Permit Contact List

A listing of permitted AIRS facilities.

Date of Government Version: 09/30/2009
Date Data Arrived at EDR: 10/01/2009
Date Made Active in Reports: 10/21/2009
Number of Days to Update: 20

Source: Pollution Control Agency
Telephone: 651-296-7351
Last EDR Contact: 09/25/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

TIER 2: Tier 2 Facility Listing
A listing of facilities which store or manufacture hazardous materials that submit a chemical inventory report.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 03/04/2009
Date Made Active in Reports: 05/01/2009
Number of Days to Update: 58
Source: Department of Public Safety
Telephone: 651-296-2233
Last EDR Contact: 08/31/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34
Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 10/23/2009
Next Scheduled EDR Contact: 02/01/2010
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 09/09/2009
Date Data Arrived at EDR: 09/09/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 43
Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 10/26/2009
Next Scheduled EDR Contact: 02/08/2010
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 10/23/2009
Next Scheduled EDR Contact: 02/01/2010
Data Release Frequency: N/A

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 08/21/2009
Next Scheduled EDR Contact: 11/16/2009
Data Release Frequency: Varies

MDA LIS: Licensing Information System Database Listing
Information provided lists all individuals or companies who hold licenses, certificates and/or permits required by state law and regulated by the Department. Additionally, the LIS lists all companies who must register products with the Department before being used or sold in commercial channels within our state.

Date of Government Version: 09/23/2009
Date Data Arrived at EDR: 09/23/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 6
Source: Department of Agriculture
Telephone: 651-201-6000
Last EDR Contact: 09/21/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Site Listing
A listing of coal ash disposal site locations.

Date of Government Version: 09/17/2009
Date Data Arrived at EDR: 09/18/2009
Date Made Active in Reports: 09/29/2009
Number of Days to Update: 11

Source: Pollution Control Agency
Telephone: 651-757-2740
Last EDR Contact: 09/17/2009
Next Scheduled EDR Contact: 11/30/2009
Data Release Frequency: Varies

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 09/09/2009
Next Scheduled EDR Contact: 12/07/2009
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 05/05/2009
Date Made Active in Reports: 05/22/2009
Number of Days to Update: 17

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 10/20/2009
Next Scheduled EDR Contact: 02/01/2010
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 07/28/2009
Date Data Arrived at EDR: 08/27/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 25

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/27/2009
Next Scheduled EDR Contact: 11/23/2009
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 09/11/2008
Date Made Active in Reports: 10/02/2008
Number of Days to Update: 21

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 09/08/2009
Next Scheduled EDR Contact: 12/07/2009
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 06/01/2009
Date Data Arrived at EDR: 06/12/2009
Date Made Active in Reports: 06/29/2009
Number of Days to Update: 17

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 09/14/2009
Next Scheduled EDR Contact: 12/14/2009
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 07/17/2009
Date Made Active in Reports: 08/10/2009
Number of Days to Update: 24

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/24/2009
Next Scheduled EDR Contact: 01/04/2010
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: PennWell Corporation
Telephone: (800) 823-6277
This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Centers
Source: Department of Human Services
Telephone: 651-296-3971

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

MARSH LAKE DAM
MARSH LAKE
MADISON, MN 56256

TARGET PROPERTY COORDINATES

Latitude (North):	45.18820 - 45° 11' 17.5''
Longitude (West):	96.1328 - 96° 7' 58.1''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	725244.4
UTM Y (Meters):	5007640.0
Elevation:	941 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	45096-B2 CORRELL, MN
Most Recent Revision:	1958
East Map:	45096-B1 APPLETON, MN
Most Recent Revision:	1977

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

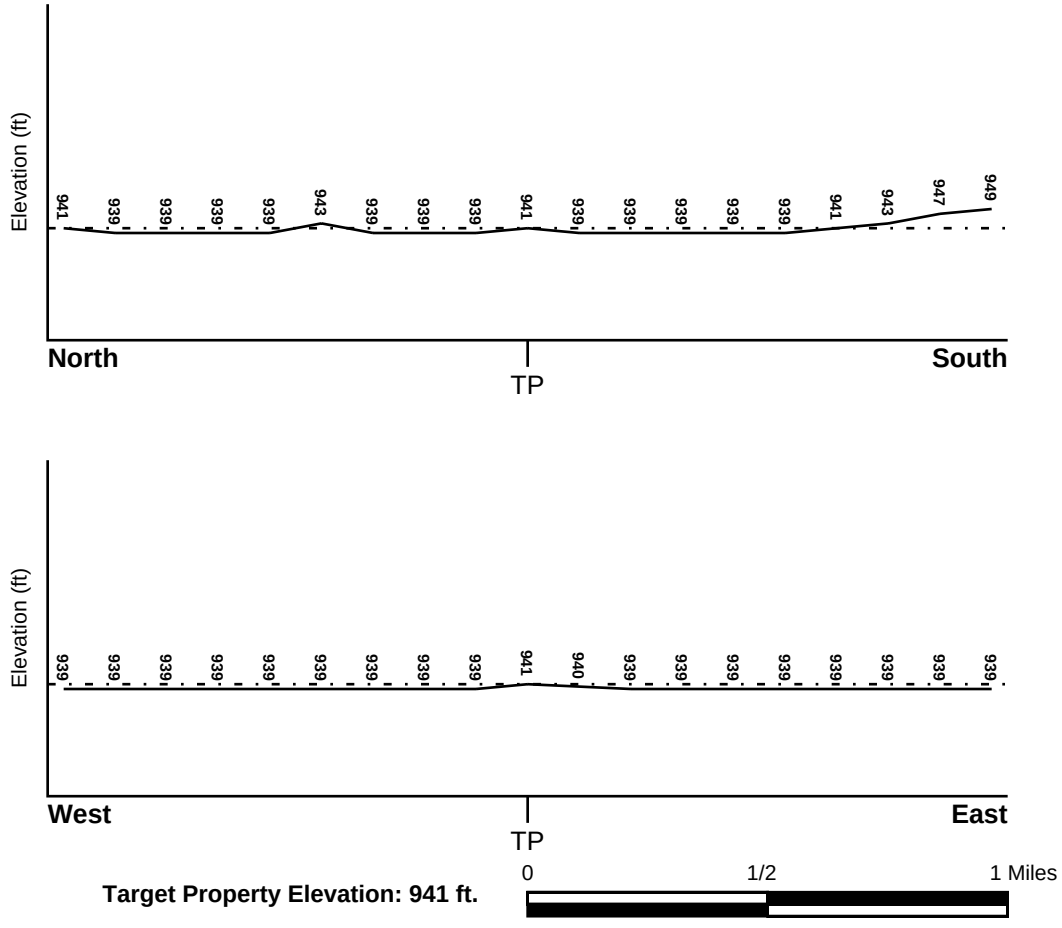
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General East

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LAC QUI PARLE, MN	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 2702390075B

Additional Panels in search area: 2706520195B

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CORRELL	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Precambrian
System:	Precambrian
Series:	Orthogneiss and paragneiss
Code:	Wgn *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Metamorphic Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name: WATER

Soil Surface Texture: Not reported

Hydrologic Group: Not reported

Soil Drainage Class: Not reported

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Bedrock Max: > 0 inches

No Layer Information available.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 2627945.2s

County Boundary
Major Roads
Contour Lines
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

0 1/4 1/2 1 Miles

Groundwater Flow Direction
GI Indeterminate Groundwater Flow at Location
GV Groundwater Flow Varies at Location
HD Closest Hydrogeological Data

N

SITE NAME:	Marsh Lake Dam	CLIENT:	Army Corp of Engineers
ADDRESS:	Marsh Lake Madison MN 56256	CONTACT:	Grant Riddick
LAT/LONG:	45.1882 / 96.1328	INQUIRY #:	2627945.2s
		DATE:	October 30, 2009 5:19 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: MN Radon

Radon Test Results

County	Num Sites	< Pci/L	>= 4 Pci/L	% >= 4 Pci/L
LAC QUI PARLE	15	9	6	40%

Federal EPA Radon Zone for LAC QUI PARLE County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 56256

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	11.300 pCi/L	0%	100%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	16.000 pCi/L	0%	100%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Minnesota Groundwater Database
Source: Minnesota Geological Survey County Water Well Index (CWI)
Telephone: 612-627-4780

OTHER STATE DATABASE INFORMATION

RADON

State Database: MN Radon
Source: Department of Health
Telephone: 651-215-0909
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

STREET AND ADDRESS INFORMATION

Louisburg Road
Louisburg Road
Correll, MN 56227

Inquiry Number: 3028253.10s
March 31, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

LOUISBURG ROAD
CORRELL, MN 56227

COORDINATES

Latitude (North):	45.216900 - 45° 13' 0.8''
Longitude (West):	96.195700 - 96° 11' 44.5''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	720192.2
UTM Y (Meters):	5010654.5
Elevation:	941 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	45096-B2 CORRELL, MN
Most Recent Revision:	1958

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

EXECUTIVE SUMMARY

Federal CERCLIS list

CERCLIS ---- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---- Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ---- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---- RCRA - Large Quantity Generators
RCRA-SQG ---- RCRA - Small Quantity Generators
RCRA-CESQG ---- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---- Engineering Controls Sites List
US INST CONTROL ---- Sites with Institutional Controls

Federal ERNS list

ERNS ---- Emergency Response Notification System

State- and tribal - equivalent NPL

MN PLP ---- Permanent List of Priorities

State- and tribal - equivalent CERCLIS

SHWS ---- Superfund Site Information Listing

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---- Permitted Solid Waste Disposal Facilities
LCP ---- Closed Landfills Priority List
UNPERM LF ---- Unpermitted Facilities

State and tribal leaking storage tank lists

LUST ---- Leak Sites
LAST ---- Leaking Aboveground Storage Tanks
INDIAN LUST ---- Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

UST ---- Underground Storage Tank Database

EXECUTIVE SUMMARY

AST ---------- Aboveground Storage Tanks
INDIAN UST ---------- Underground Storage Tanks on Indian Land
FEMA UST ---------- Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL ---------- Site Remediation Section Database

State and tribal voluntary cleanup sites

VIC ---------- Voluntary Investigation and Cleanup Program
INDIAN VCP ---------- Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS ---------- Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
SWRCY ---------- Recycling Facilities
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ---------- Clandestine Drug Labs
SRS ---------- Site Remediation Section Database
MN DEL PLP ---------- Delisted Permanent List of Priorities
CDL ---------- Clandestine Drug Labs
US HIST CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---------- CERCLA Lien Information
LUCIS ---------- Land Use Control Information System
LIENS ---------- Environmental Liens

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
SPILLS ---------- Spills Database
AGSPILLS ---------- Department of Agriculture Spills

Other Ascertainable Records

RCRA-NonGen ---------- RCRA - Non Generators
DOT OPS ---------- Incident and Accident Data

FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
SSTS	Section 7 Tracking Systems
ICIS	Integrated Compliance Information System
PADS	PCB Activity Database System
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
FINDS	Facility Index System/Facility Registry System
RAATS	RCRA Administrative Action Tracking System
MN LS	List of Sites
BULK	Bulk Facilities Database
MANIFEST	Hazardous Waste Manifest Data
DRYCLEANERS	Registered Drycleaning Facilities
ENF	Generators Associated with Enforcement Logs
MN HWS Permit	Active TSD Facilities
AIRS	Permit Contact List
TIER 2	Tier 2 Facility Listing
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
COAL ASH DOE	Sleam-Electric Plan Operation Data
MDA LIS	Licensing Information System Database Listing
AGVIC	Agricultural Voluntary Investigation & Cleanup Listing
WIMN	What's In My Neighborhood
COAL ASH	Coal Ash Disposal Site Listing

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

DOD: Consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

A review of the DOD list, as provided by EDR, and dated 12/31/2005 has revealed that there is 1 DOD site within approximately 1.5 miles of the target property.

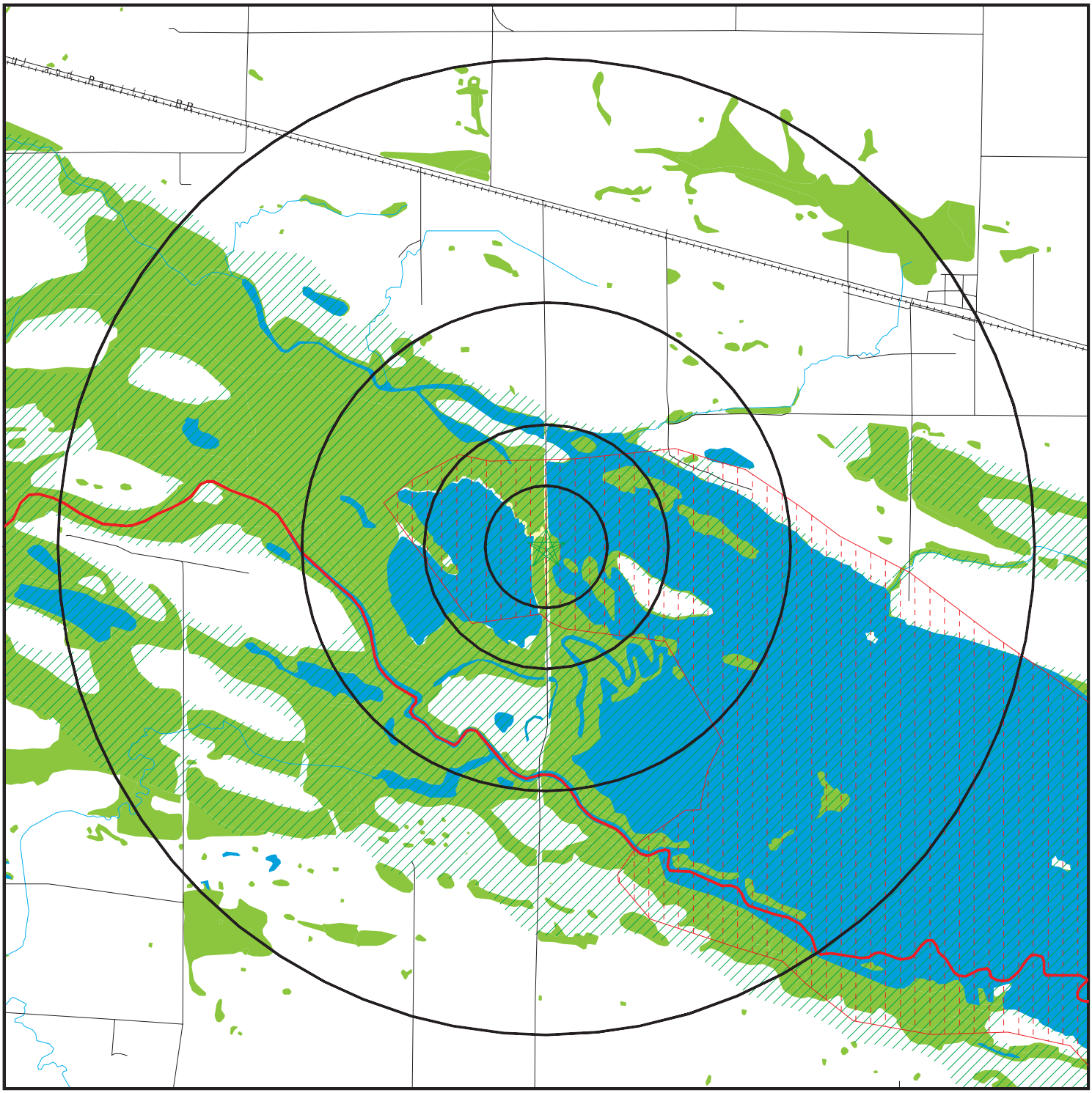
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MASH LAKE		0 - 1/8 (0.000 mi.)	0	7

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 30 records.

Site Name	Database(s)
CORRELL CITY OF - SW	WIMN
LOUISBURG CITY OF	WIMN
HARVEY HASTAD FARM - SEC 8	WIMN
MIKE KEMEN FARM - SEC 21	WIMN
ROBERT GOERGER FARM - SEC 17	WIMN
ROBERT LUDVIGSON FARM - SEC 23	WIMN
DALE KEMEN FARM - SEC 22	WIMN
RODNEY WEBER FARM - SEC 21	WIMN
THEO NELSON - MAKIN BACON FARM	WIMN
LARRY CLARK FARM - SEC 22	WIMN
A FRAME FARM - SEC 22	WIMN
SCHMIEG OIL CO	WIMN
MNDOT TRUCK STATION	WIMN
CHRISTENSEN FARMS SITE F031	WIMN
MADISON GAS & GRUB	WIMN
LUND IMPLEMENT CO	WIMN
MNDOT TRUCK STATION	UST, AST
MADISON GAS & GRUB	UST
SCHMIEG OIL CO	AST
LUND IMPLEMENT CO	RCRA-NonGen, FINDS
RICHARD LARSON DBA LARSON AUTO BOD	RCRA-CESQG
LOUISBURG FARM ELEV	FINDS
THOMPSON CHUCK DBA FARM ADVANTAGE	BULK
CORRELL DUMP	ODI
HALVORSON MYRON	ICIS
FIELDCREST FERT CO	ICIS
FIELDCREST FERTILIZER	SSTS
FIELDCREST FERT CO	SSTS
MNDOT	TIER 2
LAC QUI PARLE COOP OIL	TIER 2

OVERVIEW MAP - 3028253.10s



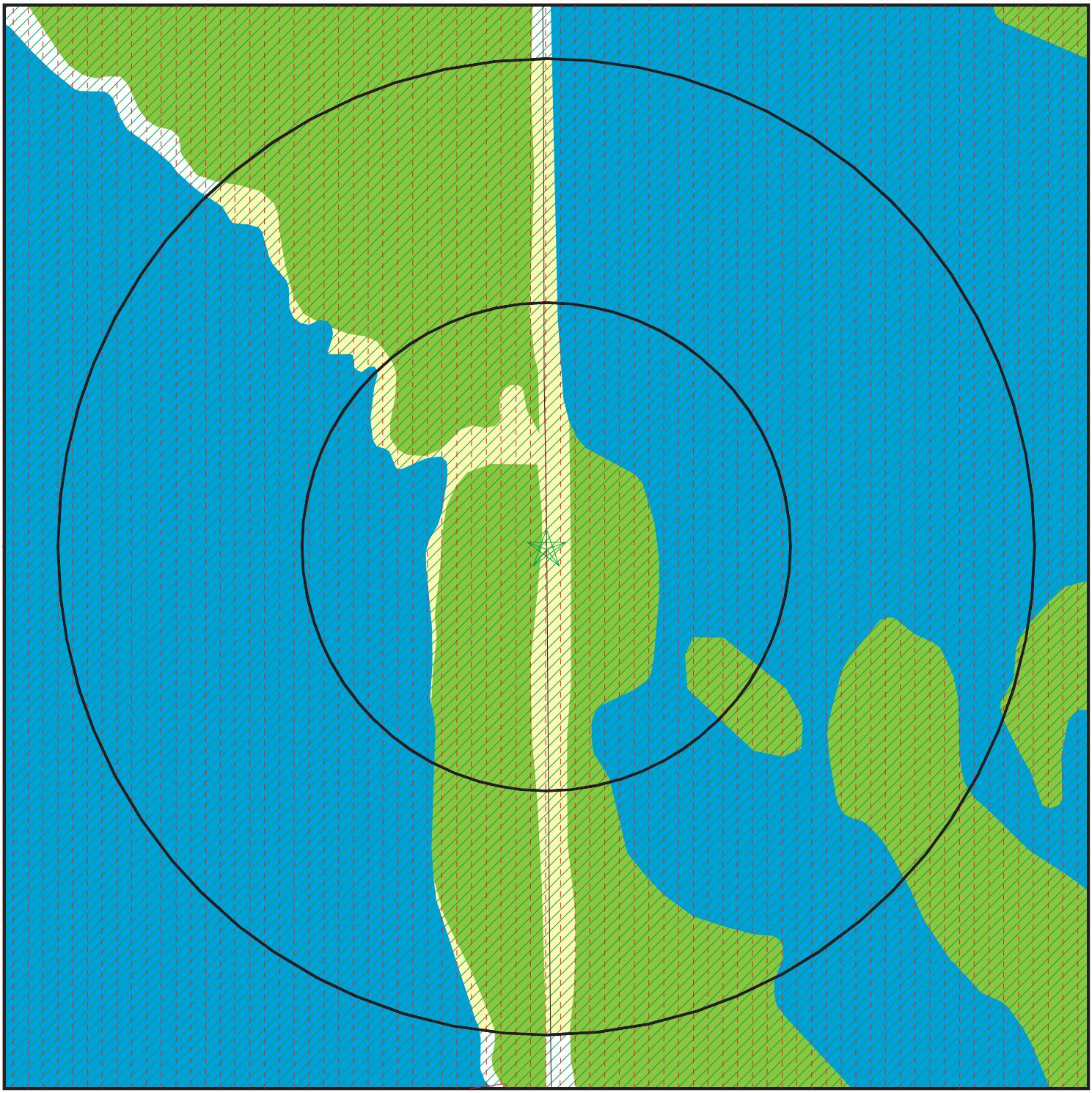
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

0 1/2 1 2 Miles

N

SITE NAME: Louisburg Road ADDRESS: Louisburg Road Correll MN 56227 LAT/LONG: 45.2169 / 96.1957	CLIENT: Army Corp of Engineers CONTACT: Ellen Engberg INQUIRY #: 3028253.10s DATE: March 31, 2011 1:52 pm

DETAIL MAP - 3028253.10s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

N

SITE NAME: Louisburg Road	CLIENT: Army Corp of Engineers
ADDRESS: Louisburg Road Correll MN 56227	CONTACT: Ellen Engberg
LAT/LONG: 45.2169 / 96.1957	INQUIRY #: 3028253.10s DATE: March 31, 2011 1:53 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.500	0	0	0	0	0	0
Proposed NPL		1.500	0	0	0	0	0	0
NPL LIENS		0.500	0	0	0	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.500	0	0	0	0	0	0
Federal CERCLIS list								
CERCLIS		1.000	0	0	0	0	NR	0
FEDERAL FACILITY		1.500	0	0	0	0	0	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		1.000	0	0	0	0	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.500	0	0	0	0	0	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		1.000	0	0	0	0	NR	0
Federal RCRA generators list								
RCRA-LQG		0.750	0	0	0	0	NR	0
RCRA-SQG		0.750	0	0	0	0	NR	0
RCRA-CESQG		0.750	0	0	0	0	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		1.000	0	0	0	0	NR	0
US INST CONTROL		1.000	0	0	0	0	NR	0
Federal ERNS list								
ERNS		0.500	0	0	0	NR	NR	0
State- and tribal - equivalent NPL								
MN PLP		1.000	0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
SHWS		1.500	0	0	0	0	0	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		1.000	0	0	0	0	NR	0
LCP		1.000	0	0	0	0	NR	0
UNPERM LF		1.000	0	0	0	0	NR	0
State and tribal leaking storage tank lists								
LUST		1.000	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LAST		1.000	0	0	0	0	NR	0
INDIAN LUST		1.000	0	0	0	0	NR	0
State and tribal registered storage tank lists								
UST		0.750	0	0	0	0	NR	0
AST		0.750	0	0	0	0	NR	0
INDIAN UST		0.750	0	0	0	0	NR	0
FEMA UST		0.750	0	0	0	0	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL		1.000	0	0	0	0	NR	0
State and tribal voluntary cleanup sites								
VIC		1.000	0	0	0	0	NR	0
INDIAN VCP		1.000	0	0	0	0	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		1.000	0	0	0	0	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		1.000	0	0	0	0	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI		1.000	0	0	0	0	NR	0
DEBRIS REGION 9		1.000	0	0	0	0	NR	0
SWRCY		1.000	0	0	0	0	NR	0
INDIAN ODI		1.000	0	0	0	0	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		0.500	0	0	0	NR	NR	0
SRS		0.500	0	0	0	NR	NR	0
MN DEL PLP		1.000	0	0	0	0	NR	0
CDL		0.500	0	0	0	NR	NR	0
US HIST CDL		0.500	0	0	0	NR	NR	0
Local Land Records								
LIENS 2		0.500	0	0	0	NR	NR	0
LUCIS		1.000	0	0	0	0	NR	0
LIENS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		0.500	0	0	0	NR	NR	0
SPILLS		0.500	0	0	0	NR	NR	0
AGSPILLS		0.500	0	0	0	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.750	0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOT OPS		0.500	0	0	0	NR	NR	0
DOD		1.500	1	0	0	0	0	1
FUDS		1.500	0	0	0	0	0	0
CONSENT		1.500	0	0	0	0	0	0
ROD		1.500	0	0	0	0	0	0
UMTRA		1.000	0	0	0	0	NR	0
MINES		0.750	0	0	0	0	NR	0
TRIS		0.500	0	0	0	NR	NR	0
TSCA		0.500	0	0	0	NR	NR	0
FTTS		0.500	0	0	0	NR	NR	0
HIST FTTS		0.500	0	0	0	NR	NR	0
SSTS		0.500	0	0	0	NR	NR	0
ICIS		0.500	0	0	0	NR	NR	0
PADS		0.500	0	0	0	NR	NR	0
MLTS		0.500	0	0	0	NR	NR	0
RADINFO		0.500	0	0	0	NR	NR	0
FINDS		0.500	0	0	0	NR	NR	0
RAATS		0.500	0	0	0	NR	NR	0
MN LS		1.000	0	0	0	0	NR	0
BULK		0.750	0	0	0	0	NR	0
MANIFEST		0.750	0	0	0	0	NR	0
DRYCLEANERS		0.750	0	0	0	0	NR	0
ENF		0.500	0	0	0	NR	NR	0
MN HWS Permit		1.500	0	0	0	0	0	0
AIRS		0.500	0	0	0	NR	NR	0
TIER 2		0.500	0	0	0	NR	NR	0
INDIAN RESERV		1.500	0	0	0	0	0	0
SCRD DRYCLEANERS		1.000	0	0	0	0	NR	0
PCB TRANSFORMER		0.500	0	0	0	NR	NR	0
COAL ASH EPA		1.000	0	0	0	0	NR	0
COAL ASH DOE		0.500	0	0	0	NR	NR	0
MDA LIS		0.250	0	0	NR	NR	NR	0
AGVIC		1.000	0	0	0	0	NR	0
WIMN		1.000	0	0	0	0	NR	0
COAL ASH		1.000	0	0	0	0	NR	0

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants		1.500	0	0	0	0	0	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

DOD **MASH LAKE** **DOD** **CUSA103642**
Region **N/A**

MASH LAKE (County), MN

< 1/8
1 ft.

DOD:

Feature 1:	Army Corps of Engineers DOD
Feature 2:	Not reported
Feature 3:	Not reported
URL:	Not reported
Name 1:	Mash Lake
Name 2:	Not reported
Name 3:	Not reported
State:	MN
DOD Site:	Yes
Tile name:	MNBIG_STONE

Count: 30 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CORRELL	S110187400	CORRELL CITY OF - SW	119 HWY 7 E	56227	WIMN
CORRELL	1007444677	CORRELL DUMP	.5 MI SOUTH OF JCT STATE HIWAY		ODI
LOUISBURG	S110213812	LOUISBURG CITY OF	RR 1	56256	WIMN
LOUISBURG	1004536276	LOUISBURG FARM ELEV	G D	56256	FINDS
MADISON	S110201656	HARVEY HASTAD FARM - SEC 8	3223 HWY 119	56256	WIMN
MADISON	S110595475	MIKE KEMEN FARM - SEC 21	2375 HWY 212	56256	WIMN
MADISON	S110595818	ROBERT GOERGER FARM - SEC 17	2232 HWY 212	56256	WIMN
MADISON	S110226798	ROBERT LUDVIGSON FARM - SEC 23	1979 HWY 212	56256	WIMN
MADISON	S110189042	DALE KEMEN FARM - SEC 22	2495 HWY 212	56256	WIMN
MADISON	S110227351	RODNEY WEBER FARM - SEC 21	1880 HWY 212	56256	WIMN
MADISON	S107413285	THOMPSON CHUCK DBA FARM ADVANTAGE	1778 HWY 212	56256	BULK
MADISON	S110442903	THEO NELSON - MAKIN BACON FARM	2199 HWY 2L2	56256	WIMN
MADISON	1005429304	FIELDCREST FERTILIZER	RT. 3 BOX 1C	56256	SSTS
MADISON	1011595197	HALVORSON MYRON	RTE 3 BOX 40 MADISON MN 5	56256	ICIS
MADISON	1011590033	FIELDCREST FERT CO	RT 3 MADISON MN 56256	56256	ICIS
MADISON	S110595302	LARRY CLARK FARM - SEC 22	1884 HWY 40	56256	WIMN
MADISON	S110594173	A FRAME FARM - SEC 22	2484 HWY 40	56256	WIMN
MADISON	S110440655	SCHMIEG OIL CO	HWY 40	56256	WIMN
MADISON	S110437043	MNDOT TRUCK STATION	HWY 40 E	56256	WIMN
MADISON	U003961465	MNDOT TRUCK STATION	HWY 40 E	56256	UST, AST
MADISON	A100026233	SCHMIEG OIL CO	HWY 40	56256	AST
MADISON	S110186108	CHRISTENSEN FARMS SITE F031	1596 HWY 40	56256	WIMN
MADISON	S107730445	MNDOT	HWY 40 E	56256	TIER 2
MADISON	1000183235	LUND IMPLEMENT CO	HWY 75 N	56256	RCRA-NonGen, FINDS
MADISON	S110435869	MADISON GAS & GRUB	HWY 75 & HWY	56256	WIMN
MADISON	U004016829	MADISON GAS & GRUB	HWY 75 & HWY	56256	UST
MADISON	1012211489	RICHARD LARSON DBA LARSON AUTO BOD	2356 HIGHWAY 75 S	56256	RCRA-CESQG
MADISON	S110214030	LUND IMPLEMENT CO	HWY 75 N	56256	WIMN
MADISON	S107729877	LAC QUI PARLE COOP OIL	HWY 75 & HWY 40	56256	TIER 2
MADISON	1004535106	FIELDCREST FERT CO	RURAL ROUTE 3 BOX 1 C	56256	SSTS

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 15

Source: EPA
Telephone: N/A
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 11/30/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 57

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 01/11/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/28/2010
Date Data Arrived at EDR: 12/01/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 86

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/25/2010
Date Data Arrived at EDR: 06/02/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 124

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 01/05/2011
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 01/05/2011
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/07/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 73

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 01/07/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Annually

State- and tribal - equivalent NPL

MN PLP: Permanent List of Priorities

The list identifies hazardous waste sites where investigation and cleanup are needed, cleanup is underway, or cleanup has been completed and long-term monitoring or maintenance continues.

Date of Government Version: 08/01/2009
Date Data Arrived at EDR: 12/16/2009
Date Made Active in Reports: 01/13/2010
Number of Days to Update: 28

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: Superfund Site Information Listing

The SRS database includes all sites that the State Superfund Program is dealing with or has dealt with. The Superfund Program identifies, investigates and determines appropriate cleanup plans for abandoned or uncontrolled hazardous waste sites where a release or potential release of a hazardous substance poses a risk to human health or the environment.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Permitted Solid Waste Disposal Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7276
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

LCP: Closed Landfills Priority List

The Minnesota Legislature enacted a law to manage and clean up the state's closed Mixed Municipal Solid Waste Landfills. Under that law, the MPCA is required to create and periodically revise a priority list of qualified landfills, based on the relative health and environmental risks they present. The MPCA established the first such priority list in December, 1994.

Date of Government Version: 11/01/2009
Date Data Arrived at EDR: 01/08/2010
Date Made Active in Reports: 01/26/2010
Number of Days to Update: 18

Source: Minnesota Pollution Control Agency
Telephone: 651-296-9543
Source: Pollution Control Agency, GIS Section
Telephone: 651-296-7266
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

UNPERM LF: Unpermitted Facilities

These are facilities that have solid waste disposal yet are not permitted.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 13

Source: Pollution Control Agency
Telephone: 651-757-2665
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

State and tribal leaking storage tank lists

LUST: Leak Sites

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

LAST: Leaking Aboveground Storage Tanks

A listing of leaking aboveground storage tanks.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 02/04/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 11/04/2009
Date Data Arrived at EDR: 05/04/2010
Date Made Active in Reports: 07/07/2010
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 05/04/2010
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 11/05/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 84

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 02/16/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

State and tribal registered storage tank lists

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

UST: Underground Storage Tank Database

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 03/02/2011
Number of Days to Update: 15

Source: Minnesota Pollution Control Agency
Telephone: 651-649-5451
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

AST: Aboveground Storage Tanks

Registered Aboveground Storage Tanks.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 02/15/2011
Date Made Active in Reports: 03/02/2011
Number of Days to Update: 15

Source: Minnesota Pollution Control Agency
Telephone: 651-296-0930
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 02/11/2010
Date Data Arrived at EDR: 02/11/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 60

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 11/05/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 84

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 12/02/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 57

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 02/03/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 02/04/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 02/03/2011
Date Data Arrived at EDR: 02/04/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 45

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/27/2010
Date Data Arrived at EDR: 08/30/2010
Date Made Active in Reports: 10/04/2010
Number of Days to Update: 35

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 02/16/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Semi-Annually

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 01/17/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Site Remediation Section Database

Sites that have an Institutional Control event.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Pollution Control Agency
Telephone: 512-296-6300
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing
A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 09/01/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 75

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 01/05/2010
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng
A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VIC: Voluntary Investigation and Cleanup Program
Voluntary Investigation and Cleanup (VIC) Program List.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Minnesota Pollution Control Agency
Telephone: 651-296-7291
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

State and tribal Brownfields sites

BROWNFIELDS: Petroleum Brownfields Program Sites
Purchasing, selling, or developing property can present a special set of obstacles if the property is contaminated with chemicals. The Petroleum Brownfields Program is one of several programs within the Minnesota Pollution Control Agency (MPCA) designed to help people address these obstacles. The purpose of the Petroleum Brownfields Program is to provide the technical assistance and liability assurance needed to expedite and facilitate the development, transfer, investigation and/or cleanup of property that is contaminated with petroleum.

Date of Government Version: 09/30/2009
Date Data Arrived at EDR: 03/17/2010
Date Made Active in Reports: 03/31/2010
Number of Days to Update: 14

Source: Pollution Control Agency
Telephone: 651-296-7999
Last EDR Contact: 03/15/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites

Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 12/29/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 81
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/29/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

ODI: Open Dump Inventory

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: No Update Planned

SWRCY: Recycling Facilities

A listing of companies that accept commercial quantities of recyclable materials.

Date of Government Version: 10/07/2010
Date Data Arrived at EDR: 02/17/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 7
Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 02/15/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/08/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 12/03/2010
Date Data Arrived at EDR: 12/30/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 48

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/08/2011
Next Scheduled EDR Contact: 06/20/2011
Data Release Frequency: Quarterly

SRS: Site Remediation Section Database

The database contains site information for sites monitored by the Site Remediation Section.

Date of Government Version: 01/03/2011
Date Data Arrived at EDR: 01/06/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 27

Source: Pollution Control Agency
Telephone: 651-282-5988
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 12/27/2010
Data Release Frequency: Quarterly

MN DEL PLP: Delisted Permanent List of Priorities

This generally means that either no more cleanup at a site is needed or that no state superfund funding is needed for long term monitoring activities.

Date of Government Version: 06/30/2010
Date Data Arrived at EDR: 08/27/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 53

Source: Pollution Control Agency
Telephone: 651-296-6139
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Annually

CDL: Clandestine Drug Labs

This data was passively gathered. That is, the DOH asks law enforcement and other agencies to notify them of Clandestine Drug Labs (CDLs). They do not require reporting of events. Therefore the data represents only a subset of all CDLs. This data has not been verified. The DOH has made no attempt to verify that reported CDLs actually occurred. They have no knowledge if the CDL was involved in cooking or just consisted of chemicals associated with Meth production. The reports they receive are that a suspected CDL was seized.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 20

Source: Department of Health
Telephone: 651-215-5800
Last EDR Contact: 01/10/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Varies

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 11/09/2010
Date Data Arrived at EDR: 11/16/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/22/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Varies

LIENS: Environmental Liens

Sites included in the Site Remediation System Database that have Environmental Liens.

Date of Government Version: 07/06/2006
Date Data Arrived at EDR: 07/07/2006
Date Made Active in Reports: 08/14/2006
Number of Days to Update: 38

Source: Pollution Control Agency
Telephone: 602-282-5988
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 01/05/2011
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 51

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 01/05/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Annually

SPILLS: Spills Database

Spills reported to the Pollution Control Agency.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/17/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 13

Source: Minnesota Pollution Control Agency
Telephone: 651-649-5451
Last EDR Contact: 03/23/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

AG SPILLS: Department of Agriculture Spills

This data is a list of pesticide/fertilizer incidents reported to have occurred in Minnesota.

Date of Government Version: 02/15/2011
Date Data Arrived at EDR: 02/16/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 12

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 02/17/2010
Date Data Arrived at EDR: 02/19/2010
Date Made Active in Reports: 05/17/2010
Number of Days to Update: 87

Source: Environmental Protection Agency
Telephone: 312-886-6186
Last EDR Contact: 01/06/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 10/13/2010
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/11/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 703-692-8801
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/15/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 10/01/2010
Date Data Arrived at EDR: 10/29/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 91

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/03/2011
Next Scheduled EDR Contact: 04/18/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/16/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 5

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/16/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 03/04/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/04/2010
Date Data Arrived at EDR: 09/09/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 84

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/09/2011
Next Scheduled EDR Contact: 06/20/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/29/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Every 4 Years

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/31/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 03/18/2010
Date Data Arrived at EDR: 04/06/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 51

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 01/13/2011
Next Scheduled EDR Contact: 04/25/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (312) 353-2000
Last EDR Contact: 03/14/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 02/25/2010
Date Made Active in Reports: 05/12/2010
Number of Days to Update: 76

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Biennially

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

LS: List of Sites

The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory (METRO), 1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP).

Date of Government Version: 04/22/2009
Date Data Arrived at EDR: 07/14/2009
Date Made Active in Reports: 07/24/2009
Number of Days to Update: 10

Source: Minnesota Pollution Control Agency
Telephone: 651-297-2731
Source: Pollution Control Agency, GIS Section
Telephone: 651-297-2731
Last EDR Contact: 03/28/2011
Next Scheduled EDR Contact: 07/11/2011
Data Release Frequency: Semi-Annually

BULK: Bulk Facilities Database

Facilities that use bulk pesticides and fertilizers

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 09/16/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 33

Source: Department of Agriculture
Telephone: 651-297-3997
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Semi-Annually

MANIFEST: Hazardous Waste Manifest Data

Hazardous waste manifest data.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/22/2010
Date Made Active in Reports: 08/17/2010
Number of Days to Update: 26

Source: Pollution Control Agency
Telephone: 651-296-7258
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

DRYCLEANERS: Registered Drycleaning Facilities

A listing of coin-operated laundries and drycleaning; drycleaning plants, except rug cleaning; and industrial launderers.

Date of Government Version: 12/21/2010
Date Data Arrived at EDR: 12/23/2010
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 41

Source: Pollution Control Agency
Telephone: 651-296-6300
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Varies

ENFORCEMENT: Generators Associated with Enforcement Logs

Regulatory Compliance, Hazardous Waste Enforcement Log and Hazardous Waste Permit Unit Project Identification List.

Date of Government Version: 12/20/2010
Date Data Arrived at EDR: 01/14/2011
Date Made Active in Reports: 02/02/2011
Number of Days to Update: 19

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8332
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Quarterly

MN HWS PERMIT: Active TSD Facilities

Active TSD Facilities.

Date of Government Version: 09/21/2010
Date Data Arrived at EDR: 09/24/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 25

Source: Minnesota Pollution Control Agency
Telephone: 651-297-8470
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Permit Contact List
A listing of permitted AIRS facilities.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 12/02/2010
Date Made Active in Reports: 12/23/2010
Number of Days to Update: 21

Source: Pollution Control Agency
Telephone: 651-296-7351
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

TIER 2: Tier 2 Facility Listing
A listing of facilities which store or manufacture hazardous materials that submit a chemical inventory report.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 11/16/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 14

Source: Department of Public Safety
Telephone: 651-296-2233
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 08/31/2010
Date Data Arrived at EDR: 09/01/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 92

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/22/2011
Next Scheduled EDR Contact: 05/09/2011
Data Release Frequency: Varies

WIMN: What's In My Neighborhood
Since 2003, the PCAa??s "Whata??s in My Neighborhood?" database provides information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality around Minnesota.

Date of Government Version: 01/17/2011
Date Data Arrived at EDR: 01/18/2011
Date Made Active in Reports: 02/24/2011
Number of Days to Update: 37

Source: Pollution Control Agency
Telephone: 651-757-2593
Last EDR Contact: 01/18/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 01/18/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Varies

MDA LIS: Licensing Information System Database Listing

Information provided lists all individuals or companies who hold licenses, certificates and/or permits required by state law and regulated by the Department. Additionally, the LIS lists all companies who must register products with the Department before being used or sold in commercial channels within our state.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 09/16/2010
Date Made Active in Reports: 10/19/2010
Number of Days to Update: 33

Source: Department of Agriculture
Telephone: 651-201-6000
Last EDR Contact: 03/01/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Site Listing

A listing of coal ash disposal site locations.

Date of Government Version: 11/16/2010
Date Data Arrived at EDR: 11/19/2010
Date Made Active in Reports: 11/30/2010
Number of Days to Update: 11

Source: Pollution Control Agency
Telephone: 651-757-2740
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/18/2011
Next Scheduled EDR Contact: 06/27/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: N/A

AGVIC: Agricultural Voluntary Investigation & Cleanup Listing

A listing of agricultural voluntary investigation & cleanup site locations.

Date of Government Version: 02/15/2011
Date Data Arrived at EDR: 02/16/2011
Date Made Active in Reports: 02/28/2011
Number of Days to Update: 12

Source: Department of Agriculture
Telephone: 651-201-6400
Last EDR Contact: 02/14/2011
Next Scheduled EDR Contact: 05/30/2011
Data Release Frequency: Quarterly

PCB TRANSFORMER: PCB Transformer Registration Database

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100

Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 02/04/2011
Next Scheduled EDR Contact: 05/16/2011
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/25/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Annually

NJ MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/22/2010
Date Made Active in Reports: 08/26/2010
Number of Days to Update: 35

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 01/21/2011
Next Scheduled EDR Contact: 05/02/2011
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 02/09/2011
Date Made Active in Reports: 03/04/2011
Number of Days to Update: 23

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/09/2011
Next Scheduled EDR Contact: 05/23/2011
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 12/01/2009
Date Made Active in Reports: 12/14/2009
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 02/18/2011
Next Scheduled EDR Contact: 06/06/2011
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/19/2010
Date Made Active in Reports: 08/26/2010
Number of Days to Update: 38

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 02/28/2011
Next Scheduled EDR Contact: 06/13/2011
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 07/06/2010
Date Made Active in Reports: 07/26/2010
Number of Days to Update: 20

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/21/2011
Next Scheduled EDR Contact: 07/04/2011
Data Release Frequency: Annually

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Child Care Centers
Source: Department of Human Services
Telephone: 651-296-3971

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

LOUISBURG ROAD
LOUISBURG ROAD
CORRELL, MN 56227

TARGET PROPERTY COORDINATES

Latitude (North):	45.21690 - 45° 13' 0.8''
Longitude (West):	96.1957 - 96° 11' 44.5''
Universal Tranverse Mercator:	Zone 14
UTM X (Meters):	720192.2
UTM Y (Meters):	5010654.5
Elevation:	941 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	45096-B2 CORRELL, MN
Most Recent Revision:	1958

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

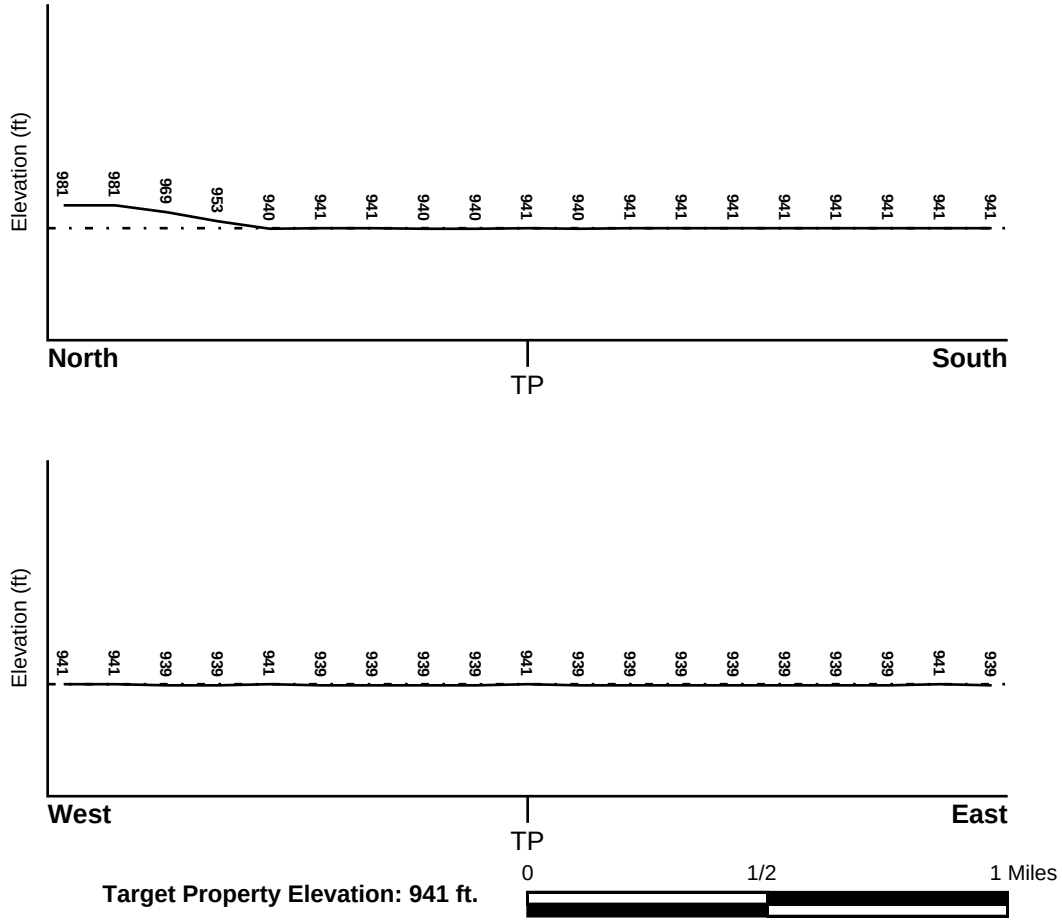
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General North

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
BIG STONE, MN	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 27011C - FEMA DFIRM Flood data

Additional Panels in search area: 27073C - FEMA DFIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
CORRELL	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

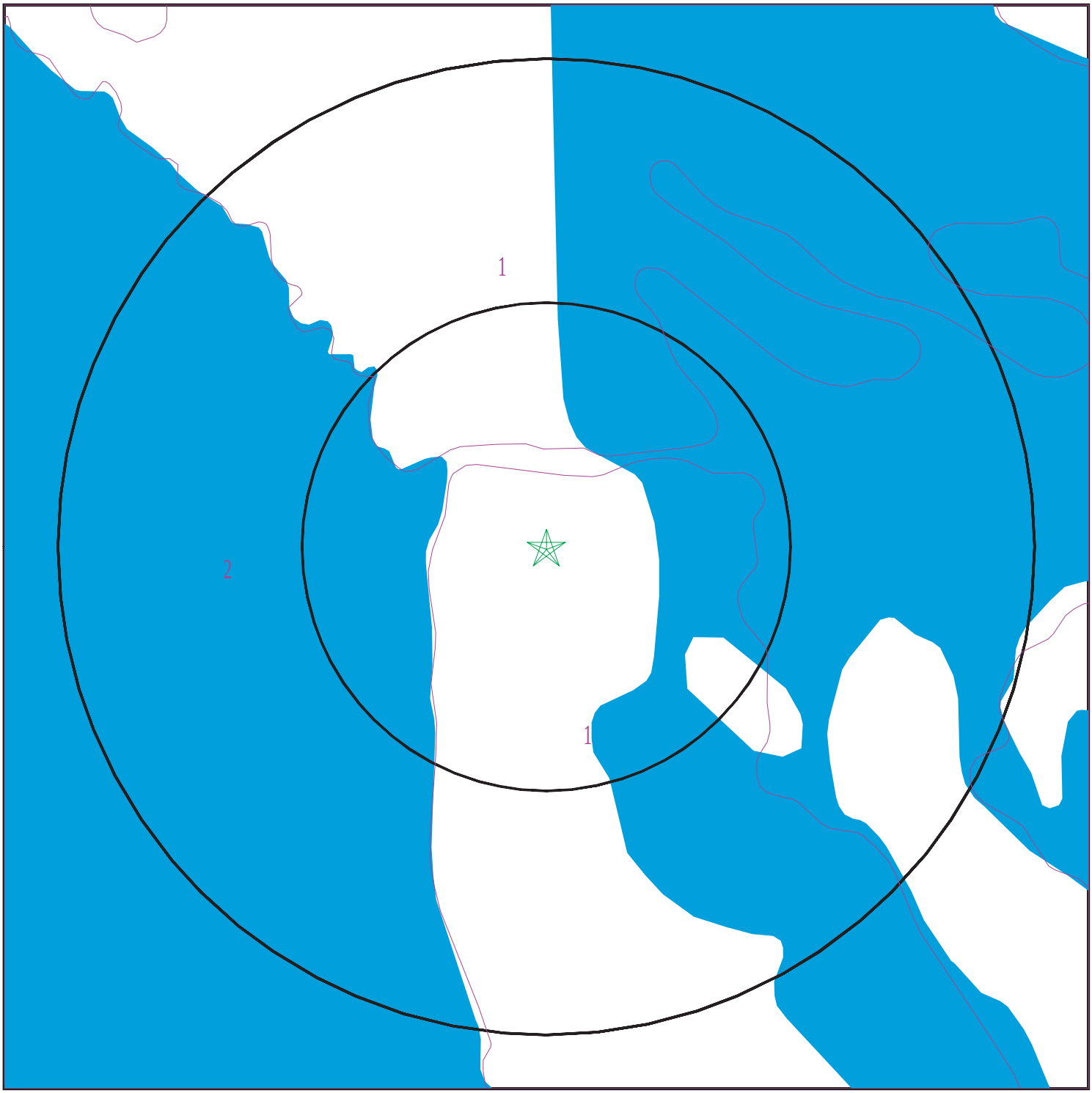
Era:	Precambrian
System:	Precambrian
Series:	W granitic rocks
Code:	Wg *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3028253.10s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Louisburg Road	CLIENT:	Army Corp of Engineers
ADDRESS:	Louisburg Road Correll MN 56227	CONTACT:	Ellen Engberg
		INQUIRY #:	3028253.10s
LAT/LONG:	45.2169 / 96.1957	DATE:	March 31, 2011 1:53 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Rauville

Soil Surface Texture: silty clay loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Very poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	33 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 1.4	Max: 8.4 Min: 7.4
2	33 inches	59 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 1.4	Max: 8.4 Min: 7.4

Soil Map ID: 2

Soil Component Name: Water

Soil Surface Texture: silty clay loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class:

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Unknown

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

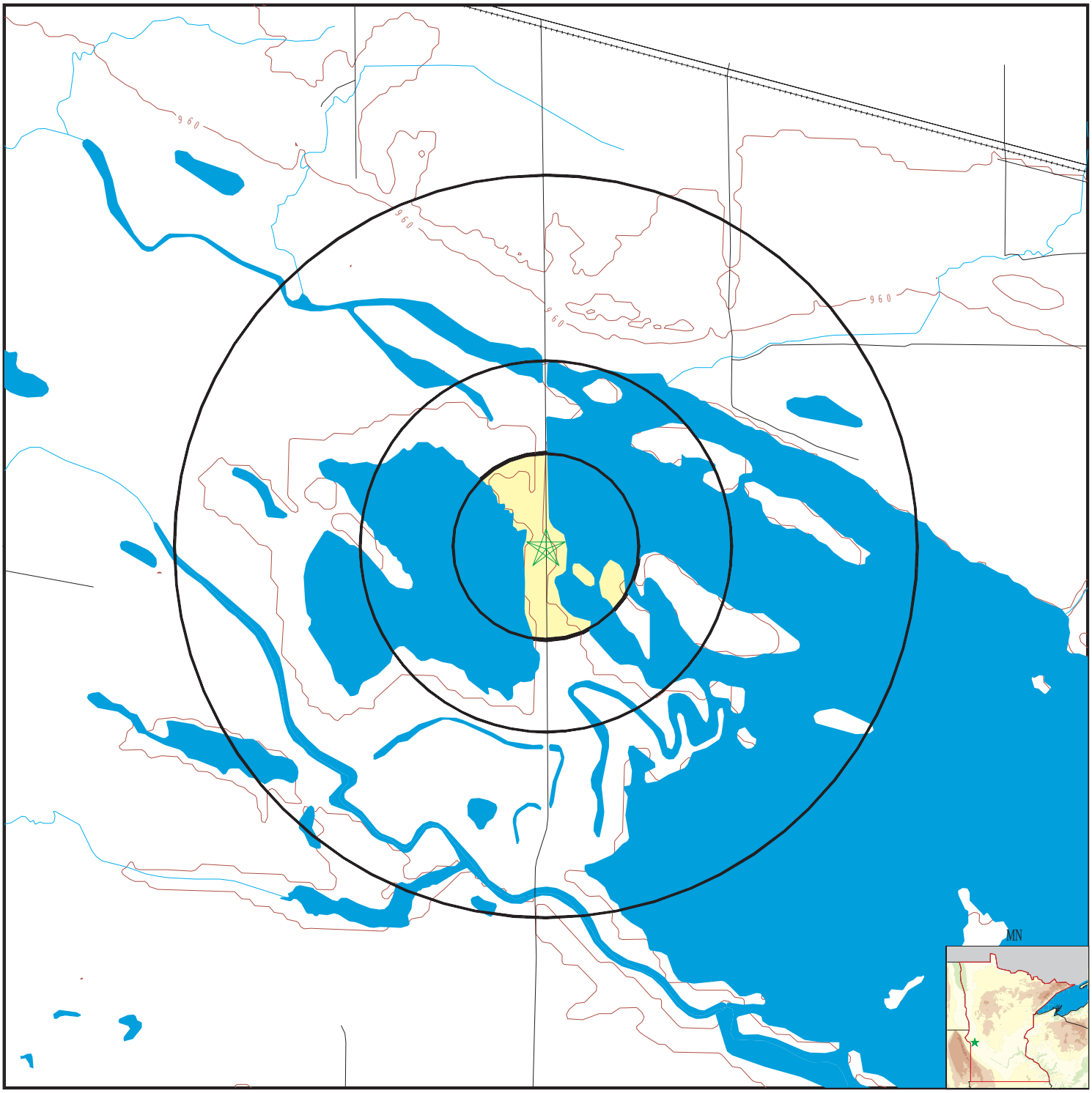
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 3028253.10s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data

SITE NAME:	Louisburg Road	CLIENT:	Army Corp of Engineers
ADDRESS:	Louisburg Road Correll MN 56227	CONTACT:	Ellen Engberg
		INQUIRY #:	3028253.10s
LAT/LONG:	45.2169 / 96.1957	DATE:	March 31, 2011 1:53 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: MN Radon

Radon Test Results

Zipcode	Num Tests	Minimum	Maximum	Average	# > 4 pCi/L	# < 4 pCi/L
56227	11	0.3	8.3	4.7	6	5

Federal EPA Radon Zone for BIG STONE County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for BIG STONE COUNTY, MN

Number of sites tested: 3

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	4.933 pCi/L	33%	67%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2009 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Minnesota Groundwater Database
Source: Minnesota Geological Survey County Water Well Index (CWI)
Telephone: 612-627-4780

OTHER STATE DATABASE INFORMATION

RADON

State Database: MN Radon
Source: Department of Health
Telephone: 651-215-0909
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

STREET AND ADDRESS INFORMATION

Appendix G – Cost Estimate

APPENDIX G
COST ENGINEERING

GENERAL

This appendix contains a summary of the detailed cost estimate prepared for the Feasibility Report and Environmental Assessment for the Marsh Lake Ecosystem Restoration Project. This estimate includes real estate; construction; planning, engineering, and design, (PED); and construction management (S and A) costs. The estimate was developed based on review of the project plans, discussions with project delivery team (PDT) members, and quotes from material suppliers in the areas. Guidance for the preparation of the estimate and attachments was obtained from ER-1110-2-1150 Engineering and Design for Civil Works Projects, ER-1110-1-1300 Cost Engineering Policy and General Requirements, and ER-1110-2-1302 Civil Works Cost Engineering.

PRICE LEVEL

The Marsh Lake cost estimate is based on April 2010 prices, unless noted otherwise. Estimated costs are considered fair and reasonable for a prudent and capable contractor and include overhead, profit, and bond. Based on the location of the project, approximately 20 miles northwest of Montevideo, Minnesota, it assumed that no per diem will be required to be included in the estimate. Labor rates used were from published Davis-Bacon wage rates or Minnesota Department of Labor wage rates current in February 2011. Equipment rates are from the MII 2007 equipment manual for region 4. Fuel costs were updated to reflect February 2011 pricing. The 2008 MII cost book was used. Work was assumed to be divided among a prime contractor and three subcontractors. The prime contractor was assumed to be responsible for earthwork, scour protection, and care of water. A structural contractor was assumed to be responsible for construction of concrete structures and bridges. A seeding contractor was used for completing seeding operations while another subcontractor would complete construction of recreation features.

TOTAL PROJECT COST SUMMARY

The total project cost summary for Marsh Lake, shown in the attachments at the end of this appendix, reflects pricing levels for three separate dates. Contingencies are included in these prices. The first date, April 2010, reflects pricing at the time the estimate was developed. The second date, October 2011, reflects escalation of pricing levels to the anticipated funding date. The third is the fully funded pricing level. This reflects pricing escalated to the midpoint of construction for each project feature as well as PED and S and A. Escalation factors were developed from quarterly cost index factors contained in EM 1110-2-1304, revised 30 September 2010.

AVERAGE ANNUAL COSTS

Average annual costs for Marsh Lake were determined by annualizing the sum of the first project costs (construction, preconstruction engineering and design, and construction management) and

adding interest accrued during construction with operations and maintenance costs over the life of the project. A table representing these costs is contained in the attachments at the end of this appendix as well as in the main report.

QUANTITIES

Quantities were for the most part provided by the civil engineer for earthwork related tasks and by the structural engineer for the structures. Some quantities, such as temporary access roads downstream of structures, were developed by the cost engineer.

MII COST ESTIMATE

The MII cost estimate, a summary of which is included in the attachments at the end of this appendix, was completed using the version of MII current at the time the estimate was developed. Both electronic and hard copies of the MII cost estimate are available for review. Overhead costs used for prime and subcontractors are based on typical markups for mobilization/demobilization, job office overhead, home office overhead, and bond for the type of work to be done and the size of the project. Profit was based on the use of the weighted guideline method.

Material pricing was determined based on actual price quotes from suppliers in the region for work at the project site or from pricing for recent Corps projects, such as the Montevideo Flood Reduction Project.

Specific tasks as well as crews and associated production rates used for the estimate include standard MII CSI tasks, modified as necessary to meet project requirements, or user defined tasks developed by the cost engineer. Production rates for hauling materials were based on consideration of distance for hauling, anticipated hauling speeds, and estimated time required for loading and unloading.

CONSTRUCTION METHODS

Work required for this project is standard civil works type heavy construction that includes excavation, fill, structural concrete, stoplogs, bridges, riprap and bedding, roadway aggregate, and topsoil and seeding. Tasks required to facilitate construction of project features include construction of temporary access roads, cofferdam construction and dewatering. Standard industry practices are assumed to be used for all work items.

PROJECT DESCRIPTION

The project site is located on Marsh Lake in western Minnesota, approximately 20 miles northwest of Montevideo, Minnesota. The main purpose of the project is to improve habitat in the area by restoring the Pomme de Terre River to its original channel and to provide features to facilitate control of lake levels and to allow fish passage into the lake. An additional feature to control wave action on lakebed sediments was evaluated but not included in the project. Project

features, grouped by the civil works work breakdown structure, are discussed in the following paragraphs.

Site access is not considered to be a major concern. Roads access the dam on both sides of the lake.

Obtaining satisfactory materials, including steel, concrete, riprap, and topsoil is not anticipated to be a concern as suppliers have been identified in the region. A borrow site for obtaining impervious fill has been identified in the area immediately north of the dam on the east side of the lake.

No real estate acquisition is required as all the real estate is under the control of the local sponsor or the Corps of Engineers. No utility relocations are required as there are no known utilities in the construction area.

CWBS 02 Relocations:

Two Lane Bridge: A two lane bridge is required to restore flows from the Pomme de Terre River to its original channel and to allow the river to outlet to the Minnesota River on the downstream side of the Marsh Lake Dam rather than into the lake. The bridge is estimated to be approximately 450 feet in length with five spans. The estimated costs for this feature are based on information provided by a Minnesota Department of Transportation (MNDOT) cost estimator specializing in bridge and wall estimates. Documentation for this estimate is contained in the attachments at the end of this appendix.

CWBS 03 Reservoirs:

Fishway: An existing concrete spillway in the Marsh Lake Dam embankment will be modified to facilitate fish passage between Marsh Lake and the Minnesota River downstream. Work includes excavation and backfill in the existing channel downstream of the spillway and placement of rockfill boulders, riprap, and bedding on the downstream side of the structure and on the channel bed to create a series of stepped pools to allow fish access into the lake. Due to the width of the fishway, over 120 feet, it is assumed that access for rock placement will be from embankments to be located on both sides of the fishway as well as from a temporary access road to be placed in the center of the fishway that will be removed when placement of rock is complete.

Modification of Spillway Crest: The crest of the existing concrete overflow weir at the upstream end of the proposed fishway will be lowered to allow fish passage. This will require concrete demolition at the crest of the structure as well as subsequent construction of a one-foot raise from the base of demolition to meet elevation requirements.

Pedestrian Bridge: A pedestrian bridge will be constructed across the fishway structure to allow access along the entire Marsh Lake Dam. Work will include construction of bridge piers and superstructure.

Drawdown Structure: A concrete drawdown structure will be constructed on the west side of the fishway to allow regulation of lake levels. It will be a reinforced concrete structure with an apron, retaining walls, sheetpile cutoffs on the upstream and downstream ends of the structure, ten stoplog bays and associated piers, and a concrete walkway on top of the piers for operation of the stoplog bays and to allow continuous access across the entire dam.

Dewatering of the site for construction of the concrete structure is assumed to be completed by installing a sheetpile cofferdam around the structure pumping out the site with pumps powered by a portable generator.

Riprap and bedding are to be placed in the outlet channel downstream of the structure. As with the fishway, the 120 foot width of the downstream channel will require placement of rock from embankments to be located on both sides of the channel as well as from a temporary access road to be placed approximately at the center of the channel and removed after the rock is placed.

The embankments downstream of the dam on both sides of the fishway and drawdown structure, which were referenced previously in relation to placement of rock in the downstream channels, are to be constructed of impervious fill. The source of the impervious fill, which was noted previously, is a field north of the road raise located on the east side of Marsh Lake. Due to the presence of the spillway on the east side of the drawdown structure inhibiting access across the dam to the drawdown structure, it is assumed that access will be from the west side of the structure. This is likely somewhat conservative as the contractor will likely access the embankment on the east side of the spillway across the crest of the dam.

CWBS 09 Canals and Channels

Initially plans were discussed to include excavation of the original channel alignment for the Pomme de Terre River as part of this project. This option was removed from consideration early in the development of the project. Subsequently, no costs were developed for this feature as part of this report.

CWBS 10 Breakwaters and Seawalls:

Breakwaters placed at three separation locations in Marsh Lake were evaluated as an option for reducing the wave fetch length on the lake, thereby reducing wave action responsible for resuspension of lake bed sediments into the water column. The breakwaters were to consist of rockfill structures with a 4 foot top width and 1V on 5H side slopes. Due to the difficult access issues it was assumed that work will be done here in the winter months when the contractor would be able to access the sites by coming across the ice. For the purposes of development of the estimate, an area construction engineer in the Grand Forks Office of the St. Paul District who has previous experience in hauling material across the Red Lake River in winter was consulted regarding the anticipated effort required to supplement and maintain the haul road. Based on these conversations, it was assumed that construction would have to include crews that would supplement the ice thickness on the haul road prior to initiation of hauling operations and to maintain the roads during hauling operations. This would be done by pumping water out of the lake onto the haul road. This water would freeze thereby increasing the thickness of the ice.

Ultimately this feature was dropped from the proposed project due to the high cost of construction compared to the benefits.

CWBS 11 Levees and Floodwalls:

Fish Pond Levee Breach: This work consists of excavating existing embankment material to allow flow into/out of the abandoned fish pond.

Diversion Dikes A and B: These dikes are to be constructed to restore the Pomme de Terre River to its original channel. Work includes placement of impervious fill from the identified borrow site across the existing cutoff channel at two locations. Diversion dike B will require placement of riprap and bedding on the slopes adjacent to the channel to prevent scouring actions from restoring the cutoff channel.

Road Raise: Construction of the road raise is required to prevent movement of water between Marsh Lake and the Pomme de Terre River through a low area on the east side of Marsh Lake .

Louisburg Road Culverts: Work at Louisburg Road consists of removal of the existing culverts and replacement with concrete culverts with stoplogs to allow regulation of water levels at the northwest end of the lake.

Recreation Features:

Recreation features to be constructed/installed include information kiosks, picnic tables, benches, trash and recycling receptacles, canoe launches, fishing structures, trails, a parking lot, and a toilet vault. It is assumed that recreation features will be standard designs commonly used for such sites.

Site Restoration:

Site restoration is assumed to include removal of temporary access roads as well as placing topsoil and seeding all areas disturbed by the contractor’s operations as well as any staging areas. It is assumed that topsoil will be obtained from stripping operations on the project sites.

OPERATIONS AND MAINTENANCE

A detailed operations and maintenance estimate has been developed for this project and is included in this appendix. The estimate includes costs for routine annual inspections to be conducted on a yearly basis as well as formal periodic inspections to be conducted on a five year schedule.

Routine annual maintenance would include mowing of grass and vegetation as well as spraying herbicide on the riprap to prevent growth of woody materials and brush. A 5 year cycle is assumed for maintenance of roadway aggregate. A ten year cycle is assumed for repairs to the riprap, bedding, impervious fill, topsoil, turf, and stoplogs. Maintenance of concrete structures is assumed to be on a longer interval at 20 years and would include repair to concrete as well as

painting the railings on the super structure. An operations and maintenance summary is contained in the attachments at the end of this appendix.

CONTINGENCY DISCUSSION

Contingencies for construction, PED, and S and A were estimated using the spreadsheet developed by the Cost Engineering Branch and Directories of Expertise in the Walla Walla District. Although it is preferable to conduct a meeting with the design team to evaluate the factors that determine contingencies used, this was not possible based on present workloads and schedules of team members as well as the complexity and detail of the contingency spreadsheet. Contingencies were first developed by the cost estimator. The spreadsheet was then provided to the team members for their input. Contingencies ranged from approximately 6% to 38%. The contingency risk matrix is shown in the attachments at the end of the appendix.

DESIGN AND CONSTRUCTION SCHEDULE

The anticipated design and construction schedule, shown in the attachments at the end of this appendix, is based on receiving funding for development of plans and specifications at the beginning of FY 2012 and funding for construction the beginning of FY 2013. It is assumed that the planning, engineering, and design phase will be completed by the beginning of the fourth quarter of FY 2012 and contract award would be completed by the end of FY 2012. The total estimated period for construction would be from the beginning of FY 2013 through the end of the 2014 construction season.

The anticipated sequence of construction starts with the construction of those features that result in the rerouting of the Pomme de Terre River to outlet into the Minnesota River downstream of the Marsh Lake Dam. This would aid the construction of subsequent features by diverting the flows from the Pomme de Terre River downstream of Marsh Lake. These features include a two lane bridge, diversion dikes A and B, and a road raise. The estimated construction period for this work would be from October 2012 through the end of June 2013.

Features that control water levels in Marsh Lake or are associated with the dam are assumed to be constructed next. These include construction of a drawdown structure, modifications to the existing spillway to facilitate fish passage into the lake, construction of a pedestrian bridge over the spillway, and construction of downstream embankments for the fishway and drawdown structure. The estimated period of construction for this work is July 2013 through June of 2014.

After the work is completed at the dam, control structures at Louisburg Road at the upstream end of the lake would be constructed along with the fish pond levee breach and recreation features. This work would extend into the fall of 2014.

Although the above construction sequence and schedule is considered to be reasonable based on the amount of time required for construction of each feature and the logical progression of work to optimize efficiency and construction site conditions, it is ultimately up to the contractor to determine progression of work.

APPENDIX G
COST ENGINEERING
ATTACHMENTS

PROJECT COST SUMMARY SHEET

MARSH LAKE ECOSYSTEM RESTORATION PROJECT
PROJECT DEVELOPMENT PLAN: FEASIBILITY STUDY
RECOMMENDED PLAN

PROJECT: MARSH LAKE ECOSYSTEM RESTORATION PROJECT
LOCATION: MARSH LAKE NEAR CORRELL, MINNESOTA
FEATURE: FEASIBILITY STUDY

DISTRICT: ST. PAUL DISTRICT:
POC: CHIEF, COST ENGINEERING, JAMES D. SENTZ
DATE: MARCH 2011

Item	Item Description	Total Estimated Amount	Contingency Amount	Contingency Percent	Estimated Amount Plus Contingency Date of Estimate: April 2010	Cost Index to Funding Date 1st Quarter 2012	Estimated Amount Plus Contingency Funding Date: October 2011	Midpoint Construction Date of Feature	Index to Construction Midpoint	Fully Funded Amount with Contingencies
01	Lands & Damages	**$10,000**			**$10,000**		**$10,200**			**$10,200**
	Admin Costs (includes contingency)	$10,000			$10,000	1.020	$10,200	2nd Quarter, FY2012	1.024	$10,200
02	**Relocations**	**$2,000,000**	**$666,700**		**$2,666,700**		**$2,720,000**			**$2,777,000**
	Two Lane Bridge (Alt Measure 2)	$2,000,000	$666,700	33.3%	$2,666,700	1.020	$2,720,000	2nd Quarter, FY2013	1.041	$2,777,000
03	**Reservoirs**	**$2,889,500**	**$1,026,100**		**$3,915,600**		**$3,993,900**			**$4,146,900**
	Fishway (Alt Measure 3)	$538,200	$179,400	33.3%	$717,600	1.020	$731,900	2nd Quarter, FY2014	1.059	$760,000
	Mod Exist Spillway (Alt Measure 3)	$66,300	$18,000	27.1%	$84,300	1.020	$86,000	2nd Quarter, FY2014	1.059	$89,300
	Ped Bridge over Spillway (Alt Mea 3)	$289,900	$108,700	37.5%	$398,600	1.020	$406,600	2nd Quarter, FY2014	1.059	$422,100
	Drawdown Structure (Alt Mea 4)	$1,724,800	$646,800	37.5%	$2,371,600	1.020	$2,419,000	2nd Quarter, FY2014	1.059	$2,511,700
	Embankments D/S Spillway and Drawdown Structure (Alt Mea 3 & 4)	$270,300	$73,200	27.1%	$343,500	1.020	$350,400	2nd Quarter, FY2014	1.059	$363,800
11	**Levees & Floodwalls**	**$944,200**	**$216,100**		**$1,160,300**		**$1,183,500**			**$1,220,300**
	Fish Pond Levee Breach (Alt Mea 6)	$5,800	$500	8.3%	$6,300	1.020	$6,400	4th Quarter, FY2014	1.068	$6,700
	Diversion Dike A (Alt Mea 2)	$194,600	$44,600	22.9%	$239,200	1.020	$244,000	2nd Quarter, FY2013	1.041	$249,100
	Diversion Dike B (Alt Mea 2)	$64,100	$14,700	22.9%	$78,800	1.020	$80,400	2nd Quarter, FY2013	1.041	$82,100
	Road Raise (Alt Mea 2)	$327,600	$68,300	20.8%	$395,900	1.020	$403,800	2nd Quarter, FY2013	1.041	$412,300
	Louisburg Rd Culverts (Alt Mea 5)	$352,100	$88,000	25.0%	$440,100	1.020	$448,900	4th Quarter, FY2014	1.068	$470,100
14	**Recreational Facilities**	**$339,700**	**$77,800**	**22.9%**	**$417,500**	**1.020**	**$425,800**	**1st Quarter, FY2015**	**1.072**	**$447,800**
30	**Planning, Engineering and Design**	**$926,000**	**$57,900**	**6.3%**	**$983,900**	**1.020**	**$1,003,600**	**2nd Quarter, FY2012**	**1.024**	**$1,007,600**
31	**Construction Management**	**$463,000**	**$154,300**	**33.3%**	**$617,300**	**1.020**	**$629,600**	**1st Quarter, FY2014**	**1.055**	**$651,000**
	Estimated Project Cost	**$7,572,400**	**$2,198,900**	**29%**	**$9,771,300**		**$9,966,600**			**$10,260,800**

Estimated Federal Costs (65%)	**$6,669,500**
Estimated Local Costs (35%)	**$3,591,300**

Marsh Lake – Average Annual Costs

Average annual costs are determined by annualizing the sum of the first project costs (construction, preconstruction engineering and design, and construction management) and adding interest accrued during construction with operations and maintenance costs over the life of the project. A summary of the average annual costs for each project feature is included below:

Marsh Lake Ecosystem Restoration Project

Summary of Average Annual Costs

	Marsh Lake - Alternative Measures						
	2	3	4	5	6	7	Recreation
	Restore Pomme de Terre River to its former channel	Modify Marsh Lake Dam to attain target water levels, construct fishway	Construct drawdown water control structure	Install gated culverts in Louisburg Grade Road	Breach dike at abandoned fish pond	Construct islands in Marsh Lake	All recreation features
Total First Project Costs	$ 3,962,518	$ 1,603,899	$ 2,961,839	$ 519,323	$ 7,605	$ 4,601,013	$ 493,933
Interest During Construction	$ 76,941	$ 39,326	$ 72,358	$ 12,853	$ 192	$ 113,063	$ 12,255
First Project Costs + Interest	$ 4,039,458	$ 1,643,225	$ 3,034,197	$ 532,176	$ 7,797	$ 4,714,075	$ 506,188
Annualized Project Costs	$ 192,080	$ 78,137	$ 144,279	$ 25,305	$ 371	$ 224,159	$ 24,070
Annual O&M Cost	$ 11,325	$ 7,245	$ 13,503	$ 800	$ 50	$ 20,376	$ 2,161
Average Annual Costs	**$ 203,405**	**$ 85,382**	**$ 157,782**	**$ 26,105**	**$ 421**	**$ 244,535**	**$ 26,231**

1. Assumes a 50 year period of analysis - 4.125% interest rate.

New Report

Title Page

This file reflects the estimated

Estimated by Matthew Bray
Designed by
Prepared by Matthew Bray
Preparation Date 4/1/2010
Effective Date of Pricing 4/1/2010
Estimated Construction Time Days

Right click here and select "Update Field" to build the Table of Contents for this report.

Designed by

Estimated by
Matthew Bray

Prepared by
Matthew Bray

Design Document	Feasibility Study
Document Date	3/1/2010
District	St. Paul District
Contact	Matthew Bray
Budget Year	2010
UOM System	Original

Direct Costs
LaborCost
EQCost
MatlCost
SubBidCost
PED
S&A

Timeline/Currency

Preparation Date	4/1/2010
Escalation Date	4/1/2010
Eff. Pricing Date	4/1/2010
Estimated Duration	0 Day(s)
Currency	US dollars
Exchange Rate	1.000000

Costbook CB08EB: MII English Cost Book 2008

Labor LNS2009:

Note: - http://www.wdol.gov/ - The website for current up to date, Davis Bacon & Service (FOOH) Labor Rates!!!!! Fringes paid to the laborers are taxable. In a non-union job the whole fringes are taxable. In union job, the vacation pay fringes is vacation pay

Labor Rates
LaborCost1
LaborCost2
LaborCost3
LaborCost4

Equipment EP07R04: MII Equipment Region 4r 2007

04 NORTHCENTRAL

Sales Tax	5.10
Working Hours per Year	1,260
Labor Adjustment Factor	1.08
Cost of Money	3.13
Cost of Money Discount	25.00
Tire Recap Cost Factor	1.50
Tire Recap Wear Factor	1.80
Tire Repair Factor	0.15
Equipment Cost Factor	1.00
Standby Depreciation Factor	0.50

Fuel

Electricity	0.088
Gas	3.090
Diesel Off-Road	2.950
Diesel On-Road	3.450

Shipping Rates

Over 0 CWT	13.74
Over 240 CWT	13.53
Over 300 CWT	11.81
Over 400 CWT	10.48
Over 500 CWT	5.92
Over 700 CWT	5.36
Over 800 CWT	4.04

Date	Author	Note

2/18/2011

Project: Marsh Lake Environmental Restoration Project

Design Phase: Feasibility Report and Environmental Assessment

Project Location: Marsh Lake, West Central Minnesota

Brief Summary:This MII file reflects the estimated costs associated with alternative measures considered for restoration of the ecosystem of Marsh Lake. The evaluation considered 7 alternative measures. They are as follows:

Alternative Measure 1: No action (no estimate required).

Alternative Measure 2: Restore Pomme de Terre River to its former channel.

Alternative Measure 3: Modify Marsh Lake Dam to attain target water levels and construct fishway.

Alternative Measure 4: Construct drawdown water control structure.

Alternative Measure 5: Install gated culverts in Louisburg Grade Road.

Alternative Measure 6: Breach dike at abandoned fish pond.

Alternative Measure 7: Construct islands in Marsh Lake.

These measures are identified in this MII estimate and are discussed in detail in the Marsh Lake report.

Acquisition Strategy: This project is assumed to be contracted under a small business acquisition program. The specific program has not been identified at this time. Potential increased costs due to this procurement method are reflected in the spreadsheet used to develop the project contingencies.

MII References Used:

The 2008 MII cost book was used to develop the estimate.

Equipment rates are based on the 2007 equipment manual for Region 4 (Midwest).

Fuel costs are based on pricing on the U.S. Energy Information Administration website for the week of 02/14/11 .

Cost of money is based on published rates from the U.S.Treasury Department for the period from 1/1/11 through 6/30/11.

Labor rates are based on Davis-Bacon wage rates or Minnesota Department of Labor wage rates for Big Stone/Lac Qui Parle/Swift Counties current for 02/17/11. For wage rates that were not found in either source, the MII default wage rates were used.

Contractor Assumptions: Work is assumed to be divided up between the prime contractor and subcontractors as follows:

Prime Contractor:

The prime is assumed to do most of the work, including earthwork, scour protection, and care of water.

Subcontractors:

Date	Author	Note

Structural Contractor is assumed to build the concrete structures and bridges.

Seeding Contractor is assumed to do the seeding for the project.

Recreation Contractor is assumed to construct the recreation features.

Direct Cost Markups **Category** **Method**
Productivity Productivity Productivity
Overtime Overtime Overtime

	Days/Week	Hours/Shift	Shifts/Day	1st Shift	2nd Shift	3rd Shift
Standard	*5.00*	*8.00*	*1.00*	*8.00*	*0.00*	*0.00*
Actual	*5.00*	*8.00*	*1.00*	*10.00*	*0.00*	*0.00*

Day	OT Factor	Working	OT Percent	FCCM Percent
Monday	*1.50*	*Yes*	*10.00*	*(20.00)*
Tuesday	*1.50*	*Yes*		
Wednesday	*1.50*	*Yes*		
Thursday	*1.50*	*Yes*		
Friday	*1.50*	*Yes*		
Saturday	*1.50*	*No*		
Sunday	*2.00*	*No*		

Sales Tax TaxAdj Running % on Selected Costs
MatlCost

Contractor Markups **Category** **Method**
MOB/DEMOB MiscContract Direct %
JOOH (Small Tools) Allowance % of Labor
JOOH JOOH JOOH (Calculated)
JOOH PRIME JOOH Running %
JOOH SUBS Allowance Running %
HOOH HOOH Running %
HOOH PRIME HOOH Direct %
HOOH SUBS Allowance Running %
Profit Profit Running %
Bond Bond Bond Table
Class B, Tiered, 24 months, 1.00% Surcharge

Contract Price	Bond Rate
500,000	*15.84*
2,000,000	*9.57*
2,500,000	*7.59*
2,500,000	*6.93*
100,000,000,000	*6.34*

Excise Tax Excise Running %
PROFIT PRIME Allowance Running %

Owner Markups **Category** **Method**
Escalation Escalation Escalation

StartDate	StartIndex	EndDate	EndIndex	Escalation
2/26/2010	*0.00*	*2/26/2010*	*0.00*	*0.00*

Contingency	Contingency	Running %
SIOH	SIOH	Running %

Description	Contractor	DirectCost	CostToPrime	ContractCost
Marsh Lake MII Summary		**7,083,978.53**	**7,432,452.31**	**9,175,672.54**
01 Lands and Damages	**No Markup Contractor**	**10,000.00**	**10,000.00**	**10,000.00**
Real Estate Adminsitration Costs	No Markup Contractor	10,000.00	10,000.00	10,000.00
Construction Costs for Alternative Measures	**Prime**	**7,073,978.53**	**7,422,452.31**	**9,165,672.54**
02 Relocations	**Prime**	**2,000,000.00**	**2,000,000.00**	**2,000,000.00**
02 Two Lane Bridge (Alternative measure 2)	**Prime**	**2,000,000.00**	**2,000,000.00**	**2,000,000.00**
Two Lane Bridge Revised February 2011	No Markup Contractor	2,000,000.00	2,000,000.00	2,000,000.00
03 Reservoirs	**Prime**	**1,999,814.28**	**2,237,957.85**	**2,889,424.04**
03 Fishway (Alternative measure 3)	**Prime**	**393,729.69**	**393,729.69**	**538,257.51**
Earthwork to Prepare Fishway for Scour Protection Placement	**Prime**	**84,598.76**	**84,598.76**	**115,652.74**
Excavation and Reuse of Channel Material	**Prime**	**53,757.47**	**53,757.47**	**73,490.43**
Excavate and load, bank measure, wet material, 2 C.Y. bucket, hydraulic excavator	Prime	38,341.17	38,341.17	52,415.21
Fill, from stockpile, 130 H.P., 2-1/2 C.Y., 300' haul, spread fill, with front-end loader, excludes compaction	Prime	15,416.30	15,416.30	21,075.22
Excavate and Remove Excess Channel Material	**Prime**	**30,841.28**	**30,841.28**	**42,162.31**
Excavate and load, bank measure, wet material, 2 C.Y. bucket, hydraulic excavator	Prime	6,623.98	6,623.98	9,055.47
Hauling Excess Channel Material From Fishway	Prime	17,424.53	17,424.53	23,820.61
Fill, borrow, spread, by dozer	Prime	6,792.78	6,792.78	9,286.23
Rockfill Boulders	**Prime**	**60,018.45**	**60,018.45**	**82,049.65**
Place Boulders for Fishway	Prime	15,054.14	15,054.14	20,580.12
Hauling Rockfill Boulders for Fishway	Prime	2,897.99	2,897.99	3,961.76
Excavate and load, bank measure, blasted rock, 5 C.Y. bucket, wheeled loader	Prime	3,518.65	3,518.65	4,810.26
Rockfill for Fishway	Prime	38,547.68	38,547.68	52,697.51
Riprap for Channel Bed and Scour Hole	**Prime**	**190,569.95**	**190,569.95**	**260,523.16**
Hauling Rockfill for Fishway	Prime	11,897.00	11,897.00	16,264.07
Excavate and load, bank measure, blasted rock, 5 C.Y. bucket, wheeled loader	Prime	14,444.99	14,444.99	19,747.37
R20 to R270 Riprap	Prime	133,327.35	133,327.35	182,268.32
Place Riprap for Fishway Scour Hole	Prime	30,900.60	30,900.60	42,243.40
Bedding for Channel Bed and Scour Hole	**Prime**	**51,407.50**	**51,407.50**	**70,277.84**
Hauling Rockfill for Fishway	Prime	3,355.56	3,355.56	4,587.30
Excavate and load, bank measure, blasted rock, 5 C.Y. bucket, wheeled loader	Prime	4,074.23	4,074.23	5,569.77
Place Riprap for Fishway Scour Hole	Prime	8,715.55	8,715.55	11,914.81
B3 Bedding	Prime	35,262.15	35,262.15	48,205.96
Construct and Remove Access Road in Centerline of Fishway Channel	**Prime**	**7,135.04**	**7,135.04**	**9,754.12**
Fill, borrow, spread, by dozer	Prime	2,574.19	2,574.19	3,519.10
Excavate and load, bank measure, wet rock, 3-1/2 C.Y. bucket, hydraulic excavator	Prime	4,560.85	4,560.85	6,235.02
03 Modify Existing Spillway Southeast of Marsh Lake (Alternative measure 3)	**Prime**	**42,764.25**	**54,759.00**	**66,294.67**
Concrete Demolition	**Structures Contractor**	**21,741.21**	**27,839.31**	**33,704.00**
Selective site demolition, hydodemolition, concrete pavement, 6000 PSI, 6" depth	Structures Contractor	11,513.27	14,742.57	17,848.28
Selective concrete demolition, maximum reinforcing, break up into small pieces, excl shoring, bracing, saw or torch cutting, loading, hauling, dumping	Structures Contractor	8,685.82	11,122.06	13,465.07
Hauling Concrete Demolition Material To Disposal Site.	Structures Contractor	1,542.13	1,974.67	2,390.66
One foot concrete raise on spillway crest	**Structures Contractor**	**21,023.04**	**26,919.69**	**32,590.66**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	1,218.89	1,560.77	1,889.57
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	895.88	1,147.16	1,388.82
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	Structures Contractor	454.25	581.66	704.20
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	594.33	761.03	921.35
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	67.84	86.87	105.17
Concrete impact drilling, for anchors, up to 4" D, 1" dia, in concrete or brick walls and floors, incl bit & layout, excl anchor	Structures Contractor	3,222.07	4,125.81	4,994.97
Chemical anchor, 3/4" dia x 9-1/2" L, in concrete, brick or stone, incl layout, drilling, threaded rod & epoxy cartridge	Structures Contractor	12,881.34	16,494.37	19,969.11
C.I.P. concrete forms, slab on grade, curb, wood, 6" to 12" high, 1 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	1,688.44	2,162.02	2,617.48

Description	Contractor	DirectCost	CostToPrime	ContractCost
03 Pedestrian Bridge over Existing Spillway (Alternative measure 3)	**Structures Contractor**	**186,973.88**	**239,417.32**	**289,853.55**
Pedestrian Bridge	Structures Contractor	130,000.00	166,463.10	201,530.62
Concrete Deck	**Structures Contractor**	**15,660.92**	**20,053.58**	**24,278.12**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	2,553.87	3,270.19	3,959.10
C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 2 use, includes shoring, erecting, bracing, stripping and cleaning	Structures Contractor	8,475.17	10,852.33	13,138.51
Reinforcing steel, in place, elevated slabs, #4 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	1,767.84	2,263.69	2,740.57
Structural concrete, placing, elevated slab, pumped, 6" to 10" thick, includes vibrating, excludes material	Structures Contractor	475.94	609.44	737.83
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	1,252.87	1,604.28	1,942.24
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	121.92	156.12	189.01
C.I.P. concrete forms, slab on grade, edge, wood, to 6" high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	1,013.31	1,297.53	1,570.87
Concrete Footings	**Structures Contractor**	**41,312.96**	**52,900.64**	**64,044.82**
Earthwork	**Structures Contractor**	**2,279.89**	**2,919.36**	**3,534.36**
Excavating, trench or continuous footing, common earth, 1 1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	Structures Contractor	1,007.68	1,290.32	1,562.14
Compaction, 3 passes, 24" wide, 6" lifts, walk behind, vibrating roller	Structures Contractor	624.41	799.55	967.98
Excavating, trench or continuous footing, common earth, 1 1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	Structures Contractor	647.79	829.49	1,004.23
Concrete Work	**Structures Contractor**	**39,033.07**	**49,981.28**	**60,510.45**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	5,606.91	7,179.56	8,692.02
Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	Structures Contractor	1,393.22	1,784.00	2,159.82
Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	29,905.66	38,293.76	46,360.82
C.I.P. concrete forms, slab on grade, curb, wood, 6" to 12" high, 2 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	637.39	816.17	988.10
C.I.P. concrete forms, wall, job built, plywood, 8 to 16' high, 2 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	1,339.14	1,714.76	2,075.99
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	150.75	193.04	233.70
03 Drawdown Structure (Alternative measure 4)	**Prime**	**1,179,590.83**	**1,351,303.52**	**1,724,719.00**
Dewatering / Cofferdams	**Prime**	**94,482.64**	**115,810.83**	**143,092.42**
Cofferdams	**Structures Contractor**	**76,040.29**	**97,368.49**	**117,880.37**
Sheet piling, steel, 22 psf, 15' excavation, drive, extract and salvage, excludes wales	Structures Contractor	76,040.29	97,368.49	117,880.37
Dewatering	**Prime**	**18,442.35**	**18,442.35**	**25,212.05**
Dewatering, pumping, 8 hr., attended 2 hours per day, 4" discharge pump used for 8 hours, includes 20 L.F. of suction hose and 100 L.F. of discharge hose	Prime	13,258.35	13,258.35	18,125.14
Generator set, portable, gasoline powered, 120/240 V, 2.5 kW	Prime	5,184.00	5,184.00	7,086.91
Earthwork for Drawdown Structure	**Prime**	**11,035.24**	**11,035.24**	**15,085.98**
Excavating, trench or continuous footing, common earth, 2 1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	Prime	3,365.61	3,365.61	4,601.04
Compaction, 2 passes, 24" wide, 6" lifts, walk behind, vibrating roller	Prime	2,957.77	2,957.77	4,043.49
Excavating, trench or continuous footing, common earth, 2 1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	Prime	4,711.85	4,711.85	6,441.45
Backfill, structural, 6" lifts, backfill around foundation, with hydraulic excavator	Prime	0.00	0.00	0.00
Concrete Structure	**Structures Contractor**	**391,945.77**	**501,880.83**	**607,608.27**
Railing, pipe, aluminum, satin finish, 2 rails, 1-1/4" dia, shop fabricated	Structures Contractor	17,629.02	22,573.70	27,329.13
Base Slabs	**Structures Contractor**	**170,406.35**	**218,202.84**	**264,169.98**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	83,494.14	106,913.02	129,435.58
C.I.P. concrete forms, slab on grade, depressed, edge, wood, 12" to 24" high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	5,603.27	7,174.90	8,686.38
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	57,422.62	73,528.83	89,018.59
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	Structures Contractor	13,457.41	17,232.01	20,862.15
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	9,504.04	12,169.79	14,733.51
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	924.87	1,184.28	1,433.77
Walls	**Structures Contractor**	**173,131.21**	**221,691.98**	**268,394.16**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	43,880.13	56,187.87	68,024.54
Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	25,914.72	33,183.42	40,173.93
Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	Structures Contractor	10,903.45	13,961.70	16,902.91
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	1,179.08	1,509.79	1,827.84
Concrete finishing, floors, manual screed, bull float	Structures Contractor	950.93	1,217.65	1,474.16

Description	Contractor	DirectCost	CostToPrime	ContractCost
C.I.P. concrete forms, wall, job built, plywood, 8 to 16' high, 2 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	90,302.91	115,631.55	139,990.78
Elevated Slab for Walkway	**Structures Contractor**	**30,779.19**	**39,412.30**	**47,715.00**
C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	Structures Contractor	11,489.07	14,711.59	17,810.77
C.I.P. concrete forms, slab on grade, depressed, edge, wood, 12" to 24" high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	2,465.44	3,156.96	3,822.01
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	8,532.25	10,925.42	13,226.99
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	4,743.52	6,074.01	7,353.58
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	1,946.12	2,491.98	3,016.95
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	189.38	242.50	293.59
Structural concrete, placing, elevated slab, pumped, over 10" thick, includes vibrating, excludes material	Structures Contractor	1,413.41	1,809.85	2,191.12
Sheetpile	**Structures Contractor**	**36,221.27**	**46,380.81**	**56,151.50**
Sheet piling, 15' excavation, left in place, excludes wales	Structures Contractor	36,221.27	46,380.81	56,151.50
Stoplogs	**Structures Contractor**	**107,991.00**	**138,280.90**	**167,411.49**
Stoplog Frames and Stoplogs for Drawdown Structure	Structures Contractor	107,991.00	138,280.90	167,411.49
Scour Protection Downstream of Structure	**Prime**	**537,914.92**	**537,914.92**	**735,369.34**
Construct and Remove Access Road in Centerline of Channel	**Prime**	**17,051.80**	**17,051.80**	**23,311.07**
Fill, borrow, spread, by dozer	Prime	6,531.52	6,531.52	8,929.06
Excavate and load, bank measure, wet rock, 3-1/2 C.Y. bucket, hydraulic excavator	Prime	10,520.28	10,520.28	14,382.00
Channel Excavation	**Prime**	**92,757.77**	**92,757.77**	**126,806.71**
Excavate and load, bank measure, wet material, 2 C.Y. bucket, hydraulic excavator	Prime	21,713.03	21,713.03	29,683.31
Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.4 loads/hour, 16.5 C.Y. dump trailer, highway haulers, excludes loading	Prime	48,778.42	48,778.42	66,683.70
Fill, borrow, spread, by dozer	Prime	22,266.32	22,266.32	30,439.70
R270 Riprap	**Prime**	**335,619.87**	**335,619.87**	**458,817.10**
R20 to R270 Riprap	Prime	214,417.73	214,417.73	293,124.84
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	18,460.41	18,460.41	25,236.75
Excavate and load, bank measure, blasted rock, 5 C.Y. bucket, wheeled loader	Prime	23,230.51	23,230.51	31,757.83
Place Riprap for Scour Protection in Channel D/S of Drawdown Structure	Prime	79,511.21	79,511.21	108,697.69
B3 Bedding	**Prime**	**92,485.48**	**92,485.48**	**126,434.47**
B3 Bedding	Prime	57,701.70	57,701.70	78,882.48
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	5,297.95	5,297.95	7,242.69
Excavate and load, bank measure, blasted rock, 5 C.Y. bucket, wheeled loader	Prime	6,666.92	6,666.92	9,114.17
Place Riprap for Scour Protection in Channel D/S of Drawdown Structure	Prime	22,818.91	22,818.91	31,195.13
03 Embankments on Sides of Fishway and Drawdown Structure Downstream Channel (Alternative measures 3 and 4)	**Prime**	**196,755.62**	**198,748.32**	**270,299.31**
Stripping	**Prime**	**2,045.72**	**2,045.72**	**2,796.65**
Loam or topsoil, remove and stockpile on site, 200 H.P. dozer, 6" deep, 200' haul	Prime	2,045.72	2,045.72	2,796.65
Impervious FIll	**Prime**	**183,817.12**	**183,817.12**	**251,291.55**
Placing Impervious Fill for Downstream Embankments for Fishway and Drawdown Structure	Prime	54,314.43	54,314.43	74,251.82
Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.4 loads/hour, 16.5 C.Y. dump trailer, highway haulers, excludes loading	Prime	129,502.69	129,502.69	177,039.73
Topsoil and Seeding	**Prime**	**10,892.79**	**12,885.48**	**16,211.11**
Topsoil	**Prime**	**3,907.28**	**3,907.28**	**5,341.54**
Placing Topsoil	Prime	3,907.28	3,907.28	5,341.54
Seeding	**Seeding Contractor**	**6,985.50**	**8,978.20**	**10,869.56**
Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	Seeding Contractor	1,047.20	1,345.93	1,629.46
Seeding, apply fertilizer, nitrogen, 1 lb. per M.S.F., sprayed from truck	Seeding Contractor	427.73	549.74	665.55
Soil preparation, mulching, oat straw, 1" deep, power mulcher, small	Seeding Contractor	3,847.11	4,944.54	5,986.17
Watering, water, by truck	Seeding Contractor	1,663.47	2,137.99	2,588.38
10 Breakwater & Seawalls	**Prime**	**2,188,928.97**	**2,188,928.97**	**2,992,427.25**
10 Breakwater A (Alternative measure number 7)	**Prime**	**865,790.23**	**865,790.23**	**1,183,599.06**
Rockfill Placement for Breakers	Prime	129,446.17	129,446.17	176,962.45
Rockfill for Breaker Rock	Prime	632,450.25	632,450.25	864,606.11

Description	Contractor	DirectCost	CostToPrime	ContractCost
Hauling Breakwater Rock on Ice: Site A	Prime	73,597.68	73,597.68	100,613.46
Breakwaters Ice Road Maintenance	Prime	15,788.12	15,788.12	21,583.53
Breakwaters Ice Road Constructuion	Prime	14,508.01	14,508.01	19,833.51
10 Breakwater B(Alternative Measure number 7)	**Prime**	**596,600.99**	**596,600.99**	**815,597.52**
Rockfill Placement for Breakers	Prime	88,513.19	88,513.19	121,004.06
Rockfill for Breaker Rock	Prime	432,459.23	432,459.23	591,203.64
Hauling Breakwater Rock on Ice: Site B	Prime	50,324.90	50,324.90	68,797.85
Breakwaters Ice Road Maintenance	Prime	10,795.66	10,795.66	14,758.47
Breakwaters Ice Road Constructuion	Prime	14,508.01	14,508.01	19,833.51
10 Breakwater C (Alternative Measure number 7)	**Prime**	**726,537.75**	**726,537.75**	**993,230.66**
Rockfill Placement for Breakers	Prime	109,854.32	109,854.32	150,178.95
Rockfill for Breaker Rock	Prime	536,728.05	536,728.05	733,746.81
Hauling Breakwater Rock on Ice: Site C	Prime	52,048.81	52,048.81	71,154.56
Breakwaters Ice Road Maintenance	Prime	13,398.57	13,398.57	18,316.83
Breakwaters Ice Road Constructuion	Prime	14,508.01	14,508.01	19,833.51
11 Levees & Floodwalls	**Prime**	**668,288.34**	**714,986.20**	**944,134.44**
11 Fish Pond Levee Breach (Alternative measure 6)	**Prime**	**4,173.98**	**4,371.82**	**5,837.18**
Excavation	**Prime**	**2,836.92**	**2,836.92**	**3,878.27**
Excavate and load, bank measure, medium material, 3-1/2 C.Y. bucket, hydraulic excavator	Prime	1,068.04	1,068.04	1,460.08
Grading Fishway Excavated Surface	Prime	181.14	181.14	247.63
Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip, 3.9 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	1,587.74	1,587.74	2,170.56
Topsoil and Seeding	**Prime**	**1,337.07**	**1,534.91**	**1,958.91**
Topsoil	**Prime**	**643.53**	**643.53**	**879.76**
Placing Topsoil	Prime	465.15	465.15	635.90
Loam or topsoil, remove and stockpile on site, 200 H.P. dozer, 6" deep, 200' haul	Prime	178.38	178.38	243.86
Seeding	**Seeding Contractor**	**693.53**	**891.37**	**1,079.15**
Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	Seeding Contractor	140.00	179.94	217.84
Seeding, apply fertilizer, nitrogen, 1 lb. per M.S.F., sprayed from truck	Seeding Contractor	130.13	167.25	202.49
Soil preparation, mulching, oat straw, 1" deep, power mulcher, small	Seeding Contractor	290.58	373.48	452.15
Watering, water, by truck	Seeding Contractor	132.82	170.70	206.66
11 Diversion Dike A (Alternative measure 2)	**Prime**	**141,001.22**	**143,718.53**	**194,558.89**
Clearing and Grubbing	**Prime**	**17,398.95**	**17,398.95**	**23,785.64**
Clear and grub, cut and chip, heavy trees, to 16" diameter	Prime	7,487.73	7,487.73	10,236.27
Clear and grub, heavy stumps, to 16" diameter, includes loading on site	Prime	2,807.20	2,807.20	3,837.64
Hauling Clearing and Grubbing Material	Prime	7,104.02	7,104.02	9,711.72
Stripping	**Prime**	**2,713.88**	**2,713.88**	**3,710.07**
Loam or topsoil, remove and stockpile on site, 200 H.P. dozer, 6" deep, 200' haul	Prime	2,713.88	2,713.88	3,710.07
Impervious Fill	**Prime**	**106,153.01**	**106,153.01**	**145,118.98**
Placing Impervious Fill	Prime	51,778.98	51,778.98	70,785.68
Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip, 3.9 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	54,374.03	54,374.03	74,333.30
Topsoil and Seeding	**Prime**	**14,735.40**	**17,452.70**	**21,944.19**
Topsoil	**Prime**	**5,209.71**	**5,209.71**	**7,122.06**
Placing Topsoil	Prime	5,209.71	5,209.71	7,122.06
Seeding	**Seeding Contractor**	**9,525.69**	**12,242.99**	**14,822.13**
Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	Seeding Contractor	1,428.00	1,835.35	2,221.99
Seeding, apply fertilizer, nitrogen, 1 lb. per M.S.F., sprayed from truck	Seeding Contractor	583.26	749.65	907.57
Soil preparation, mulching, oat straw, 1" deep, power mulcher, small	Seeding Contractor	5,246.06	6,742.56	8,162.96
Watering, water, by truck	Seeding Contractor	2,268.36	2,915.44	3,529.61
11 Diversion Dike B (Alternative measure 2)	**Prime**	**46,430.91**	**47,349.62**	**64,082.99**

Description	Contractor	DirectCost	CostToPrime	ContractCost
Clearing and Grubbing	**Prime**	**13,919.16**	**13,919.16**	**19,028.51**
Clear and grub, cut and chip, heavy trees, to 16" diameter	Prime	5,990.18	5,990.18	8,189.02
Clear and grub, heavy stumps, to 16" diameter, includes loading on site	Prime	2,245.76	2,245.76	3,070.11
Hauling Clearing and Grubbing Material	Prime	5,683.22	5,683.22	7,769.38
Stripping	**Prime**	**1,105.35**	**1,105.35**	**1,511.09**
Loam or topsoil, remove and stockpile on site, 200 H.P. dozer, 6" deep, 200' haul	Prime	1,105.35	1,105.35	1,511.09
Impervious Fill	**Prime**	**13,715.30**	**13,715.30**	**18,749.83**
Placing Impervious Fill	Prime	5,838.51	5,838.51	7,981.67
Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip, 3.9 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	7,876.79	7,876.79	10,768.15
Topsoil and Seeding	**Prime**	**4,964.91**	**5,883.62**	**7,395.91**
Topsoil	**Prime**	**1,744.32**	**1,744.32**	**2,384.62**
Placing Topsoil	Prime	1,744.32	1,744.32	2,384.62
Seeding	**Seeding Contractor**	**3,220.59**	**4,139.30**	**5,011.29**
Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	Seeding Contractor	482.80	620.52	751.25
Seeding, apply fertilizer, nitrogen, 1 lb. per M.S.F., sprayed from truck	Seeding Contractor	197.20	253.45	306.84
Soil preparation, mulching, oat straw, 1" deep, power mulcher, small	Seeding Contractor	1,773.67	2,279.63	2,759.86
Watering, water, by truck	Seeding Contractor	766.92	985.70	1,193.35
Riprap	**Prime**	**8,336.79**	**8,336.79**	**11,397.00**
R20 Riprap	Prime	4,957.04	4,957.04	6,776.64
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	512.14	512.14	700.13
Excavate and load, bank measure, blasted rock, 3 C.Y. bucket, wheeled loader	Prime	569.87	569.87	779.06
Place Riprap and Bedding for Small Quantities	Prime	2,297.74	2,297.74	3,141.18
Bedding	**Prime**	**4,389.41**	**4,389.41**	**6,000.64**
B1 Bedding	Prime	2,564.52	2,564.52	3,505.89
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	263.72	263.72	360.52
Excavate and load, bank measure, blasted rock, 3 C.Y. bucket, wheeled loader	Prime	293.45	293.45	401.17
Place Riprap and Bedding for Small Quantities	Prime	1,267.72	1,267.72	1,733.06
11 Road Raise (Alternative measure 2)	**Prime**	**239,368.68**	**239,873.33**	**327,568.89**
Stripping	**Prime**	**3,184.06**	**3,184.06**	**4,352.85**
Loam or topsoil, remove and stockpile on site, 200 H.P. dozer, 6" deep, 200' haul	Prime	3,184.06	3,184.06	4,352.85
Impervious Fill	**Prime**	**83,024.43**	**83,024.43**	**113,500.52**
Placing Impervious Fill	Prime	40,497.39	40,497.39	55,362.92
Hauling, excavated or borrow material, loose cubic yards, 1 mile round trip, 3.9 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	42,527.04	42,527.04	58,137.59
Topsoil and Seeding	**Prime**	**2,745.88**	**3,250.52**	**4,088.07**
Topsoil	**Prime**	**976.82**	**976.82**	**1,335.39**
Placing Topsoil	Prime	976.82	976.82	1,335.39
Seeding	**Seeding Contractor**	**1,769.06**	**2,273.70**	**2,752.68**
Seeding, athletic field mix, 450 lb. per acre, mechanical seeding	Seeding Contractor	265.20	340.85	412.66
Seeding, apply fertilizer, nitrogen, 1 lb. per M.S.F., sprayed from truck	Seeding Contractor	108.32	139.22	168.55
Soil preparation, mulching, oat straw, 1" deep, power mulcher, small	Seeding Contractor	974.27	1,252.19	1,515.98
Watering, water, by truck	Seeding Contractor	421.27	541.44	655.50
Roadway Aggregate	**Prime**	**38,674.50**	**38,674.50**	**52,870.89**
Class 5 Aggregate for Road Raise	Prime	38,674.50	38,674.50	52,870.89
Riprap	**Prime**	**73,881.17**	**73,881.17**	**101,001.01**
R20 Riprap	Prime	43,929.65	43,929.65	60,055.07
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	4,538.58	4,538.58	6,204.57
Excavate and load, bank measure, blasted rock, 3 C.Y. bucket, wheeled loader	Prime	5,050.24	5,050.24	6,904.04
Place Riprap and Bedding for Small Quantities	Prime	20,362.71	20,362.71	27,837.32
Bedding	**Prime**	**37,858.64**	**37,858.64**	**51,755.56**

Description	Contractor	DirectCost	CostToPrime	ContractCost
B1 Bedding	Prime	22,118.99	22,118.99	30,238.28
Hauling, excavated or borrow material, loose cubic yards, 2 mile round trip, 3.3 loads/hour, 22 C.Y. rear/bottom dump, off highway haulers	Prime	2,274.59	2,274.59	3,109.53
Excavate and load, bank measure, blasted rock, 3 C.Y. bucket, wheeled loader	Prime	2,531.01	2,531.01	3,460.08
Place Riprap and Bedding for Small Quantities	Prime	10,934.06	10,934.06	14,947.67
11 Louisburg Road Culverts (Alternative Measure number 5)	**Prime**	**237,313.53**	**279,672.89**	**352,086.50**
Dewatering	**Prime**	**26,733.54**	**26,733.54**	**36,546.72**
Cofferdams	**Prime**	**8,291.19**	**8,291.19**	**11,334.67**
Placing Impervious Fill	Prime	2,326.10	2,326.10	3,179.95
Hauling, excavated or borrow material, loose cubic yards, 20 mile round trip, 0.5 loads/hour, 20 C.Y. dump trailer, highway haulers, excludes loading	Prime	5,965.09	5,965.09	8,154.72
Sump Pump	**Prime**	**18,442.35**	**18,442.35**	**25,212.05**
Dewatering, pumping, 8 hr., attended 2 hours per day, 4" discharge pump used for 8 hours, includes 20 L.F. of suction hose and 100 L.F. of discharge hose	Prime	13,258.35	13,258.35	18,125.14
Generator set, portable, gasoline powered, 120/240 V, 2.5 kW	Prime	5,184.00	5,184.00	7,086.91
Removal of Existing Piping	**Prime**	**20,538.22**	**20,538.22**	**28,077.26**
Topsoil stripping and stockpiling, topsoil, sandy loam, adverse conditions, 200 H.P. dozer	Prime	356.76	356.76	487.72
Excavating, trench or continuous footing, common earth, 2 1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	Prime	3,737.26	3,737.26	5,109.11
Selective demolition, water & sewer piping & fittings, concrete pipe, 60"-84", diameter, excludes excavation	Prime	15,411.78	15,411.78	21,069.04
Load and Haul 60" RCP from Site	Prime	1,032.41	1,032.41	1,411.38
Concrete Structures	**Structures Contractor**	**123,021.63**	**157,527.40**	**190,712.51**
Base Slabs	**Structures Contractor**	**33,580.28**	**42,999.06**	**52,057.34**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	14,017.26	17,948.90	21,730.06
C.I.P. concrete forms, slab on grade, depressed, edge, wood, 12" to 24" high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	4,127.74	5,285.51	6,398.97
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	10,357.69	13,262.87	16,056.86
Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	Structures Contractor	2,259.27	2,892.97	3,502.40
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	2,568.38	3,288.77	3,981.59
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	249.94	320.04	387.46
Walls	**Structures Contractor**	**63,327.55**	**81,090.01**	**98,172.62**
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	16,698.83	21,382.60	25,887.12
C.I.P. concrete forms, wall, job built, plywood, to 8' high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	29,668.61	37,990.22	45,993.34
Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	11,380.77	14,572.90	17,642.87
Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	Structures Contractor	4,149.37	5,313.20	6,432.50
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	604.52	774.08	937.15
Concrete finishing, floors, manual screed, bull float	Structures Contractor	825.46	1,056.99	1,279.65
Top Slabs	**Structures Contractor**	**26,113.80**	**33,438.34**	**40,482.54**
C.I.P. concrete forms, elevated slab, flat plate, plywood, to 15' high, 3 use, includes shoring, erecting, bracing, stripping and cleaning	Structures Contractor	7,766.22	9,944.53	12,039.47
C.I.P. concrete forms, slab on grade, depressed, edge, wood, 12" to 24" high, 4 use, includes erecting, bracing, stripping and cleaning	Structures Contractor	653.71	837.07	1,013.41
Structural concrete, ready mix, normal weight, 4500 psi, includes local aggregate, sand, portland cement and water, delivered, excludes all additives and treatments	Structures Contractor	8,532.25	10,925.42	13,226.99
Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	Structures Contractor	6,304.68	8,073.05	9,773.74
Concrete finishing, floors, manual screed, bull float, manual float, manual steel trowel	Structures Contractor	1,315.51	1,684.49	2,039.35
Concrete surface treatment, curing, sprayed membrane compound	Structures Contractor	128.02	163.92	198.46
Structural concrete, placing, elevated slab, pumped, over 10" thick, includes vibrating, excludes material	Structures Contractor	1,413.41	1,809.85	2,191.12
Stoplog Structures	**Structures Contractor**	**28,000.00**	**35,853.59**	**43,406.60**
Stoplogs and Frames	Structures Contractor	28,000.00	35,853.59	43,406.60
Backfill and Restoration of Roadbed	**Prime**	**5,114.76**	**5,114.76**	**6,992.25**
Backfill, trench, 3.25 CY wheel loader	Prime	2,117.18	2,117.18	2,894.34
Compaction, of backfill, structural, 6" lifts, self propelled roller	Prime	1,355.39	1,355.39	1,852.92
Compaction, 2 passes, 24" wide, 6" lifts, walk behind, vibrating roller	Prime	1,642.19	1,642.19	2,245.00
Scour Protection	**Prime**	**19,322.29**	**19,322.29**	**26,414.99**
Earthwork for Preformed Scour Hole	**Prime**	**3,460.84**	**3,460.84**	**4,731.22**
Backfill, dumped gravel or fill, 6" layers, spread, dozer	Prime	927.68	927.68	1,268.21

Description	Contractor	DirectCost	CostToPrime	ContractCost
Excavate and load, bank measure, wet material, 2 C.Y. bucket, hydraulic excavator	Prime	884.50	884.50	1,209.17
Hauling, excavated or borrow material, loose cubic yards, 10 mile round trip, 0.6 load/hour, 16.5 C.Y. dump trailer, highway haulers, excludes loading	Prime	1,648.66	1,648.66	2,253.84
R270 Riprap	**Prime**	**12,508.24**	**12,508.24**	**17,099.69**
R20 to R270 Riprap	Prime	8,546.63	8,546.63	11,683.87
Place Riprap and Bedding for Small Quantities	Prime	3,961.62	3,961.62	5,415.82
B3 Bedding	**Prime**	**3,353.21**	**3,353.21**	**4,584.08**
B3 Bedding	Prime	2,243.96	2,243.96	3,067.65
Place Riprap and Bedding for Small Quantities	Prime	1,109.25	1,109.25	1,516.43
Guardrail	**Prime**	**14,583.10**	**14,583.10**	**19,936.18**
Guide/Guard rail, corrugated steel, galvanized steel posts, install metal guide/guard rail, steel posts 12' - 6" O.C., W6x8 posts	Prime	9,547.57	9,547.57	13,052.23
Vehicle guide rails, guide/guard rai, steel box beam, end assembly	Prime	5,035.54	5,035.54	6,883.95
14 Recreation Features	**Recreation Contractor**	**216,946.94**	**280,579.29**	**339,686.81**
Day Use Facility	**Recreation Contractor**	**87,587.46**	**113,277.59**	**137,140.93**
Picnic Tables	**Recreation Contractor**	**5,516.36**	**7,134.35**	**8,637.29**
Site seating, picnic tables, recycled plastic, various colors, 8' long	Recreation Contractor	3,760.78	4,863.85	5,888.47
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	1,207.72	1,561.95	1,890.99
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	547.86	708.55	857.82
Park Benches	**Recreation Contractor**	**3,654.02**	**4,725.77**	**5,721.32**
Site seating, classic park bench, recycled plastic, various colors, 8' long	Recreation Contractor	2,117.68	2,738.82	3,315.78
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	619.74	801.52	970.37
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	916.59	1,185.44	1,435.16
Vault Toilet	**Recreation Contractor**	**53,000.00**	**68,545.34**	**82,985.27**
Vault Toilet	Recreation Contractor	53,000.00	68,545.34	82,985.27
Trash Receptacles	**Recreation Contractor**	**1,228.68**	**1,589.06**	**1,923.81**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	958.68	1,239.86	1,501.06
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	270.00	349.19	422.76
Recycling Receptacles	**Recreation Contractor**	**614.34**	**794.53**	**961.91**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	479.34	619.93	750.53
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	135.00	174.60	211.38
Information Kiosk with Roof	**Recreation Contractor**	**2,130.00**	**2,754.75**	**3,335.07**
Kiosks, rectangular, 5' x 9' x 7' 6" h, 1/4" fiberglass wall	Recreation Contractor	2,130.00	2,754.75	3,335.07
Accessible Canoe Launch	**Recreation Contractor**	**8,426.03**	**10,897.46**	**13,193.14**
Jetties, docks, floating, polystyrene flotation, galvanized steel frame and wood deck, 8' wide, includes anchors, minimum	Recreation Contractor	8,426.03	10,897.46	13,193.14
Accessible Fishing Structure	**Recreation Contractor**	**1,668.10**	**2,157.37**	**2,611.85**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	1,132.23	1,464.33	1,772.81
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	535.87	693.04	839.04
Accessible Trail to Fishing Structure	**Recreation Contractor**	**11,349.93**	**14,678.96**	**17,771.27**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	9,435.29	12,202.74	14,773.40
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	1,914.64	2,476.22	2,997.87
Parking Lot	**Recreation Contractor**	**23,475.00**	**30,360.41**	**36,756.21**
Topsoil stripping and stockpiling, loam or topsoil, remove and stockpile on site, 200 HP dozer, 6" deep, 300' haul	Recreation Contractor	1,463.69	1,893.00	2,291.79
Compaction, structural, 5 tons, steel wheel tandem roller	Recreation Contractor	248.66	321.60	389.35
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 6" compacted thickness	Recreation Contractor	21,762.64	28,145.81	34,075.08
Minnesota River Landing	**Recreation Contractor**	**24,782.03**	**32,050.80**	**38,802.70**
Trash Receptacles	**Recreation Contractor**	**614.34**	**794.53**	**961.91**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	479.34	619.93	750.53
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	135.00	174.60	211.38
Recycling Receptacles	**Recreation Contractor**	**614.34**	**794.53**	**961.91**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	479.34	619.93	750.53

Description	Contractor	DirectCost	CostToPrime	ContractCost
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	135.00	174.60	211.38
Accessible Fishing Structure	**Recreation Contractor**	**1,003.79**	**1,298.20**	**1,571.69**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	679.34	878.60	1,063.68
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	324.44	419.61	508.00
Accessible Trail to Fishing Structure	**Recreation Contractor**	**4,655.15**	**6,020.55**	**7,288.85**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	3,774.12	4,881.10	5,909.36
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	881.04	1,139.45	1,379.49
Rustic Fishing Structures	**Recreation Contractor**	**15,764.41**	**20,388.25**	**24,683.29**
Public Storm Utility Drainage Piping, concrete, box culvert, precast, base price, 8' long, 10' x 8', excludes excavation or backfill	Recreation Contractor	11,745.20	15,190.16	18,390.16
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	270.34	349.63	423.29
Earthwork	**Recreation Contractor**	**2,759.49**	**3,568.87**	**4,320.70**
Structural excavation for minor structures, bank measure, for spread and mat footings, elevator pits, and small building foundations, sand & gravel, 2 C.Y. bucket, machine excavation, hydraulic backhoe	Recreation Contractor	2,654.49	3,433.07	4,156.29
Compaction, 2 passes, 18" wide,12" lifts, walk behind, vibrating plate	Recreation Contractor	105.00	135.80	164.41
Select Granular Fill	**Recreation Contractor**	**989.39**	**1,279.58**	**1,549.14**
Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel	Recreation Contractor	954.05	1,233.88	1,493.81
Compaction, 2 passes, 18" wide,12" lifts, walk behind, vibrating plate	Recreation Contractor	35.34	45.70	55.33
Information Kiosk with Roof	**Recreation Contractor**	**2,130.00**	**2,754.75**	**3,335.07**
Kiosks, rectangular, 5' x 9' x 7' 6" h, 1/4" fiberglass wall	Recreation Contractor	2,130.00	2,754.75	3,335.07
Upper Pool Landing	**Recreation Contractor**	**6,974.00**	**9,019.53**	**10,919.61**
Trash Receptacles	**Recreation Contractor**	**614.34**	**794.53**	**961.91**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	479.34	619.93	750.53
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	135.00	174.60	211.38
Accessible Fishing Structure	**Recreation Contractor**	**669.19**	**865.47**	**1,047.79**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	452.89	585.73	709.12
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	216.30	279.74	338.67
Accessible Trail to Fishing Structure	**Recreation Contractor**	**3,560.47**	**4,604.79**	**5,574.84**
Sidewalks, driveways, and patios, sidewalk, concrete, cast-in-place with 6 x 6 - W1.4 x W1.4 mesh, broomed finish, 3000 psi, 4" thick, excludes base	Recreation Contractor	2,830.59	3,660.82	4,432.02
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	729.88	943.97	1,142.82
Information Kiosk with Roof	**Recreation Contractor**	**2,130.00**	**2,754.75**	**3,335.07**
Kiosks, rectangular, 5' x 9' x 7' 6" h, 1/4" fiberglass wall	Recreation Contractor	2,130.00	2,754.75	3,335.07
Other Landings	**Recreation Contractor**	**74,128.46**	**95,870.95**	**116,067.36**
Trash Receptacles	**Recreation Contractor**	**2,457.35**	**3,178.12**	**3,847.63**
Trash receptacles, fiberglass, circular, 24" diameter, 30" high, 30 gallon capacity	Recreation Contractor	1,917.35	2,479.73	3,002.12
Concrete Slabs for Trash and Recycling Receptacles	Recreation Contractor	540.00	698.39	845.51
Rustic Fishing Structures	**Recreation Contractor**	**63,151.10**	**81,673.85**	**98,879.46**
Public Storm Utility Drainage Piping, concrete, box culvert, precast, base price, 8' long, 10' x 8', excludes excavation or backfill	Recreation Contractor	46,980.78	60,760.64	73,560.63
Base course drainage layers, aggregate base course for concrete slabs and capillary water barrier, 1" minus graded gravel, 4" compacted thickness	Recreation Contractor	1,216.03	1,572.70	1,904.01
Earthwork	**Recreation Contractor**	**11,037.97**	**14,275.49**	**17,282.80**
Structural excavation for minor structures, bank measure, for spread and mat footings, elevator pits, and small building foundations, sand & gravel, 2 C.Y. bucket, machine excavation, hydraulic backhoe	Recreation Contractor	10,617.95	13,732.29	16,625.16
Compaction, 2 passes, 18" wide,12" lifts, walk behind, vibrating plate	Recreation Contractor	420.01	543.21	657.64
Granular Fill	**Recreation Contractor**	**3,916.32**	**5,065.01**	**6,132.02**
Borrow, select granular fill, 1 C.Y. bucket, loading and/or spreading, shovel	Recreation Contractor	3,776.45	4,884.11	5,913.01
Compaction, 2 passes, 18" wide,12" lifts, walk behind, vibrating plate	Recreation Contractor	139.88	180.91	219.02
Information Kiosk with Roof	**Recreation Contractor**	**8,520.00**	**11,018.99**	**13,340.27**
Kiosks, rectangular, 5' x 9' x 7' 6" h, 1/4" fiberglass wall	Recreation Contractor	8,520.00	11,018.99	13,340.27

MARSH LAKE DAM ROADWAY BRIDGE ESTIMATE PROVIDED

BY MINNESOTA DEPARTMENT OF TRANSPORTION (MNDOT)

BRIDGE COST ESTIMATOR

DATE: 2/25/2011

JEFF SOUTHWARD
2-25-11

PROPOSED 5 SPAN Bridge (CORP OF ENGINEER)

Assumptions:

1. width = 1.6667' + 6(shld) + 12(Lane) + 12(Lane) + 6 (shld) + 1.667 = 39.33' out to out
2. L = 450'
3. USED MN DOT 36M PSCB W 4.1' ± Depth of Structure
4. 3 piers @ abut + wall piers w/ 16" CIP 85' LONG)
5. 1 PIER (FIXED) w/ Footing w/ 16" CIP 75' LONG)
6. 2 - PARAPET TYPE ABUTS w/ 5' EXPOSURE 12" CIP 75' LONG
7. NO REMOVAL OF EXISTING STRUCTURE included
8. NO MARINE ACCESS Required
9. NO Aesthetic COSTS added
10. NO RISK OR CONTINGENCY ADDED

39.3333 x 450 = 17,700 SF

Supper Structure

Deck	17,700	x $13.00/SF	= $230,100
Epoxy Reinf	142,000	x $1.10/#	= $156,200
Frail	968	x $65/LF	= $62,920
36M	2700	x $180/LF	= $486,000
Bearings	60	x $800/Each	= $48,000
Exp Joint	150	x $150/LF	= $22,500
			$1,005,720 ($56.82/SF)

Abuts

Structure Exc	1	x $5000/LS	= $5,000
Footing Conc.	100	x $350/CY	= $35,000
" Reinf	10,000	x $1.00/LB	= $10,000
Stem Conc	184	x $600/CY	= $110,400
" Rienf	23,000	x $1.10/lb	= $25,300
12" CIP Piles	2,400	x $40/LF	= $96,000
			$281,700 ($15.92/SF)

Pier 1

Structure Ex	1	x $2,500/LF	= $2,500
39 x 3 x 7 Stem Concret	91	x $600/cy	= $54,600
" Rienf	11,500	x $1.10/lb	= $12,650
16" CIP Piles	850	x $50/LF	= $42,500
			$112,250 ($6.35/SF)

Pier 3 $112,250 ($6.35/SF)

Pier 4 $112,250 ($6.35/SF)

PIER 2

STRUCTURE EXC	1 X	$20,000/LS	= $20,000
42X6X3.5 FOOTING CONC	36 X	$350/CY	= $12,600
" REBAR	3600 X	$1.00/LB	= $3,600
STEM CONC	91 X	$600/CY	= $54,600
" REINF	11,500 X	$1.10/LB	= $12,600
16" CIP PILES	900 X	$50/LF	= $45,000
			$148,400 ($8.38/SF)

Superstructure → $1,005,720 ($56.82/SF)

Abutments	$ 281,700
PIER 1	$ 112,250
" 2	$ 148,400
" 3	$ 112,250
" 4	$ 112,250

Substructure → $766,850 ($43.5%/SF)

APP PANELS $26,500 ($1.50/SF)

$1,799,070 ($101.65/SF)

MISC MISSING ITEMS ±5% $90,000

MOBILIZATION ± 5% $95,000

1,984,070 SAY $2,000,000

OPERATION AND MAINTENANCE FEASIBILITY ESTIMATE				*Life Cycle 50 Years *Rate of Return 4.125%	
MARSH LAKE				EQUIVALENT AVERAGE ANNUAL O&M / MAJOR REPLACEMENT VALUE	
ACCOUNT CODE	ITEM DESCRIPTION	ESTIMATED O&M CYCLE	% ORIGINAL QUANTITY TO REPLACE	PRESENT VALUE	ANNUAL COST
				$1,325,446	$63,026
	Inspections				
	Periodic Inspections				
	Every 5 years	5 Yrs		$77,461	$3,683
	Routine Annual Inspections	1 Yr		$78,863	$3,750
	Total Inspections			$156,323	$7,433
		Yrs			
02	Relocations				
	2 Two Lane Bridge				
	Deck Area	20 Yrs	10%	$106,659	$5,072
03	Reservoirs				
	3 Fishway				
	Rockfill Boulders	10 Yrs	10%	$23,812	$1,132
	Riprap for Channel Bed	10 Yrs	10%	$75,615	$3,596
	Bedding for Channel Bed	10 Yrs	10%	$20,395	$970
	4 Drawdown Structure				
	Concrete Structure				
	Concrete Wall for Structure	20 Yrs	5%	$19,295	$917
	Downstream Concrete Apron	20 Yrs	5%	$18,991	$903
	Concrete Walkway	20 Yrs	5%	$3,430	$163
	Railing Pipe	20 Yrs	100%	$8,365	$398
	Stoplogs (per bay)	10 Yrs	5%	$30,066	$1,430
	Scour Protection D/S of Struct				
	R270 Riprap	10 Yrs	10%	$137,345	$6,531
	B3 Bedding	10 Yrs	10%	$37,843	$1,799
	Embankments on Side of Fishway and				
	3 Drawdown Structure				
	4 Impervious Fill	10 Yrs	5%	$34,753	$1,653
	Topsoil	10 Yrs	5%	$2,366	$112
	Seeding	10 Yrs	5%	$1,503	$71
	Mowing	1 Yr	100%	$12,955	$616
	Spray Weeds & Brush on Riprap	1 Yr	100%	$5,687	$270
	Existing Spillway				
	Concrete for Spillway Crest	20 Yrs	5%	$2,165	$103
	3 Pedestrian Bridge over Spillway				
	Concrete Deck	20 Yrs	5%	$1,745	$83
10	Breakwaters				
	7 Breakwater A	10 Yrs	5%	$169,206	$8,046
	7 Breakwater B	10 Yrs	5%	$115,700	$5,502
	7 Breakwater C	10 Yrs	5%	$143,597	$6,828
11	Levees and Floodwalls				
	2 Levees				
	Levee Fill	10 Yrs	5%	$36,793	$1,750
	Topsoil	10 Yrs	5%	$4,942	$235
	Seeding	10 Yrs	5%	$3,116	$148
	Mowing	1 Yr	100%	$27,760	$1,320
	Spray Weeds & Brush on Riprap	1 Yr	100%	$2,524	$120
	Roadway Aggregate	5 Yrs	5%	$15,465	$735
	Riprap	10 Yrs	10%	$29,565	$1,406
	Bedding	10 Yrs	10%	$15,190	$722
	5 Lousiburg Road Culverts				
	Concrete Structure	20 Yrs	2%	$5,027	$239
	Stoplog Structure	10 Yrs	5%	$5,906	$281
	Riprap: Scour Hole	10 Yrs	10%	$4,653	$221
	Bedding: Scour Hole	10 Yrs	10%	$1,247	$59
14	Recreation Facilities	10 Yrs	5%	$45,442	$2,161
	Total O&M			$1,325,446	$63,026

NOTE 1: UNIT PRICING INCLUDES CONTINGENCIES AND QUANTITY ADJUSTMENT FACTORS

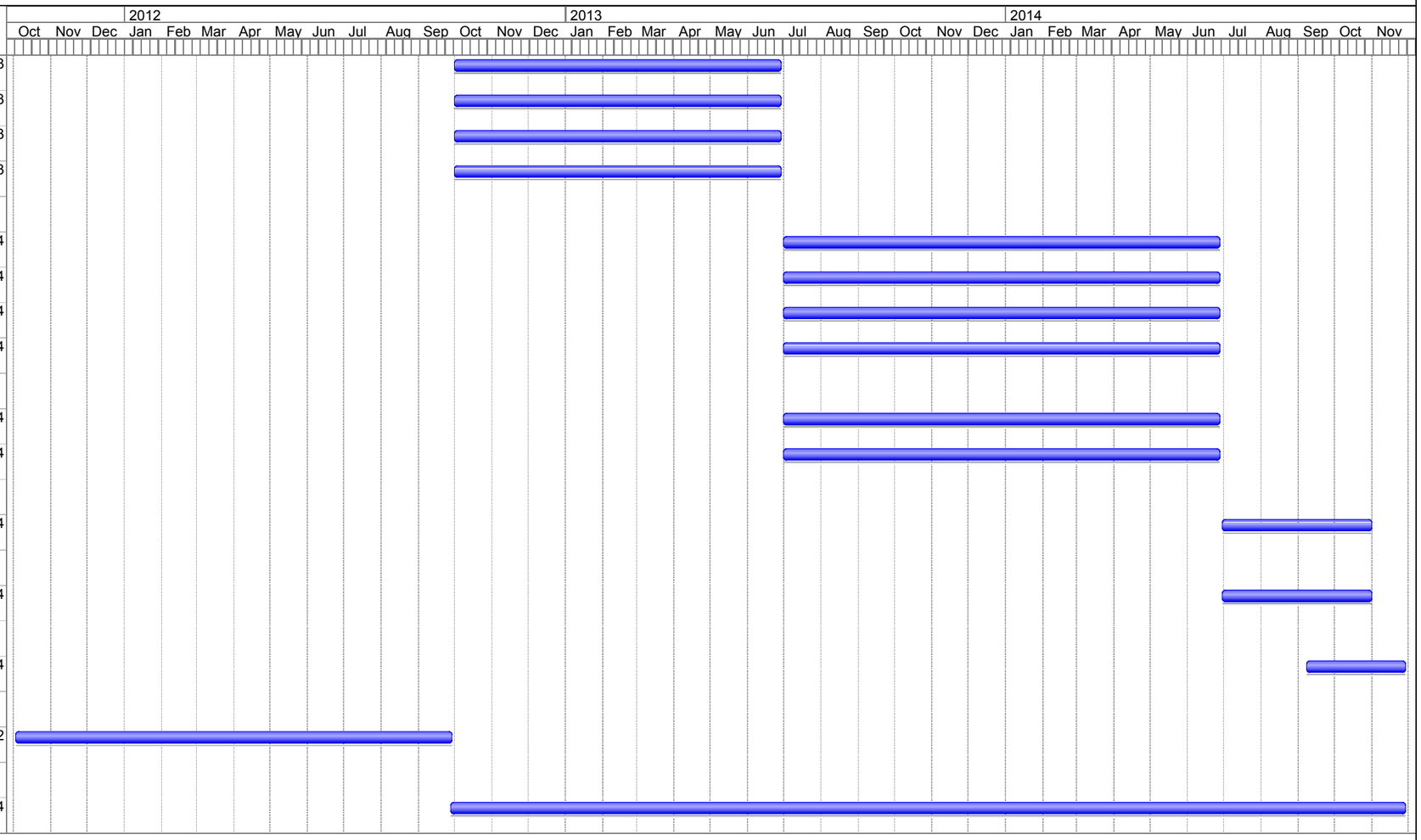
PRICING FOR APRIL 2010

MARSH LAKE ECOSYSTEM RESTORATION PROJECT
PROJECT DEVELOPMENT PLAN: FEASIBILITY STUDY
ABBREVIATED RISK ANALYSIS

		Selected Work Breakdown Structure Items													
		TWO LANE BRIDGE	FISHWAY	DRAWDOWN STRUCTURE	EMBANKMENTS D/S FISHWAY & DRAWDOWN STRUCTURE	MODIFY EXISTING SPILLWAY	PEDESTRIAN BRIDGE OVER SPILLWAY	BREAKWATERS A, B, & C	DIVERSION DIKES A & B	ROAD RAISE	LOUISBURG ROAD CULVERTS	RECREATION FACILITIES	REMAINING CONSTRUCTION ITEMS	PLANNING, ENGINEERING, & DESIGN	CONSTRUCTION MANAGEMENT
Typical Risk Elements	Project Scope	2	1	2	2	2	2	1	1	1	1	1	-	2	2
	Acquisition Strategy	2	2	2	2	2	2	2	2	2	2	2	2	-	4
	Construction Complexity	2	2	2	2	4	2	2	2	-	1	-	-	-	3
	Volatile Commodities	2	3	3	-	1	3	3	1	1	1	3	-	-	-
	Quantities	2	4	3	3	-	2	2	2	2	1	1	-	-	2
	Fabrication & Project Installed Equipment	2	-	2	-	-	4	-	-	-	2	1	-	-	1
	Cost Estimating Method	2	2	2	2	2	2	1	1	1	2	2	1	-	2
	External Project Risks	2	2	2	2	2	1	4	2	3	2	1	1	1	2
Weighted Summation		16	16	18	13	13	18	15	11	10	12	11	4	3	16
Weighted %		33.3%	33.3%	37.5%	27.1%	27.1%	37.5%	31.3%	22.9%	20.8%	25.0%	22.9%	8.3%	6.3%	33.3%

MARSH LAKE DAM ECOSYSTEM RESTORATION
ESTIMATED PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish
1	2 Two Lane Bridge	195 days	Mon 10/1/12	Fri 6/28/13
2	11 Diversion Dike A	195 days	Mon 10/1/12	Fri 6/28/13
3	11 Diversion Dike B	195 days	Mon 10/1/12	Fri 6/28/13
4	11 Road Raise	195 days	Mon 10/1/12	Fri 6/28/13
5				
6	3 Fishway	260 days	Mon 7/1/13	Fri 6/27/14
7	3 Mod Exist Spillway	260 days	Mon 7/1/13	Fri 6/27/14
8	3 Ped Bridge Over Spillway	260 days	Mon 7/1/13	Fri 6/27/14
9	3 Embank D/S Spillway	260 days	Mon 7/1/13	Fri 6/27/14
10				
11	3 Embank D/S Drawdown	260 days	Mon 7/1/13	Fri 6/27/14
12	3 Drawdown Structure	260 days	Mon 7/1/13	Fri 6/27/14
13				
14	11 Louisburg Road Culverts	90 days	Mon 6/30/14	Fri 10/31/14
15				
16	11 Fish Pond Levee Breach	90 days	Mon 6/30/14	Fri 10/31/14
17				
18	14 Recreation Facilities	60 days	Mon 9/8/14	Fri 11/28/14
19				
20	30 Planning, Eng, &Design	260 days	Mon 10/3/11	Fri 9/28/12
21				
22	31 Supervision & Administration	566 days	Fri 9/28/12	Fri 11/28/14



Project: Marsh Lake Project Schedule.
Date: Thu 3/31/11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Appendix H – Geotechnical

Report Revisions Post-ATR Comments, March 25, 2011

Marsh Lake Dam

Ecosystems Restoration Feasibility Study

Geology and Geotechnical Appendix

OCTOBER 2010

APPENDIX H-i

TABLE OF CONTENTS

1. PURPOSE:

This appendix presents the general geology and specific geotechnical analysis for the Marsh Lake project.

2. SELECTED PLAN SUMMARY:

The tentatively selected plan features that require geotechnical input are listed below followed by their geotechnical-input requirement:

- Modifications to the Marsh Lake Dam to enable passive and active water level management. Provide structural section with soil parameters.
- Restore the Pomme de Terre River to its former channel near its confluence with the Minnesota River. Construct a bridge over the Pomme de Terre River to maintain access to the Marsh Lake Dam. Compute stable slopes, estimate settlement, and find suitable borrow.
- Provide for fish passage between Lac qui Parle Lake and Marsh Lake and the Pomme de Terre River. Design riprap and bedding.
- Construct rock wave-break islands in Marsh Lake to reduce wind fetch, wave action, and sediment resuspension to restore aquatic vegetation. Estimate amount of displacement expected.
- Install gated culverts in the Louisburg Grade Road to enable water level management in upper Marsh Lake. Design riprap and bedding.
- Construct recreational and educational features including a trail bridge over Marsh Lake Dam to connect with the Minnesota State Trail, fishing access on Marsh Lake, canoe access on the Pomme de Terre River, and an improved recreation area at Marsh Lake Dam. Provide structural section with soil parameters.

The selected plan is shown in the main report. Table H-1 below lists the approximate quantities of the various project features of the proposed plan along with their respective geotechnical design aspects.

Table H-1

Feature	Approximate Quantity	Geotechnical Design Aspects
Topsoil	4,000 yd^3	-Locate borrow area if not enough stripping
Excavation	35,000 yd^2	-Locate disposal area if excess
Diversion Dikes, Containment Levees (impervious fill)	35,000 yd^3	-Compute stable side slopes -Estimate settlement/displacement -Find and control areas of high seepage gradients -Locate borrow or disposal area
Breakwater Structures, Fishway Structure	125,000 TON	-Rock gradation -Rock source -Estimate settlement/displacement
Drawdown Structure	1	-Cofferdam design -Seepage analyses -Foundation design (bearing and settlement)
Louisburg Road Culverts	3	-Seepage check -Riprap design for pipe inlet/outlet
Bridges	2	Design of bridge foundations

The cost estimate assumed a sheet pile cofferdam and a thirty day dewatering effort to allow construction of the drawdown structure. The bridge over the Pomme de Terre River assumed a pile foundation. Assumptions and costs for this bridge were provided by the Minnesota DOT.

3. TOPOGRAPHY and PHYSIOGRAPHY

As the last glaciers in the southern Minnesota area retreated northward above the continental divide at Browns Valley and into the Red River Valley, vast Lake Agassiz - headwaters of the glacial River Warren - was formed. The River Warren, flowing to the southeast, began cutting and shaping the Minnesota Valley to its present form. Eventually, the retreating ice margin uncovered lower outlets, and Lake Agassiz, now draining to the north, was reduced to such a low elevation that River Warren ceased to flow. In its place, the Minnesota River became established.

The 2020 square mile, Upper Minnesota River Watershed, is one of the 13 major watersheds of the Minnesota River Basin. Situated within the Northern Glaciated Plains Ecoregion, the watershed can further be divided into three geomorphic settings: the headwaters flowing off the Coteau des Prairies, the lower basin-situated within the Blue Earth Till Plain, and the Minnesota River Valley-carved by the glacial River Warren.

The portion of the watershed within the Blue Earth Till Plain is represented by nearly level to gently sloping lands, ranging from 0-6% in steepness. Soils are predominantly loamy, with landscapes having a complex mixture of well and poorly drained soils. Drainage of depressional areas is often poor, and tile drainage is common. Water erosion potential is moderate on much of the land within this geomorphic setting.

The Coteau des Prairies or Highland of the Prairies, so named by French explorers, is a morainal plateau that occupies the headwaters of the Upper Minnesota River and several other rivers. In addition to being an impressive topographic barrier, the Coteau acts as an important drainage divide. Its well drained southwestern side sheds water into the Big Sioux River, while waters on the northeastern side flow into the Des Moines and Minnesota Rivers. The Coteau is characterized by landscapes with long northeast facing slopes which are undulating to rolling (2-18%). Soils are predominantly loamy and well drained.

Tributaries draining the Coteau and entering the Upper Minnesota River from South Dakota include the Little Minnesota River - headwaters of Big Stone Lake and the Whetstone River. Alluvial deposits at the mouth of the Whetstone River formed a natural dam and originally impounding Big Stone Lake. In 1973 a diversion was completed that directed flows of the Whetstone River directly into Big Stone Lake. Further modifications were made in the late 1980's with the completion of the Big Stone/Whetstone River Control Structure. This structure can redirect up to 1460 cubic feet per second (cfs) of flow from the Whetstone directly into the Minnesota River, bypassing the deposition of unwanted sediments and nutrients into Big Stone Lake during high flow periods.

Below Ortonville, the Minnesota is a small but distinct river. It flows for fifteen miles, passing through the Big Stone-Whetstone Reservoir (constructed during the 1970's) and further down receives the waters of the Yellow Bank River whose headwaters are also in South Dakota. The Upper Minnesota then meets Marsh Lake and Lac Qui Parle (meaning

the Lake Which Talks). Both Marsh and Lac Qui Parle lakes are natural impoundments, dammed by alluvial fans of sediment deposited at the mouths of two major tributaries, the Pomme De Terre and Lac Qui Parle rivers respectively. The Pomme De Terre River comes down from the hills of the lake country to the north. The Lac Qui Parle River originates in the Coteau des Prairies, flows northeast through the prairies of the southwest, then confluences with the Minnesota River by Watson. Although they are natural reservoirs, the lakes were subject to some natural fluctuation; thus dams were built at the outlets for greater water control. The outlet of the Upper Minnesota River Watershed is below the Lac Qui Parle Reservoir, 288 miles upstream from the mouth of the Minnesota River.

Counties within the watershed include sections of Big Stone, Chippewa, Lac Qui Parle, Swift and Traverse. Land use within the watershed is primarily agricultural, with 76% of the available acres utilized for production of grain crops, mainly corn and soybeans. Of these acres, approximately 15% have been tiled to improved drainage. The majority of the crop-lands (82%) are classified as moderately productive. As of 1994, roughly eight percent of the agricultural acres within the Upper Minnesota River Watershed were classified as grasslands enrolled in the Conservation Reserve Program (CRP), a voluntary federal program that offers annual rental payments to farmers in exchange for planting areas of grass and trees on lands subject to erosion. Approximately thirty nine percent of the lands draining into the Upper Minnesota River have a high water erosion potential and twenty six percent have the potential for significant wind erosion. Water erosion potential is highest on lands draining the Coteau region.

4. REGIONAL GEOLOGY and STRATIGRAPHY

Marsh Lake is part of the Minnesota River flowage. The pertinent geology and stratigraphy are related to the last glacier that retreated from the area approximately 14000 years ago. As the glacier retreated north, the melting ice margin headed the ancestral Minnesota River. The glacier eventually retreated north of the topographic divide, near Browns Valley, and meltwater ponded behind the divide to form Glacial Lake Agassiz. When the meltwater raised the lake enough to overtop the drainage divide, a southern outlet stream, the River Warren, discharged from the lake. The River Warren carved the present oversized valley now occupied by the Minnesota River. Lake Agassiz ultimately drained to the northeast, allowing the Minnesota River to aggrade and adjust to the local conditions. The original Marsh Lake was formed by the damming effect of a delta at the mouth of the Pomme de Terre River. The present Marsh Lake is ponded behind a man-made embankment nearly two miles long that connects the lower river valley walls at elevation 950.

Bedrock- Bedrock lies at an estimated depth greater than 200 feet beneath the glacial sediments in the region. The bedrock is likely composed of Paleozoic Era, Cretaceous Period sedimentary rock or granitic intrusive rocks. The bedrock lies well below the influence of the proposed project.

Glacial Till- Overlying the bedrock are the numerous till layers that were deposited

predominately out of the Des Moines lobe, though some older units are encountered in the area. Dark gray, medium stiff to hard, sandy, gravelly till was encountered in boring 09-15M at 930 feet and older borings taken in 1972 and 1986 show the average till elevation is about 927 feet except for the area just east of the concrete dam where the till surface dips to about 885. A two to three-foot- thick zone of soft to medium stiff reworked or disturbed till tops the firm till beneath the west portion of the embankment. Till deposits vary in thickness from over 300 feet deep within the Bigstone Moraine, north of the project area, to nonexistent at exposed bedrock along the Minnesota River farther downstream.

Stream sediment from Glacial River Warren- As the River Warren flowed through the underlying till it both cut channels and deposited sediments. These deposits are found as stratified sand and gravel bars, and may be interbedded with finer sediments from stagnant periods, as seen in borehole 09-17M. This unit is found locally at elevation 935 feet, and extends below the end of the borehole at elevation 905.5.

Present day Alluvium- Recent, upper level soils consist of stream sediments of the Pomme de Terre River, channel fill of organics and clays and lake sediments from Marsh Lake. Varying OH, OL and CH are encountered in most boreholes, and these fine sediments vary in thickness depending on the depositional mechanism, and the channel topography from the stream cuts. The upper portion of the alluvium is commonly highly organic and very soft to medium stiff. The lower portion is sparsely organic and stiff. It contains shells, and ranges from black to greenish gray to gray.

Embankment fill- Borings taken in 1972 and 1986, and 09-16M show the embankment material averages fourteen feet in thickness and is clay, variably silty and sandy with minor amounts of organics and roots.

5. SEISMIC RISK and EARTHQUAKE HISTORY

According to Corps of Engineers Regulation ER 1110-2-1806, Earthquake Design Analysis for Corps of Engineers Projects, the entire state of Minnesota is located within earthquake Seismic Risk Zone 0. The Uniform Building Code of the International Conference of Building Officials assigns every location in the United States to a four grade Seismic Risk Zone (0 = least risk, 3 = greatest risk).

In Minnesota there are few faults that could possibly affect the project. The Morris fault extends diagonally from the town of Morris, Minnesota to the Brainerd area in west-central Minnesota, roughly 30 miles southeast of Marsh Lake. The Morris fault, it is confined to the Precambrian bedrock and is not considered tectonically active, although some seismic activity has been associated with the Morris fault. In 1975, an earthquake with a Modified Mercalli Intensity of VI occurred near the town of Morris. This earthquake occurred about 10 miles west-northwest

of Morris at a depth of 3-5 miles. It is one of the best documented earthquakes in Minnesota history, and possibly the largest. In Fargo and in Valley City, North Dakota, a Modified Mercalli Intensity of II (felt by persons at rest, on upper floors, or favorably placed) was assigned for this event. However, it was not felt north of Grand Forks, North Dakota. The Modified Mercalli Intensity Scale ranges from I (not felt) to XII (damage nearly total). Five other earthquakes have been linked to the Morris fault since the year 1860. The most recent earthquake in Minnesota occurred along the western edge of the Morris fault in 1993 near the town of Graceville. It had a magnitude of 4.1 on the Richter scale and a Mercalli Intensity of V. The Graceville earthquake occurred at an estimated depth of 7 miles.

Eighteen recorded earthquakes have occurred in Minnesota since 1860. Some are associated with glacial isostatic rebound, particularly in the northeast region of the state near Duluth. No earthquake has exceeded the magnitude or intensity of the Morris event in 1975. An approximate frequency of between 10 and 30 years has been established for minor earthquakes in Minnesota. The seismic risk assessment for the Red River Valley region relies largely on earthquake history. The absence of major or catastrophic earthquakes, coupled with the infrequency of these earthquakes in general, implies an extremely low risk level for seismic activity in the vicinity of Marsh Lake.

6. SUBSURFACE INVESTIGATIONS

A total of 21 soil borings including several test pits and several hand augers were advanced by the St. Paul District in the project area in the years from 1972 through 2009. However, for the selected plan, the 5 borings shown on Plates H-3 taken in 2009 contain the most relevant geotechnical information. Therefore, only these boring locations and logs are presented on Plate H-1 through H-3. Borings 09-18A through 09-21A are short, hand auger borings taken for environmental sampling and provide no meaningful geotechnical information. As a result, these borings were not included on Plate H-3. Limited index testing was completed to delineate the contact between the different geologic units. Tests taken from samples consist of Atterberg limits, natural moisture content, consolidation, and triaxial compression tests. Results of the all the laboratory tests taken in the Marsh Lake Dam area are shown on the Plate H-5. Table H-2, below, summarizes the consolidation tests results:

Table H-2: Consolidation Testing Summary

Formation	LL	PL	PI	Liquidity	ω_0	C_c	e_o	γ_{sat}	γ_{moist}	OCR
09-15MU - OL	47	16	31	0.60	34.7%	0.37	1.025	112.9	109.5	2.5
09-17MU - OH	81.2%	31.4%	49.8%	0.73	68.0%	0.53	1.755	97.7	97.4	1.0

7. SITE HYDROGEOLOGY

Currently insufficient data exists for a detailed site specific groundwater characterization at the Marsh Lake project site. Commonly, groundwater levels in the project area are high. Groundwater will be located within ten feet below the ground surface. Water levels fluctuate

seasonally, with fall /winter conditions exhibiting the lowest measured water levels as might be expected.

8. CONSTRUCTION MATERIALS

Borrow Source. The impervious dike borrow will tentatively be obtained from an area shown on Plate H-4. Archeological investigations must be completed before any borrow sites may be used for the project. In addition, geotechnical characterization of the borrow site must occur prior to approval. The investigation should determine the thickness of topsoil present, the thickness and suitability of foundation soils for impervious borrow, and the natural moisture content and Proctor density of the soils.

Concrete Aggregate, Riprap, and Bedding. Sources for fine and coarse concrete aggregate, bedding, and riprap should be available locally. Most commercial aggregates in the Marsh Lake vicinity are obtained from sand and gravel deposits, and quarried rock located along the Minnesota River valley within 40 miles of the project site. Additional investigations will be necessary prior to plans and specifications in order to accurately quantify and test the quality of the stone product available within a reasonable radius of the area.

9. SETTLEMENT AND DISPLACEMENT:

The computer program CSETT was used to estimate the consolidation settlement expected. However, the two consolidation tests that were done for this project resulted in C_c and e_0 that varied by the formation sampled, as shown in the testing summary above in Table H-2. Soil stratigraphy from boring no. 09-17M was used to compute settlement for the diversion dike and boring no. 09-15M was used for the road raise. The CSETT input for both the diversion dike and the road raise is shown on Plate H-6 with the output on Plate H-7. The road raise was computed for two loads. The existing embankment was the first load and the proposed road raise was the second. No overbuild for settlement was included for Diversion Dike B. Table H-5 summarizes the results, below:

Table H-5: Computed Settlement

Feature	Diversion Dike A (Base Elev. 940)	Road Raise
Settlement (inches)	20	8

10. SLOPE STABILITY:

Criteria in EM 1110-2-1902 were used for this analysis. The following tables in this EM define shear strengths, pore pressures, and Factors-of-safety required for static design conditions:

Table 2-1
Shear Strengths and Pore Pressures for Static Design Conditions

Design Condition	Shear Strength	Pore Water Pressure
During Construction and End-of-Construction	Free draining soils – use drained shear strengths related to effective stresses[1]	Free draining soils – Pore water pressures can be estimated using analytical techniques such as hydrostatic pressure computations if there is no flow, or using steady seepage analysis techniques (flow nets or finite element analyses).
	Low-permeability soils – use undrained strengths related to total stresses[2]	Low-permeability soils – Total stresses are used; pore water pressures are set to zero in the slope stability computations.
Steady-State Seepage Conditions	Use drained shear strengths related to effective stresses.	Pore water pressures from field measurements, hydrostatic pressure computations for no-flow conditions, or steady seepage analysis techniques (flow nets, finite element analyses, or finite difference analyses).
Sudden Drawdown Conditions	Free draining soils – use drained shear strengths related to effective stresses.	Free draining soils – First-stage computations (before drawdown) – steady seepage pore pressures as for steady seepage condition. Second- and third-stage computations (after drawdown) – pore water pressures estimated using same techniques as for steady seepage, except with lowered water level.
	Low-permeability soils – Three-stage computations: First stage--use drained shear strength related to effective stresses; second stage--use undrained shear strengths related to consolidation pressures from the first stage; third stage--use drained strengths related to effective stresses, or undrained strengths related to consolidation pressures from the first stage, depending on which strength is lower – this will vary along the assumed shear surface.	Low-permeability soils – First-stage computations--steady-state seepage pore pressures as described for steady seepage condition. Second-stage computations – total stresses are used; pore water pressures are set to zero. Third-stage computations -- same pore pressures as free draining soils if drained strengths are used; pore water pressures are set to zero where undrained strengths are used.

[1] Effective stress shear strength parameters can be obtained from consolidated-drained (CD, S) tests (direct shear or triaxial) or consolidated-undrained (CU, $\bar{R}$) triaxial tests on saturated specimens with pore water pressure measurements. Repeated direct shear or Bromhead ring shear tests should be used to measure residual strengths. Undrained strengths can be obtained from unconsolidated-undrained (UU, Q) tests. Undrained shear strengths can also be estimated using consolidated-undrained (CU, R) tests on specimens consolidated to appropriate stress conditions representative of field conditions; however, the "R" or "total stress" envelope and associated c and ϕ, from CU, R tests should not be used.

[2] For saturated soils use $\phi = 0$. Total stress envelopes with $\phi > 0$ are only applicable to partially saturated soils.

Table 3-1
Minimum Required Factors of Safety: New Earth and Rock-Fill Dams

Analysis Condition[1]	Required Minimum Factor of Safety	Slope
End-of-Construction (including staged construction)[2]	1.3	Upstream and Downstream
Long-term (Steady seepage, maximum storage pool, spillway crest or top of gates)	1.5	Downstream
Maximum surcharge pool[3]	1.4	Downstream
Rapid drawdown	1.1-1.3[4,5]	Upstream

[1] For earthquake loading, see ER 1110-2-1806 for guidance. An Engineer Circular, "Dynamic Analysis of Embankment Dams," is still in preparation.
[2] For embankments over 50 feet high on soft foundations and for embankments that will be subjected to pool loading during construction, a higher minimum end-of-construction factor of safety may be appropriate.
[3] Pool thrust from maximum surcharge level. Pore pressures are usually taken as those developed under steady-state seepage at maximum storage pool. However, for pervious foundations with no positive cutoff steady-state seepage may develop under maximum surcharge pool.
[4] Factor of safety (FS) to be used with improved method of analysis described in Appendix G.
[5] FS = 1.1 applies to drawdown from maximum surcharge pool; FS = 1.3 applies to drawdown from maximum storage pool. For dams used in pump storage schemes or similar applications where rapid drawdown is a routine operating condition, higher factors of safety, e.g., 1.4-1.5, are appropriate. If consequences of an upstream failure are great, such as blockage of the outlet works resulting in a potential catastrophic failure, higher factors of safety should be considered.

Soils parameters for various formations are shown below in Table H-3 for the Marsh Lake borings.

Table H-3

	Unit weights		Unconsolidated-Undrained Strengths (UU)		Consolidated-Drained Strengths (CD)	
	Moist (pcf)	Saturated (pcf)	c in psf	ϕ in degrees	c' in psf	ϕ' in degrees
COMPACTED DIKE FILL (ESTIMATED FROM EARTH MANUAL)	120	120	(1300)	(0)	(0)	(25)
OH DEPOSITS TESTED (ESTIMATED)	97	97	140	0	(0)	(20)
OL DEPOSITS TESTED (ESTIMATED)	110	115	(840)	(0)	200	30
CL TESTED (ESTIMATED)	110	115	(840)	(0)	200	30
CH TESTED (ESTIMATED)	97	97	140	0	(0)	(25)
SM (ESTIMATED)	130	130	- -	- -	(0)	(33)
GW (ESTIMATED)	130	135	- -	- -	(0)	(30)

End-of-Construction (EOC) and steady state seepage design conditions apply to the diversion dikes. These stability cases were analyzed using the computer program SLOPE/W with the soil stratigraphy from boring number 09-17M. Slope stability calculations were completed using the shear strengths and unit weights shown in Table H-3, above. The pool was set equal to elevation 947.1 or maximum storage pool and the toe of slope equal to 936 for the thalweg sections and

940 for the overbank section. UU-strength values for the compacted dike fill was obtained from the *Earth Manual,* Third Edition, 1998, Table 1-3 on page 50 assuming a CL soil is used for construction. For the EOC case, shear strengths obtained from Unconsolidated-Undrained triaxial testing results were used for design. Long-term stability cases utilized CD-shear strengths, fully softened friction angles with zero cohesion, obtained from Figure 5.18 in "Soil Strength and Slope Stability", 1st Edition, page 50 (J. Michael Duncan and Stephen Wright, 2005).

The overbank portion of Dike A assumes a 40 foot toe drain and a tail water of 942.0. The toe drain was needed to draw the phreatic surface away from the downstream embankment slope, in order to meet the long-term minimum required factor of safety. The steepest stable slope computed for the Dike A was 1V:4H. In order to achieve an adequate factor of safety for the Dike A, berms with a 45 foot top width; a top elevation of 940; and side slopes of 1V:4H were needed upstream and downstream. Diversion Dike B did not require a toe drain or stability berms to meet minimum required factors of safety. Selected stability analyses were checked and confirmed with the computer program UTEXAS4. All of the SLOPE/W results are shown in Table H-4 below. In all the cases, the required minimum factors of safety were met. The critical results from the stability analyses (shown in red in Table H-4) are presented on Plates H-8.

Table H-4: Computed Factor-of-Safety

			Block		Circular			
Embankment Section	Shear Strength	FS Required	Optimized	Non-opt.	Optimized	Non-opt.	Crack Defined	Notes
Dike A Thalweg Section	U-U	1.3	1.30	1.38	1.40	1.61	10' Deep	
Dike A Thalweg Section	C-D	1.5	1.66	1.78	1.65	1.68	No Crack Needed	
Dike A Overbank Section	U-U	1.3	1.31	1.38	1.30	1.48	7' Deep	
Dike A Overbank Section	C-D	1.5	1.50	1.81	1.80	1.84	No Crack Needed	With cutoff.
Dike B	U-U	1.3	1.48	1.62	1.52	1.65	Search	
Dike B	C-D	1.5	2.18	2.40	2.17	2.20	No Crack Needed	
Road Raise	U-U	1.3	2.86	3.09	2.81	2.99	Search	
Road Raise	C-D	1.5	1.57	1.87	1.58	2.27	No Crack Needed	

Means required FS not met

Means minimum FS for section

11. SEEPAGE

The amount of seepage for this project is not important because the intent of the project does not involve keeping areas from getting wet from seepage. Seepage was only considered when computing the slope stability during steady state seepage conditions. The pore water pressures used in the stability computations were from steady state conditions computed using SEEP/W. Seepage under the diversion dikes through the near surface sand layers will likely need to be cut off by construction of an impervious backfilled trench beneath the embankment to prevent

piping. Seepage under and around the proposed drawdown structure will have to be analyzed as the structural design proceeds.

12. CONSTRUCTABILITY:

The culverts on Louisburg Grade Road, the breakwaters, the fishway, the fish pond notch, and the road raise can be constructed any time. However, the order of construction of excavation of the old Pomme de Terre River channel, the diversion dikes, and bridge over the Pomme de Terre River along Marsh Lake dam is important. The bridge and the excavation of the old Pomme de Terre River channel should be done first. Then Dike A should be constructed next, followed by Dike B. The Dike A needs to be constructed out of impervious fill and is significantly taller requiring compaction of its fill to be stable. This means the site will have to be dewatered. Two dewatering berms built to at least elevation 941 were taken into account in stability computations, so they will need to be left in place. The other cutoff dike that forces the water of the Pomme de Terre River to flow through its former channel can be constructed from pervious fill.

13. ROCK GRADATION:

The calculation of the minimum diameter of the 50 percent-less-than-by-weight rock for the rockfill for fishway is explained in the Hydraulic Appendix and is 1.6 feet. The layer thickness with this diameter and assuming turbulent flow conditions is 54-inches thick and its gradation is shown in Plate H-9 and Table H-5, below:

Table: H-5

Percent Less-than-by-Weight:	Maximum (lbs.)	Minimum (lbs.):
100	2330	930
50	690	470
15	350	150

14. FUTURE WORK:

- Design of an impervious cut-off of the sand layer for thalweg portion of Dike A.
- Stability evaluation of the slopes for the bridge over the Pom de Terre River, the water control structure, spillway alterations, and culvert at the Louis Grade Road.
- Seepage analysis under/around the drawdown structure.
- Define riprap gradation and extent of riprap for downstream of Louisburg Grade road culverts.
- Test the borrow sites for suitability as impervious fill; prior to borrow site approval determine the thickness of topsoil, natural moisture content, and Proctor density.

- Estimate displacement expected at the proposed breakwaters.

Bibliography

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Duncan, J. Michael and Stephen G.Wright (2005). *Soil Strength and Slope Stability.* New York: John Wiley & Sons, Inc.

Naval Facilities Engineering Manual. (2005). *Soil Mechanics, Foundations, and Earth Structures.* Washington, D.C.: U.S. Government Printing Office.

Marsh Lake Dam: Boring Locations

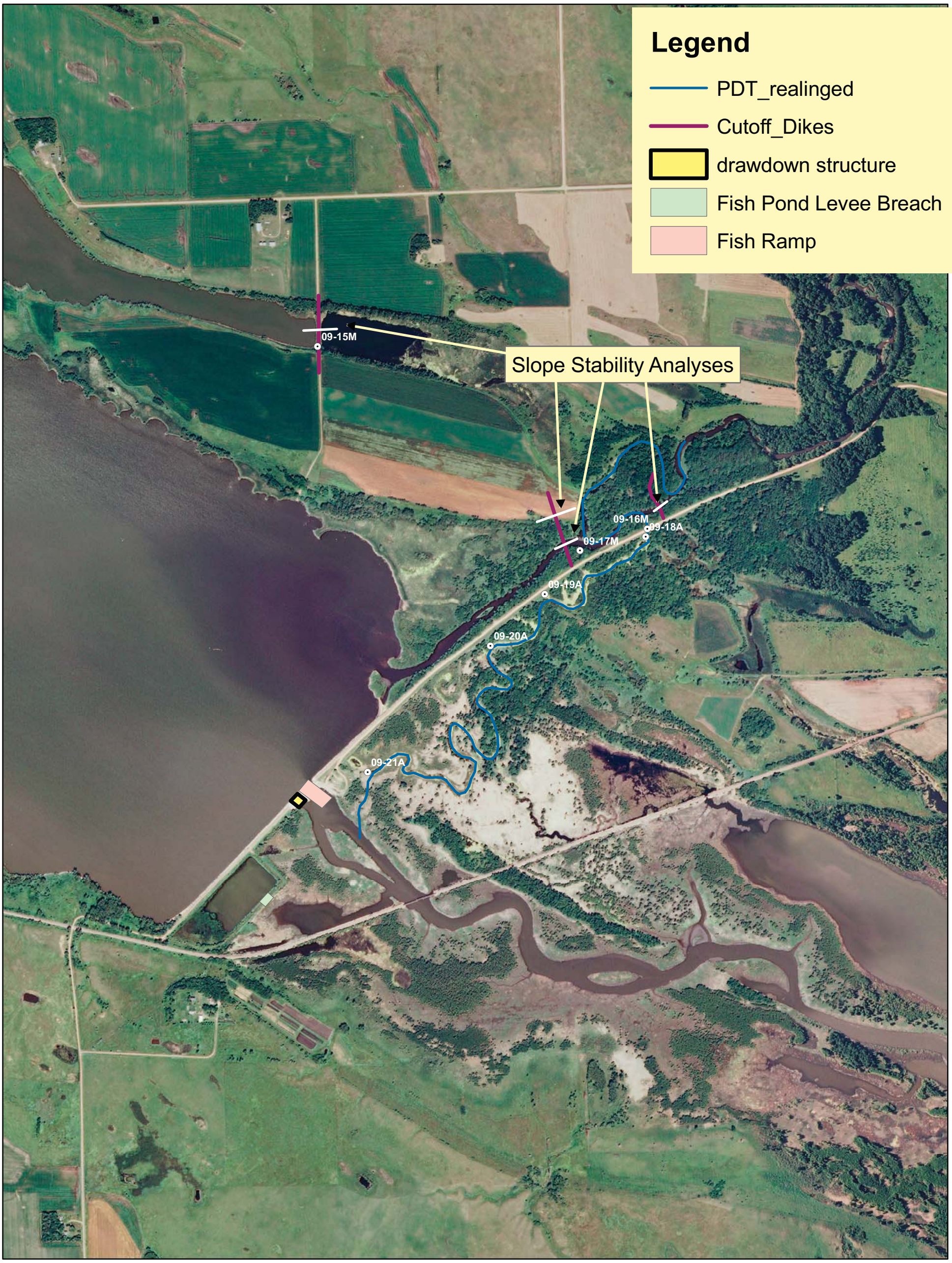
St. Paul District

US Army Corps of Engineers®

0 2,000 4,000 8,000 Feet

PLATE H-1

Marsh Lake Project: Boring Locations



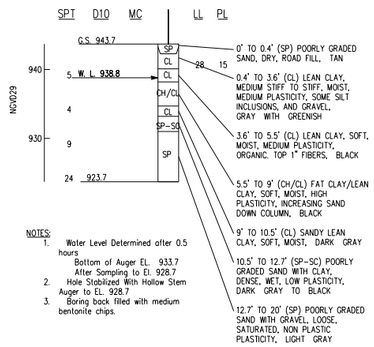
St. Paul District
US Army Corps of Engineers®

0 500 1,000 2,000 Feet

N
W E
S

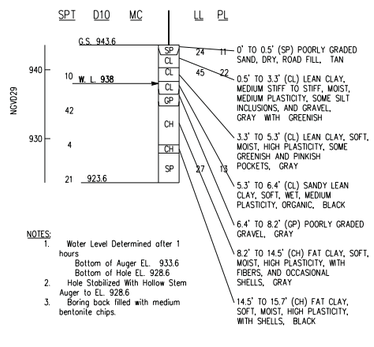
PLATE H-2

09-13M



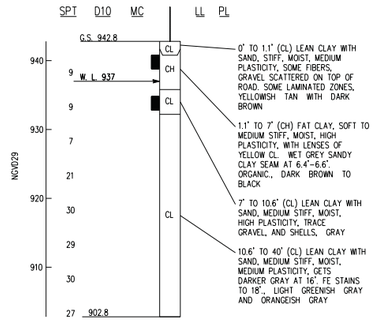
NOTES:
1. Water Level Determined after 0.5 hours
   Bottom of Auger EL. 933.7
   After Sampling to El. 928.7
2. Hole Stabilized With Hollow Stem Auger to EL. 928.7
3. Boring back filled with medium bentonite chips.

09-14M



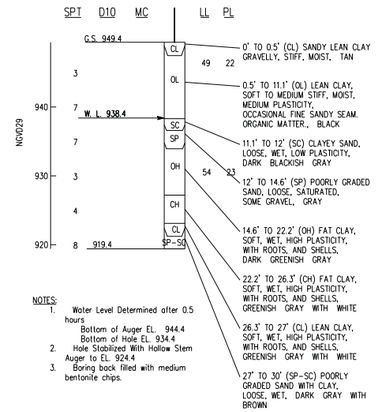
NOTES:
1. Water Level Determined after 1 hours
   Bottom of Auger EL. 933.6
   Bottom of Hole EL. 928.6
2. Hole Stabilized With Hollow Stem Auger to EL. 928.6
3. Boring back filled with medium bentonite chips.

09-15M



NOTES:
1. Water Level Determined after 0.5 hours
   Bottom of Auger EL. 932.8
   Bottom of Hole EL. 927.8
2. Hole Stabilized With 4" casing to EL. 932.8
3. Undisturbed samples taken in offset hole
4. Boring Backfilled with tremied high solids bentonite grout.

09-16M



NOTES:
1. Water Level Determined after 0.5 hours
   Bottom of Auger EL. 944.4
   Bottom of Hole EL. 934.4
2. Hole Stabilized With Hollow Stem Auger to EL. 924.4
3. Boring back filled with medium bentonite chips.

GENERAL BORING LEGEND

84-1M — YEAR OF BORING-BORING NUMBER, BORING TYPE (EG: M=MACHINE, A=AUGER, TP=TEST PIT, P=PIEZOMETER).

1 MAY 1984 — DATE OF BORING

G.S. 1020.2 — GROUND SURFACE ELEVATION AT BORING

GW	WELL GRADED GRAVELS, GRAVEL - SAND MIXTURE, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS, LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND - SILT MIXTURES
SC	CLAYEY SANDS, SAND - CLAY MIXTURES
ML	INORGANIC SILTS, LIQUID LIMIT LESS THAN 50
MH	INORGANIC SILTS, LIQUID LIMIT GREATER THAN 50
CL	INORGANIC CLAYS, LOW TO MED. PLASTICITY, LIQUID LIMIT LESS THAN 50
CH	INORGANIC CLAYS, HIGH PLASTICITY, LIQUID LIMIT GREATER THAN 50
OL	ORGANIC SILTS OR CLAYS, LOW PLASTICITY, LIQUID LIMIT LESS THAN 50
OH	ORGANIC SILTS OR CLAYS, MED. TO HIGH PLASTICITY, LIQUID LIMIT GREATER THAN 50
PT	PEAT
SP-SM	BORDERLINE MATERIAL
SP&SM	STRATIFIED MATERIAL

1 — LOCATION AND SAMPLE NUMBER FOR UNDISTURBED SAMPLE

NO RECOVERY

W.L. 726.7 — WATER LEVEL ON DATE OF BORING

700.0 — ELEVATION AT BOTTOM OF BORING

GENERAL BORING NOTES

1. GENERAL: THE UNIFIED SOIL CLASSIFICATION SYSTEM IS USED TO IDENTIFY BASIC SOIL TYPE. THE LEGEND REPRESENTS ONLY THE BASIC SOILS. TO COMPLETE THE CLASSIFICATION, PERTINENT INFORMATION IS ADDED TO THE RIGHT OF THE BORING STAFF, NOTES PERTAINING TO A SPECIFIC BORING ARE SHOWN BELOW THE BORING STAFF.

2. MOISTURE CONTENT: THE NATURAL MOISTURE CONTENT IN PERCENT OF DRY WEIGHT (MC) IS SHOWN TO THE LEFT OF THE BORING STAFF.

3. BLOW COUNT (SPT): BLOW COUNTS ARE SHOWN TO THE LEFT OF THE BORING STAFF AND, EXCEPT AS NOTED, ARE THE NUMBER OF BLOWS NECESSARY TO DRIVE THE SAMPLER USED A DISTANCE OF 12". STANDARD BLOW COUNTS ARE FOR A STANDARD PENETRATION TEST (SPT) USING A 1⅜" X 2" SAMPLER, 140 LB. HAMMER AND A 30" DROP. FOR NON-STANDARD BLOW COUNTS, SAMPLER SIZE, HAMMER WEIGHT AND HEIGHT OF DROP ARE AS SHOWN.

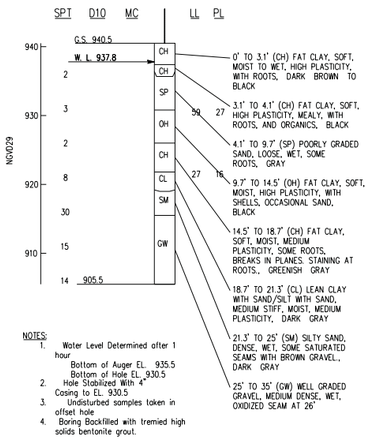
4. ATTERBERG LIMITS: LIQUID LIMIT (LL) AND PLASTIC LIMIT (PL) ARE SHOWN TO THE RIGHT OF THE BORING STAFF.

5. D_{10} SIZE: THE GRAIN SIZE IN MILLIMETERS OF WHICH 10% OF THE SAMPLE IS FINER IS SHOWN TO THE LEFT OF THE BORING STAFF.

6. ELEVATIONS REFERENCED TO N.G.V.D. 1929 ADJUSTED ELEVATION.

7. THE BORINGS SHOW SUMMARIES OF INFORMATION RECORDED ON THE ORIGINAL FIELD LOGS. THESE LOGS ARE AVAILABLE FOR INSPECTION AT THE ST. PAUL DISTRICT OFFICE. ARRANGEMENTS TO INSPECT LOGS CAN BE MADE BY CALLING (651) 290-5599.

09-17M



NOTES:
1. Water Level Determined after 1 hour
   Bottom of Auger EL. 935.5
   Bottom of Hole EL. 930.5
2. Hole Stabilized With 4" Casing to EL. 930.5
3. Undisturbed samples taken in offset hole
4. Boring Backfilled with tremied high solids bentonite grout.

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

SCALE: AS SHOWN
DATE: OCT. 2010
CADD FILE NAME:
SOL. NO:
AE APPROVING OFFICIAL:

DESIGNED: JJF
DRAWN: JJF
CHECKED: KWS
DESIGNED:
CHECKED:

DEPARTMENT OF THE ARMY
ST. PAUL, MINNESOTA
CORPS OF ENGINEERS
ST. PAUL DISTRICT

FEASABILITY STUDY
GEOLOGICAL DATA
AQUATIC ECOSYSTEM RESTORATION
MARSH LAKE DAM APPLETON, MINNESOTA

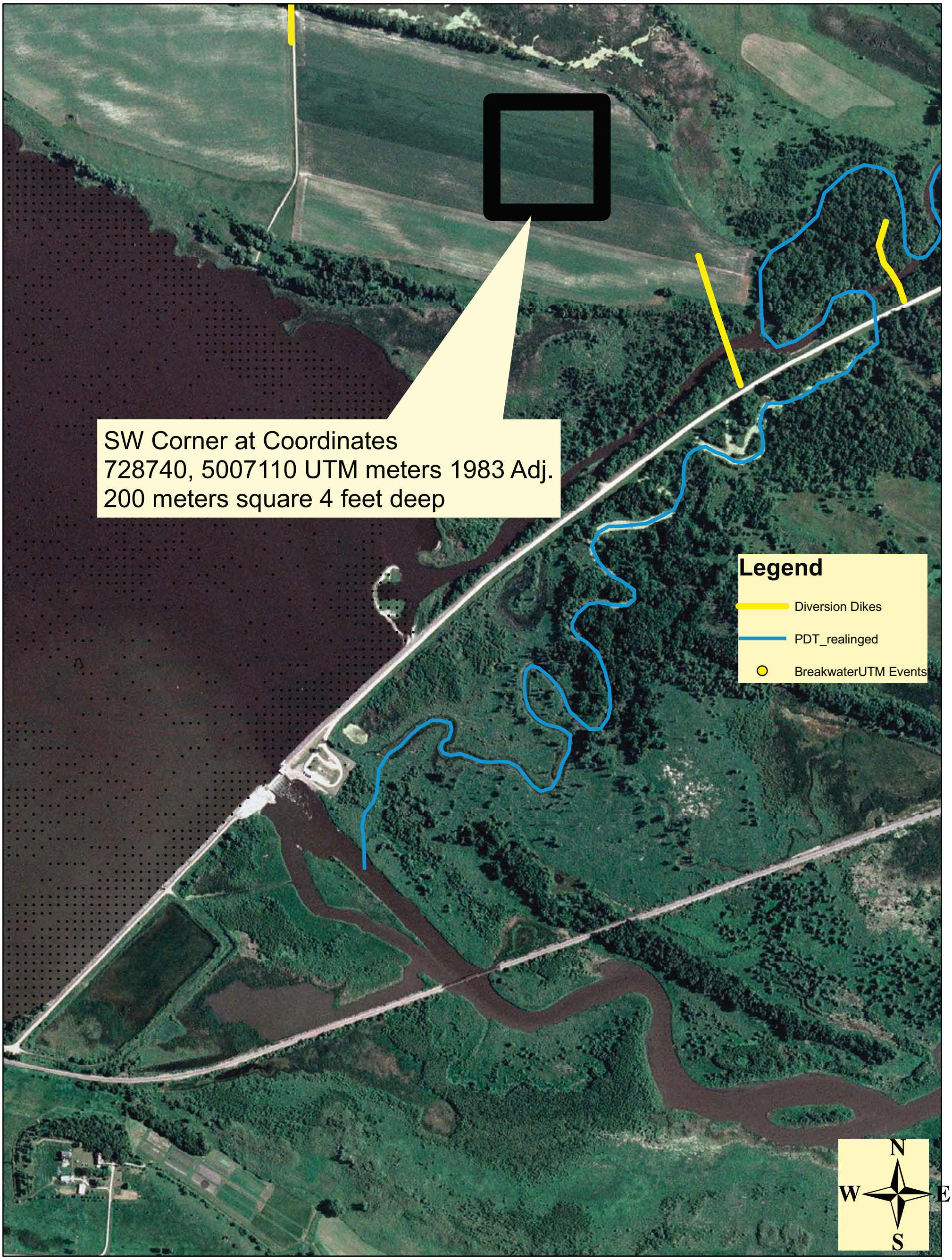
BORING LOGS
09-13M THROUGH 09-17M

DRAWING NUMBER:

SHT OF

PLATE H-3

Marsh Lake Dam: Borrow Location



St. Paul District
US Army Corps of Engineers®

0 500 1,000 2,000 Feet

PLATE H-4

SET Job#: **7223**

Extrusion Log

Date: 10/7/2009

Project/Client: Marsh Lake: Stage 1

Boring #	Sample#	Depth(ft)	Recovery (in)		Soil Description
09-17MU	1	12-14	BE:	21	Top 11.5" Organic Clay with shells and shell fragments, a few roots and rootlets, black (OH)
			AE:	20.5	Bottom 9" Lean Clay with sand and a trace of gravel and organics
					a few roots and rootlets and shell fragments, gray (CL)
09-17MU	2	15-16.5	BE:	15.5	Top 9.5" Lean Clay with a trace of gravel, gray (CL)
				15.5	Bottom 6" Silty Clay with sand and a trace of gravel, gray (CL-ML) *see below
					* Bottom has less clay and more silt than top of sample

PLATE H-5

Atterberg Limit (Plasticity Index) (ASTM:D4318)

Job: 7223

Project/Client: Marsh Lake: Stage 1 /// USACE St. Paul Division

Date: 10/21/09

Sample Information & Classification

Boring #	09-13	09-14	09-15	09-15	09-16	09-16	09-17	09-17
Sample #	1	1	2	6	1	5	4	6
Depth (ft)	3-3.5	1-2	3-4	18-19	3-4	18-19	10-11	19-19.5
Type or BPF								
Soil Classification	Sandy Lean Clay (CL)	Sandy Lean Clay (CL)	Lean Clay w/sand and a trace of organic material (CL)	Sandy Lean Clay w/a little gravel (CL)	Organic Clay w/a few rootlets (OL)	Organic Clay w/a few shells and rootlets (OH)	Organic Clay w/a few shells and rootlets and a trace of sand (OH)	Lean Clay (CL)
Atterberg Limits								
Liquid Limit	27.6	23.7	46.6	27.5	49.1	54.3	58.6	27.1
Plastic Limit	14.9	11.3	21.5	12.7	22.3	22.6	27.2	16.4
Plasticity Index	12.7	12.4	25.1	14.8	26.8	31.7	31.4	10.7

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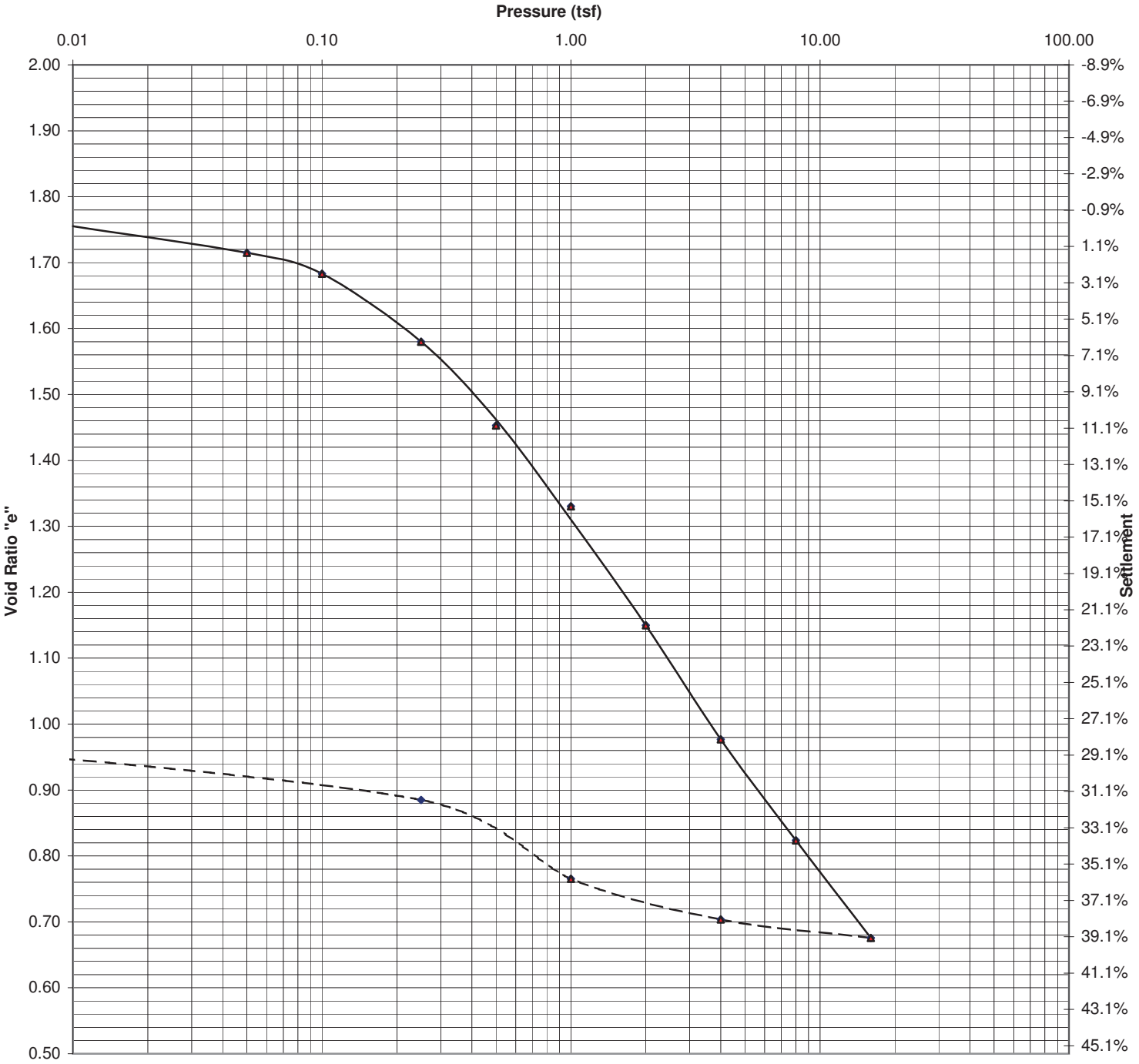
Void Ratio and % Settlement vs. Log of Pressure



Project: Marsh Lake: Stage 1				Date: 10/21/09
Sample #: SN1	Boring #: 09-17MU	Depth ft: 12-14 (Top)		Job #: 7223
Soil Type: Organic Clay w/a trace of shell fragments (OH)				
Initial W/C (%): 68.0	Dry Density (pcf): 58.0	LL: 81.2	PL: 31.4	PI: 49.8	Gs: 2.56
Organic Content (%):	Initial Height (in.): 0.748	Diameter (in.): 2.506	e_o= 1.755	
Preconsolidation Pressure (Pc): 0.23 tsf	Compression Index (Cc): 0.53	Recompression Index (Cr): ≅ 0.10		
Remarks:				

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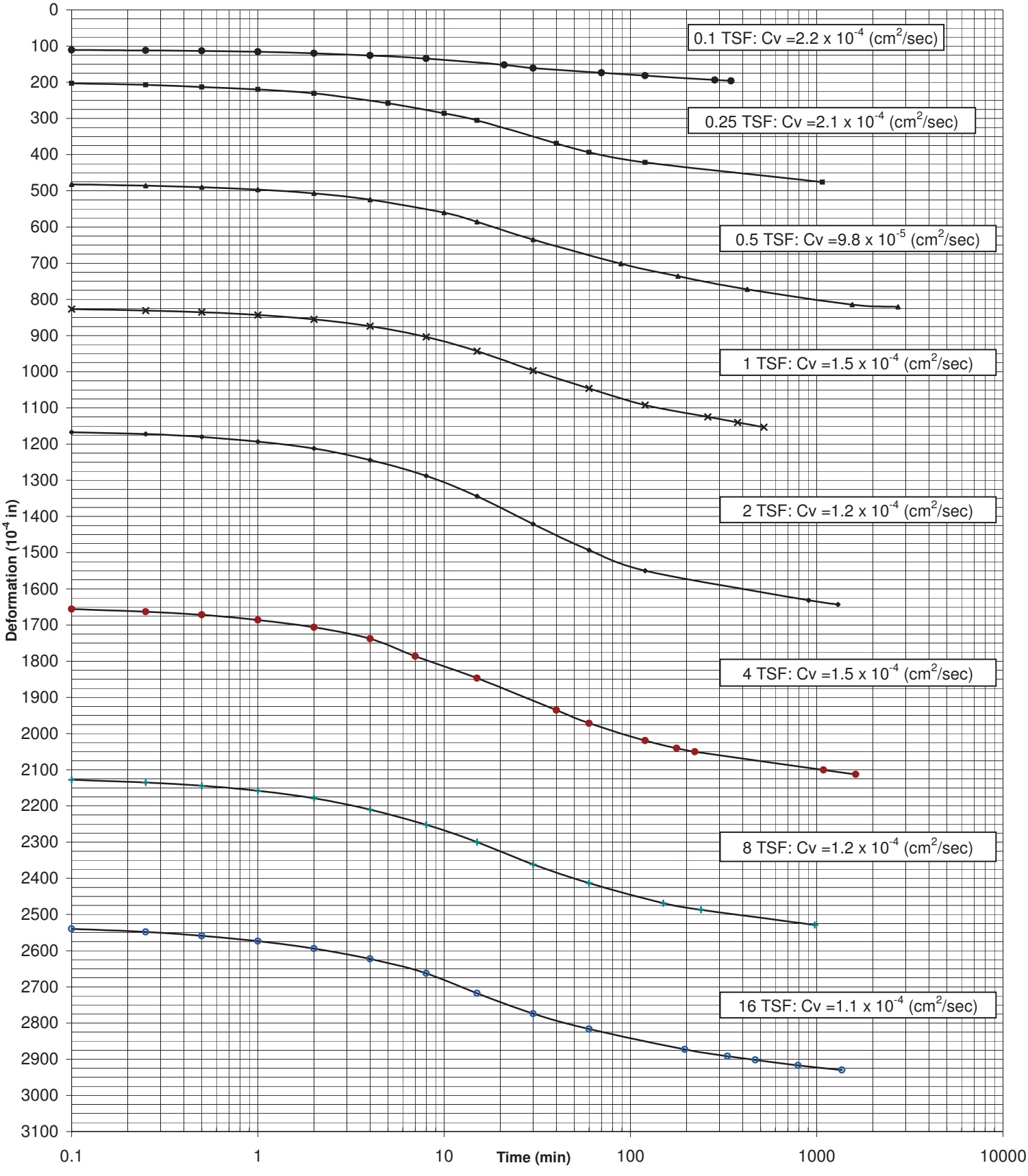
PLATE H-5

Consolidation Log of Time Curves



Project: Marsh Lake: Stage 1			Date: 10/21/09
Sample #: SN1	Boring #: 09-17MU	Depth ft: 12-14 (Top)	Job #: 7223

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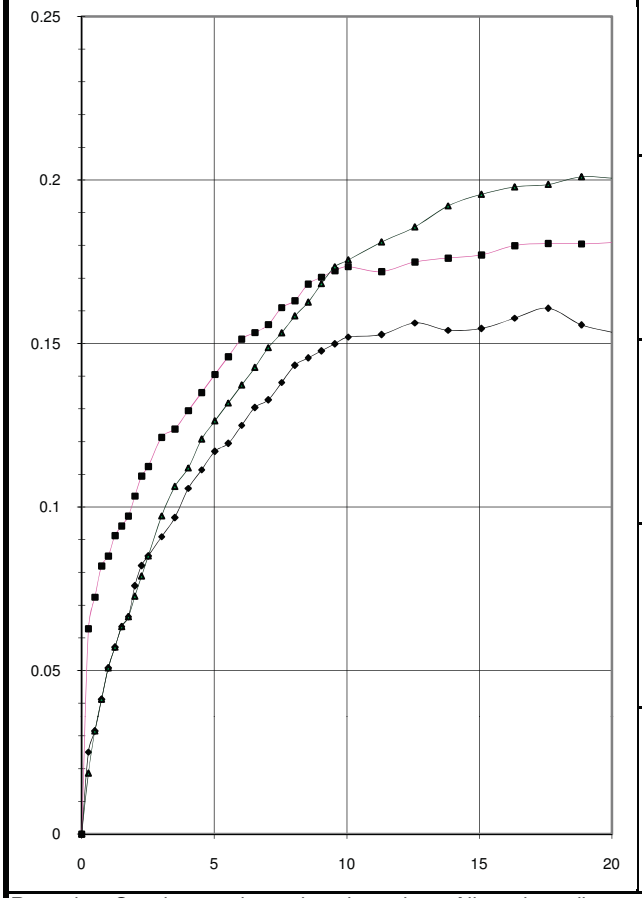
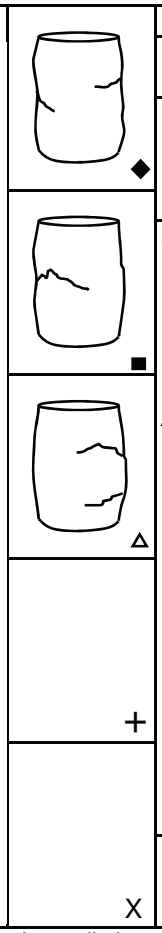
PLATE H-5

TRIAXIAL TEST ASTM: D 2850

Job No. **7223**
Date: **10/13/09**

Project: **Marsh Lake: Stage 1**
Boring #: **09-17MU** Sample #: **1** Type: **3T** Depth (ft): **12 - 14 (Mid-Top)**
Soil Type: **Organic Clay w/a Trace of Shell Fragments (OH)**





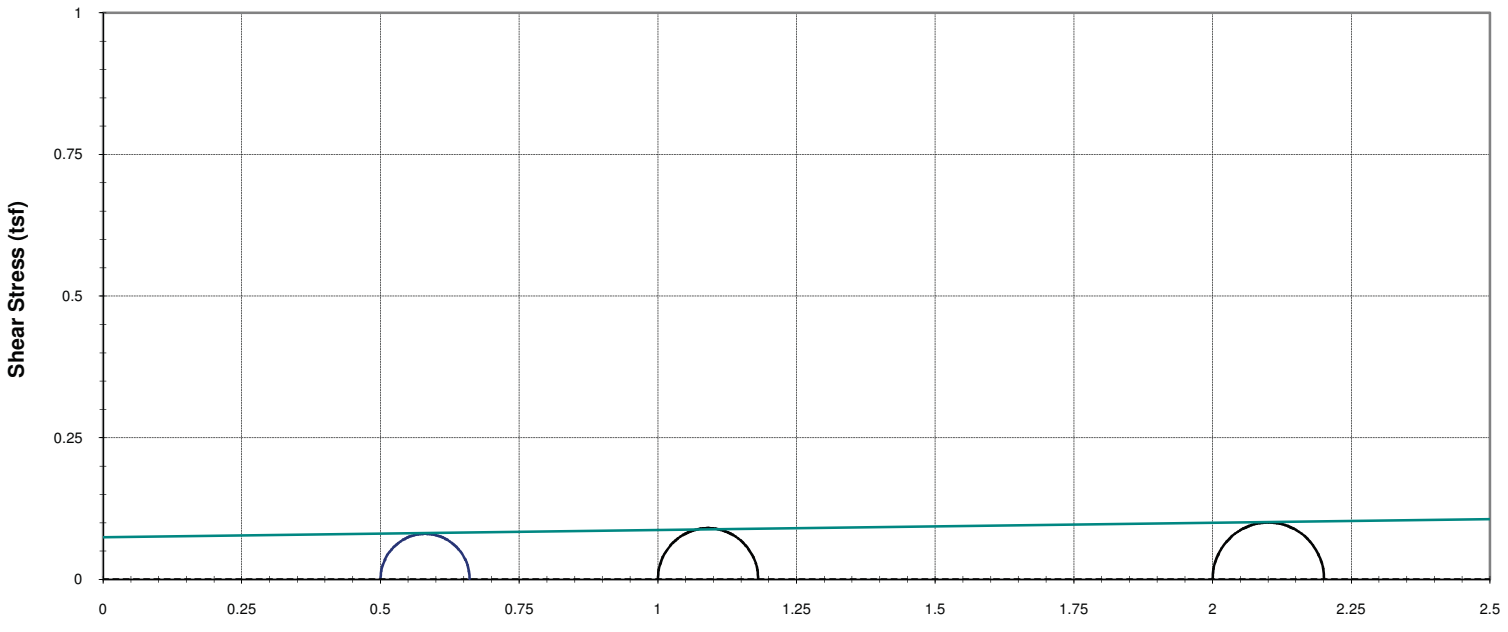
Failure Criterion: **Max. Deviator Stress**
Angle of internal friction, ϕ_u = **0.7 °**
Apparent Cohesion, c_u = **0.07 (tsf)**

Test Date:	10/7/09	Liquid Limit:	81.2
Test Type:	U-U	Plastic Limit:	31.4
Strain Rate (in/min):	0.05	Plasticity Index:	49.8
Strain Rate (%/min):	1.257	Spec. Gravity (Actual):	2.56

Before Consolidation	A	B	C	D	E
Diameter (in)	1.94	1.94	1.94		
Height (in)	3.98	3.98	3.98		
Water Content (%)	69.2	69.4	70.0		
Dry Density (pcf)	58.5	58.5	58.3		
Void Ratio	1.73	1.73	1.74		
After Consolidation					
Diameter (in)					
Height (in)					
Water Content (%)					
Dry Density (pcf)					
Void Ratio					
Back Pressure (tsf)					
Minor Principal Stress (tsf)	0.50	1.00	2.00		
Max. Deviator Stress (tsf)	0.16	0.18	0.20		
Ultimate Deviator Stress (tsf)	0.15	0.18	0.20		
Deviator Stress at Failure (tsf)	0.16	0.18	0.20		
Max. Pore Pressure Buildup (tsf)	--------	--------	--------		
Pore Pressure Parameter "B"	--------	--------	--------		
Pct. Axial Strain at Failure	17.6	20.1	18.9		

"These test results are for informational purposes only and must be reviewed by a qualified professional engineer to verify that the test parameters shown are appropriate for any particular design"

Remarks: Specimens trimmed to given sizes; Allowed to adjust under applied confining pressures for about 10 minutes.



Total ϕ_u: 0.7 ° c_u= 0.07 (tsf)

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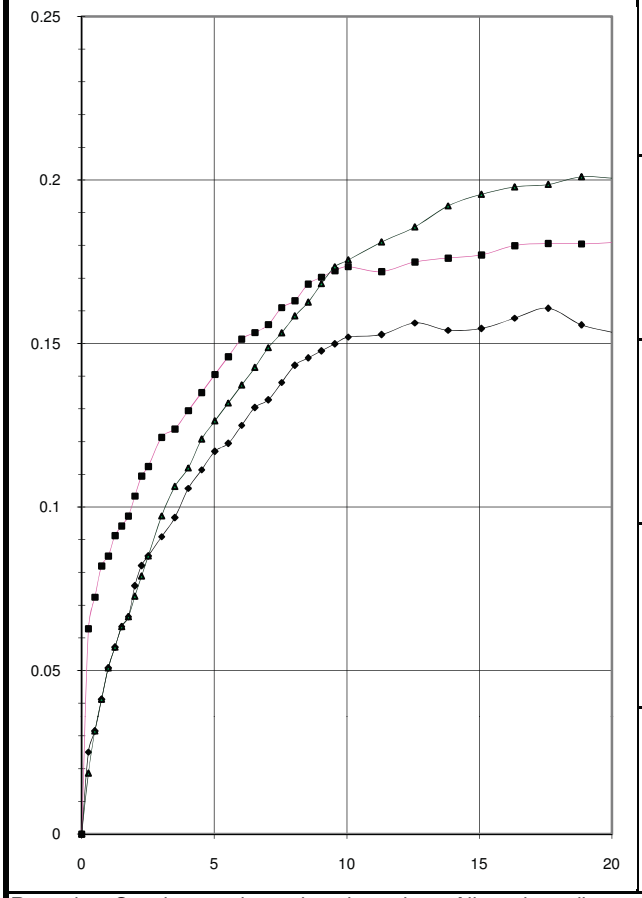
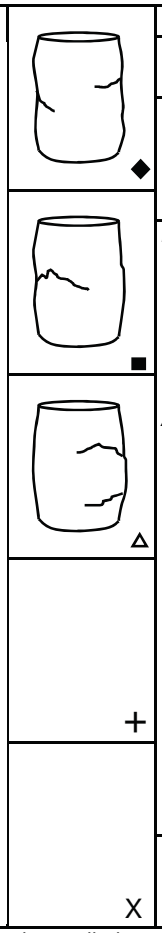
PLATE H-5

TRIAXIAL TEST ASTM: D 2850

Job No. **7223**
Date: **10/13/09**

Project: **Marsh Lake: Stage 1**
Boring #: **09-17MU** Sample #: **1** Type: **3T** Depth (ft): **12 - 14 (Mid-Top)**
Soil Type: **Organic Clay w/a Trace of Shell Fragments (OH)**





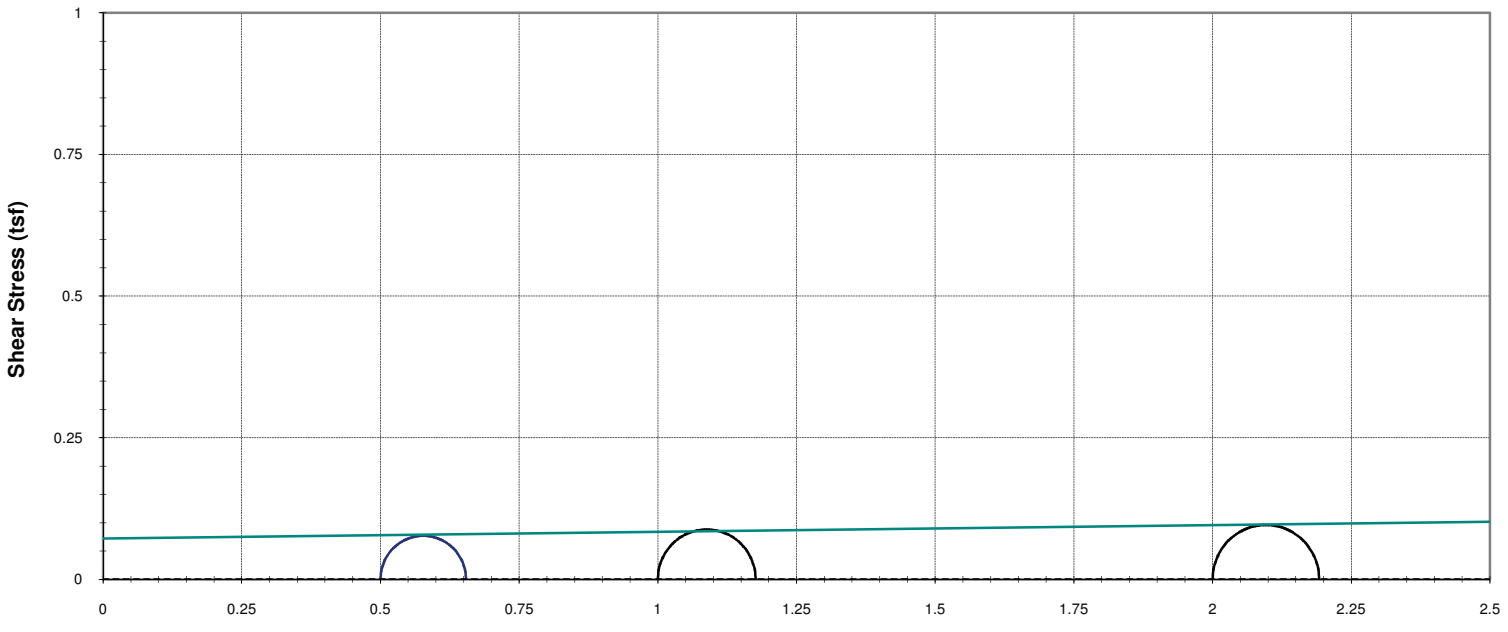
Failure Criterion: **Given Strain of: 15%**
Angle of internal friction, ϕ_u = **0.7 °**
Apparent Cohesion, c_u = **0.07 (tsf)**

Test Date:	10/7/09	Liquid Limit:	81.2
Test Type:	U-U	Plastic Limit:	31.4
Strain Rate (in/min):	0.05	Plasticity Index:	49.8
Strain Rate (%/min):	1.257	Spec. Gravity (Actual):	2.56

Before Consolidation	A	B	C	D	E
Diameter (in)	1.94	1.94	1.94		
Height (in)	3.98	3.98	3.98		
Water Content (%)	69.2	69.4	70.0		
Dry Density (pcf)	58.5	58.5	58.3		
Void Ratio	1.73	1.73	1.74		
After Consolidation					
Diameter (in)					
Height (in)					
Water Content (%)					
Dry Density (pcf)					
Void Ratio					
Back Pressure (tsf)					
Minor Principal Stress (tsf)	0.50	1.00	2.00		
Max. Deviator Stress (tsf)	0.16	0.18	0.20		
Ultimate Deviator Stress (tsf)	0.15	0.18	0.20		
Deviator Stress at Failure (tsf)	0.15	0.18	0.19		
Max. Pore Pressure Buildup (tsf)	--------	--------	--------		
Pore Pressure Parameter "B"	--------	--------	--------		
Pct. Axial Strain at Failure	15.0	15.0	15.0		

"These test results are for informational purposes only and must be reviewed by a qualified professional engineer to verify that the test parameters shown are appropriate for any particular design"

Remarks: Specimens trimmed to given sizes; Allowed to adjust under applied confining pressures for about 10 minutes.



Total ϕ_u: 0.7 ° c_u= 0.07 (tsf)

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PLATE H-5

Hydraulic Conductivity Test Data

Project: Marsh Lake: Stage 1 Date: 10/20/2009

Reported To: USACE -Geotech. & Geology Section Job No.: 7223

Boring:	09-17 MU						
Sample No.:	2						
Depth (ft.):	15 - 17 (Bot)						
Location:							
Sample Type:	5" TWT						
Soil Type:	Silty Clay (CL-ML)						
Atterberg Limits							
LL							
PL							
PI							
Permeability Test							
Before Test Conditions: Saturation %:							
Porosity:							
Ht. (in):	2.97						
Dia. (in):	2.88						
Dry Density (pcf):	106.7						
Water Content:	26.3%						
Test Type:	Falling						
Max Head (ft):	5.0						
Confining press. (Effective-psi):	6.9						
Trial No.:	12 - 16						
Water Temp °C:	20.0						
% Compaction							
% Saturation (After Test)	98.0%						
Coefficient of Permeability							
K @ 20 °C (cm/sec)	**7.8×10^{-7}**						
K @ 20 °C (ft/min)	**1.5×10^{-6}**						
Notes:							

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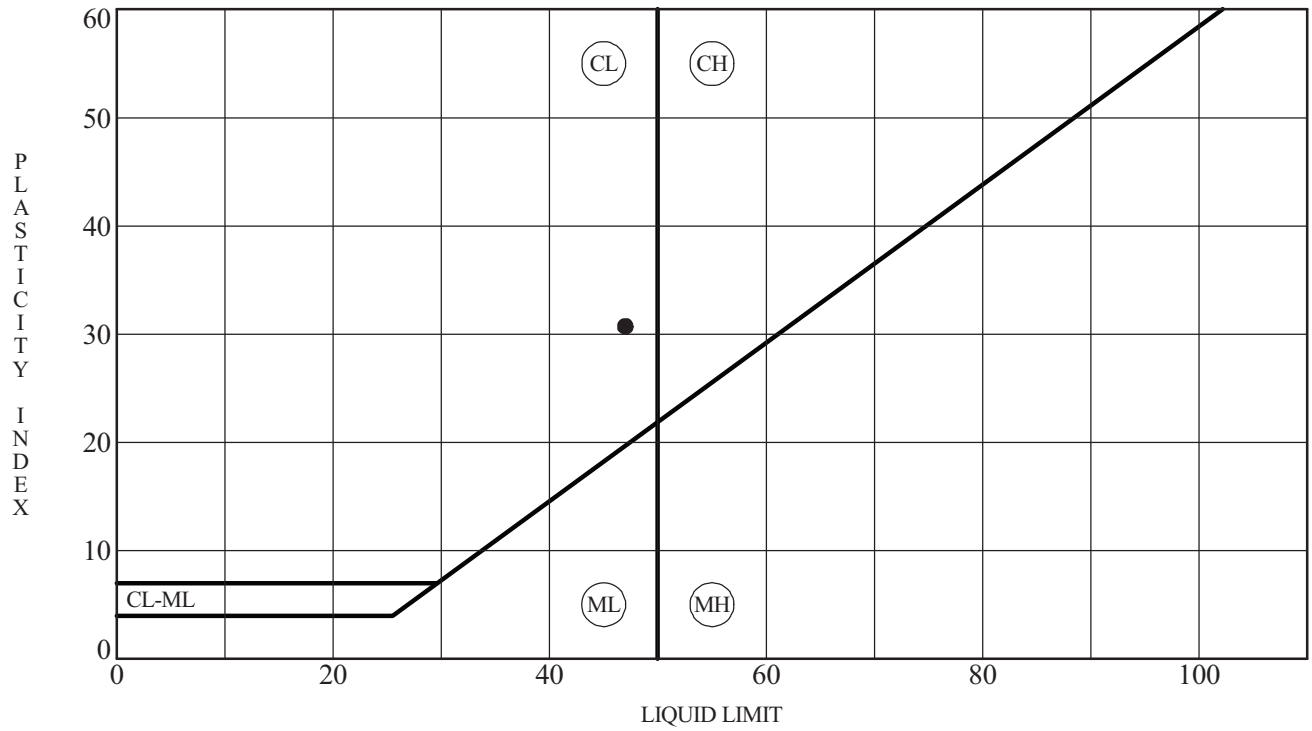
PLATE H-5

Borehole	Depth feet	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Organic Content (%)	Specific Gravity	Electrical Resistivity (ohm-cm)
09-15MU	8-10	47	16	31						2.638	

Braun Project BL-09-05055
Marsh Lake: Stage 2
Marsh Lake

LABORATORY RESULTS SUMMARY

BRAUN SM INTERTEC



Specimen Identification		LL	PL	PI	Fines	Classification
● **09-15MU**	**8.0'-10.0'**	**47**	**16**	**31**		

Braun Project BL-09-05055
Marsh Lake: Stage 2
Marsh Lake

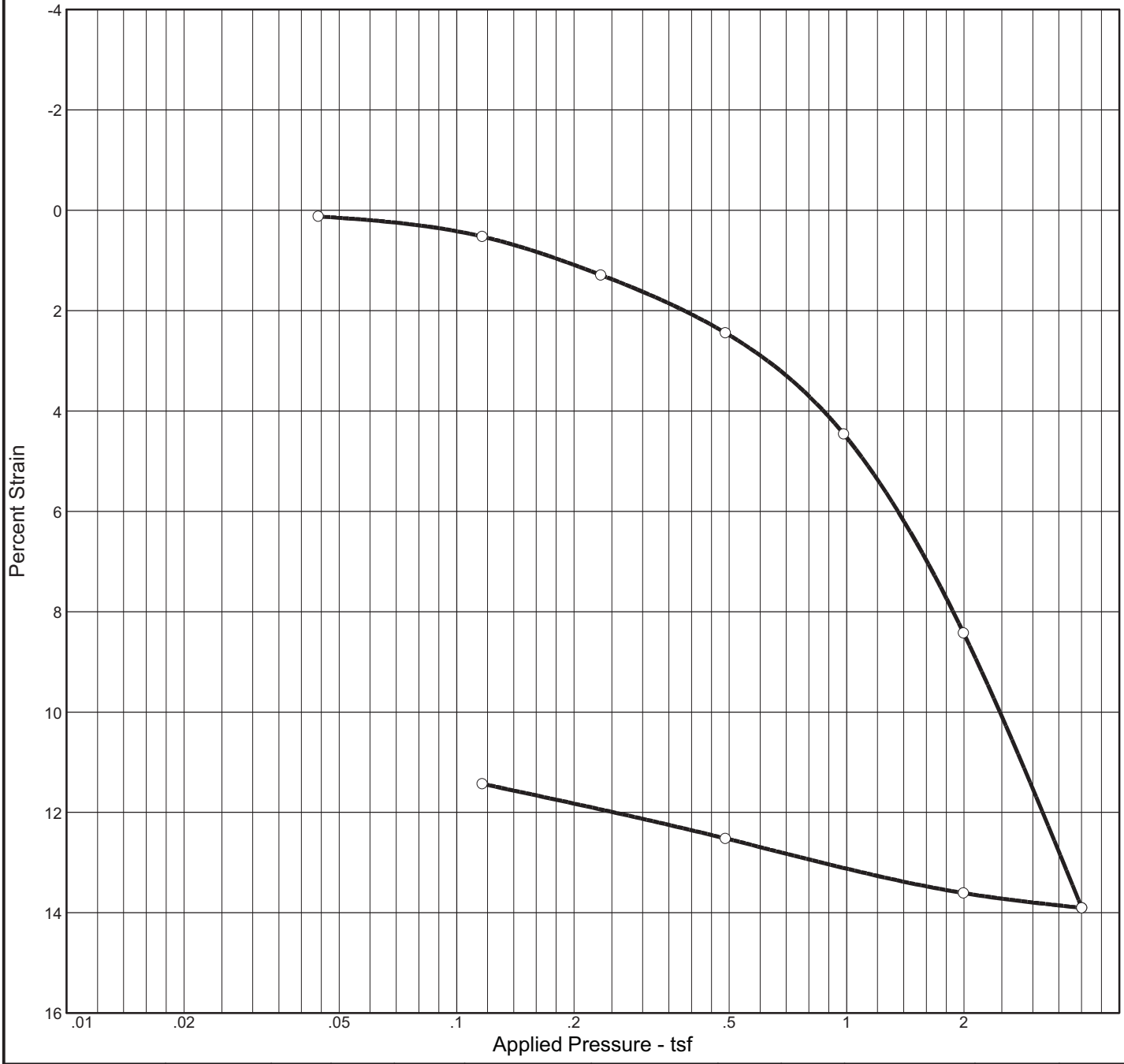
ATTERBERG LIMITS RESULTS

BRAUN SM INTERTEC

ATTERBERG LIMITS BL-09-05055.GPJ BRAUN.GDT 12/7/09 12:19

PLATE H-5

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Swell Press. (tsf)	Heave %	e_o
Sat.	Moist.											
89.4 %	34.7 %	81.3	47	31	2.638		1.27	0.37	0.03			1.025

MATERIAL DESCRIPTION	USCS	AASHTO
Organic Clay, black (OL)	OL	

Project No. BL-09-05055 **Client:** US Army Corps of Engineers

Project: Marsh Lake: Stage 2
Marsh Lake, MN

Location: Boring 09-15MU, #2, 8-10'

Remarks:
ASTM D 2435

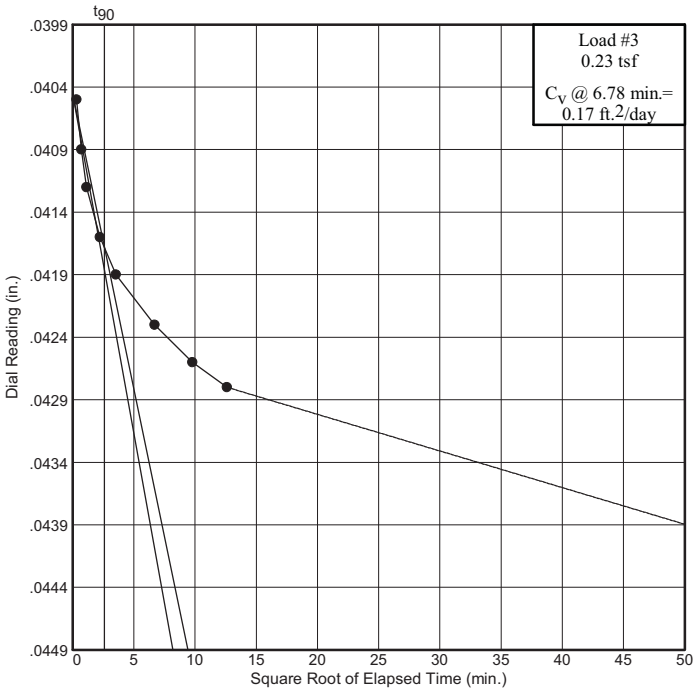
BRAUN INTERTEC

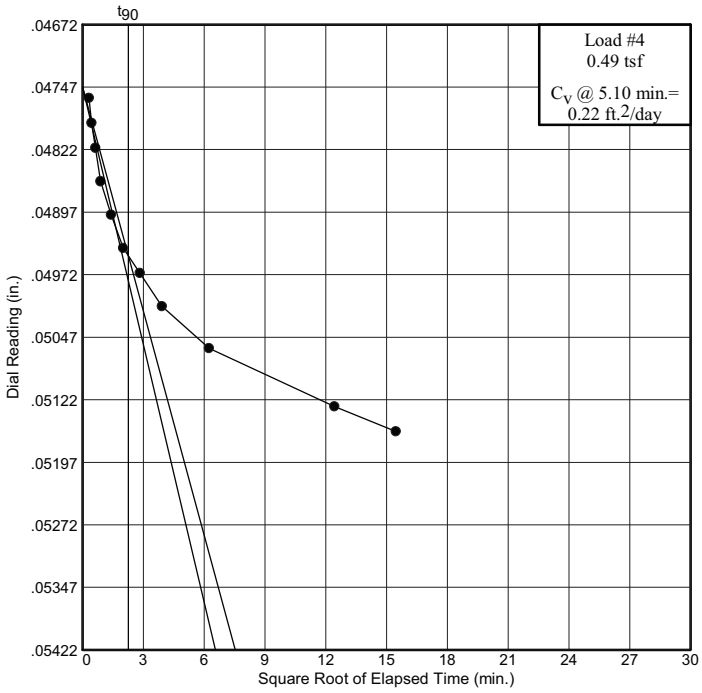
Figure 1

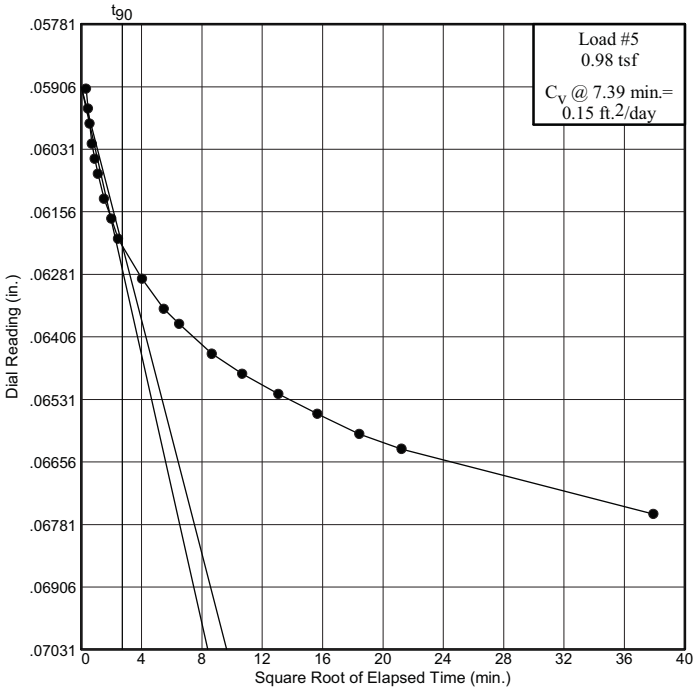
PLATE H-5

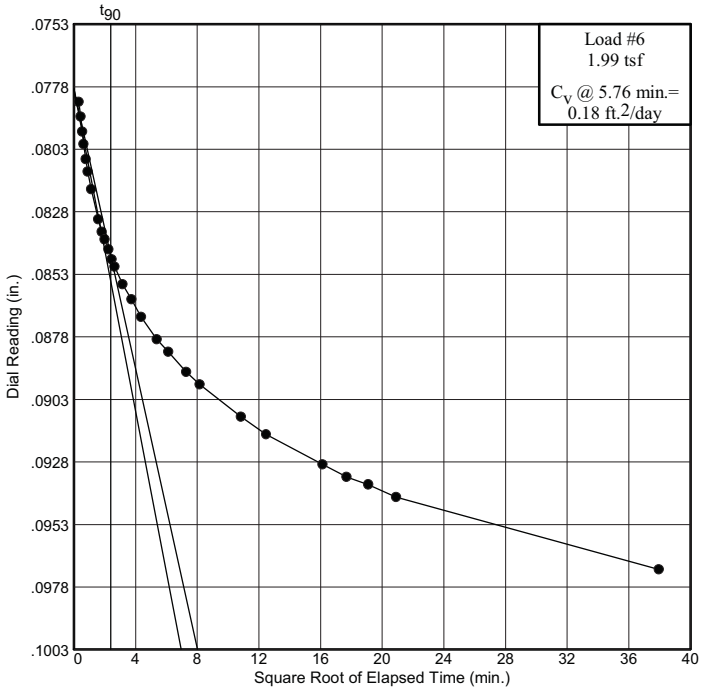
Dial Reading vs. Time

Project No.: BL-09-05055
Project: Marsh Lake: Stage 2
Marsh Lake, MN
Location: Boring 09-15MU, #2, 8-10'









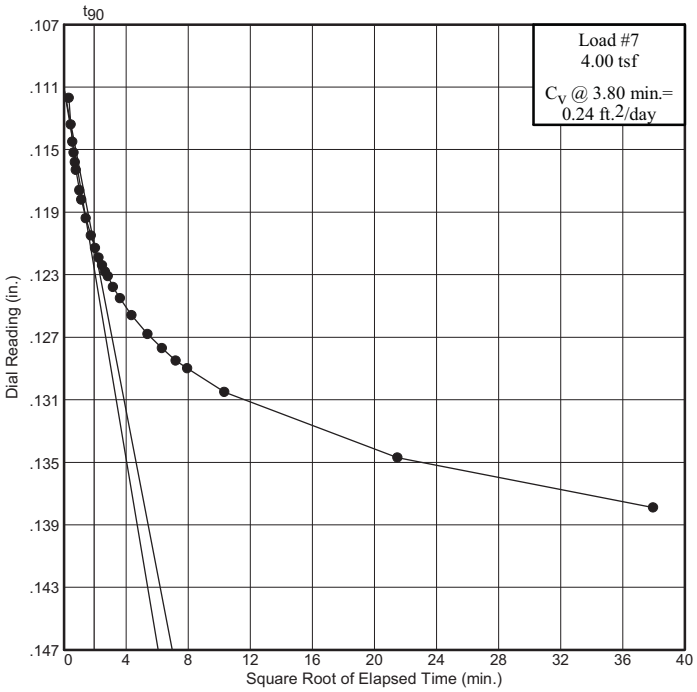
BRAUN INTERTEC

Figure 2

PLATE H-5

Dial Reading vs. Time

Project No.: BL-09-05055
Project: Marsh Lake: Stage 2
Marsh Lake, MN
Location: Boring 09-15MU, #2, 8-10'



BRAUN INTERTEC

Figure 3

PLATE H-5

CONSOLIDATION TEST DATA

Client: US Army Corps of Engineers
Project: Marsh Lake: Stage 2
Marsh Lake, MN
Project Number: BL-09-05055

Sample Data

Source:
Sample No.: #2
Elev. or Depth: 8-10'
Sample Length(in./cm.):
Location: Boring 09-15MU, #2, 8-10'
Description: Organic Clay, black (OL)
Liquid Limit: 47
Plasticity Index: 31
USCS: OL
AASHTO:
Figure No.: 1
Testing Remarks: ASTM D 2435

Test Specimen Data

TOTAL SAMPLE		BEFORE TEST		AFTER TEST	
Wet w+t =	142.80 g.	**Consolidometer # =**	4	**Wet w+t =**	121.65 g.
Dry w+t =	113.83 g.			**Dry w+t =**	99.40 g.
Tare Wt. =	30.42 g.	**Spec. Gravity =**	2.638	**Tare Wt. =**	30.83 g.
Height =	.74 in.	**Height =**	.74 in.		
Diameter =	2.49 in.	**Diameter =**	2.49 in.		
Weight =	104.68 g.	**Defl. Table =**	#4-2008		
Moisture =	34.7 %	**Ht. Solids =**	0.3676 in.	**Moisture =**	32.4 %
Wet Den. =	109.6 pcf	**Dry Wt. =**	77.69 g.*	**Dry Wt. =**	68.57 g.
Dry Den. =	81.3 pcf	**Void Ratio =**	1.025	**Void Ratio =**	0.794
		Saturation =	89.4 %		

*** Initial dry weight used in calculations**

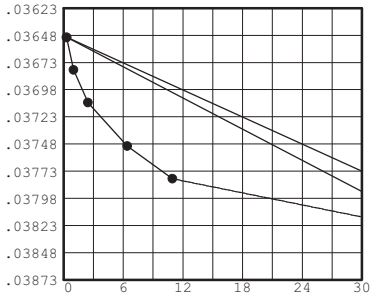
End-of-Load Summary

Pressure (tsf)	Final Dial (in.)	Machine Defl. (in.)	C_v ($ft.^2$/day)	C_α	Void Ratio	% Compression /Swell
start	0.03440				1.025	
0.04	0.03540	0.00010			1.023	0.1 Comprs.
0.12	0.03860	0.00030			1.015	0.5 Comprs.
0.23	0.04450	0.00050	0.17		0.999	1.3 Comprs.
0.49	0.05340	0.00080	0.22		0.976	2.4 Comprs.
0.98	0.06860	0.00100	0.15		0.935	4.5 Comprs.
1.99	0.09860	0.00150	0.18		0.855	8.4 Comprs.
4.00	0.13990	0.00200	0.24		0.744	13.9 Comprs.
1.99	0.13720	0.00150			0.750	13.6 Comprs.
0.49	0.12840	0.00080			0.772	12.5 Comprs.
0.12	0.11980	0.00030			0.794	11.4 Comprs.

C_c = 0.37 **P_c =** 1.27 tsf **C_r =** 0.03

Pressure: 0.12 tsf **TEST READINGS** **Load No. 2**

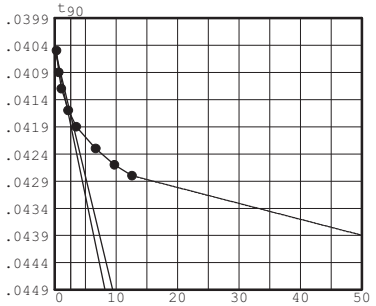
No.	Elapsed Time	Dial Reading
1	0.00	0.03540
2	0.10	0.03680
3	1.00	0.03710
4	6.00	0.03740
5	41.00	0.03780
6	120.00	0.03810
7	1445.00	0.03860



Void Ratio = 1.015 **Compression =** 0.5 %

Pressure: 0.23 tsf **TEST READINGS** **Load No. 3**

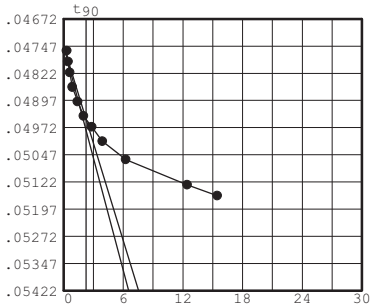
No.	Elapsed Time	Dial Reading
1	0.00	0.03860
2	0.10	0.04100
3	0.50	0.04140
4	1.25	0.04170
5	5.00	0.04210
6	12.50	0.04240
7	45.00	0.04280
8	95.50	0.04310
9	159.00	0.04330
10	2870.00	0.04450



Void Ratio = 0.999 **Compression =** 1.3 %
D_0 = 0.04046 **D_{90} =** 0.04169 **D_{100} =** 0.04182
C_v at 6.8 min. = 0.17 ft.^{2}/day

Pressure: 0.49 tsf **TEST READINGS** **Load No. 4**

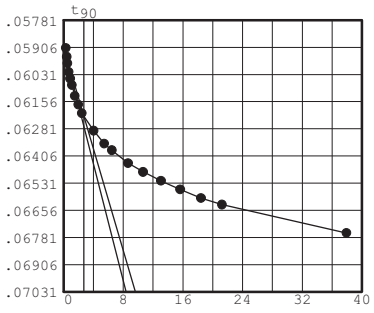
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04450	11	154.50	0.05210
2	0.10	0.04840	12	239.00	0.05240
3	0.20	0.04870	13	601.00	0.05290
4	0.40	0.04900	14	1400.00	0.05340
5	0.80	0.04940			
6	2.00	0.04980			
7	4.00	0.05020			
8	8.00	0.05050			
9	15.30	0.05090			
10	39.00	0.05140			



Void Ratio = 0.976 **Compression =** 2.4 %
D_0 = 0.04747 **D_{90} =** 0.04949 **D_{100} =** 0.04972
C_v at 5.1 min. = 0.22 ft.^{2}/day

Pressure: 0.98 tsf **TEST READINGS** **Load No. 5**

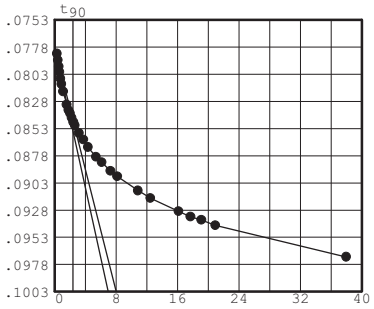
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05340	11	16.30	0.06390
2	0.10	0.06010	12	30.00	0.06450
3	0.20	0.06050	13	42.30	0.06480
4	0.30	0.06080	14	75.00	0.06540
5	0.50	0.06120	15	114.00	0.06580
6	0.80	0.06150	16	171.00	0.06620
7	1.25	0.06180	17	245.00	0.06660
8	2.30	0.06230	18	340.00	0.06700
9	4.00	0.06270	19	451.00	0.06730
10	6.00	0.06310	20	1439.00	0.06860



Void Ratio = 0.935 **Compression =** 4.5 %
D_0 = 0.05907 **D_{90} =** 0.06224 **D_{100} =** 0.06259
C_v at 7.4 min. = 0.15 ft.^{2}/day

Pressure: 1.99 tsf **TEST READINGS** **Load No. 6**

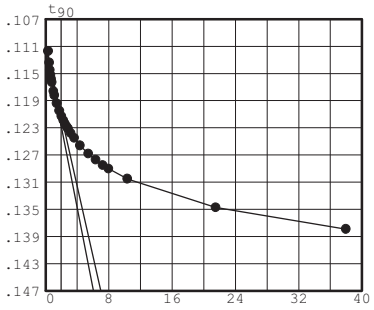
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.06860	15	10.00	0.08720
2	0.10	0.07990	16	14.00	0.08780
3	0.20	0.08050	17	19.00	0.08850
4	0.30	0.08110	18	29.00	0.08940
5	0.40	0.08160	19	37.50	0.08990
6	0.60	0.08220	20	53.00	0.09070
7	0.80	0.08270	21	66.50	0.09120
8	1.25	0.08340	22	117.50	0.09250
9	2.50	0.08460	23	155.50	0.09320
10	3.25	0.08510	24	260.50	0.09440
11	4.00	0.08540	25	313.00	0.09490
12	5.00	0.08580	26	365.00	0.09520
13	6.00	0.08620	27	437.00	0.09570
14	7.00	0.08650	28	1440.00	0.09860



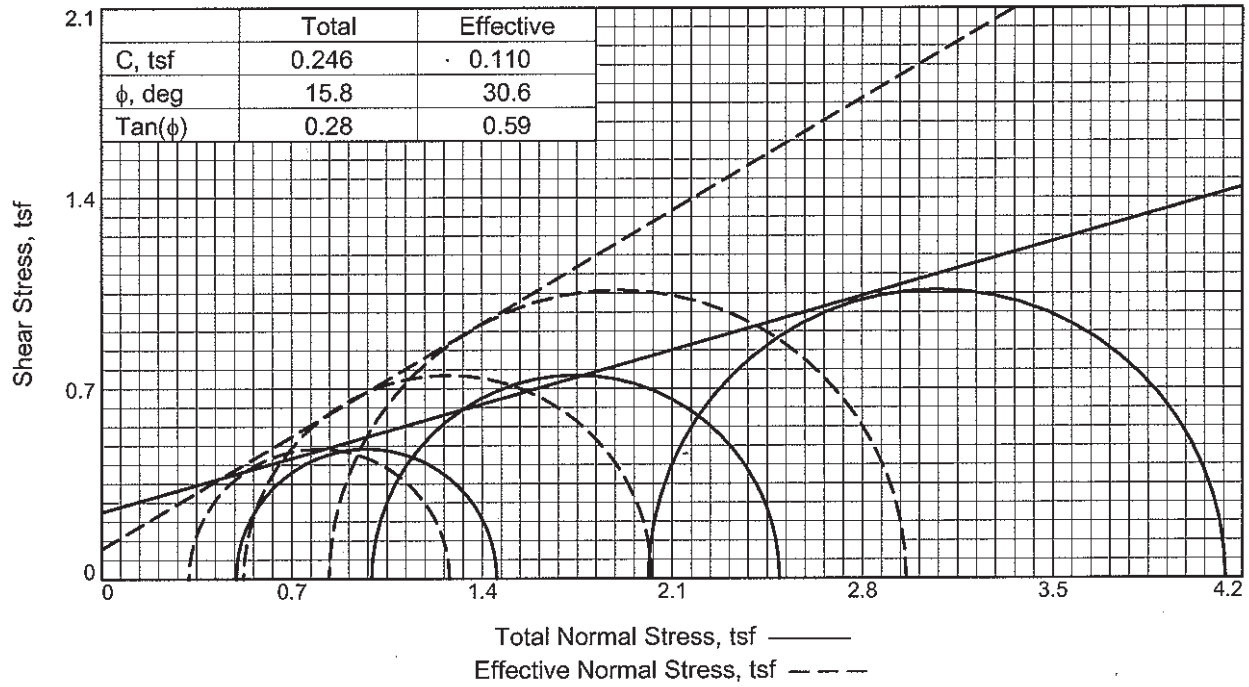
Void Ratio = 0.855 **Compression =** 8.4 %
D_0 = 0.07790 **D_{90} =** 0.08461 **D_{100} =** 0.08535
C_v at 5.8 min. = 0.18 ft.^{2}/day

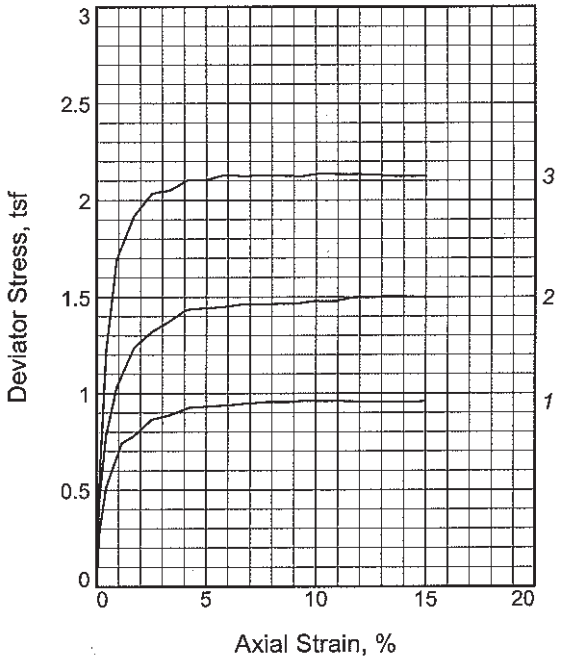
Pressure: 4.00 tsf **TEST READINGS** **Load No. 7**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.09860	14	6.00	0.12440
2	0.10	0.11370	15	7.00	0.12480
3	0.20	0.11540	16	8.00	0.12510
4	0.30	0.11650	17	10.00	0.12580
5	0.40	0.11720	18	13.00	0.12650
6	0.50	0.11780	19	19.00	0.12760
7	0.60	0.11830	20	29.00	0.12880
8	1.00	0.11960	21	40.00	0.12970
9	1.25	0.12020	22	52.00	0.13050
10	2.00	0.12140	23	63.00	0.13100
11	3.00	0.12250	24	107.00	0.13250
12	4.00	0.12330	25	462.00	0.13670
13	5.00	0.12390	26	1442.00	0.13990



Void Ratio = 0.744 **Compression =** 13.9 %
D_0 = 0.11112 **D_{90} =** 0.12115 **D_{100} =** 0.12227
C_v at 3.8 min. = 0.24 ft.^{2}/day





Sample No.		1	2	3
Initial	Water Content, %	33.9	31.9	31.9
	Dry Density, pcf	84.7	86.2	87.9
	Saturation, %	94.8	92.5	96.5
	Void Ratio	0.9445	0.9099	0.8728
	Diameter, in.	1.43	1.41	1.40
	Height, in.	2.78	2.82	2.82
At Test	Water Content, %	34.2	31.4	28.2
	Dry Density, pcf	86.6	90.0	94.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.9028	0.8295	0.7452
	Diameter, in.	1.42	1.39	1.37
	Height, in.	2.76	2.78	2.75
Pore Pressure Parameter B		1.0	1.0	1.0
Consolidation Pressure, tsf		0.50	1.00	2.01
Back Pressure, tsf		6.64	6.14	5.13
Cell Pressure, tsf		7.14	7.14	7.14
Peak Deviator Stress, tsf		0.96	1.51	2.14
Total Pore Pr., tsf		6.83	6.63	6.32
Ultimate Deviator Stress, tsf		0.96	1.50	2.12
Total Pore Pr., tsf		6.82	6.62	6.30
Maj. Eff. Stress at Ultimate, tsf		1.28	2.02	2.96
Min. Eff. Stress at Ultimate, tsf		0.31	0.51	0.83

Type of Test:
CU with Pore Pressures

Sample Type: Thinwall, 5", Bottom of sample

Description: Organic Clay, black (OL)

LL= 47 **PL=** 16 **PI=** 31

Assumed Specific Gravity= 2.638

Remarks: Rate of strain is 0.001 in/min. Failure criteria based on the ultimate stress which occurs at 15% strain. Samples were saturated for 10 days and consolidated for 3 days.

Figure CU Traix ASTM D 4767

Client: US Army Corps of Engineers

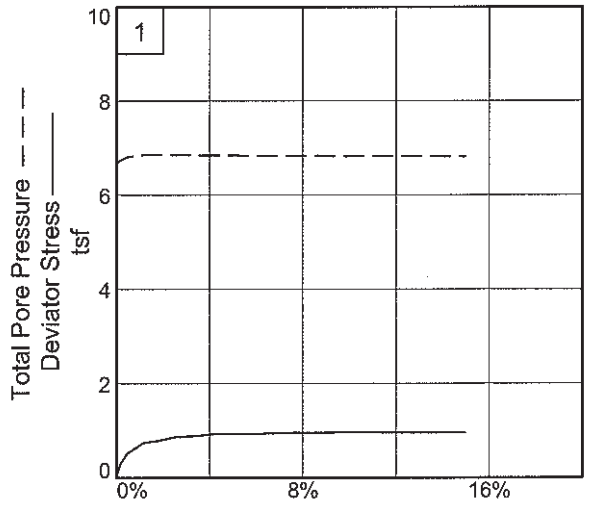
Project: Marsh Lake: Stage 2
Marsh Lake, MN

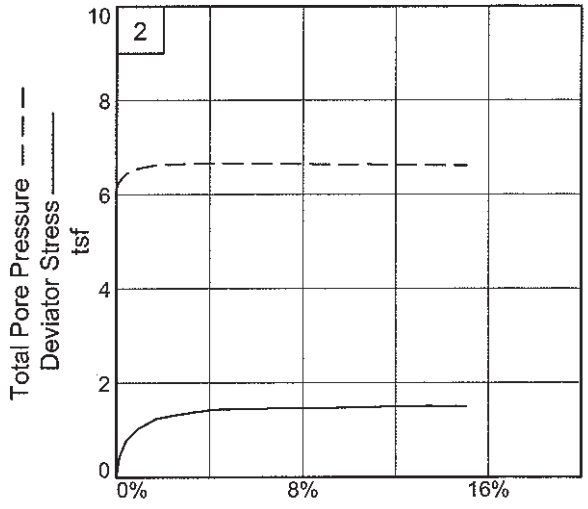
Sample Number: Boring 09-15MU, #2 **Depth:** 8-10'

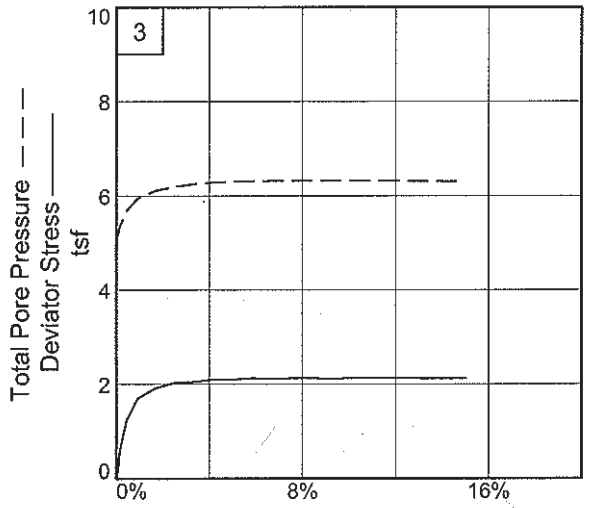
Proj. No.: BL-09-05055 **Date Sampled:**

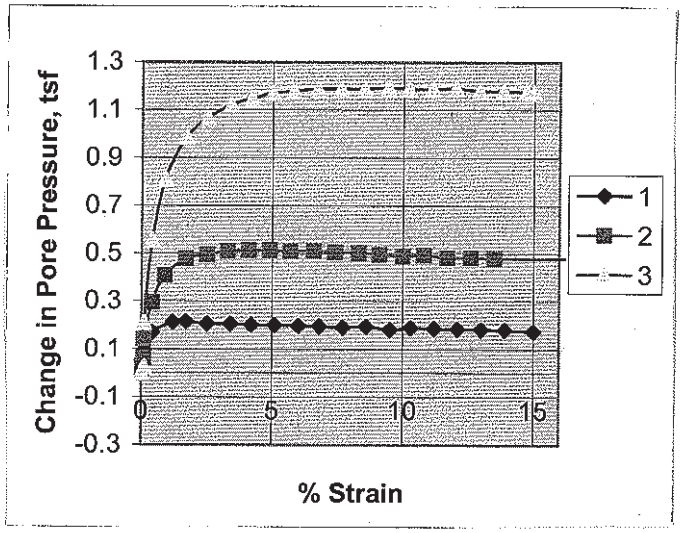
BRAUN INTERTEC

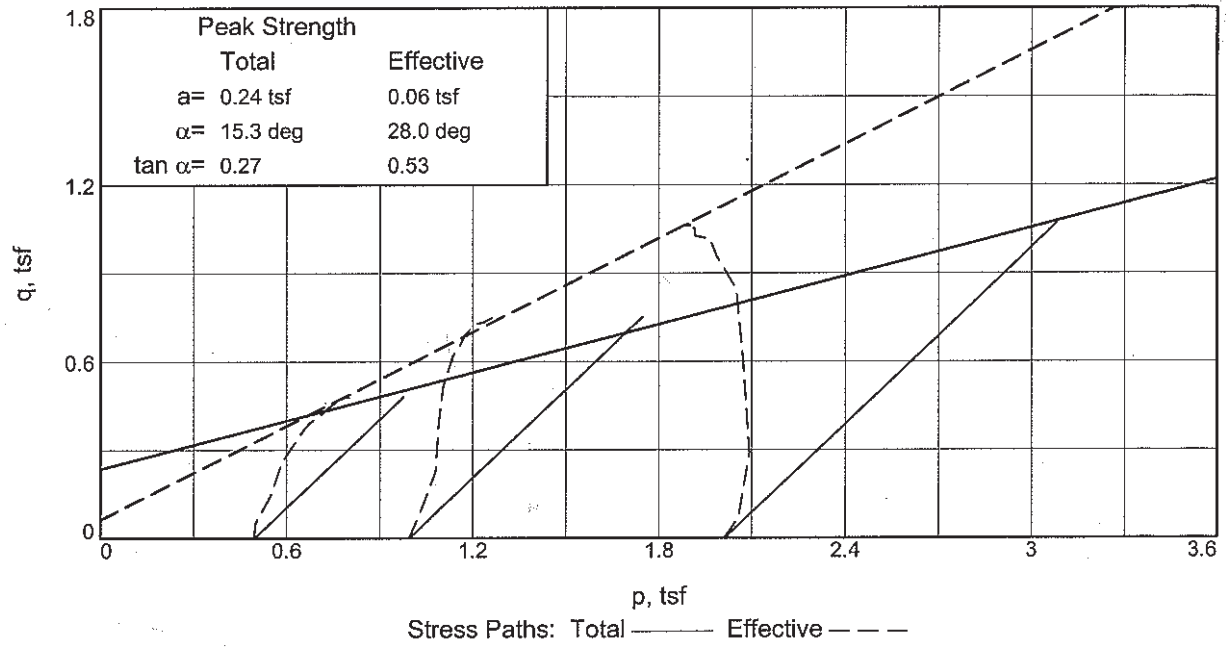
PLATE H-5











Client: US Army Corps of Engineers
Project: Marsh Lake: Stage 2
Depth: 8-10' **Sample Number:** Boring 09-15MU, #2
Project No.: BL-09-05055 **Figure** _____

Braun Intertec

PLATE H-5

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

12/7/2009
12:11 PM

Date:
Client: US Army Corps of Engineers
Project: Marsh Lake: Stage 2
Marsh Lake, MN
Project No.: BL-09-05055
Depth: 8-10' **Sample Number:** Boring 09-15MU, #2
Description: Organic Clay, black (OL)
Remarks: Rate of strain is 0.001 in/min. Failure criteria based on the ultimate stress which occurs at 15% strain. Samples were saturated for 10 days and consolidated for 3 days.
Type of Sample: Thinwall, 5", Bottom of sample
Assumed Specific Gravity=2.638 **LL=**47 **PL=**16 **PI=**31
Test Method: COE uniform strain

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	101.950			161.490
Moisture content: Dry soil+tare, gms.	84.020			128.140
Moisture content: Tare, gms.	31.190			29.710
Moisture, %	33.9	35.8	34.2	33.9
Moist specimen weight, gms.	132.5			
Diameter, in.	1.43	1.43	1.42	
Area, in.²	1.60	1.60	1.58	
Height, in.	2.78	2.78	2.76	
Net decrease in height, in.		0.00	0.02	
Wet Density, pcf	113.4	115.0	116.2	
Dry density, pcf	84.7	84.7	86.6	
Void ratio	0.9445	0.9445	0.9028	
Saturation, %	94.8	100.0	100.0	

Test Readings for Specimen No. 1

Consolidation cell pressure = 7.140 tsf
Consolidation back pressure = 6.644 tsf
Consolidation effective confining stress = 0.496 tsf
Peak Stress = 0.961 tsf **at reading no.** 14
Ult. Stress = 0.958 tsf **at reading no.** 20

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. tsf	P tsf	Q tsf
0	0.0131	19.740	0.0	0.0	0.000	0.496	0.496	1.00	6.644	0.496	0.000
1	0.0141	22.000	2.3	0.0	0.103	0.448	0.551	1.23	6.692	0.500	0.052
2	0.0171	26.120	6.4	0.1	0.291	0.403	0.694	1.72	6.737	0.548	0.145
3	0.0252	31.060	11.3	0.4	0.515	0.327	0.842	2.57	6.813	0.584	0.257
4	0.0449	36.220	16.5	1.2	0.744	0.284	1.028	3.62	6.856	0.656	0.372
5	0.0597	37.070	17.3	1.7	0.778	0.282	1.060	3.76	6.858	0.671	0.389
6	0.0827	39.150	19.4	2.5	0.864	0.291	1.155	3.97	6.849	0.723	0.432
7	0.1057	39.880	20.1	3.4	0.889	0.291	1.180	4.06	6.849	0.736	0.445
8	0.1296	40.920	21.2	4.2	0.927	0.295	1.222	4.14	6.845	0.758	0.463
9	0.1539	41.260	21.5	5.1	0.933	0.296	1.229	4.15	6.844	0.762	0.466
10	0.1783	41.570	21.8	6.0	0.937	0.299	1.236	4.14	6.841	0.768	0.469
11	0.2022	42.020	22.3	6.8	0.948	0.302	1.250	4.14	6.838	0.776	0.474
12	0.2271	42.400	22.7	7.7	0.955	0.305	1.260	4.13	6.835	0.782	0.477
13	0.2510	42.630	22.9	8.6	0.955	0.301	1.256	4.17	6.839	0.779	0.478
14	0.2749	42.990	23.3	9.5	0.961	0.315	1.276	4.05	6.825	0.796	0.481
15	0.2988	43.190	23.4	10.3	0.960	0.307	1.267	4.13	6.833	0.787	0.480
16	0.3228	43.420	23.7	11.2	0.960	0.309	1.269	4.11	6.831	0.789	0.480
17	0.3477	43.580	23.8	12.1	0.957	0.312	1.269	4.07	6.828	0.791	0.479
18	0.3725	43.810	24.1	13.0	0.956	0.314	1.270	4.05	6.826	0.792	0.478
19	0.3976	44.070	24.3	13.9	0.957	0.316	1.273	4.03	6.824	0.794	0.478
20	0.4265	44.400	24.7	15.0	0.958	0.322	1.280	3.97	6.818	0.801	0.479

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	109.360			158.850
Moisture content: Dry soil+tare, gms.	90.220			128.690
Moisture content: Tare, gms.	30.230			29.970
Moisture, %	31.9	34.5	31.4	30.6
Moist specimen weight, gms.	130.9			
Diameter, in.	1.41	1.41	1.39	
Area, in.²	1.55	1.55	1.51	
Height, in.	2.82	2.82	2.78	
Net decrease in height, in.		0.00	0.04	
Wet Density, pcf	113.7	116.0	118.3	
Dry density, pcf	86.2	86.2	90.0	
Void ratio	0.9099	0.9099	0.8295	
Saturation, %	92.5	100.0	100.0	

Test Readings for Specimen No. 2

Consolidation cell pressure = 7.140 tsf
Consolidation back pressure = 6.145 tsf
Consolidation effective confining stress = 0.995 tsf
Peak Stress = 1.505 tsf **at reading no.** 19
Ult. Stress = 1.500 tsf **at reading no.** 21

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. tsf	P tsf	Q tsf
0	0.0092	19.520	0.0	0.0	0.000	0.995	0.995	1.00	6.145	0.995	0.000
1	0.0109	23.800	4.3	0.1	0.204	0.932	1.136	1.22	6.208	1.034	0.102
2	0.0130	29.050	9.5	0.1	0.454	0.853	1.307	1.53	6.287	1.080	0.227
3	0.0208	35.940	16.4	0.4	0.781	0.700	1.481	2.12	6.440	1.090	0.390
4	0.0349	41.380	21.9	0.9	1.034	0.588	1.622	2.76	6.552	1.105	0.517
5	0.0567	45.920	26.4	1.7	1.239	0.516	1.755	3.40	6.624	1.135	0.619
6	0.0789	47.850	28.3	2.5	1.318	0.501	1.819	3.63	6.639	1.160	0.659
7	0.1017	49.310	29.8	3.3	1.375	0.485	1.860	3.83	6.655	1.172	0.687
8	0.1233	50.860	31.3	4.1	1.435	0.481	1.916	3.98	6.659	1.198	0.717
9	0.1463	51.310	31.8	4.9	1.443	0.482	1.925	3.99	6.658	1.203	0.721
10	0.1692	51.710	32.2	5.7	1.448	0.486	1.934	3.98	6.654	1.210	0.724
11	0.1920	52.290	32.8	6.6	1.461	0.484	1.945	4.02	6.656	1.215	0.731
12	0.2162	52.610	33.1	7.4	1.462	0.489	1.951	3.99	6.651	1.220	0.731
13	0.2400	52.980	33.5	8.3	1.465	0.493	1.958	3.97	6.647	1.225	0.732
14	0.2629	53.320	33.8	9.1	1.466	0.499	1.965	3.94	6.641	1.232	0.733
15	0.2865	53.950	34.4	10.0	1.480	0.506	1.986	3.92	6.634	1.246	0.740
16	0.3108	54.240	34.7	10.8	1.478	0.502	1.980	3.94	6.638	1.241	0.739
17	0.3347	55.070	35.6	11.7	1.498	0.513	2.011	3.92	6.627	1.262	0.749
18	0.3596	55.420	35.9	12.6	1.498	0.512	2.010	3.93	6.628	1.261	0.749
19	0.3836	55.960	36.4	13.5	1.505	0.515	2.020	3.92	6.625	1.268	0.753
20	0.4076	56.210	36.7	14.3	1.501	0.520	2.021	3.89	6.620	1.270	0.750
21	0.4279	56.510	37.0	15.0	1.500	0.524	2.024	3.86	6.616	1.274	0.750

Parameters for Specimen No. 3

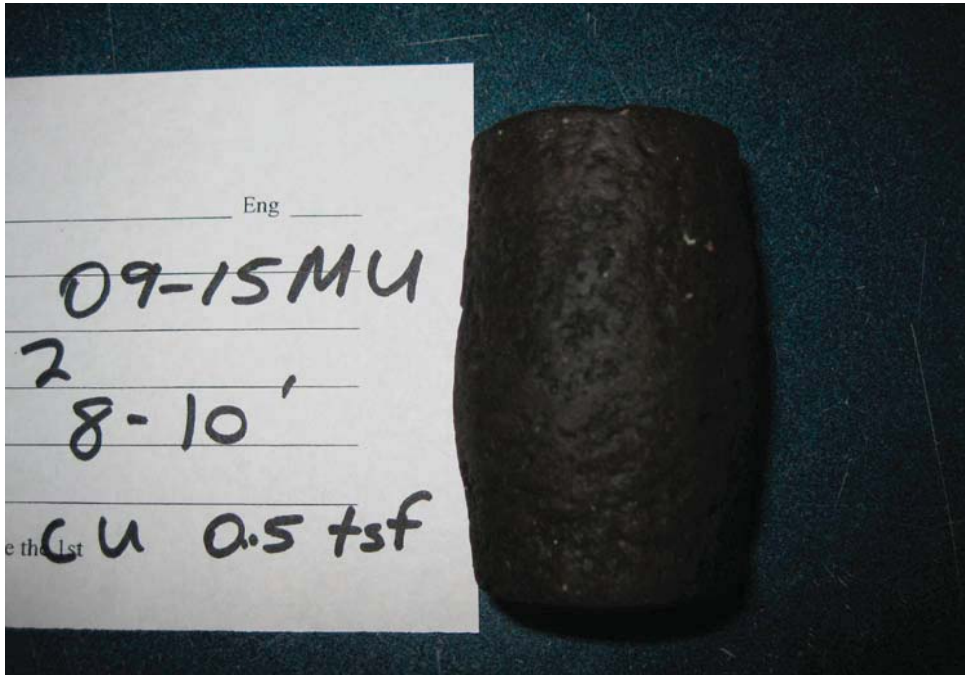
Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	100.010			159.530
Moisture content: Dry soil+tare, gms.	83.300			131.880
Moisture content: Tare, gms.	30.980			31.540
Moisture, %	31.9	33.1	28.2	27.6
Moist specimen weight, gms.	132.7			
Diameter, in.	1.40	1.40	1.37	
Area, in.²	1.55	1.55	1.48	
Height, in.	2.82	2.82	2.75	
Net decrease in height, in.		0.00	0.07	
Wet Density, pcf	116.0	117.0	121.0	
Dry density, pcf	87.9	87.9	94.4	
Void ratio	0.8728	0.8728	0.7452	
Saturation, %	96.5	100.0	100.0	

Test Readings for Specimen No. 3

Consolidation cell pressure = 7.143 tsf
Consolidation back pressure = 5.131 tsf
Consolidation effective confining stress = 2.012 tsf
Peak Stress = 2.138 tsf **at reading no.** 15
Ult. Stress = 2.124 tsf **at reading no.** 21

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress tsf	Minor Eff. Stress tsf	Major Eff. Stress tsf	1:3 Ratio	Pore Press. tsf	P tsf	Q tsf
0	0.0099	18.700	0.0	0.0	0.000	2.012	2.012	1.00	5.131	2.012	0.000
1	0.0118	21.570	2.9	0.1	0.140	1.986	2.126	1.07	5.157	2.056	0.070
2	0.0139	30.600	11.9	0.1	0.580	1.802	2.382	1.32	5.341	2.092	0.290
3	0.0219	44.000	25.3	0.4	1.229	1.456	2.685	1.84	5.687	2.071	0.615
4	0.0348	53.710	35.0	0.9	1.693	1.203	2.896	2.41	5.940	2.049	0.846
5	0.0566	58.680	40.0	1.7	1.918	1.027	2.945	2.87	6.116	1.986	0.959
6	0.0796	61.500	42.8	2.5	2.035	0.946	2.981	3.15	6.197	1.964	1.018
7	0.1022	62.230	43.5	3.4	2.053	0.890	2.943	3.31	6.253	1.916	1.026
8	0.1245	63.720	45.0	4.2	2.105	0.863	2.968	3.44	6.280	1.916	1.053
9	0.1474	64.140	45.4	5.0	2.106	0.841	2.947	3.50	6.302	1.894	1.053
10	0.1702	65.080	46.4	5.8	2.131	0.834	2.965	3.56	6.309	1.900	1.066
11	0.1940	65.370	46.7	6.7	2.125	0.825	2.950	3.58	6.318	1.887	1.062
12	0.2189	65.910	47.2	7.6	2.128	0.823	2.951	3.59	6.320	1.887	1.064
13	0.2438	66.360	47.7	8.5	2.128	0.825	2.953	3.58	6.318	1.889	1.064
14	0.2679	66.740	48.0	9.4	2.124	0.820	2.944	3.59	6.323	1.882	1.062
15	0.2917	67.530	48.8	10.2	2.138	0.825	2.963	3.59	6.318	1.894	1.069
16	0.3159	67.890	49.2	11.1	2.133	0.824	2.957	3.59	6.319	1.891	1.067
17	0.3406	68.420	49.7	12.0	2.134	0.822	2.956	3.60	6.321	1.889	1.067
18	0.3655	68.790	50.1	12.9	2.128	0.832	2.960	3.56	6.311	1.896	1.064
19	0.3905	69.210	50.5	13.8	2.124	0.833	2.957	3.55	6.310	1.895	1.062
20	0.4144	69.730	51.0	14.7	2.124	0.836	2.960	3.54	6.307	1.898	1.062
21	0.4234	69.930	51.2	15.0	2.124	0.838	2.962	3.53	6.305	1.900	1.062


Eng
09-15MU
2
8-10'
CU 1 tsf


Eng
09-15MU
2
8-10'
CU 0.5 tsf


Eng
09-15MU
2
8-10'
CU 2 tsf

PLATE H-5

CSETT INPUT

```
100 TITLE
110 Marsh Lake: The diversion dike A: Thalweg Case
120 2DSO  1  6  0  0.5  125
130 -9999  936
140  1119  936
150  1189.4  953.6
160  1199.4  953.6
170  1269.8  936
180  9999  936
190 SOIL  1  936 N 100
200 SOIL  2  930.4 D 40  0.03  62  0.32
210 INDEX  0.53  600  1.755
220 SOIL  3  918.8 N 34
240 BOUS  80
250 TIMI  0.0192  2
260 OUTPUT  1144.4  1194.4  5
270 END
```

```
100 TITLE
110 Marsh Lake: The diversion dike A: Overbank Case
120 2DSO  1  6  0  0.5  125
130 -9999  940.
140  1119  940.
150  1173.4  953.6
160  1183.4  953.6
170  1237.8  940.
180  9999  940.
190 SOIL  1  940.5 D 100  0.1  7  0.32
200 INDEX  0.53  100  1.755
210 SOIL  2  936.4 N 40
220 SOIL  3  930.6 D 34  0.1  7  0.32
230 INDEX  0.53  600  1.755
240 SOIL  4  919.2 N 35
260 BOUS  80
270 TIMI  0.0192  2
280 OUTPUT  1118.4  1178.4  5
290 END
```

CSETT INPUT

```
100 TITLE
110 Marsh Lake: Initial Highway embankment Load only
120 2DSO  1  8  0  0.5  125
130 -9999  939
140  1136.6  939
150  1168  939
160  1183  944
170  1218  944
180  1223  939
190  1254.4  939
200  9999  939
210 SOIL  1  939 S 50  0.1  11  0.32
220 INDEX  0.53  138  1.755
230 SOIL  2  932.1 S 40  0.03  11  0.32
240 INDEX  0.37  550  1.025
250 SOIL  3  927.9 N 60
280 BOUS  80
290 TIMS  0.5  1  5  10  50
300 OUTPUT  1135.5  1195.5  5
310 END
```

```
100 TITLE
110 Marsh Lake: Both the  Initial Highway embankment and the proposed  road raise
120 2DSO  1  8  0  0.5  125
130 -9999  939
140  1136.6  939
150  1168  939
160  1223  952.75
170  1248  952.75
180  1303  939
190  1325  939
200  9999  939
210 SOIL  1  939 S 50  0.1  11  0.32
220 INDEX  0.53  138  1.755
230 SOIL  2  932.1 S 40  0.03  11  0.32
240 INDEX  0.37  550  1.025
250 SOIL  3  927.9 N 60
270 BOUS  80
280 TIMI  0.0192  2
290 OUTPUT  1135.5  1235.5  5
300 END
```

CSETT Settlement

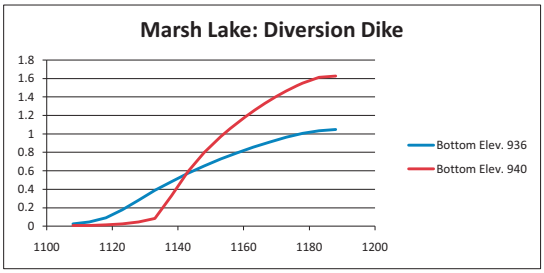
II. OUTPUT SUMMARY.

TITLE- Marsh Lake Diversion Dike: Bottom at 936.0

TIME (YR)	X=1108.0 1108	X=1113.0 1113	X=1118.0 1118	X=1123.0 1123	X=1128.0 1128	X=1133.0 1133	X=1138.0 1138	X=1143.0 1143	X=1148.0 1148	X=1153.0 1153	X=1158.0 1158	X=1163.0 1163	X=1168.0 1168	X=1173.0 1173	X=1178.0 1178	X=1183.0 1183	X=1188.0 1188
ULT.	0.024	0.045	0.092	0.177	0.283	0.388	0.484	0.573	0.654	0.728	0.795	0.858	0.913	0.965	1.007	1.035	1.047
0.5	0.018	0.034	0.068	0.132	0.211	0.288	0.361	0.427	0.486	0.54	0.591	0.637	0.68	0.717	0.75	0.771	0.779
1	0.024	0.045	0.092	0.176	0.279	0.383	0.478	0.567	0.646	0.718	0.785	0.847	0.904	0.954	0.996	1.024	1.034
5	0.024	0.045	0.092	0.177	0.283	0.388	0.484	0.573	0.654	0.728	0.795	0.858	0.913	0.965	1.007	1.035	1.047
10	0.024	0.045	0.092	0.177	0.283	0.388	0.484	0.573	0.654	0.728	0.795	0.858	0.913	0.965	1.007	1.035	1.047
50	0.024	0.045	0.092	0.177	0.283	0.388	0.484	0.573	0.654	0.728	0.795	0.858	0.913	0.965	1.007	1.035	1.047

TITLE- Marsh Lake Diversion Dike: Bottom at 940.0

TIME (YR)	X=1108.0	X=1113.0	X=1118.0	X=1123.0	X=1128.0	X=1133.0	X=1138.0	X=1143.0	X=1148.0	X=1153.0	X=1158.0	X=1163.0	X=1168.0	X=1173.0	X=1178.0	X=1183.0	X=1188.0
ULT.	0.007	0.01	0.016	0.026	0.045	0.085	0.33	0.592	0.799	0.97	1.118	1.249	1.364	1.466	1.551	1.614	1.627
0.5	0.006	0.008	0.012	0.02	0.034	0.066	0.289	0.526	0.708	0.858	0.985	1.097	1.196	1.283	1.357	1.412	1.423
1	0.007	0.01	0.016	0.026	0.045	0.084	0.329	0.591	0.795	0.966	1.113	1.244	1-Jan-00	1.459	1.543	1.606	1.62
5	0.007	0.01	0.016	0.026	0.045	0.085	0.33	0.592	0.799	0.97	1.118	1.249	1.364	1.466	1.551	1.614	1.627
10	0.007	0.01	0.016	0.026	0.045	0.085	0.33	0.592	0.799	0.97	1.118	1.249	1.364	1.466	1.551	1.614	1.627
50	0.007	0.01	0.016	0.026	0.045	0.085	0.33	0.592	0.799	0.97	1.118	1.249	1.364	1.466	1.551	1.614	1.627



II. OUTPUT SUMMARY.

TITLE- Marsh Lake existing road raise: Existing road profile

TIME (YR)	X=1135.5	X=1140.5	X=1145.5	X=1150.5	X=1155.5	X=1160.5	X=1165.5	X=1170.5	X=1175.5	X=1180.5	X=1185.5	X=1190.5	X=1195.5
ULT.	0.012	0.014	0.015	0.028	0.035	0.05	0.083	0.235	0.393	0.499	0.56	0.58	0.583
0.5	0	0	0	0	0.001	0.007	0.023	0.085	0.15	0.194	0.218	0.224	0.225
1	0	0	0	0.006	0.017	0.022	0.036	0.147	0.259	0.335	0.374	0.384	0.386
5	0.01	0.012	0.014	0.017	0.028	0.039	0.069	0.215	0.365	0.468	0.523	0.541	0.544
10	0.011	0.013	0.015	0.023	0.035	0.048	0.078	0.229	0.385	0.491	0.549	0.567	0.573
50	0.012	0.014	0.015	0.028	0.035	0.05	0.083	0.235	0.393	0.499	0.56	0.58	0.583

TITLE- Marsh Lake existing road raise: Raised road profile

TIME (YR)	X=1135.5	X=1140.5	X=1145.5	X=1150.5	X=1155.5	X=1160.5	X=1165.5	X=1170.5	X=1175.5	X=1180.5	X=1185.5	X=1190.5	X=1195.5
ULT.	0.114	0.274	0.413	0.52	0.624	0.732	0.851	0.965	1.063	1.14	1.186	1.199	1.202
0.5	0.03	0.093	0.147	0.188	0.226	0.268	0.315	0.361	0.4	0.433	0.451	0.454	0.454
1	0.052	0.164	0.258	0.328	0.393	0.466	0.546	0.623	0.691	0.748	0.778	0.785	0.785
5	0.095	0.247	0.375	0.476	0.569	0.674	0.781	0.889	0.981	1.06	1.099	1.11	1.113
10	0.11	0.267	0.402	0.509	0.607	0.715	0.829	0.943	1.038	1.118	1.162	1.173	1.174
50	0.114	0.274	0.413	0.52	0.624	0.732	0.851	0.965	1.063	1.14	1.186	1.199	1.202

TITLE- Marsh Lake existing road raise: Raised road profile minus existing road profile

TIME (YR)	X=1135.5 1135.5	X=1140.5 1140.5	X=1145.5 1145.5	X=1150.5 1150.5	X=1155.5 1155.5	X=1160.5 1160.5	X=1165.5 1165.5	X=1170.5 1170.5	X=1175.5 1175.5	X=1180.5 1180.5	X=1185.5 1185.5	X=1190.5 1190.5	X=1195.5 1195.5
ULT.	0.102	0.26	0.398	0.492	0.589	0.682	0.768	0.73	0.67	0.641	0.626	0.619	0.619
0.5	0.03	0.093	0.147	0.188	0.225	0.261	0.292	0.276	0.25	0.239	0.233	0.23	0.229
1	0.052	0.164	0.258	0.322	0.376	0.444	0.51	0.476	0.432	0.413	0.404	0.401	0.399
5	0.085	0.235	0.361	0.459	0.541	0.635	0.712	0.674	0.616	0.592	0.576	0.569	0.569
10	0.099	0.254	0.387	0.486	0.572	0.667	0.751	0.714	0.653	0.627	0.613	0.606	0.601
50	0.102	0.26	0.398	0.492	0.589	0.682	0.768	0.73	0.67	0.641	0.626	0.619	0.619

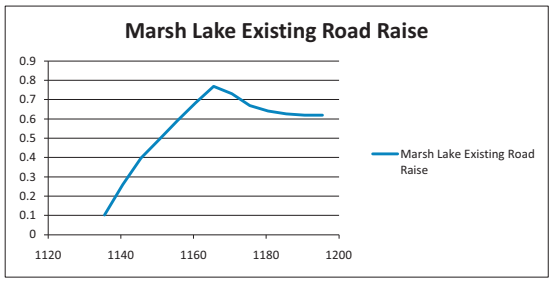
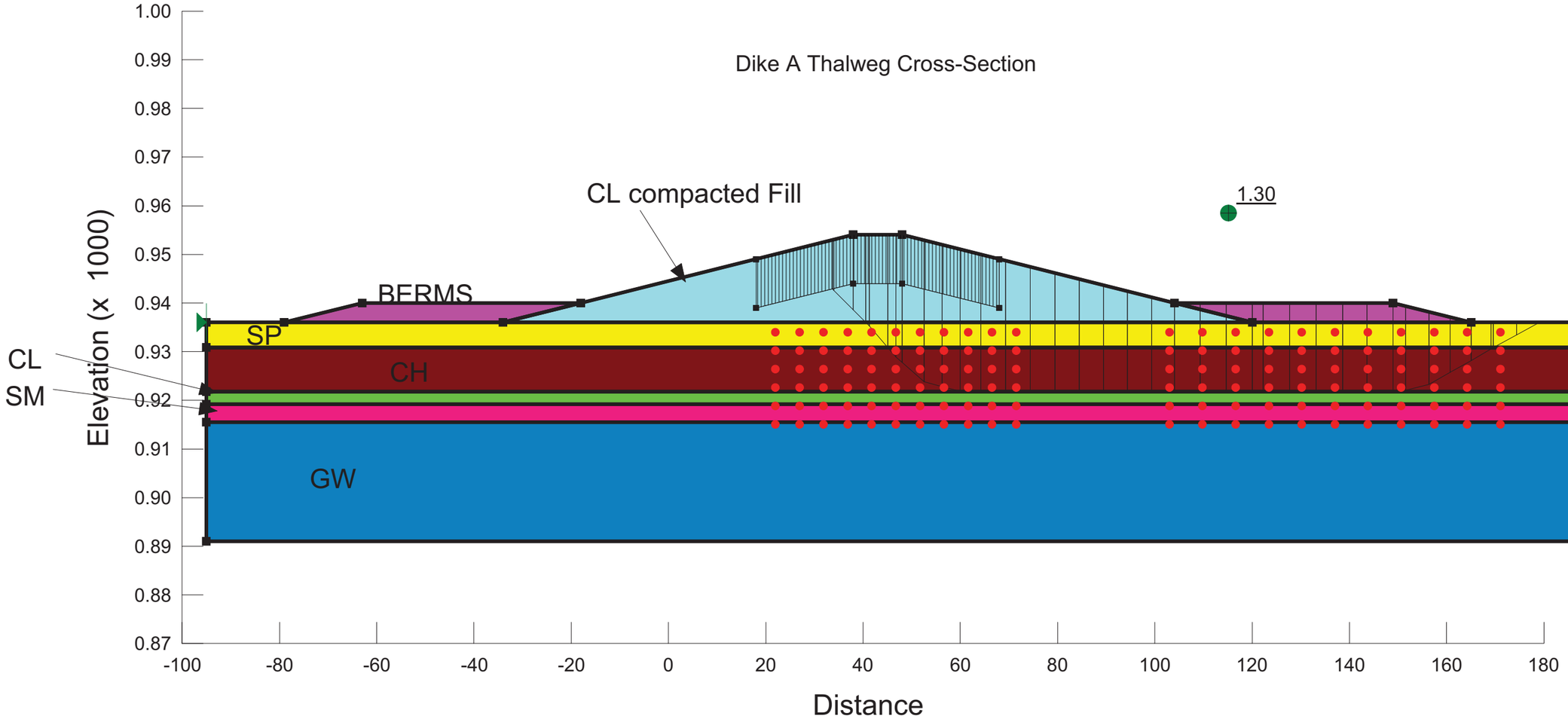


PLATE H-7

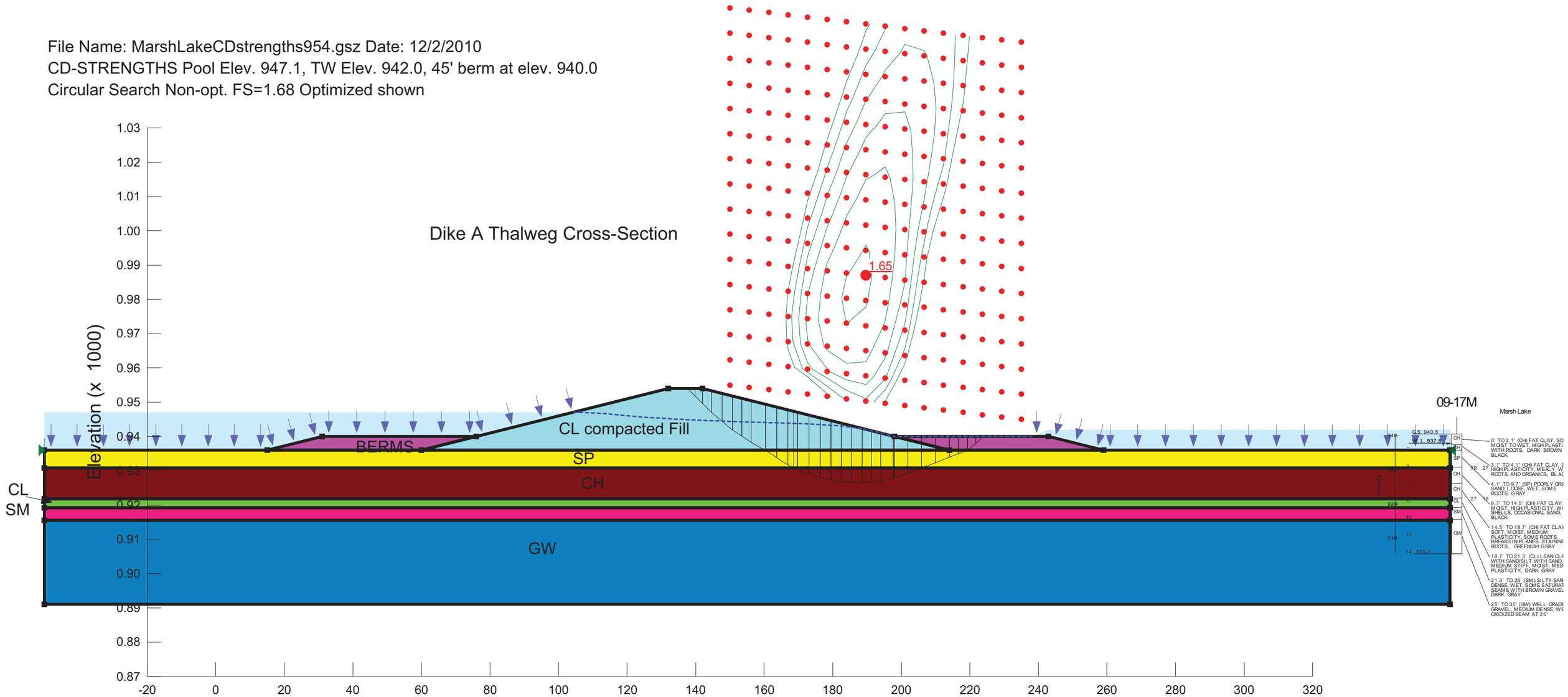
File Name: MarshLakeUUstrengthsCLtop954.gsz Date: 12/2/2010
UU-STRENGTHS 10' Crack filled with water with 45 foot berm at elev. 940.0
Non-Circular Search Non-opt. FS=1.38 Optimized Shown



CH Multiple Trial: 97 pcf Multiple Trial: 180 psf
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
SM Multiple Trial: 105 pcf 0 psf 33 °
GW Multiple Trial: 130 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 120 pcf Multiple Trial: 1300 psf
BERMS 100 pcf 300 psf
CL 97 pcf 840 psf

PLATE H-8

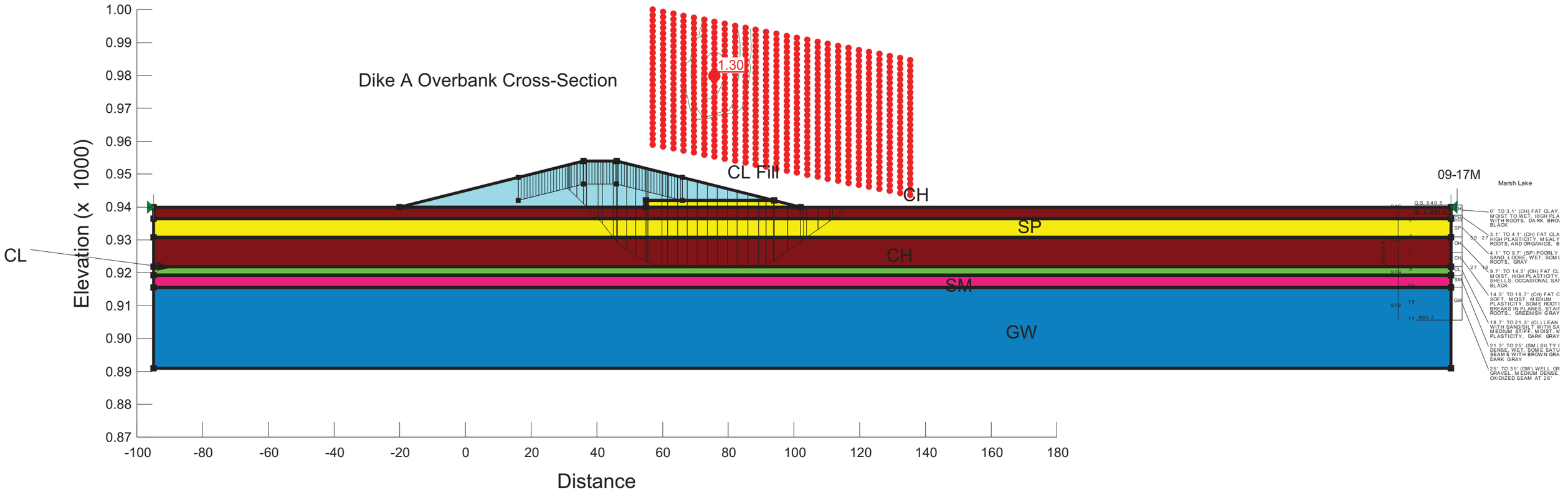
File Name: MarshLakeCDstrengths954.gsz Date: 12/2/2010
CD-STRENGTHS Pool Elev. 947.1, TW Elev. 942.0, 45' berm at elev. 940.0
Circular Search Non-opt. FS=1.68 Optimized shown



Name: CH Unit Weight: Multiple Trial: 97 pcf Cohesion: Multiple Trial: 0 psf Phi: 25 °
Name: SP Unit Weight: Multiple Trial: 125 pcf Cohesion: 0 psf Phi: Multiple Trial: 30 °
Name: SM Unit Weight: Multiple Trial: 130 pcf Cohesion: 0 psf Phi: 33 °
Name: GW Unit Weight: Multiple Trial: 130 pcf Cohesion: 0 psf Phi: Multiple Trial: 30 °
Name: CL compacted Fill Unit Weight: Multiple Trial: 120 pcf Cohesion: Multiple Trial: 0 psf Phi: 25 °
Name: BERMS Unit Weight: 100 pcf Cohesion: 300 psf Phi: 0 °
Name: CL Unit Weight: 100 pcf Cohesion: 200 psf Phi: 30 °

PLATE H-8

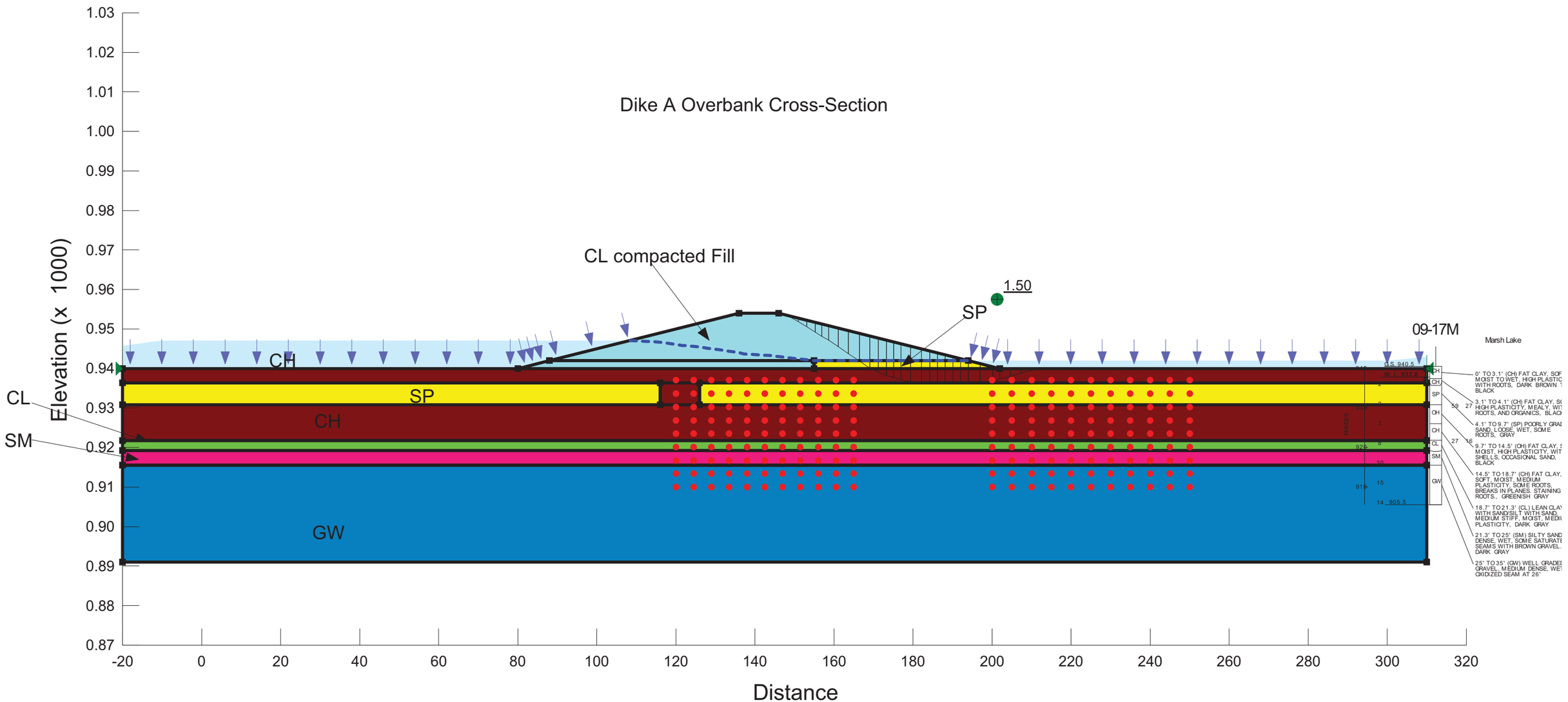
File Name: MarshLakeUUstrengthstop954Bottom940.gsz Date: 12/2/2010
UU-STRENGTHS 7' Crack depth filled with water
Circular Search Non-opt.=1.48 Optimized Shown



CH Multiple Trial: 97 pcf Multiple Trial: 180 psf 0 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
SM Multiple Trial: 105 pcf 0 psf 33 °
GW Multiple Trial: 130 pcf 0 psf Multiple Trial: 30 °
CL Fill Multiple Trial: 120 pcf Multiple Trial: 1300 psf 0 °
CL 97 pcf 840 psf 0 °

PLATE H-8

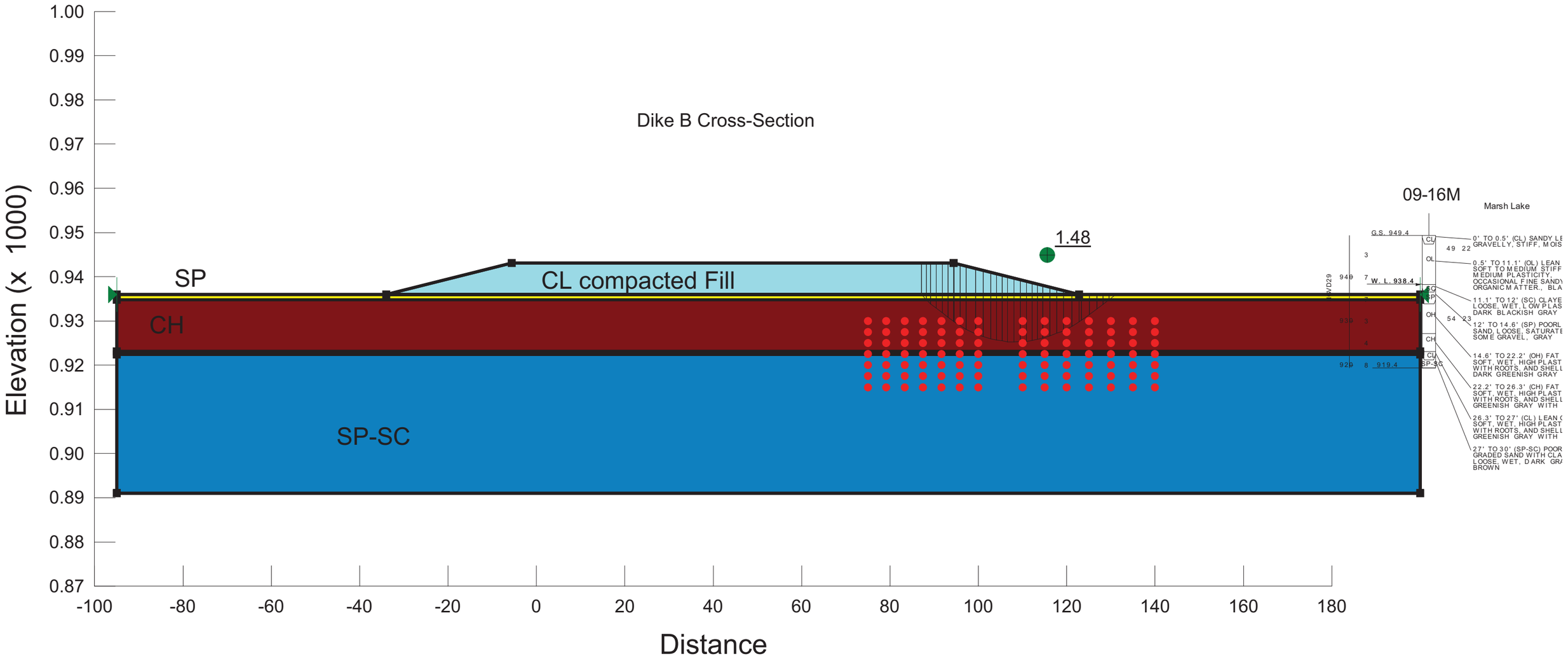
File Name: MarshLakeCDstrengths940top954.gsz Date: 12/9/2010
CD-STRENGTHS Pool Elev. 947.1, SAND CUTOFF, Downstream Water Surface Elev. 942.0
Non-Circular Search Non-opt. FS = 1.81 Optimized Shown



CH Multiple Trial: 97 pcf Multiple Trial: 0 psf 25 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
SM Multiple Trial: 130 pcf 0 psf 33 °
GW Multiple Trial: 130 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 120 pcf Multiple Trial: 0 psf 25 °
CL 113 pcf 200 psf 30 °

PLATE H-8

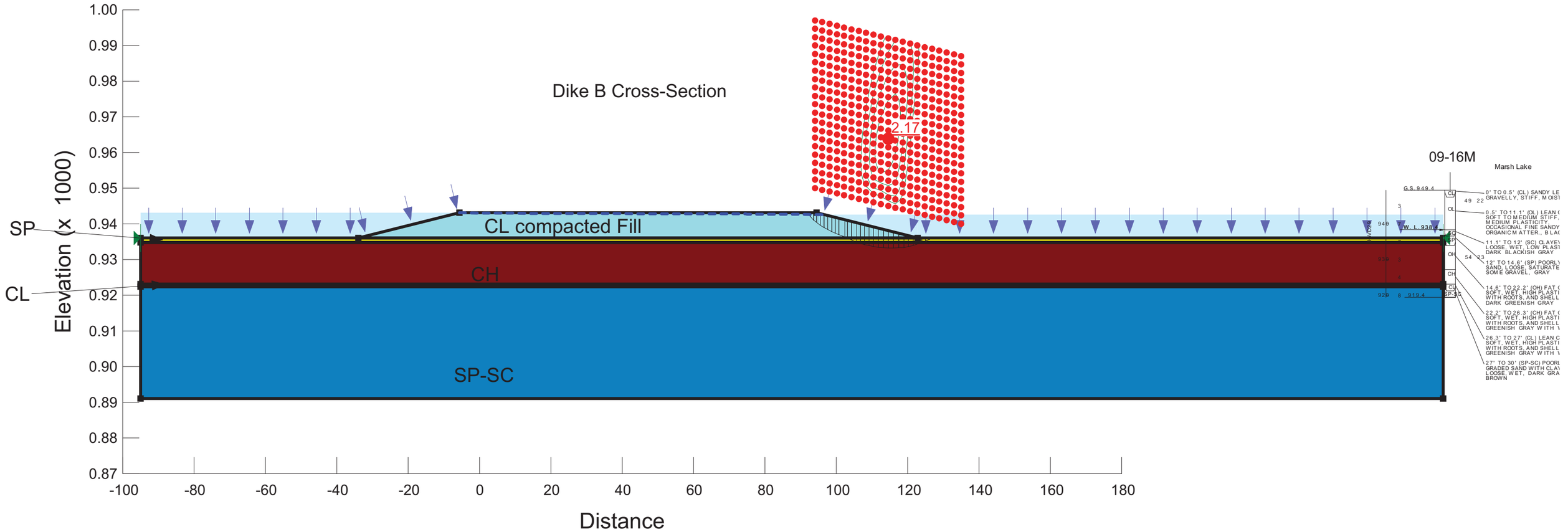
File Name: MarshLakeUUstrengthsDikeB.gsz Date: 12/2/2010
UU-STRENGTHS Search for Crack depth
Non-Circular Search Non-opt. FS = 1.62 Optimized Shown



CH Multiple Trial: 97 pcf Multiple Trial: 180 psf 0 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
SP-SC Multiple Trial: 130 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 100 pcf Multiple Trial: 1300 psf 0 °
CL 97 pcf 840 psf 0 °

PLATE H-8

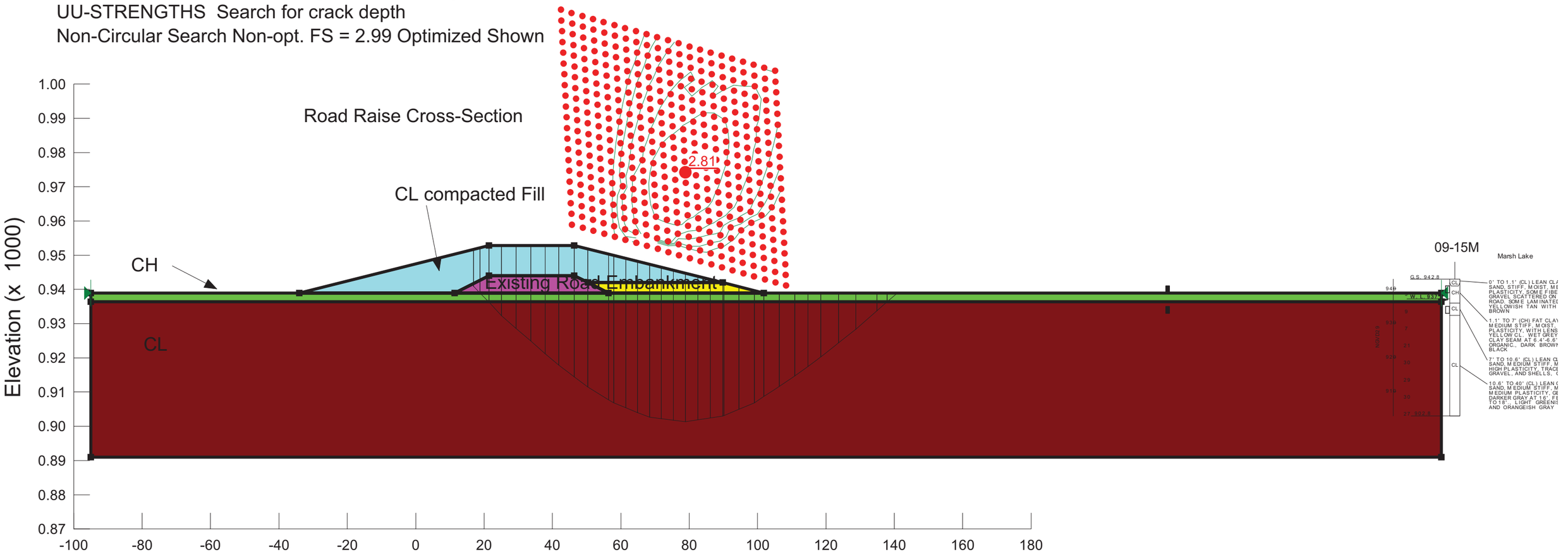
File Name: MarshLakeCDstrengthsDikeB.gsz Date: 12/2/2010
CD-STRENGTHS Downstream Water Surface Elev.=942.6
Circular Search Non-opt. FS= 2.20 Otimized Shown



CH Multiple Trial: 97 pcf Multiple Trial: 0 psf 25 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
SP-SC Multiple Trial: 130 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 120 pcf Multiple Trial: 0 psf 25 °
CL 97 pcf 0 psf 20 °

PLATE H-8

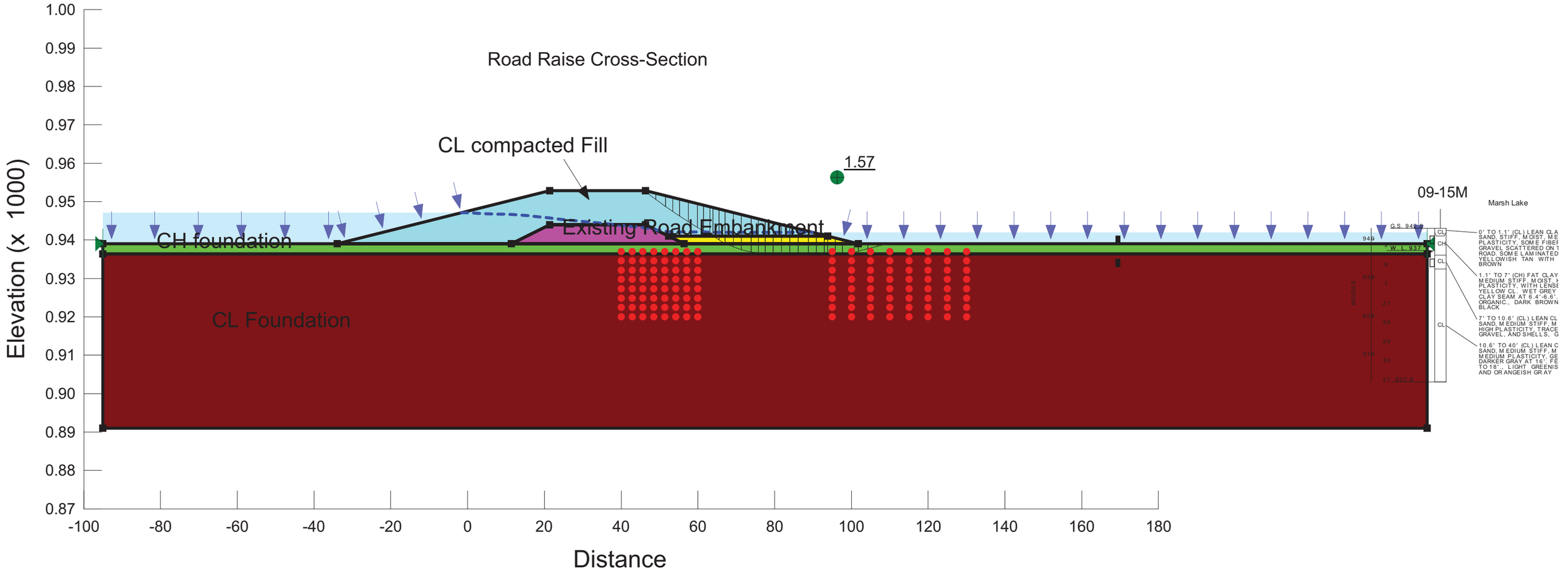
File Name: MarshLakeUUstrengthsRoadRaise.gsz Date: 3/1/2011
UU-STRENGTHS Search for crack depth
Non-Circular Search Non-opt. FS = 2.99 Optimized Shown



CL Multiple Trial: 97 pcf Multiple Trial: 840 psf 0 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 120 pcf Multiple Trial: 1300 psf 0 °
Existing Road Embankment 100 pcf 1300 psf 0 °
CH 97 pcf 180 psf 0 °

PLATE H-8

File Name: MarshLakeCDstrengthsRoadRaise.gsz Date: 12/10/2010
CD-STRENGTHS Pool Elev. 947.1, Downstream Water Surface Elev. = 942.0
Non-Circular Search Non-opt. FS=1.87 Optimized Shown



CL Foundation Multiple Trial: 97 pcf Multiple Trial: 200 psf 30 °
SP Multiple Trial: 125 pcf 0 psf Multiple Trial: 30 °
CL compacted Fill Multiple Trial: 120 pcf Multiple Trial: 0 psf 25 °
Existing Road Embankment 120 pcf 0 psf 30 °
CH foundation 97 pcf 0 psf 25 °

PLATE H-8

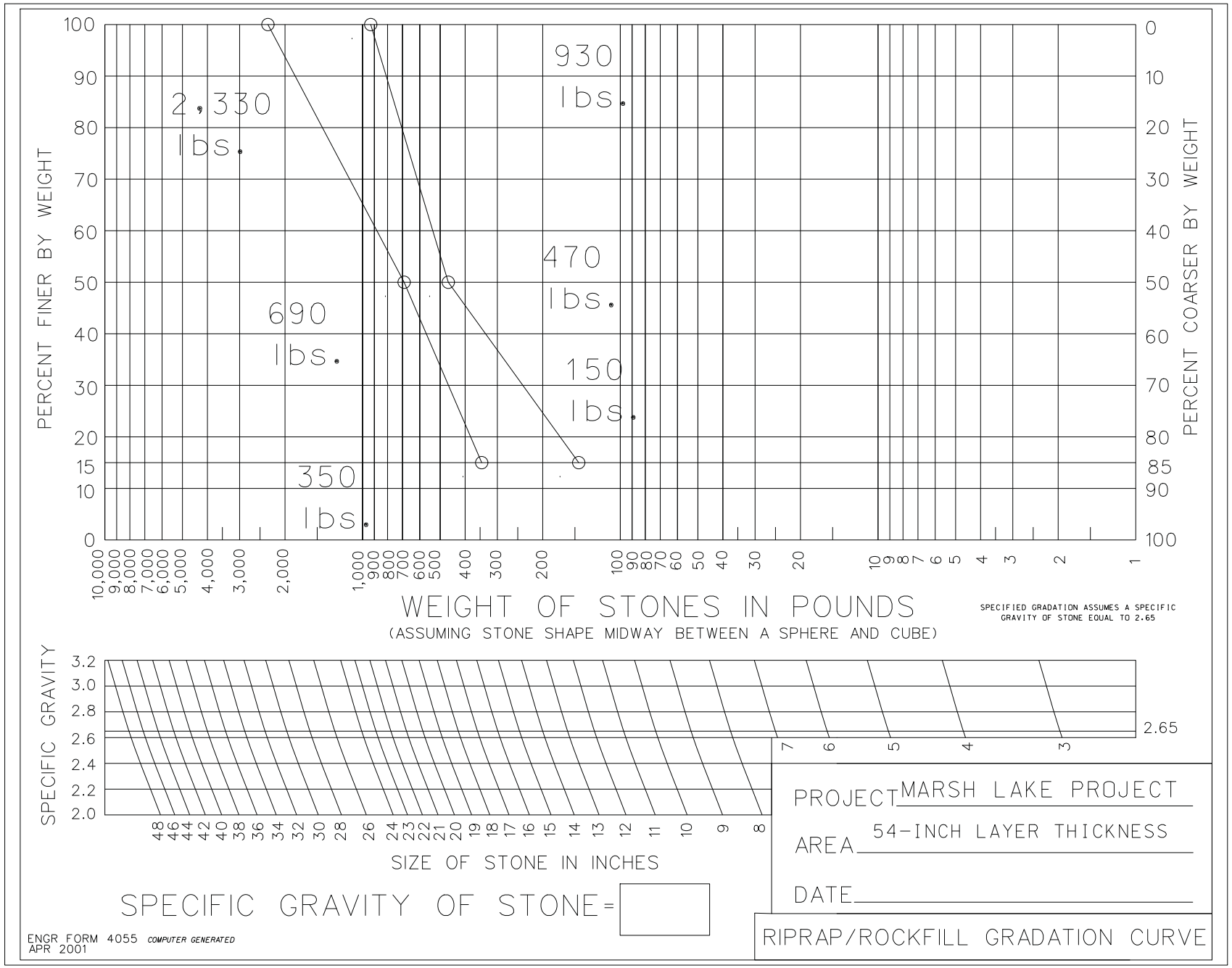

PERCENT FINER BY WEIGHT
PERCENT COARSER BY WEIGHT
2,330 lbs.
930 lbs.
470 lbs.
690 lbs.
150 lbs.
350 lbs.
WEIGHT OF STONES IN POUNDS
(ASSUMING STONE SHAPE MIDWAY BETWEEN A SPHERE AND CUBE)
SPECIFIED GRADATION ASSUMES A SPECIFIC GRAVITY OF STONE EQUAL TO 2.65
SPECIFIC GRAVITY
2.65
SIZE OF STONE IN INCHES
SPECIFIC GRAVITY OF STONE =
PROJECT MARSH LAKE PROJECT
AREA 54-INCH LAYER THICKNESS
DATE
RIPRAP/ROCKFILL GRADATION CURVE
ENGR FORM 4055 COMPUTER GENERATED
APR 2001

PLATE H-9

Appendix I – Recreation

RECREATION BENEFIT ANALYISIS

Marsh Lake, Minnesota

1.1 RECREATION BENEFIT ANALYSIS

Providing future recreational opportunities is an important part of this region by not only proving tourism dollars to the local economy but also providing a higher quality of life. An analysis of current local recreation, local user counts and studies, SCORP information, recreational professionals input and available State and Federal recreation was accomplished.

1.1.1 Recreation Benefits Without Site Facilities

Without the cost-shared proposed recreation features, recreation in the project area would be limited. Due to the lack of access to the project without the proposed recreation features, no recreation activities are forecasted to occur. Therefore no benefits were found for without-project conditions.

1.1.2 Recreation Challenges

The Marsh Lake Restoration plan with recreational features directly aligns with the Minnesota State Comprehensive Outdoor Recreation Plan (SCORP). Highlighted below are the five challenges listed for outdoor recreation in Minnesota along with the features included in this Feasibility Study that address these challenges.

- *Challenge #1 - Natural Resource Base*
  The highest priority is to address a declining natural resource base and the need to protect and restore the natural resource base on which outdoor recreation depends. Minnesota has a great deal of federal-, state- and county-owned or administered land, but most of it is in the northern third of the state and does not offer close-to-home recreational opportunities for most of the state's population. About two-thirds of all recreation use occurs within a half-hour drive from home, according to the 2004 Outdoor Recreation Participation Survey of Minnesotans.

- *Challenge #2 - Sustaining Existing Facilities*
  The Minnesota State Comprehensive Outdoor Recreation Plan (SCORP) calls for sustaining existing outdoor recreation facilities for future generations. The state still needs to invest in the outdoor recreation infrastructure to ensure that it is accessible, safe, energy efficient, economical to operate and maintain and flexible enough to accommodate changing needs.

  Project Features: Update Corps of Engineers Day Use facility at dam structure to include picnic area, comfort stations, and construction of a pedestrian bridge. Update boat ramps around Marsh Lake. Construct and update Canoe/Kayak launches and portage areas.

- *Challenge #3 - Healthy Lifestyle*
  SCORP noted the connection between outdoor recreation and a healthy lifestyle. If anything, this connection is even more relevant today. A 2006 survey by the United Health Foundation found that while Minnesotans are generally healthier than people in the rest of the country, yet there has been a 132 percent rise in the obesity rate of Minnesotans since 1990.

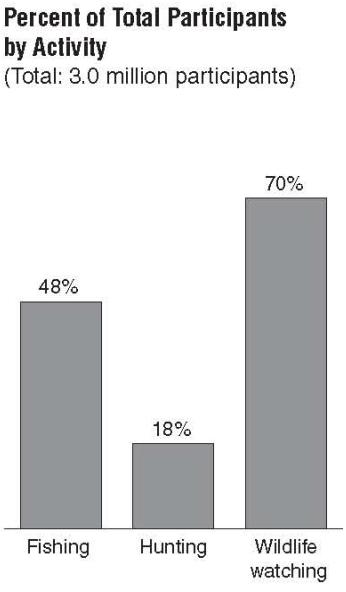
  Project Features: Pedestrian and bike bridge development across Marsh Lake spillway will provide connectivity to local and state bike trails. Canoe launch and portage area at dam location will provide connectivity for the Minnesota River State Water Trail.

- *Challenge #4 - Connecting People and Nature*
  SCORP identified the need to expand nature-based outdoor recreation experiences for young people by providing "near-by" access to nature and allowing time for frequent unstructured play and exploration. SCORP expands the theme to include reconnecting many adult Minnesotans with the outdoors.

  Project Features: Provide interpretive kiosks at existing boat ramps on Marsh Lake to interpret the environmental and cultural features of this project and area. These kiosks will also acquaint people with the myriad of recreational opportunities available to them and within the nearby Minnesota River Corridor.

- *Challenge #5 - Population Changes*
  Although Minnesota's population has increased in recent years the project area's population has experienced a decline. Minnesota's population has become older, more culturally and ethnically diverse and more concentrated in urban and urbanizing areas. These changes mean that who participates in outdoor recreation, what activities they participate in, where they participate, why they participate and when they participate also have changed. (Refer to Section 2.9 Social and Economic Conditions)

  Participation rates in some activities, such as fishing and hunting, are declining. At the same time, participation rates in other activities, such as ATV-riding and kayaking are increasing. (MN SCORP) The fastest growth in outdoor recreation participation is projected for activities that are popular with older adults. These adults are more active and living longer than past generations. Older adults tend to participate in low impact activities such as bird watching, wildlife photography, biking, hiking, and fishing. (US Forest Service; Customer Diversity and the Future Demand for Outdoor Recreation, 1994.)



  Project Features: Provide canoe/kayak access area and portage area near spillway. This will actually

provide a two for one – access to both the Minnesota River and Pomme de Terre River providing linkage to the Minnesota River State Water Trail. Update facilities at boat landings to include fishing and wildlife viewing platforms and interpretive kiosks. Update facilities to include accessibility.

1.1.3 Population Market Area

Population sources for Big Stone, Lac qui Parle, Swift and Chippewa Counties were obtained from the U.S. Census. For the purpose of this study, all four counties have been included in the Market Area population, see Table 1. A linear extrapolation of 2000-2008 US census figures was assuming a constant rate of change, was applied. This extrapolation methodology has been used in previous studies for MVP and is an acceptable method of acquiring quantifiable data and would reflect the best available data. This rate was calculated up to project year 2024 where the population was held constant to project year 2064. Due to the fluctuation of populations and increase in immigrants to the area[1], population trends appear to decline in the short term and plateau over time.

Table 1 – Market Area Population

Place	Base Population		Population Change	Population Predictions*					
	2000	2008	2000-08	2014	2024	2034	2044	2054	2064
Lac Qui Parle County	8,067	7,165	-11.2%	6,489	5,361	5,361	5,361	5,361	5,361
Chippewa County	13,088	12,414	-5.1%	11,909	11,066	11,066	11,066	11,066	11,066
Swiift County	11,956	11,035	-7.7%	10,345	9,193	9,193	9,193	9,193	9,193
Big Stone County	5,802	5,365	-7.5%	5,038	4,491	4,491	4,491	4,491	4,491
Regional Totals	**38,913**	**35,979**		**33,781**	**30,111**	**30,111**	**30,111**	**30,111**	**30,111**

*Linear extrapolation of 2000-2008 US census figures, assuming a constant rate of change.

1.1.4 Participation and Demand

The participation rate in per capita activity days for recreation activity was derived from reviewing the 2004 Outdoor Recreation Participation Survey of Minnesotans – Report on Findings. The rates used were taken from the South region for users. The participation rate change from 1999-2001 to 2005-2009 is from the Long-Term National Trends in Outdoor Recreation Activity Participation---1980 to Now, A Recreation Research Report in the IRIS Series. The rate was calculated up to project year 2034 in spite of unchanging regional population. This was based upon the growth in usage the Marsh Lake area has seen in the past several years as well as the growing older population who traditionally participate in more passive recreation such as wildlife viewing. [2] The increase in immigrant populations also plays a role in determining growth; day use activities are

[1] Pew Hispanic Center, (n.d.). *Demographic Profile of Hispanics in Minnesota, 2007.* Retrieved from http://www.pewhispanic.org

[2] Cordell, H. Ken, Green, Gary T., Betz, Carter J, USDA Forest Service, University of Georgia. May 2009. Long-Term National Trends in Outdoor Recreation Activity Participation –1980 to Now, A Recreation Research Report in the IRIS Series. Retrieved on September 14, 2009, from http://warnell.forestry.uga.edu/nrrt/nsre/IrisReports.html.

more prevalent in immigrant populations such as fishing and picnicking.[3] These participation rates are shown in Table 2.

Table 2 – Participation Rates (in Per Capita Activity Days) by Recreation Activity

Primary Activity:	Rate of Change	2004	2014	2024	2034	2044	2054	2064
Picnicking	0%	3.72	3.72	3.72	3.72	3.72	3.72	3.72
Wildlife Viewing	18%	18.84	21.99	25.14	28.29	28.29	28.29	28.29
Fishing	7%	1.76	1.87	1.97	2.08	2.08	2.08	2.08
Canoe/kayak	16%	0.51	0.59	0.66	0.74	0.74	0.74	0.74

Projected demands for (proposed) project-supported recreations are given in Table-3. The projected public use demand (in activity days) is calculated using recreation activity participation rates (Table-2), population projections for the surrounding counties from Table-1, recreation years and participation rates (per activity), and professional judgment in consultation with the MN DN, US Fish and Wildlife and other recreation and wildlife specialists. The years for depicting projected growth were chosen to reflect a fifty-year project life. Tables 3, 5 and 6 show 2014 as the first project year. This year is used in the tables because it is the proposed project construction completion date.

Table 3 – Market Area Activity Days

Primary Activity:	Year:									
	2014	2015	2016	2017	2018	2024	2034	2044	2054	2064
Market Area Population:	33,781	33,414	33,047	32,680	32,313	30,111	30,111	30,111	30,111	30,111
Picnicking										
Participation Rate	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72	3.72
Activity Days/Year	125,665	124,300	122,935	121,570	120,204	112,013	112,013	112,013	112,013	112,013
Wildlife Viewing										
Participation Rate	21.99	22.31	22.62	22.94	23.25	25.14	28.29	28.29	28.29	28.29
Activity Days/Year	742,892	745,351	747,579	749,576	751,341	757,076	851,968	851,968	851,968	851,968
Fishing										
Participation Rate	1.87	1.88	1.89	1.90	1.91	1.97	2.08	2.08	2.08	2.08
Activity Days/Year	63,076	62,749	62,414	62,071	61,720	59,451	62,679	62,679	62,679	62,679
Canoe/Kayak										
Participation Rate	0.59	0.59	0.60	0.61	0.62	0.66	0.74	0.74	0.74	0.74
Activity Days/Year	19,781	19,819	19,851	19,877	19,898	19,908	22,183	22,183	22,183	22,183

1.1.5 Estimate of Current and Future Usage of Proposed Activities

Lacking a comprehensive site design, Table-4, establishing the maximum design capacity value, is a conservative estimate based on a concept (See Section 7.2 of the main report). Satisfactory limits on site visitation, feature conflicts, and neighborhood impacts would be established during the design phase of the proposed project. Visitation, parking, etc., will be adjusted to minimize negative social affects and over-use. Annual Primary

[3] Dunn, Robert A. 2002. Managing for Ethnic Diversity: Recreation Facility and Service Modifications for Ethnic Minority Visitors. Prepared for the U.S Army Corps of Engineers, Engineer Research and Development Center.

Activity Days were developed for the four site oriented recreational activities listed below in table 4. This was calculated by multiplying (supply of units) x (people per unit) x (turn over rate) x (weeks in season) and divided by (weekend day use) x (recreation season use). This formula determines the annual activity occasions which in turn is used to develop Annual Primary Activity Days as shown in Table 5. Design capacity values were based on Carrying Capacity guidelines in the "Optimum Recreation Carrying Capacity" developed for the U.S. Department of the Interior in 1977.

A Primary Activity Day (or visitor day) is a standard unit of use consisting of a visit by an individual to a recreation area during a 24-hour period. People often engage in more than one activity occasion during any given recreational site visit. A person engaged in bicycling, walking/jogging, or picnicking, etc., tends to participate in more than one activity per day; they might also bird watch or photograph the outdoors on the same day. The Primary Activity Day therefore, is considered to consist of 1.25 activity occasions/day for most types of recreation. The Annual Primary Activity Days listed in Table 5 was derived from dividing the annual capacity in occasions by the activity day factor. This was necessary so as to avoid double counting of visitors engaging in more than one activity during the day.

Based upon the growth in usage the Marsh Lake area has seen in the past several years picnicking, fishing, canoeing and wildlife viewing, was projected at 40 percent of capacity the first year, 50 percent of capacity the second year, 60 percent capacity the third year, 80 percent capacity the fourth year and full capacity the fifth year.

Table 4 – Project Recreation Features: Maximum Capacity and Expected Use

Site Recreation, Design Capacity Values						
Primary Activity	(u)= Supply of Units	(p) = People per Unit	(t) = Turnover Rate	(s) = Weeks in Season	(w) = Weekend Day Use	(y) = Recreation Season Use
Picnicking	4	4	2	18	30%	70%
Fishing	21	2	2	22	20%	65%
Canoeing*	36	2	1	18	30%	65%
Wildlife Viewing	72.5					

*The limiting factor for supply of units for canoeing is the boat launch rather than the available area. Assuming 20 minutes per launch (1) over a 12-hour day

Table-5 shows estimated recreation site capacity (from Table-4, converted to activity days) by major recreation activities that would be supported by the project.

Table 5 – Estimated Annual Use, Per Site and Activity

Primary Activity:	Activity Occasions*	Conversion Factor	Activity Days (2014)	Activity Days (2015)	Activity Days (2016)	Activity Days (2017)	Activity Days (2018-2064)
Picnicking	2,743	1.25	878	1,098	1,317	1,756	2,195
Fishing	14,215	1.25	4,549	5,687	6,824	9,098	11,373
Canoeing	6,646	1.25	2,127	2,659	3,190	4,254	5,317
Total Site Activity Days			7,554	9,443	11,331	15,108	18,885
SUBTOTAL ACTIVITY DAYS			7,554	9,443	11,331	15,108	18,885
Wildlife Viewing**	72.5%	1.25	4,382	5,477	6,572	8,763	10,954
TOTAL ANNUAL PRIMARY ACTIVITY DAYS* **			**11,936**	**14,920**	**17,903**	**23,871**	**29,839**

* Capacity of Recreation Use in Activity Occasions = upts/wy
**72.5% of Total Activity Days for Site Recreation
***Annual Primary Activity Day numbers may contain rounding errors

1.1.6 Annual Recreation Benefits

Table-6 shows the projected recreation visitation over the life of the project. The design provides a positive social value in that less popular forms of recreation can also be supported and provided by the project's main features at little or no additional cost. Noting the excess demand for each activity, it is evident the project will provide a positive percentage of the market area recreation needs for years to come. Visitation growth of the project is tied to recreation growth as indicated by the Long-Term National Trends in Outdoor Recreation Activity Participation and the population growth expected for the region.

The numbers shown may be somewhat affected by final site design, as stated earlier. Other factors that could affect these values are: changes outside of the population value ranges estimated, enlarging the recreation sites and features, additional recreation features, climate change, or the addition of recreation features not supported by this project.

Table 6 – Project Recreation and Excess Demand

Primary Activity:		Year:									
		2014	2015	2016	2017	2018	2024	2034	2044	2054	2064
Picnicking											
(Table 3)	Market Zone Demand	125,665	124,300	122,935	121,570	120,204	112,013	112,013	112,013	112,013	112,013
(Table 5)	Demand Met by Proposed Facilities	878	1,098	1,317	1,756	2,195	2,195	2,195	2,195	2,195	2,195
	Excess Demand	124,787	123,203	121,618	119,814	118,009	109,818	109,818	109,818	109,818	109,818
Wildlife Viewing											
(Table 3)	Market Zone Demand	742,892	745,351	747,579	749,576	751,341	757,076	851,968	851,968	851,968	851,968
(Table 5)	Demand Met by Proposed Facilities	4,382	5,477	6,572	8,763	10,954	10,954	10,954	10,954	10,954	10,954
	Excess Demand	738,510	739,874	741,007	740,813	740,387	746,122	841,014	841,014	841,014	841,014
Fishing											
(Table 3)	Market Zone Demand	63,076	62,749	62,414	62,071	61,720	59,451	62,679	62,679	62,679	62,679
(Table 5)	Demand Met by Proposed Facilities	4,549	5,687	6,824	9,098	11,373	11,373	11,373	11,373	11,373	11,373
	Excess Demand	58,527	57,062	55,590	52,973	50,347	48,078	51,306	51,306	51,306	51,306
Canoe/Kayak											
(Table 3)	Market Zone Demand	19,781	19,819	19,851	19,877	19,898	19,908	22,183	22,183	22,183	22,183
(Table 5)	Demand Met by Proposed Facilities	2,127	2,659	3,190	4,254	5,317	5,317	5,317	5,317	5,317	5,317
	Excess Demand	17,654	17,160	16,661	15,624	14,581	14,591	16,866	16,866	16,866	16,866

1.1.7 Unit Day Values

The Unit Day Value (UDV) method was used to determine daily recreation benefits. This method was chosen because local wildlife and recreation experts were extremely knowledgeable and provided ample data regarding the existing recreation opportunities as well as needs and priorities for Marsh Lake. UDV was also chosen because the recreation facilities will not influence the project selection and the total project annual visits are also not forecasted to be more than 750,000.

Unit day values were developed for each recreational activity. This methodology relies on professional judgment to assign point values to five specific criteria:

- Recreation Experience—pertains to the availability and quality of activities on site.
- Availability of Opportunity—is specific to travel times and scarcity of activities.
- Carrying Capacity—concerns the level of site recreation development.
- Accessibility—pertains to the ease of access, specifically by automobile.
- Environmental—is specific to the aesthetic qualities of the site and surrounding areas.

The total points assigned are converted to a unit-day value, which is then applied to the estimated visitation to derive the overall benefits. The points were assigned to the criteria as outlined in Table-7. These points were then converted to a Unit Day Value using "General Recreation" point-to-value data for Fiscal Year 2010, with a range for general recreation of $3.58 -$10.75.

This method is outlined in the *Economics Guidance Memorandum 11-03, Unit Day Values for Recreation, Fiscal Year 2011*. The table provided in the memorandum was adjusted from Table K-3-1, Federal Register Vol. 44, No. 242, p.72962, December 4, 1979, using the CPI factor.

Point assignment for both types of recreation is assumed using parameters outlined in the memorandum and assumptions by a recreation professional. Points are adjusted, from a maximum assignment, by judgment factors set forth for each criterion. Maximum points vary according to the criteria and are shown in Table-7.

Table 7 – Unit Day Values

Criteria and (Maximum Points)	Picnicking	Wildlife Viewing	Canoe / kayak	Fishing
Recreation Experience (30)	12	23	23	23
Availability (18)	3	3	3	3
Carrying Capacity (14)	8	10	5	8
Accessibility (18)	12	15	7	7
Environmental Quality (20)	8	8	10	10
Total Points Assigned (100)	43	59	48	51
Unit Day Values*	**6.99**	**8.22**	**7.44**	**8.38**
2011 UDV = $3.58 -$10.75				

1.1.8 Benefit Computation

Recreation benefits attributable to the proposed site recreation facilities were based on projected demand for the primary activities listed in Table 6. These demand estimates over the period of analysis were used in conjunction with Unit Day Values developed for each of the recreational activities. Demand at each project year was multiplied by the appropriate Unity Day Value for each recreation activity. The value of the recreation activity at each project year was converted to a present worth value using a 4 1/8 percent annual interest rate. The sum of these present worth values, by recreational activity were converted to an average annual dollar value, given a 50 year project life and a 4 1/8 percent annual interest rate. Table 8 shows the Average Annual Benefit summary.

Table 8 – Project Recreation Average Annual Benefit

Picnicking	$	14,381
Wildlife Viewing	$	84,393
Fishing	$	89,327
Canoe/kayak	$	36,828
TOTAL ANNUAL AVG BENEFITS	**$**	**224,929**

The present value of estimated construction costs, contingencies, engineering, design, construction management, and interest during construction were calculated to be $447,800. This present value was amortized at 4 1/8 percent over the 50-year life of the project. The resulting annualized cost of $21,293.33 was added to the estimated annual operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) cost of $2,161 for a total annual cost of $23,454.33. The net annual benefits, or the annual benefits minus the annual costs, are $201,474.67. The benefit-cost ratio, or the annual benefits divided by the annual costs, was calculated to be 9.59. Therefore, the Marsh Lake proposed recreation plan is economically justified. The Federal costs of the Marsh Lake Ecosystem Restoration project with the recreation facilities would be approximately .4 percent greater than the Federal costs of the project without the recreation facilities, less than the 10 percent limit, in accordance with ER 1105-2-100.

1.2 REFERENCES

- 2004 Outdoor Recreation Participation Survey of Minnesotans – Report on Findings, Tim Kelly, Office of Management and Budget Services, Minnesota Department of Natural Resources, January 2005.

- Economics Guidance Memorandum 11-03, Unit Day Values for Recreation, Fiscal Year 2011, U.S. Army Corps of Engineers, November 2010.

- ER 1105-2-100, Planning Guidance Notebook, U.S. Army Corps of Engineers. April 22, 2000.

- Long-Term National Trends in Outdoor Recreation Activity Participation –1980 to Now, H. Ken Cordell, Gary T. Green and Carter J. Betz, May 2009.

- Minnesota's Outdoor Legacy: Strategy for the 90's. Statewide Comprehensive Outdoor Recreation Plan for 1990-1994, Minnesota Departments of Natural Resources and Trade and Economic Development. 1990.

- Population Estimates: Metropolitan and Micropolitan Statistical Areas, U.S. Census Bureau. (2000). Retrieved on August 4, 2009, from http://www.census.gov/popest/metro/metro.html.

- The 2008-2012 Minnesota State Comprehensive Outdoor Recreation Plan, Office of Management and Budget Services. Minnesota Department of Natural Resources. 2007.

- Urban Research and Development Corporation, Guidelines for Understanding and Determining Optimum Recreation Carrying Capacity, Prepared for the U.S. Department of the Interior, 1977.

- Urban Research and Development Corporation, Recreation Carrying Capacity Handbook – Methods and Techniques for Planning, Design, and Management, Prepared for the U.S. Army Corps of Engineers, July 1980.

- (3) ACCESSIBLE FISHING STRUCTURES
- (1) INTERPRETIVE KIOSK
- (1) TRASH RECEPTACLE

- (2) RUSTIC FISHING STRUCTURES
- (1) INTERPRETIVE SIGNAGE
- (1) TRASH RECEPTACLE

NOTES:
1. SEE PLATE 2 FOR FISHING STRUCTURE DETAILS
2. SEE PLATE 3 FOR CANOE LANDING DETAIL
3. SEE PLATE 4 FOR KIOSK DETAILS

- (2) RUSTIC FISHING STRUCTURES
- (1) INTERPRETIVE SIGNAGE
- (1) TRASH RECEPTACLE

- (3) ACCESSIBLE FISHING STRUCTURES
- (2) RUSTIC FISHING STRUCTURES
- (1) INTERPRETIVE KIOSK
- (2) TRASH AND RECYCLING RECEPTACLES
- AGGREGATE PARKING LOT

- (2) RUSTIC FISHING STRUCTURES
- (1) INTERPRETIVE SIGNAGE
- (1) TRASH RECEPTACLE

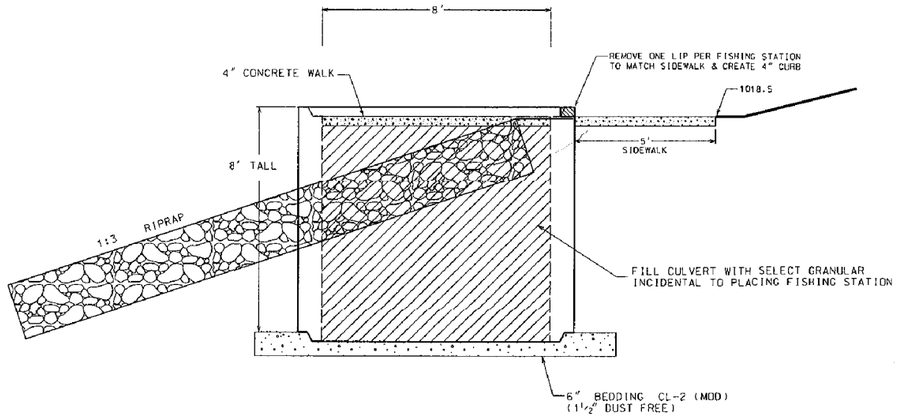
- (2) RUSTIC FISHING STRUCTURES
- (1) INTERPRETIVE SIGNAGE
- (1) TRASH RECEPTACLE

- WOOD/METAL PREFABRICATED PEDESTRIAN BRIDGE
- PICNIC AREA
- VAULT TOILETS
- (2) TRASH AND RECYCLING RECEPTACLES
- (3) BENCHES
- (1) INTERPRETIVE KIOSK
- (1)ACCESSIBLE CANOE LANDING
- (5) ACCESSIBLE FISHING STRUCTURES

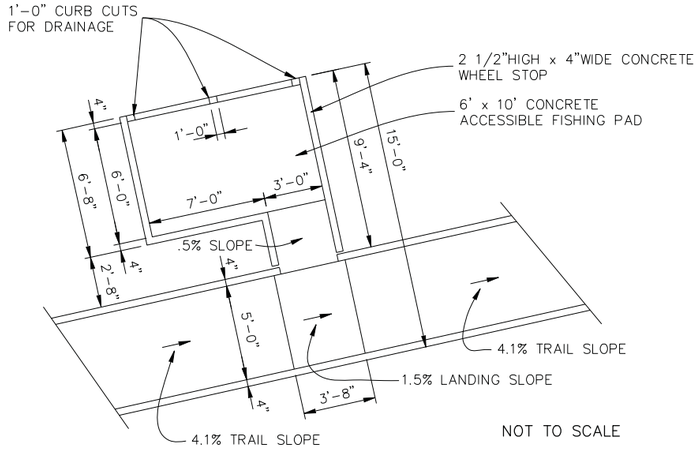
PROPOSED FISHING STATION

8' X 10' CONCRETE BOX

PLACED ON END

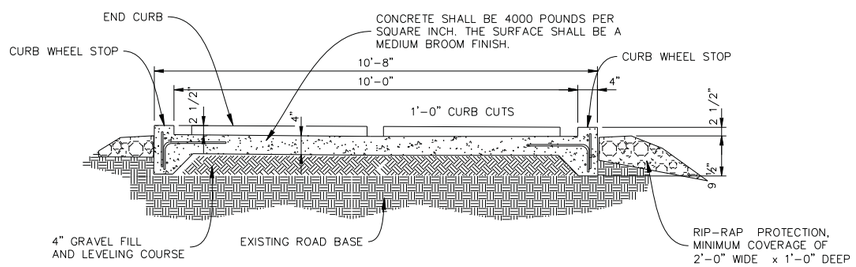


NOT TO SCALE



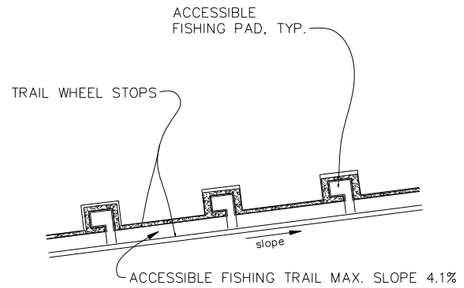
NOT TO SCALE

ACCESSIBLE FISHING RAMP
TYPICAL FISHING PAD



NOT TO SCALE

ACCESSIBLE FISHING RAMP
FISHING PAD SECTION VIEW



NOT TO SCALE

ACCESSIBLE FISHING RAMP
SITE PLAN

US Army Corps of Engineers®
ST. PAUL DISTRICT

MARK	DESCRIPTION	DATE	APPR.
MARK	DESCRIPTION	DATE	APPR.

U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

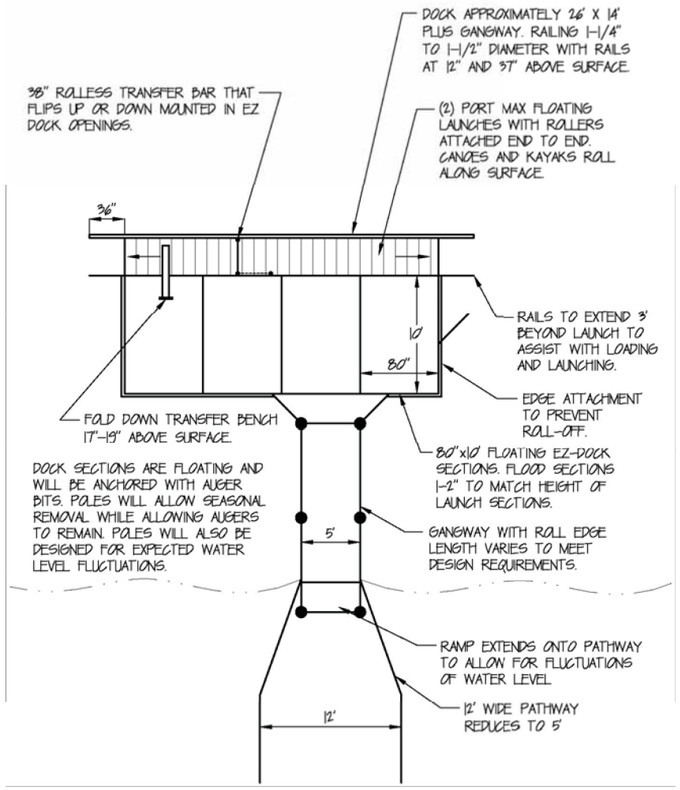
DESIGNED BY:
DWN BY: RGM
CKD BY:
SUBMITTED BY:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE:
PLOT DATE:
FILE NUMBER:
SIZE:
FILE NAME: MSHLKD_revised2.dgn

FEASIBILITY STUDY
MARSH LAKE
APPLETON, MN

ECOSYSTEM RESTORATION
FISHING STRUCTURE DETAILS

SHEET IDENTIFICATION
PLATE 2

* Pam Blough, PM Blough, Inc. (2/23/2009) *Universally Accessible Canoe and Kayak Launch.* Retrieved from http://www.designingaccessiblecommunities.org



NOT TO SCALE

ACCESSIBLE CANOE AND KAYAK LAUNCH*

US Army Corps of Engineers®
ST. PAUL DISTRICT

MARK	DESCRIPTION	DATE	APPR.

MARK	DESCRIPTION	DATE	APPR.

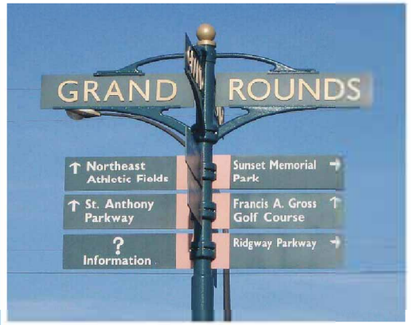
U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

DESIGNED BY:
DWN BY: RGM
CKD BY:
SUBMITTED BY:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
PLOT SCALE:
PLOT DATE:
FILE NUMBER:
SIZE: D
FILE NAME: MSHLKD_mcplan3.dgn

FEASIBILITY STUDY
MARSH LAKE
APPLETON, MN

ECOSYSTEM RESTORATION
CANOE LAUNCH DETAIL

SHEET IDENTIFICATION
PLATE 3

	Rustic	Contemporary Rustic	Modern	Traditional
Directional/ Informational				
Individual Trail Kiosks/Information			 	
System-Wide Kiosks/Information				

EXAMPLES OF
INFORMATION/EDUCATIONAL
KIOSKS AND SIGNAGE*

*** Image collage courtesy of SRF Consulting Group, Inc.**

US Army Corps of Engineers
ST. PAUL DISTRICT

MARK	DESCRIPTION	DATE	APPR.

DESIGNED BY:
DWN BY: RGM
CKD BY:
SUBMITTED BY:
DATE:
SOLICITATION NO.:
CONTRACT NO.:
FILE NUMBER:
PLOT SCALE: N/A
PLOT DATE:
SIZE:
FILE NAME: MSHLKD_mcplan4.dgn

U.S. ARMY CORPS OF ENGINEERS
ST. PAUL DISTRICT
ST. PAUL, MINNESOTA

FEASIBILITY STUDY
MARSH LAKE
APPLETON, MN

ECOSYSTEM RESTORATION
INFORMATION/EDUCATION KIOSK DETAILS

SHEET IDENTIFICATION
PLATE 4

Appendix J – Hydrology and Hydraulics

Marsh Lake Dam

Ecosystems Restoration Feasibility Study

Hydraulics & Hydrology Appendix

January 2011

Contents

List of Figures

List of Tables

I. General

The Lac qui Parle Project is located on the Minnesota River in western Minnesota near the South Dakota state line. The project lies along the northeasterly boundary of Lac qui Parle County and the southwesterly boundaries of Chippewa, Swift, and Big Stone Counties. The actual Marsh Lake Dam, which is part of the greater Lac qui Parle Project, is 303.5 River miles above the mouth of the Minnesota River and is located near Appleton, Minnesota just downstream of the Pomme de Terre River.

The purpose of this appendix is to provide feasibility level hydraulic designs for several proposed ecosystem restoration features on Marsh Lake and evaluate impacts of those features in terms of their ability to meet ecosystem objectives, flood impacts, and dam safety.

Much of the design utilized existing hydrologic and hydraulic (H&H) data, which is outlined in Section II. Other H&H data, including unsteady water level models using HEC-RAS software, was developed for the current feasibility study and is detailed in Section III.

II. Hydrologic and Hydraulic Data (previously developed)

1. Pool and Tailwater Elevation Frequency Curve.

   Analysis is taken from "Section 22 Study, Minnesota River Main Stem Hydrologic Analyses, October 2001". Graphical frequency plots are shown in Plates 1-2.

	10% Event	2% Event	1% Event	0.5% Event
Pool Elevation	942.5	945.4	947.4	949.2
Tailwater Elevation	941.8	943.5	944.6	945.8

Table 1. Summary of Results from Marsh Lake Frequency Analysis

2. Minnesota River Standard Project Floods & Probable Maximum Floods.

   Standard Project Floods and Probable Maximum Floods for several locations near to Marsh Lake were developed in "Report on Probable Maximum Floods (PMF) and Standard Project Floods, (SPF) Minnesota River Basin, St Paul District Corps of Engineers, January 1971". No PMF or SPF was developed specifically for Marsh Lake in the report, but the unit hydrograph shape for the Lac Qui Parle Dam was adapted for the development of the Frequency Inflow Hydrographs (section 5).

3. Probable Maximum Flood.

   The Probable Maximum Flood (PMF) specifically for Marsh Lake was developed in "Dam Failure Planning Report, Marsh Lake Dam, Minnesota River, St Paul District Corps of Engineers, August 1987". An inflow hydrograph with a peak of 109,000 cfs was adopted as the PMF for Marsh Lake Dam. Routing of the PMF through the reservoir with an antecedent pool equal to 937.6 resulted in a peak pool elevation of 952.0 (approximately 2' above the top of the embankment). The graphical PMF inflow hydrograph for Marsh Lake is shown in Plate 3.

4. Spillway Design Flood.

   The spillway design flood for Marsh Lake was developed in "Dam Failure Planning Report, Marsh Lake Dam, Minnesota River, St Paul District Corps of Engineers, August 1987". The PMP hyetograph was reduced to obtain a peak stage in the Marsh Lake reservoir of 947.1 (3' of freeboard). The resultant inflow hydrograph has a peak flow of 21,000 cfs. The SDF inflow hydrograph for Marsh Lake is shown in Plate 6.

5. Flow Frequency Analysis for Pomme de Terre River at Appleton

   The peak discharges on the Pomme de Terre River at Appleton are taken from the Flood Insurance Study, City of Appleton, Swift County, Minnesota dated October 1981 and are shown in Table 2 below.

	Peak Discharges, in cfs			
	10-year	50-year	100-year	500-year
Pomme de Terre River at Appleton	2,620	5,300	6,700	11,000

Table 2. Summary of Peak Discharges at Appleton, MN

6. Surveys of Lake Bathymetry

   Two lakebed bathymetry surveys are available for Marsh Lake. The Corps of Engineers collected lake bed elevations during the winter of 1991 and the Minnesota Department of Natural Resources collected approximate lake bed elevations referenced to the pool level during a vegetation survey during the summer of 1992.

III. Hydrologic and Hydraulic Data (developed for current study)

7. Historic Inflows and Pool Elevations

   Historic inflows into Marsh Lake were obtained for the period from September 1984 to September 2003. The historic inflows consist of outflows from the Highway 75 dam on the Minnesota River, rated flows on the Pomme de Terre at Appleton, and local inflows to Lac Qui Parle Reservoir. Historic pool and tailwater elevations for Marsh Lake were also obtained for use in the calibration of an unsteady model for Marsh Lake.

8. HEC-RAS Unsteady water level model

   An unsteady water level model for Marsh Lake was developed for this study using HEC-RAS. The model was calibrated to Marsh Lake Pool Elevations using historic inflows and used primarily for determining the effect of proposed feasibility features to Marsh Lake water levels. The model was also used to estimate the downstream impacts of the proposed project on Lac Qui Parle reservoir and downstream on the Minnesota River at Montevideo. A georeferenced schematic of the HEC-RAS model, which includes Marsh Lake, Marsh Lake Dam, the Minnesota River, Lac Qui Parle Reservoir, Lac Qui Parle Dam, and the Pomme de Terre River, is shown in Plate 23.

   The calibrated existing conditions model was altered to determine effects of specific proposed project features on Marsh Lake water levels. Simulations were performed over the 20 year period

(1983-2003) for 1) existing conditions, 2) re-routing of the lower Pomme de Terre River, and 3) re-routing of the Lower Pomme de Terre River combined with a modified primary spillway/fishway.

Separately, unsteady flow simulations were also performed to determine the size of drawdown structure required to achieve desired water level and habitat goals (see section 15). This was done using simplified model geometry (based on calibrated existing conditions geometry) with only the Marsh Lake Reservoir and assuming no tail water submergence at the dam. This model was used to determine the time required to achieve a drawdown (from 938.3 to 935.5) and the duration of water level increases (i.e. "bounce") during a 5 year summer storm during drawdown (935.5).

The model geometry combined data from several sources, outlined in Table 3 below.

Geometry	***Source***
Pomme de Terre River (upstream cross sections)	HEC-2 modeling from FIS study
Pomme de Terre River (downstream cross sections)	Recent field surveys
Marsh Lake Reservoir Elevation-Storage relationship	Water Control Manual (Reference 4)
Minnesota River Downstream of Marsh Lake Dam	Combination of recent field surveys and estimated cross sections
Marsh Lake Dam Primary Spillway	As built: 112' wide, sill elevation of 937.6'
Marsh Lake Dam Overflow Spillway	As built: 90' wide, elevation of 940.0'
Marsh Lake Dam Low Flow Conduit	As built: 2' x 2' square gated conduit, invert of 935.0'. Approximated as 2'x1' conduit to simulate actual operation
Lac Qui Parle Reservoir Elevation-Storage relationship	Water Control Manual (Reference 4)
Lac Qui Parle Dam Outlet Structures	As built drawings
Minnesota River Downstream of Lac Qui Parle	Previous Compilation of FIS study model data

Table 3. Source of HEC-RAS Model Geometry

Calibration of HEC-RAS Water Level Model (existing conditions)

The primary purpose of the unsteady modeling was to evaluate changes to the water level conditions on Marsh Lake between existing conditions and with project conditions, and the initial of the calibration effort focused on matching historic Marsh Lake pool elevations. All HEC-RAS model runs were made using HEC-RAS version 4.1.0 Jan 2010.

Inflows: Historic inflows for the modeling effort were obtained from a variety of sources and described in the table below.

Inflow	**Source**
From HWY 75 Dam to Marsh Lake	USACE Water Control Records (computed flow)
Pomme de Terre River at Appleton	USGS Gage Records (flow)
Combined Lac Qui Parle Reservoir Inflows (Lac Qui Parle River, Chippewa Diversion, and Local)	Combination of Watson Sag, Lac Qui Parle River, and local inflows based on gage records from USGS and USACE

Table 4. Sources of Inflow Data for Modeling

N-Values: Three distinct river reaches were modeled: Pomme de Terre River from Appleton downstream to Marsh Lake, Minnesota River downstream of Marsh Lake to Lac Qui Parle Reservoir, and the Minnesota River downstream of Lac Qui Parle to Montevideo. The Pomme de Terre River used n-values of 0.45 for the main channel and 0.07 for the overbank areas, which are reasonable typically for streams similar to the Pomme de Terre and result in stages in Appleton that match observed data. The Minnesota River downstream of Marsh Lake Dam used n-values of 0.028 for the main channel and 0.053 for the overbank areas, which are typical of streams similar to this reach of the Minnesota River. The Minnesota River downstream of Lac Qui Parle Dam used n-values ranging from 0.02-0.05 for the main channel and values ranging from 0.04-0.08 in the overbank areas, which were taken directly from the previously calibrated model based on the Flood Insurance Study (FIS).

Lac Qui Parle Gates: Marsh Lake Dam is subject to relatively frequent tailwater submergence and is dependent on the operation of the gates on the Lac Qui Parle Dam. The existing conditions model was calibrated to Marsh Lake Pool elevations using an automated gate operating scheme based on pool elevation that maintains the Lac Qui Parle reservoir elevation between 933' and 935' during low inflows and allows for larger outflows during floods (shown in Table 4). This operating scheme is approximately representative of the operation of the gates at Lac Qui Parle according the Water Control Manual (Reference 4).

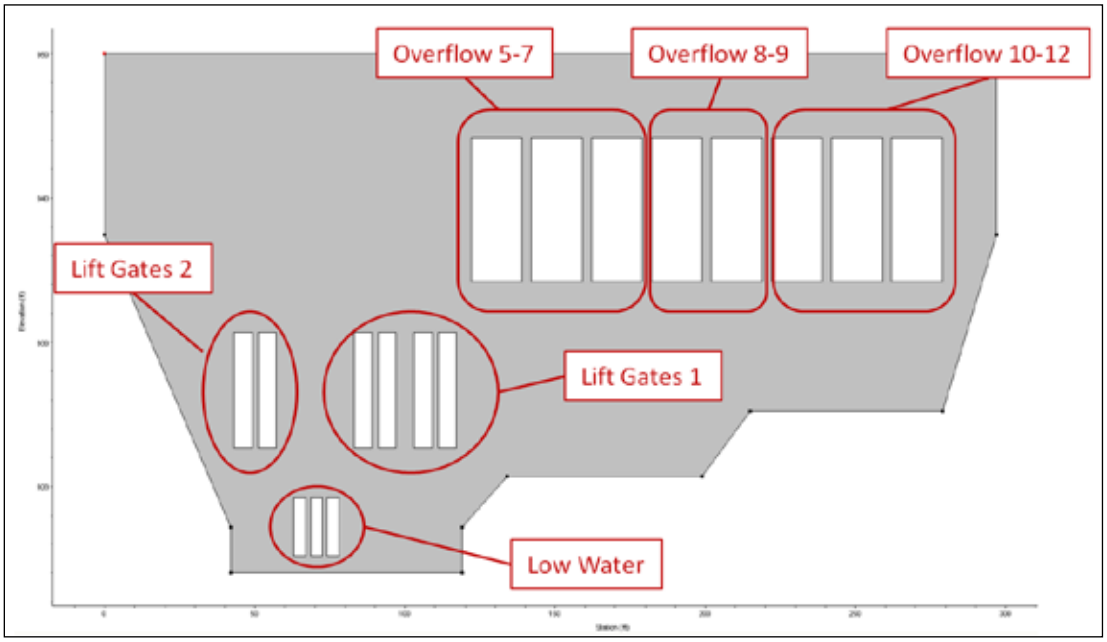


Figure 1. Schematic of Modeled Lac Qui Parle Dam Gates.

	Gate Group Name					
	Lift Gates 1	Low Water	Lift Gates 2	Overflow 5-7	Overflow 8-9	Overflow 10-12
Trigger Elevation to Open	941.1	960	935	941.1	941.1	941.1
Trigger Elevation to Close	940	915	933	940	940	940
Maximum Opening	8	4	8	10	10	10
Minimum Opening	0	0	0	10	3.5	0
Total Width of Gate Group	12	12	24	51	34	51

Table 5. Summary of Simplified Lac Qui Parle Gate Operations used in HEC-RAS modeling

Downstream Boundary Condition: The downstream boundary condition for the model was on the Minnesota River at Montevideo using normal depth with a friction slope of 0.00005. The model was not calibrated for stages at Montevideo, but the downstream boundary is considered to provide reasonable results for the tailwater at Lac Qui Parle Dam and peak flow routing from Lac Qui Parle down to Montevideo.

Marsh Lake Dam Outlets: Marsh Lake dam (existing conditions) consists of 3 distinct outflow features: a 2' gated conduit, a primary spillway, and an auxiliary spillway. The primary spillway is an ogee crested concrete structure which was modeled using a weir coefficient of 3.6. The auxiliary spillway is a grouted rip-rap section cut through the embankment, a weir coefficient of 3.0 was used, which is higher than the default of 2.6 for a broad-crested weir, but chosen to better match the historic pool elevation data. The small, low flow conduit was modeled using HEC-RAS culvert routine and typical values for roughness and loss coefficients. The existing conditions model was calibrated using the available historic inflows and Marsh Lake Pool level data for the 20 year period of October 1984 to September 2003. Results of the calibration are shown on Plates 24-28.

Modeling of With-Project Conditions

In order to estimate Marsh Lake water level changes for existing versus project conditions, the existing conditions model was altered to reflect proposed project conditions.

Primary Spillway: The modification to the primary spillway was modeled as a family of rating curves for various head and tail water conditions, which were determined using a steady flow HEC-RAS model described in section 9 and shown in the figure below.

Auxiliary Spillway: The auxiliary spillway will be modified under proposed conditions to include a stop-log structure will allow for periodic water level drawdowns on Marsh Lake. The structure will have the same width as the existing spillway. For the purposed of feasibility level design, the auxiliary spillway dimensions and weir coefficients was not altered.

Lower Pomme de Terre River: The return of the Pomme de Terre to its historic channel was modeled by altering the lower reach to include and appropriate centerline alignment and utilized surveyed cross sections in the area as well as dimensions of the proposed bridge over the Pomme de Terre at the dam access road.

9. HEC-RAS fish ramp model

   A separate steady flow HEC-RAS model was developed to simulate flow in the proposed fish ramp (primary spillway modification). This model used the detailed cross section geometry that includes a series of rock weirs. Roughness height of 1' was used for the entire fish ramp, and expansion and contraction coefficients were set at 0.3 & 0.1 respectively. Roughness height was chosen over a Manning's N-value roughness definition for the modeling as it better accounts for increased friction losses during low flows. A roughness height of 1' results in an equivalent N-value between 0.032-0.042 for flow depths greater than 1'. Sensitivity analysis was performed on the roughness, contraction, and expansion parameters and it was determined that their effect on the values were relatively minor in terms of their affect on the with-project pool duration curve.

   The fish ramp model was also used to estimate the velocities for the range of flow conditions in order to meet criteria for fish passage and to select a size for the base stone for the ramp. A schematic of the proposed fish ramp spillway as well as the modeled family of rating curves for the modified outlet structure is shown in Plates 14 and 15.

10. Frequency Inflow Hydrographs.

    Marsh Lake summer-time (May – September) inflow hydrographs for more frequent events (2, 5, 10, 25, 50, and 100 year return periods) were estimated for the purposes of this feasibility study. The estimate was obtained by taking the shape of the unit hydrograph for the Lac Qui Parle Reservoir (from Reference 2) and adjusted for drainage area using a simple ratio. The peak inflow frequency at Marsh Lake was determined by adjusting the 2, 5, 10, 25, 50, and 100 year flows at the Lac Qui Parle River and Pomme de Terre River Gages for to the entire Marsh Lake watershed based on a direct drainage area ratio; and then taking an average of the results of the two gages as the adopted Marsh Lake inflow frequency curve. The all-year inflow frequency curve was then adjusted for summer-only (May-September) using a ratio of 0.386 obtained from the ratio of the sum of all-year peaks to the sum the summer peaks at the Pomme de Terre River gage based on the record from 1931 to 1997. The final inflow hydrographs were calculated as a ratio of the Marsh Lake inflow unit hydrograph such that the peak inflow is equal to the peak inflow frequency. The information was used for the preliminary sizing of the stop-log drawdown structure to insure that water level goals can be obtained when the lake is occasionally drained. The graphic plots of the adopted frequency inflow event and their derivation are shown in Plates 8-11.

    The 1% annual chance inflow hydrograph (shown in Plate 11) was also computed in a similar fashion and used to simulate existing and with project peak pool elevations on Marsh Lake, resulting in an existing peak inflow of 16,655 cfs and a peak inflow of 11,372 cfs under with project conditions.

11. Partial Duration Flow Frequency Curve for Pomme de Terre River.

    A partial duration frequency analysis was done for this feasibility study based on the period from 1936 to 2007. The analysis will aid in the estimation of bankfull flow for the Pomme de Terre River in the vicinity of Marsh Lake and in consideration of stream restoration alternatives. Bankfull flow is taken to be approximately equal to a 1.5 year flood, or 850 cfs.

Exceedance Probability (%)	Return Period (years)	Flow (cfs)
0.1	1000	18778
0.2	500	14319
0.5	200	9729
1	100	7072
2	50	5223
5	20	3380
10	10	2420
20	5	1746
30	3.33	1383
40	2.5	1202
50	2	1056
60	1.67	928
70	1.43	809
80	1.25	731
90	1.11	636
95	1.05	587
99	1.01	528

Table 6. Results of Partial Duration Flow Frequency analysis for Pomme De Terre River at Appleton

12. Estimated Sediment Yield from the Pomme De Terre River Watershed.

    Sediment yield for the Pomme De Terre River was estimated by utilizing the existing USGS suspended sediment data from the neighboring Chippewa River gage at Milan, MN. The annual sediment yield at Milan was calculated and adjusted to the Pomme de Terre River based on drainage area. A total average annual suspended sediment load from the Pomme De Terre River was estimated to be 13,200 cubic yards per year. It is noted that estimates of the rate of sediment deposition in Marsh Lake cited in "Water Control Manual, Lac Qui Parle Project, August 1995" are significantly higher than the rate suggested by the Chippewa River gage.

Annual Sediment Yield
Chippewa River Near Milan, MN

Flow-Duration Q Exceed.	Mid Ordin.	Increment	Water Q_w (cfs)	Sediment Q_s (tons/day)	Daily Yield Q_s (tons/day)
0.0%					
	0.05%	0.1%	9,600.0	4,014.4	4.0
0.1%					
	0.30%	0.4%	4,820.0	1,807.8	7.2
0.5%					
	1.00%	1.0%	2,990.0	1,040.0	10.4
1.5%					
	3.25%	3.5%	1,771.0	567.1	19.8
5.0%					
	10.00%	10.0%	1,000.0	292.6	29.3
15.0%					
	20.00%	10.0%	581.0	156.0	15.6
25.0%					
	30.00%	10.0%	360.0	89.6	9.0
35.0%					
	40.00%	10.0%	232.0	53.9	5.4
45.0%					
	50.00%	10.0%	159.0	34.8	3.5
55.0%					
	60.00%	10.0%	101.0	20.6	2.1
65.0%					
	70.00%	10.0%	65.0	12.4	1.2
75.0%					
	80.00%	10.0%	38.0	6.6	0.7
85.0%					
	90.00%	10.0%	19.0	3.0	0.3
95.0%					
	97.50%	5.0%	5.0	0.6	0.0
100.0%					
		Sum: Average Daily Sediment Load		108.5	Tons / day
		Average Annual Sediment Yield		**39,593**	Tons / year
				27,319	C.Y. / year

Adjusted to Pomme De Terre River

Drainage Area of Pomme De Terre River
905 sq. mi.

Drainage Area of Chippewa River
1870 sq. mi.

Average Annual Load from Pomme De Terre
--Adjusted for Drainage Area
13221 C.Y. / year
8.8 Acre-ft / year

Table 7. Estimate of Average Annual Sediment Load to Marsh Lake from the Pomme De Terre River based in nearby gage site

Source	Result
University of Minnesota Study	105 cm deposited near mouth of Pomme De Terre River in Marsh Lake since construction of Marsh Lake Dam (~30 years). Study done prior to removal of Appleton Mill Dam.
Observed Sediment Rate for Big Stone River	0.05 acre-ft per sq. mi.
Chippewa River at Milan data translated to Appleton	8.8 acre-ft per year

Table 8. Summary of Sediment Load Estimates for Marsh Lake

13. Wind Speed and Direction Frequency and Duration Analysis.

Analysis of the wind speed and direction was performed on data obtained for the nearby Montevideo airport in order to support the utilization of aquatic plant growth modeling for Marsh Lake. Graphical plots of the results of the wind analysis are shown in Plates 12-13.

IV. Project Feature Alternatives: Design

14. Primary Spillway Modification.

The concept for the modification to the primary spillway includes a rectangular notch cut into the existing concrete ogee crest, a sloping rock fill base on the downstream side of the structure, and a series of arched bolder weirs. These features will have the effect of creating greater water level variability, lowering the average water level and allowing for fish passage between the Minnesota River and Marsh Lake.

a. General Layout of Spillway Notch, Rock Ramp, and Boulder Weirs

The specific layout and geometry of the features were optimized to achieve target water levels in Marsh Lake and velocities in the fish way. Optimization was done utilizing a HEC-RAS (steady flow) model of the fish ramp to establish a family of rating curves for the range of head and tail water conditions, and a separate HEC-RAS (unsteady) model to simulate water levels for 20 years of water level data (1983 – 2003).

Although the establishment of the fishway rating curves is complicated by the lack of calibration data, there will be an opportunity during construction to field fit the boulder weirs to achieve the desired hydraulic performance. Modeled hydraulic performance curves, are shown in Plate 14.

Design data for the dam modification is shown below in Table 9 and a figure detailing the design is shown on Plates 15-16.

Primary spillway modification: Design data	
Elevation of Existing Spillway Crest	937.6
Elevation of "notch"	935.5
Width of "notch"	30'
Invert of V-notch at Station 0+20 (d/s of crest)	936.0
Width of V-notch in base rock fill	30'
Slope of rock fill base (starting at Station 0+20)	4%
Number of boulder weirs	9
Spacing of weirs	20'
Vertical drop of each weir	0.8'
Diameter of individual weir boulders	5'
Number of boulders per weir	~34
Spacing between boulders along weir	0' (side by side)
Boulder "stick-up" above rip-rap base: (Min.-Max.)	1' – 3.5'
Upstream Angle Weir Intersection with bank	30°

*Elevations in NGVD 1929 Datum

Table 9. Primary Spillway Modification Design

b. Rip Rap Base Sizing

The rock fill base of the fish ramp will be subject to high velocities and must be constructed of material that resists erosion under the critical condition. The tail water condition at

Marsh Lake is controlled by the Lac Qui Parle Reservoir and does not necessarily submerge the dam at all higher flows. The minimum tail water elevation therefore was estimated based on a 20 year period for the tail water at the dam (1983-2003). Under the minimum tail water condition, average channel velocity for the full range of flows was determined using HEC-RAS (fish ramp model described in Section 9) and D50 riprap size was determined using criteria from HDC 712-1 (high turbulence and gamma of 165 lb/ft^3). Required D50 based on a spherical diameter is 1.6'.

Spillway Flow	Min. TW	Velocity Channel	HDC 712-1 D_{50} (ft)
1000	934	7.9	0.79
2000	936	9.3	1.09
3000	937	10.2	1.32
4000	938.5	10.7	1.47
5000	**941.5**	**11.2**	**1.60**
6000	942.5	8.8	0.98
7000	943.25	8.3	0.89
8000	944	8.1	0.83
10000	945	8.4	0.90
12000	946	8.7	0.96

Table 10. Determination of Critical Condition for Rip Rap Design

c. Fishway Containment Dikes

The rock-ramp fishway must include containment dikes along the left and right banks so as to contain all of the flow leaving the primary spillway within the fishway. For the purposes of the feasibility study, the top of the dikes will tie into to embankment at approximately 946.0' (NGVD 1929) and slope downstream at 4%.

d. Velocity Conditions for Fish Passage

Average velocities in the center (V-notch) of the fish ramp as well as in the sides of the ramp at the restrictive boulder weir cross sections were computed for a range of flow conditions and the results are shown in Table 11. Actual point velocities are expected to be lower than the average velocity especially in the sides where depth varies considerably.

Flow Rate (cfs)	Exceedance Duration	Average Velocity in center, V-notch of channel (ft/s)	Average Velocity in sides of channel (ft/s)
15	90%	3.12	0.26
175	50%	5.23	3.12
1500	10%	8.66	5.19

Table 11. Average velocities in fish ramp at the weir cross sections

15. Overflow Spillway Modification

The concept for modification of the Marsh Lake Dam overflow spillway consists of a series of stop-log bays with a concrete sill at elevation 935.0 (NGVD 1929 datum), with a top of stop log elevation of

940.0 (NGVD 1929 datum). The structure will allow for the periodic removal of the stop logs to achieve a water level drawdown while maintaining full spillway capacity for flood events.

a. Drawdown Structure Width

The desired minimum drawdown lake level is 935.0 (NGVD 1929). The criteria for selection of stop log bay size is based on (1) a maximum duration of bounce in the water surface for a 5-year summer storm (less than 7 days above 936.0), and (2) a maximum time to drawdown from average water surface elevation (938.3) to drawdown elevation (935.5) of about 15 days.

Preliminary routing simulations, as shown in Table 12, suggested that a total effective weir width of approximately 70' will meet the necessary criteria. To insure a conservative feasibility level design; a width of 90' was carried forward for the sizing of the drop structure and outlet channel.

Width of Drawdown Outlet	Equilibrium Flow (cfs)	5-yr Rainfall: duration of bounce (above 936.0')	Maximum Water Surface During Bounce	Time to Drawdown (938.3 to 936.0)
20'	180	19.5 days	937.33	~54 days
40'	350	12 days	936.88	~36 days
60'	520	7.5 days	936.57	9 days
70'	605	6 days	936.45	6.75 days
80'	685	5 days	936.36	5.5 days
90'	770	4 days	936.28	4.5 days
Assumptions used for Feasibility Sizing:		Primary Spillway has 5' wide notch at 935.5' and sloping boulder fill Pomme de Terre has been rerouted and does not flow into the reservoir Sill of drawdown structure is at 934' Weir coefficient for drawdown structure is 3.0 Tailwater in Lac Qui Parle Reservoir is 935.0' Mean Inflow during drawdown is 375 cfs Inflow hydrograph for "bounce" has peak flow of 560 cfs		

Table 12. Feasibility Level Sizing of Drawdown Structure

b. Approach Channel

The sill elevation of the drawdown structure was selected as 935.0' based on the lake bed bathymetry in the lower end of Marsh Lake. The sill will be set very near to the bottom of the lake bed, and the lake bed may limit the discharge through the structure when the stoplogs are removed. At this sill elevation, no approach channel dredging will be required. Some scour of the lake bed would be expected while the stop logs are removed. A map of bathymetry near the outlet is shown in Plate 17.

c. Drawdown Structure Configuration

A typical drop structure as defined in US Army Corps of Engineers Engineering Manual 1110-2-1601, Plate B-48 (Hydraulic Design of Flood Control Channels) was utilized as the basis for

the design. The typical design is altered to allow for removable stop logs. A full pool elevation of 950' and a width of 90' were used for design, resulting in a design flow of 8500 cfs. Design calculations and structure dimensions are shown in Plate 18 and in Figure 2 below.

A large panel will be included in the design rather than individual stop logs, and will be constructed of aluminum. They will be less apt to seize in place and will eliminate the problem of trying to pull the lower stop-logs out from under water. A secondary/backup stop-log slot and spare panels will be included in the design in order to provide redundancy in case of failure. Although the panels will be removed about once every 10 years, they may need to be exercised every few years

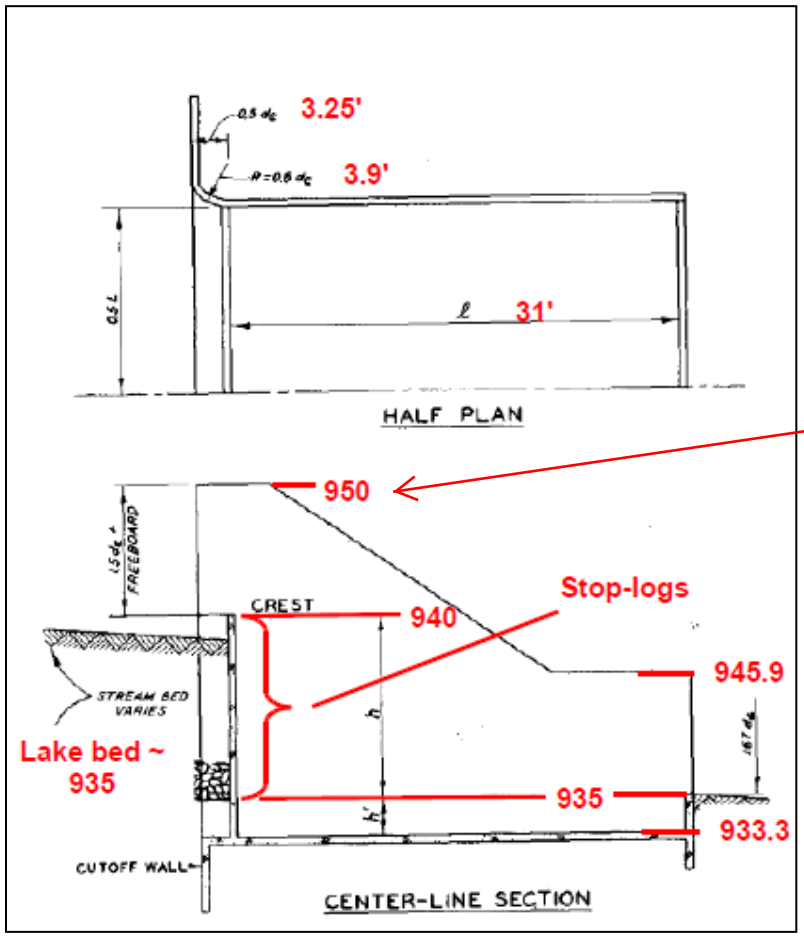


Figure 2. Preliminary design of auxiliary spillway/drawdown structure.

d. Outlet Channel Downstream of Drawdown Structure

The outlet channel will convey water from the drawdown structure to the Minnesota River. The channel will be lined with rip rap to prevent scour. For the design flow of 8500 cfs, a channel width of 90 feet, and Manning's n-value of 0.04, the maximum downstream channel slope to maintain sub-critical flow is approximately 2.75%. The slope must be reduced substantially to minimize the channel velocities and the size of rip-rap required for erosion protection.

The outlet channel will be protected from scour by rip-rap. The detailed design of the channel will be completed in next phase of design.

The minimum ration of radius of curvature to width of 3 is set for outflow channel, using the criteria in EM 1110-2-1601, Section 2-5-c.

e. Frequency of Operation

Duration analysis of the modeled water levels on Marsh Lake for the 20 year period (1983-2003) indicates that pool will reach elevation 940.0' or greater about 12-13% percent of the time during non-drawdown conditions (i.e. stop logs in place). This duration is not significantly altered under with-project conditions.

16. Embankment Sections

Two new sections of embankment are needed to separate the Marsh Lake pool from the rerouted section of the Pomme De Terre River. One of these sections must intersect the current Pomme De Terre River channel. Locations of these embankments are shown in Plate 19.

a. Selection of Design Elevations

The existing Spillway Design Flood (SDF) routed through the existing Marsh Lake dam and resulted in a peak pool elevation of 947.1' *(as determined in Reference 3). The design elevation for the new embankment sections shall include 5' of freeboard above the SDF routing, or an elevation of 952.1'.

Rip-rap protection against wave action is necessary for the lake side of new embankments. Top elevation of the rip-rap layer is assumed be equal to that of the existing embankments, which is 942.0'.

17. Diversion Plug

A diversion plug is needed to divert the Pomme De Terre River into its historic channel in the area upstream of the Marsh Lake Dam. The location of this plug is identified in Plate 19.

a. Selection of Design Elevation

The top elevation of the plug was chosen as 944.0 (NGVD 1929) in order to allow overtopping during floods and allow the river reach to mimic natural geomorphic processes. The plug will be situated in a ~200' reach of the existing Pomme de Terre river channel. The plug has a top-width that fills the much of this area, which will convert the area to terrestrial habitat.

18. Fish Pond Breach

An abandoned fish rearing pond exists downstream of the Marsh Lake Dam embankment. The embankment of the pond (which is separate from the main Marsh Lake Embankment) will be breached with the goal of allowing the area to periodically flood. A bottom elevation of the breach of 936.0 (NGVD 1929), which is expected to flooded by the tail water about 20% of the time, was selected.

19. In-Lake Breakwater Structures

A series of in-lake rock breakwater structures are included in the design features with the intent of reducing wind fetch and wave induced bottom sediment resuspension, in turn promoting water clarity and improving the conditions for aquatic plant growth.

a. Layout

The proposed layout of the rock breakwaters was done primarily by examination of a weighted wind fetch map (shown in Plate 13) which took into account both the shape of Marsh Lake and the frequency of wind directions in the region. The proposed locations of the breakwater structures are shown in Plate 20.

b. Typical Section

The breakwater structure elevation will be 2' above the average water surface elevation of 938.3 (NGVD 1929) or 940.3. A typical section of the breakwater structures is shown in Figure 1. A side slope ratio of 1V to 5H is recommended for structures that are subject to ice loading, which is the case for the proposed breakwater structures. Due to the ice load angular rock (quarry stone) is required for the structure.

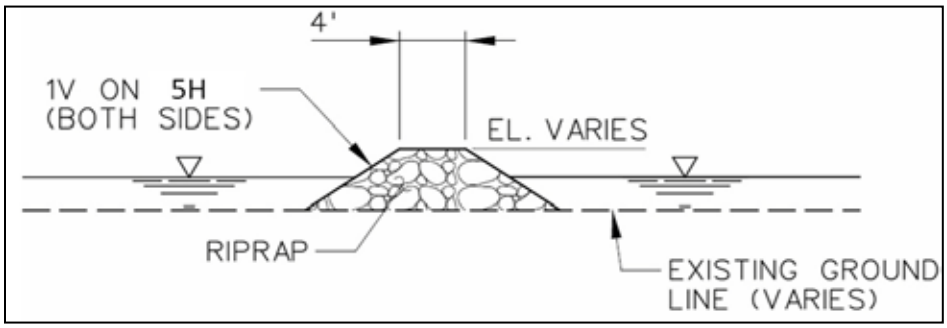


Figure 3. Typical section of in-lake breakwater structure

c. Aquatic Plant Growth Modeling & Optimization

Simulation of the conditions for aquatic plant growth based on reduced wind fetch in Marsh Lake is being conducted. During final design, this modeling will be available for use in the optimization of the breakwater structure layout.

20. Louisburg Grade Road Culvert Modifications

Several culverts connect the upper section of Marsh Lake to the main body of the lake through Louisburg Grade Road. Installation of stop log control structures at these locations in order to

maintain higher water levels in the upper part of Marsh Lake during Marsh Lake water level drawdown are included in the design. The structures will provide the ability to maintain Upper Marsh Lake water levels up to the average water surface elevation of 938.3 (NGVD 1929).

21. Rerouting of the Pomme De Terre River

The lower section of the Pomme De Terre River was channelized as part of the original Marsh Lake Dam construction. The current project includes the restoration of this section of river by reconnecting the historic meandering channel. This project feature will include the construction of a bridge over the Pomme De Terre along the current embankment, the construction of two new sections of embankment (see section 16), the construction of a diversion plug (see section 17), some excavation along the historic channel, and erosion control structures.

As the historic channel was originally formed by the geomorphic conditions of the Pomme De Terre River and its watershed, it is expected that the channel plan form dimensions will result in a stable natural channel once the fine sediments are removed.

a. Approach to Construction

The reconnection of the Pomme De Terre to its historic channel will require some excavation of material that now blocks this flow path, particularly through the current embankment and near the mouth where it will meet the Minnesota River. It will also require that fill be placed in two channelized reaches of the current flow path. Some erosion control structures will also be necessary to prevent head cutting. However, the general philosophy will be to connect the river to its original flow path and allow natural processes to form to channel.

b. Stream Classification

The lower reach of the Pomme De Terre was classified according to the Rosgen stream classification system based on field surveys. The lower reach of the river below Appleton falls generally into the "C" class.

c. Bankfull Flow

The Pomme De Terre River below Appleton has a bankfull flow rate of approximately 850 cfs (see section 11).

d. Typical Channel Dimensions

Cross section surveys of the Pomme De Terre below Appleton, MN indicate that the average bankfull width of channel is approximately 90-110 feet. This width was verified with aerial photos. Steady flow modeling of the Pomme de Terre River with a bankfull discharge (850 cfs, see Section 11) shows that hydraulic depth varies from 3-5 feet in the reach between Appleton and the mouth. An average depth of 4' is therefore considered the typical depth for the Pomme Terre River in the project reach. Based on the stream slope upstream of the project area, a typical slope of 0.0005 ft/ft is considered representative of the reach to be restored. Typical side slopes are approximately 1V:6H.

e. Bridge Dimensions

The bridge over the Pomme De Terre River must have a low flow channel of the appropriate size to mimic natural geomorphologic process, and also have enough flow area such that it does not induce flooding upstream.

Preliminary bridge sizing was done using a low flow channel with a top with of 90', a depth 4.5', side slopes of 1V:3H, as well a overbank area as required to not induce an increase in stages greater than 0.5' upstream of the bridge for the 1% chance flood event. For preliminary sizing, the width of overbank required was calculated based on the results from the HEC-RAS model for a steady flow of 8000 cfs (1% chance flood), and increased until the upstream stage increase was less than 0.5'. Results of the preliminary sizing for the bridge are summarized below.

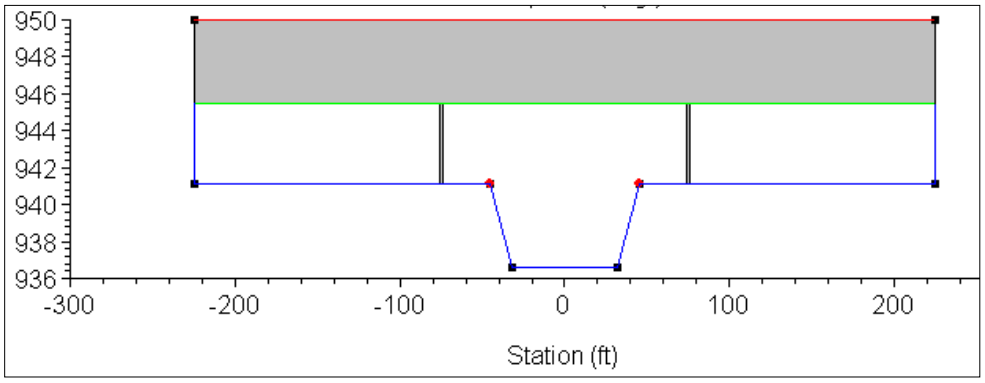


Figure 4. Cross Section View of Preliminary Bridge Design

Station	-225	-225	-45.5	-32	32	45.5	225	225
Elevation	950	941.1	941.1	936.6	936.6	941.1	941.1	950
				* *Bridge Deck Elevation = 950.0'* * *Low Chord of Bridge Elevation = 946.0'*				

Table 13. Station Elevation Data for Preliminary Bridge Design

f. Erosion Control Structures

In-channel erosion control structures will be necessary to insure that excessive head cutting does not take place in the new Pomme De Terre River channel, as it has the potential to threaten infrastructure. The concept for the erosion control structures, shown in Plate 21, consists on a series of small rock cross vane structures the lowest of which is to be placed near the mouth of the re-routed Pomme de Terre River, and the highest of which is located slightly upstream of the re-routed reach. The design of the structures is to be based on guidance from Reference 9 (Rosgen 2001).

V. Project Feature Alternatives: Impacts

22. Overall Impact on Marsh Lake Water Levels

The combined project features will alter the water level regime in Marsh Lake. The overall effect will be increased water level variability, minimal changes during flood events, and occasional managed water level drawdown. An HEC-RAS (unsteady) model was calibrated to simulate 20 years of water level data in Marsh Lake, and then used to simulate the "with-project" condition (dam modification & rerouting of the Pomme De Terre) and evaluate water level changes.

a. Average Water Levels

The water levels on Marsh Lake during non-flood scenarios are controlled by a combination of the inflows to the lake and the primary ogee crest outlet. The "with-project" conditions will alter the Elevation-Discharge relationship at the dam as well as reduce inflow to the lake by draining the Pomme De Terre River directly downstream into the Minnesota River. Existing & with project Elevation-Discharge curves for the primary outlet structure are shown in Plate 22.

	Existing	With Project
Annual 10% Exceedance	940.3	940.3
Annual 25% Exceedance	940.3	939.0
Annual Average	939.0	938.0
Annual 75% Exceedance	938.3	937.3
Annual 90% Exceedance	937.9	936.6
Minimum	937.7	936.0
September Average	938.1	937.7
September 90% Exceedance	937.7	936.8
April Average	939.9	940.0

Table 14. Summary of Existing and With Project Marsh Lake modeled water levels based on 20 years of lake levels (1983-2003)

b. Flood Impacts

<u>Upstream/Marsh Lake Pool</u>

The changes to large flood levels on Marsh Lake from the proposed project were evaluated with two methods:

(1) For water level simulations over 20 years (1983 – 2003), results for the two largest flood events (1997 & 2001) with & without project features were compared

and,

(2) Estimated 100 year flood hydrographs for with and without project conditions were routed through the reservoir.

Simulated with project water levels were on the order of 1.5' lower than modeled existing conditions for the 1997 & 2001 flood events. This is primarily attributed to reduced inflows to Marsh Lake due to the altered Pomme De Terre flow path. Note that the calibration of the HEC-RAS unsteady model focused on average water levels and that the calibration of the

peak flows to the observed data was complicated by tailwater conditions controlled by the Lac Qui Parle dam. Despite this complication, the model gives a general estimate of the effect of the proposed project on Marsh Lake flood water levels.

Inflow hydrographs for the 100 year flood were estimated (as described in Section 5). The 100 year runoff was determined to be 1.06 inches, which resulted in a peak inflow of 16,655 cfs for existing conditions and 11,372 for with project conditions. Antecedent water level was 938.3 and tailwater was held at 935 (artificially low for a flood event) in order to make a direct comparison. The with-project routing resulted in a peak stage approximately 1.2' lower than existing conditions.

	1997 Peak	2001 Peak	1% inflow
Existing Observed	948.54	946.04	n/a
Existing Modeled	947.43	946.63	944.72
With Project Modeled	945.85	945.1	943.52
Difference	-1.58'	-1.53'	-1.2'

Table 15. Summary of Modeled Peak Pool Elevations for historic peaks, Existing vs. Project Conditions

In summary, this analysis shows that Marsh Lake is expected to experience lower peak flood elevations due to the project as designed in this feasibility study. Note that the current 100-year Pool Elevation on Marsh Lake of 947.4' is above the maximum pool elevation and is not relied upon for flood control downstream.

Downstream/Lac Qui Parle & Montevideo

The flood damage reduction benefits from the Lac Qui Parle Project are largely focused on the city of Montevideo and downstream to the City of Granite Falls. The project features consist of the Lac Qui Parle Dam (gated), the Chippewa Sag Diversion dam and weir (gated), downstream channel modifications, and Marsh Lake dam (un-gated). The Marsh Lake Dam, with its relatively low spillway crest and lack of operating gates, contributes relatively little actual flood control storage compared to the Lac Qui Parle Reservoir.

The HEC-RAS water level model, which routes inflows for the period of 1983-2003, shows only minor changes to the outflow from Lac Qui Parle Dam and stages at Montevideo. Depending on the timing and sources of inflows, the modeling indicates that the proposed project conditions may slightly decrease the water level at Montevideo for some flood events, and may slightly increase it for some flood events. The modeling shows changes on the order of +/- 0.1' at Montevideo.

The proposed project at Marsh Lake includes an overflow spillway with removable gates with the purpose of allowing occasional water level draw-downs of Marsh Lake for environmental purposes. Following a drawdown, Marsh Lake has the potential to provide a large amount of additional storage if the gates were to close during the flood event. This flood control benefit outweighs any perceived flood control dis-benefit resulting from the dam modification

23. Dam Safety

a. Selection of Appropriate of Hazard Potential Classification and Dam Safety Standard

Marsh Lake Dam has been classified in the National Inventory of Dams data base as a Low Hazard dam. Although no official classification of the Corps of Engineers Dam Safety Standard according to ER 1110-8-2 (FR) has been determined for Marsh Lake, it is likely a Standard 2. Dam Safety Standard 2 applies to structures with relatively small head differentials during floods and states that the dam must be able to safely pass major floods typical of the region.

b. Consequences of Marsh Lake Dam Failure

The consequences of failure at Marsh Lake Dam are relatively minor as it lies above the Lac Qui Parle Reservoir, which contains more storage than Marsh Lake. A flowage easement up to elevation 945 exists for the Lac Qui Parle Reservoir, and there is no population below that elevation.

Failure at Marsh Lake Dam during a flood event could cause an increase in the water level on Lac Qui Parle. The two largest recent flood events (1997 and 2001), the 1% Annual Exceedance Probability Event, and the 0.5% Annual Exceedance Probability Event were analyzed to determine the worst case condition on the Lac Qui Parle Reservoir (maximum pool level and maximum increase in stage) that would result from a failure of Marsh Lake Dam. The results, show in Table 16 below, show that the non-overflow section of the Lac Qui Parle Dam would not be overtopped for any of the scenarios.

Event	**1997**	**2001**	**Pool Frequency Curve**	
Annual Exceedance Probability	0.69%	1.54%	1%	0.50%
Marsh Pool Return Period	145 year	65 year	100 year	200 year
Marsh Pool	948.5	946	947.4	949.2
Marsh Storage (x 1,000 acre-ft)	123	88	106.9	134.2
LQP Pool	944.4	938	943.6	944.7
LQP Storage (x 1,000 acre-ft)	168.2	86	156.6	172.85
Combined Storage (x 1,000 acre-ft)	291.2	174	263.5	307.05
Marsh Lake Dam Failure: Worst Case Condition on Lac Qui Parle Reservoir				
Combined LQP & Marsh Lake Pool	946.3	941.8	945.4	946.9
Increase on LQP vs. Non-Failure	1.9	3.8	1.8	2.2
Remaining Freeboard at Lac Qui Parle (non-overflow embankment section)	2.2	6.7	3.1	1.6
Depth Above Flowage Easement (EL 945)	1.3	below	0.4	1.9
Estimated Loss of Life	0	0	0	0

Table 16. Potential for Increase in Lac Qui Parle Stages in the case of Marsh Lake Dam Failure

The Lac Qui Parle Reservoir can pass the Probably Maximum Flood (PMF) with 2' of freeboard. At larger events up to the PMF, Marsh Lake is already overtopped and poses no additional risk downstream if it were to breach.

c. Adequacy of Spillway and Freeboard at Marsh Lake Dam

Existing Conditions

The Probable Maximum Flood was determined in "Dam Failure Planning Report, Marsh Lake Dam, August 1987" using an all season storm with a peaking factor of 1.0. The PMF inflow hydrograph has a peak inflow of 109,000 cfs and the routing of the PMF through Marsh Lake, using an antecedent water level of 937.6' (NGVD 1929) resulted in a maximum pool elevation of 952.0' (NGVD 1929).

The Spillway Design Flood (SDF) as determined in "Dam Failure Planning Report, Marsh Lake Dam, August 1987" using a ratio of the Probable Maximum Storm (PMS) hyetograph to obtain a routing through Marsh Lake that produced a maximum stage of 947.1 (NGVD 1929) which allowed for the minimum of 3' of freeboard using an antecedent water level of 937.6 (NGVD 1929). The SDF inflow hydrograph has a peak flow of 21,000 cfs. Therefore, in terms of peak inflow to Marsh Lake, the SDF is less than 20% of the PMF for Marsh Lake.

Dam Safety Standard 2 requires that the dam be able to safely pass majors floods typical of the region. According to the pool frequency curve, the 100 year (1% annual exceedance probability) and 200 year (0.5% annual exceedance probability) pool elevations are 947.4 and 949.2 respectively. Using the minimum embankment elevation of 948.6, less than 2' of freeboard is available for the 100 year event, and the dam is overtopped for the 200 year event. It is unlikely that the dam meets current dam safety criteria under existing conditions.

With Project Conditions

Under "with-project" conditions, the drainage area into Marsh Lake will be reduced by approximately 30% from 2853 mi^2 to 1948 mi^2, which will have the effect of reducing the volume of flood inflows. The discharge capacity of the primary outlet will be subtly altered as the primary spillway will include more flow area for a given pool elevation, but have a lower discharge coefficient due to the effect of the fishway and boulder weirs. The capacity of the overflow spillway will also be subtly altered as discharge coefficient over the stoplogs will increase compared to the existing broad crested weir, but the introduction of stop log bay piers will reduce flow area. As shown in the analysis Section 22, the combined effect of project features will have the overall effect of decreasing the Marsh Lake pool elevation for large flood events.

In summary, the ability for the Marsh Lake Dam to safely pass the design flood event will be somewhat improved as a result of the proposed project.

VI. References

1. Section 22 Study, Minnesota River Main Stem Hydrologic Analyses, October 2001

2. Report on Probable Maximum Floods and Standard Project Floods, Minnesota River Basin, St Paul District Corps of Engineers, January 1971

3. Dam Failure Planning Report, Marsh Lake Dam, Minnesota River, St Paul District Corps of Engineers, August 1987

4. Water Control Manual, Lac Qui Parle Project, August 1995

5. US Army Corps of Engineers Engineering Manual 1110-2-1601, Hydraulic Design of Flood Control Channels, July 1991

6. US Army Corps of Engineers, Upper Mississippi River System Environmental Management Program, Design Handbook, July 2005

7. Federal Emergency Management Agency, Flood Insurance Study, City of Appleton Minnesota, Swift County , October 1981

8. US Army Corps of Engineers Engineering Regulation 1110-8-2 (FR), Inflow Design Floods for Dams and Reservoirs, March 1991

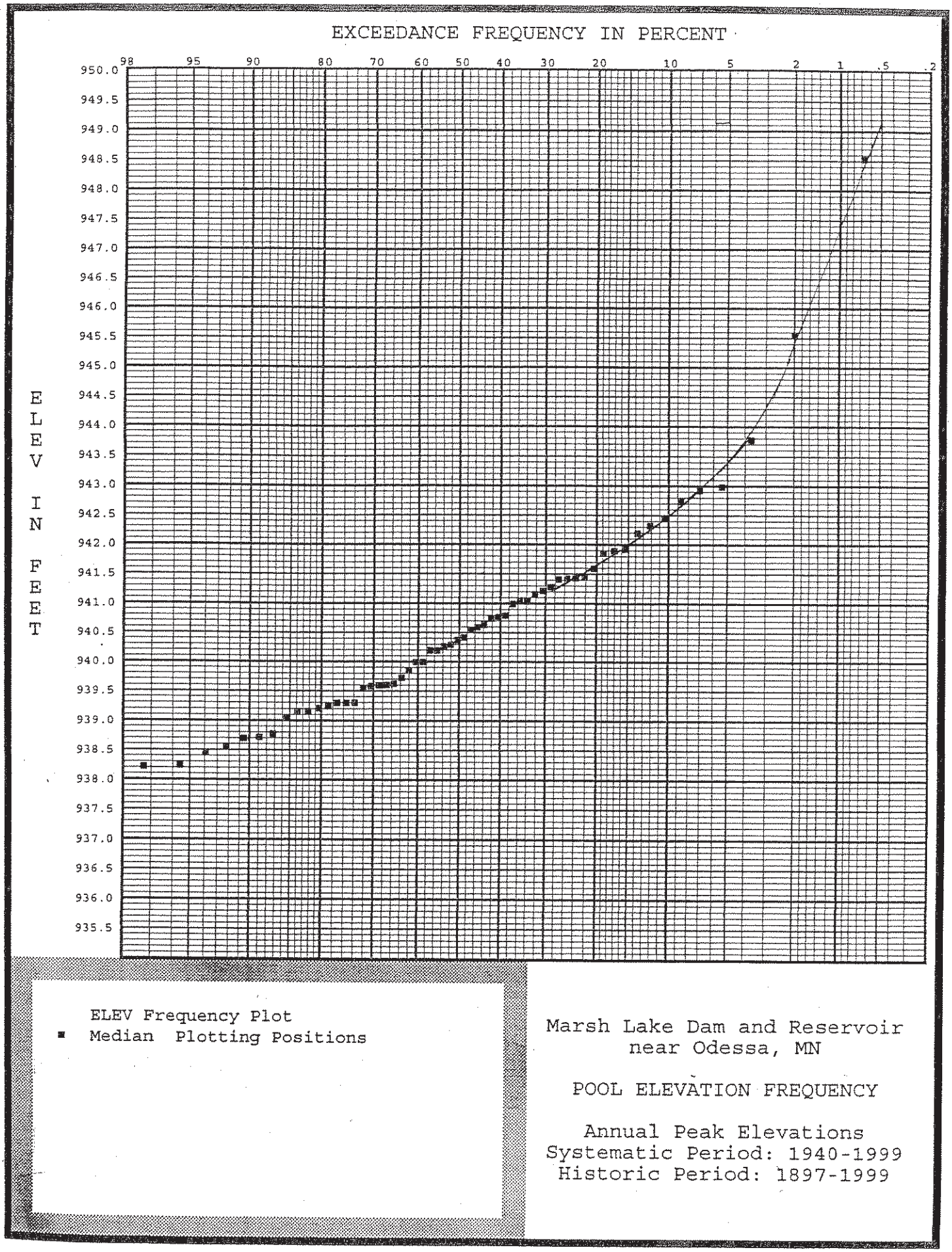
9. Rosgen, David, "The Cross-Vane, W-Weir and J-Hook Vane Structures…Their Description, Design and Application for Stream Stabilization and River Restoration", 2001

Marsh Lake Dam

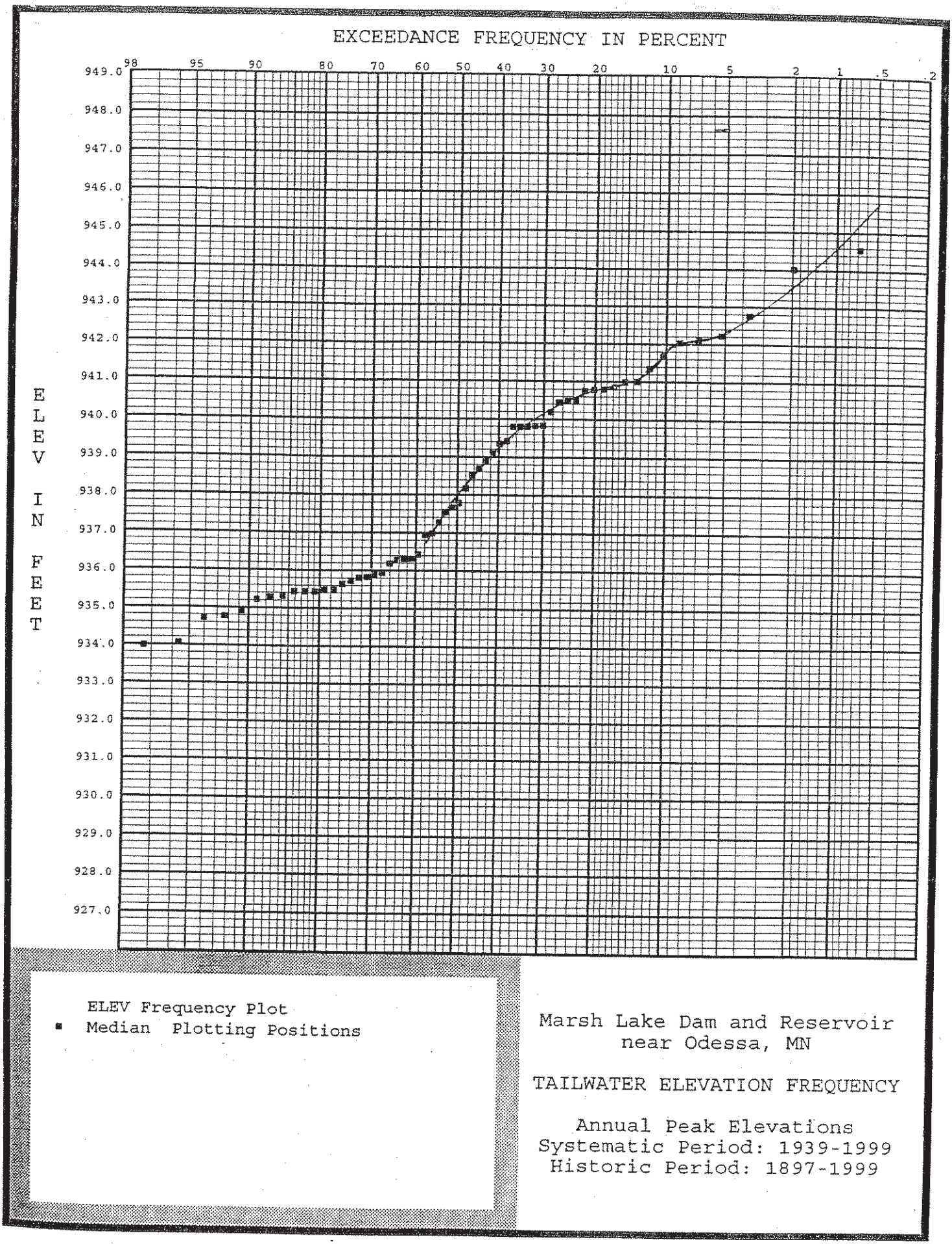
Ecosystems Restoration Feasability Study

H&H Appendix

PLATES



Hydrology & Hydraulics Appendix: Plate 1

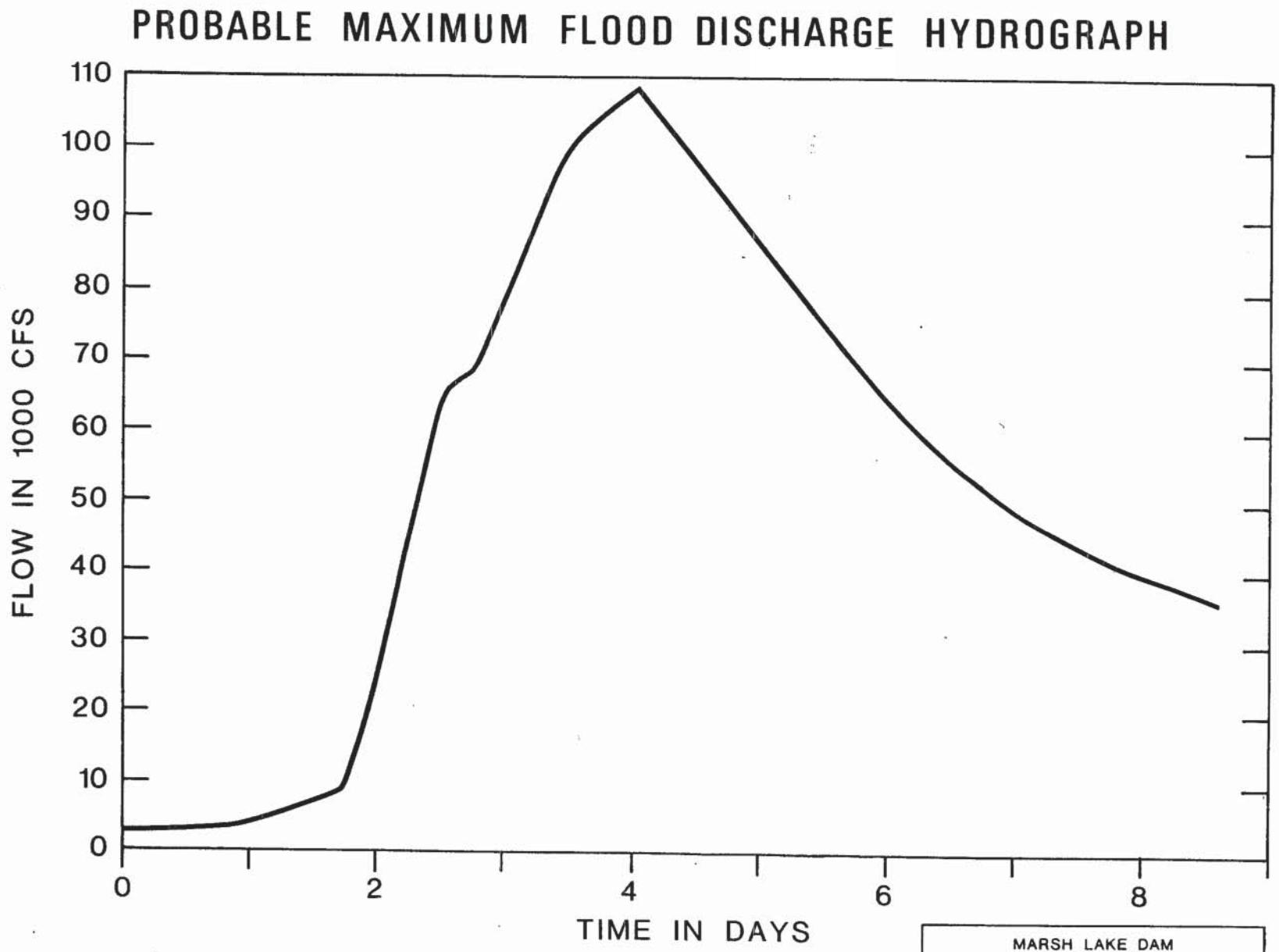


ELEV Frequency Plot
▪ Median Plotting Positions

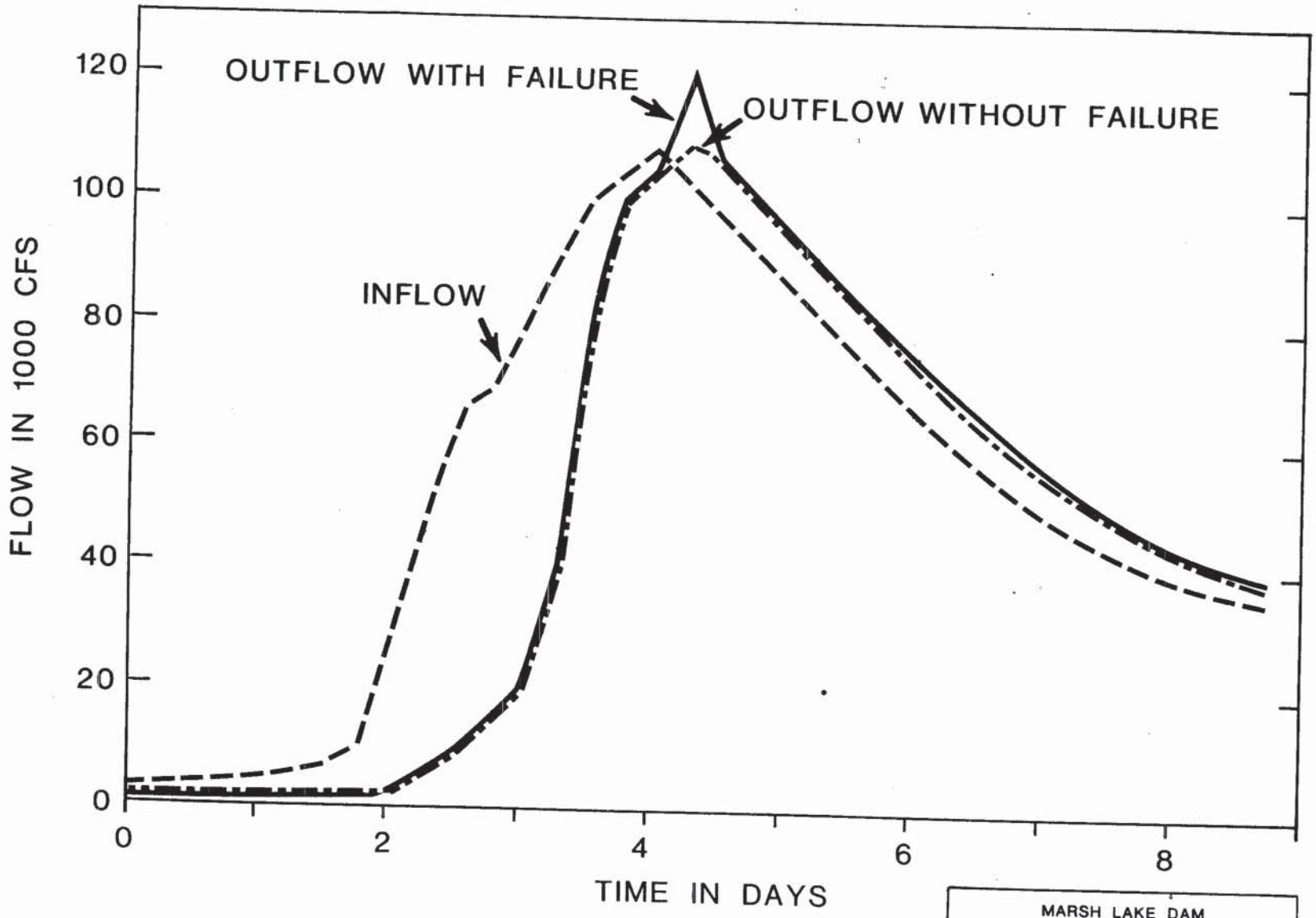
Marsh Lake Dam and Reservoir
near Odessa, MN

TAILWATER ELEVATION FREQUENCY

Annual Peak Elevations
Systematic Period: 1939-1999
Historic Period: 1897-1999


PROBABLE MAXIMUM FLOOD DISCHARGE HYDROGRAPH
FLOW IN 1000 CFS
110
100
90
80
70
60
50
40
30
20
10
0
0
2
4
6
8
TIME IN DAYS
MARSH LAKE DAM
PMF DISCHARGE HYDROGRAPH
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

PROBABLE MAXIMUM FLOOD RISK ASSESSMENT DISCHARGE HYDROGRAPH

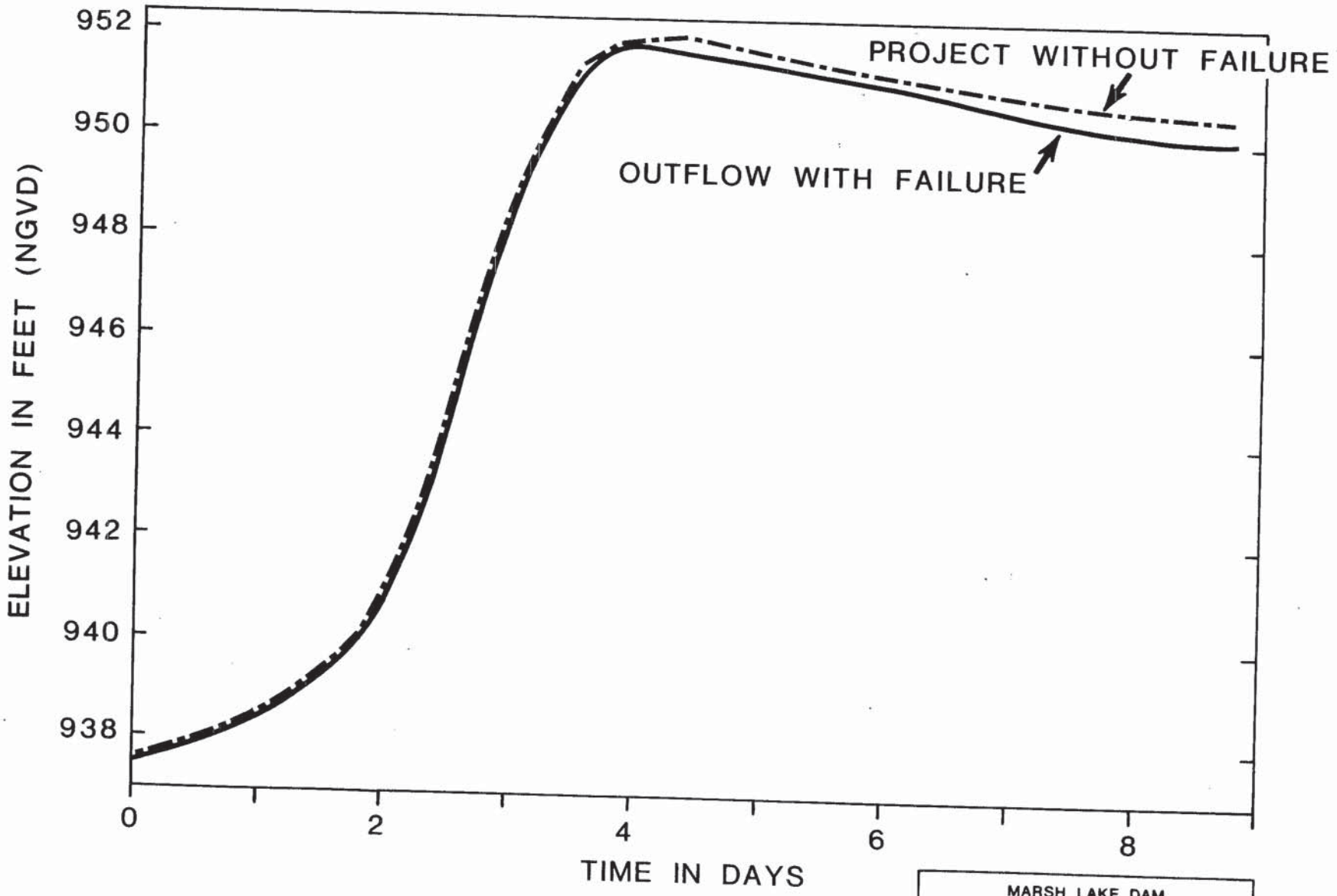


MARSH LAKE DAM

PMF RISK ASSESSMENT
DISCHARGE HYDROGRAPH

ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

PROBABLE MAXIMUM FLOOD RISK ASSESSMENT ELEVATION HYDROGRAPH

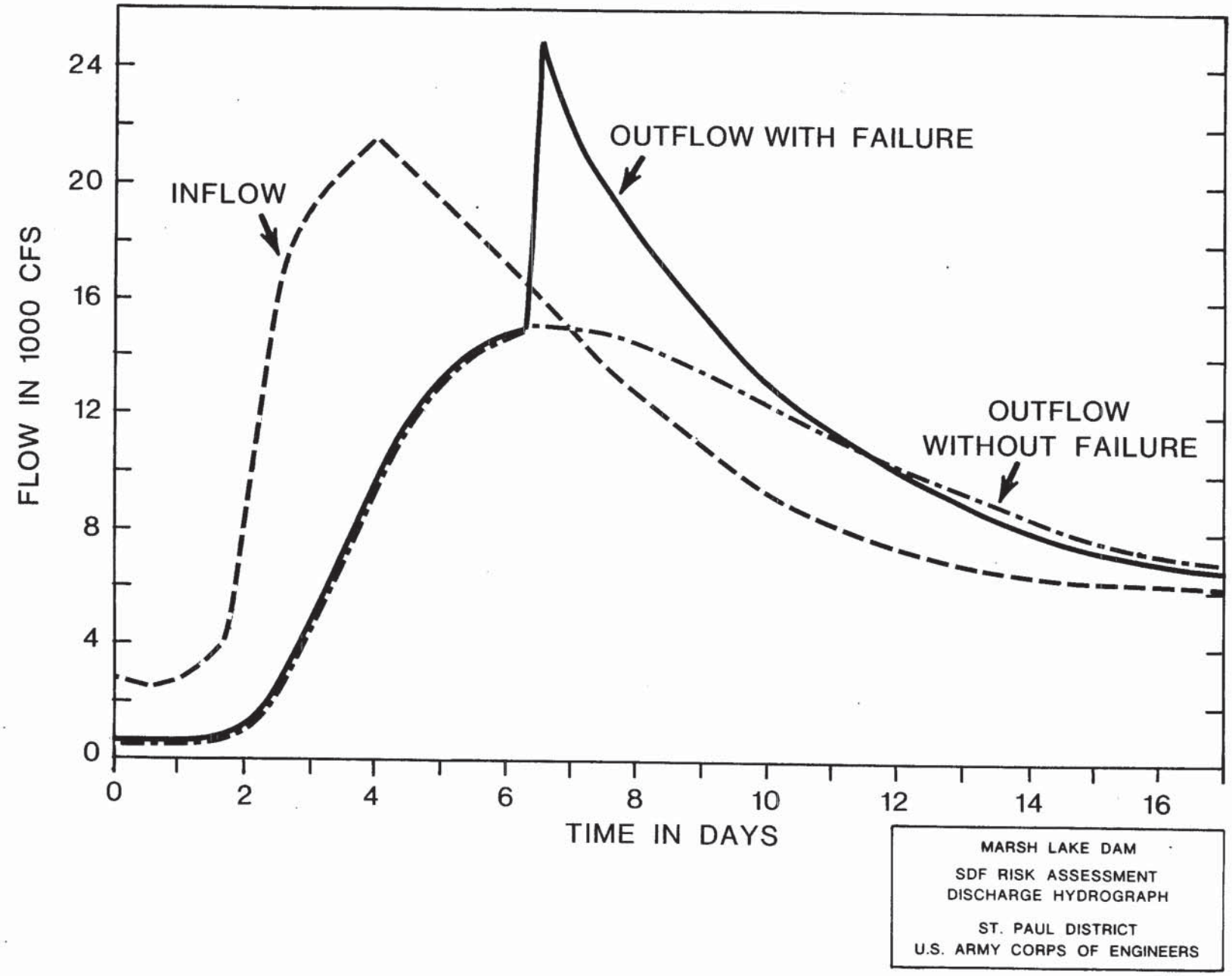


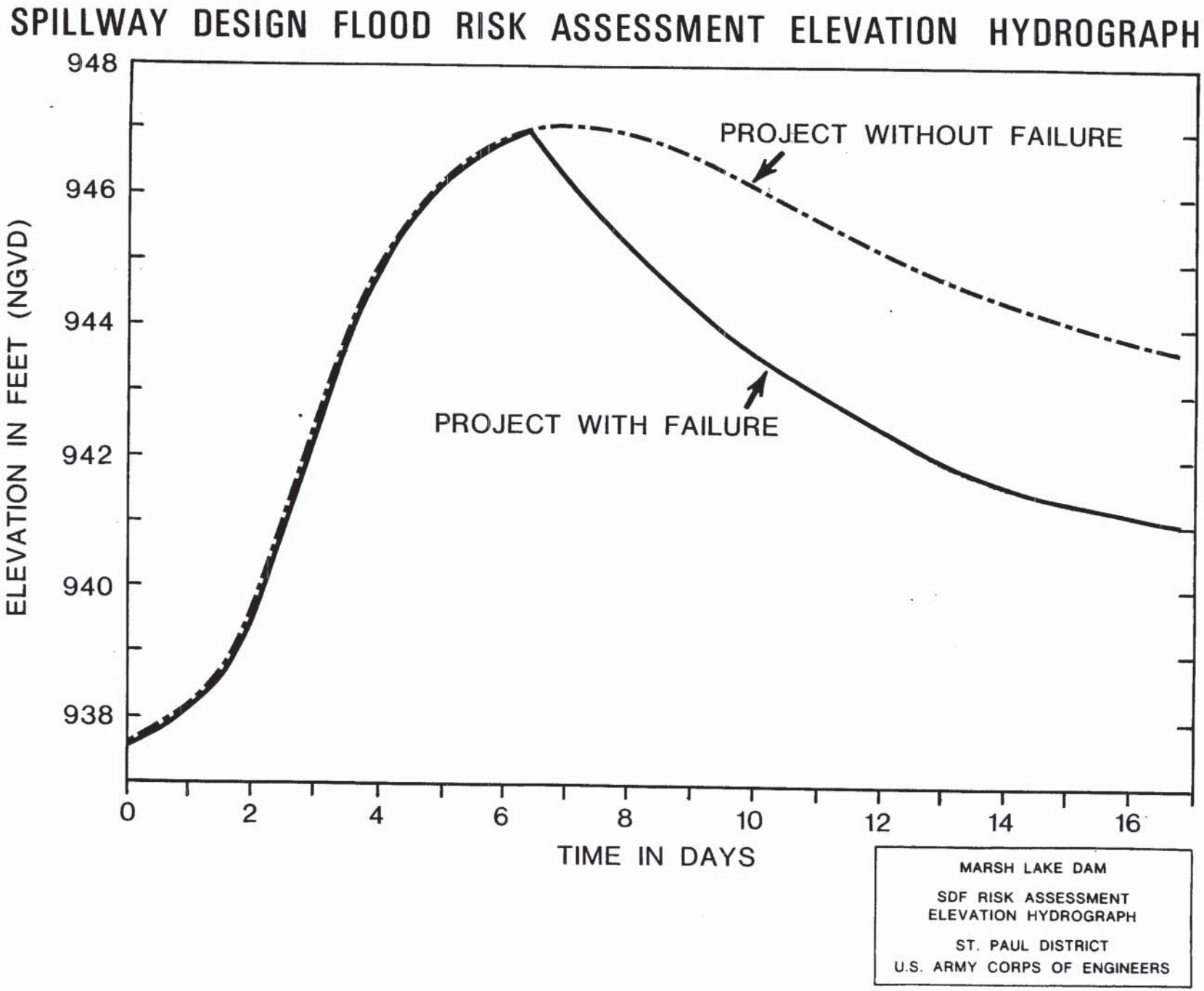
MARSH LAKE DAM

PMF RISK ASSESSMENT
ELEVATION DISCHARGE

ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

SPILLWAY DESIGN FLOOD RISK ASSESSMENT DISCHARGE HYDROGRAPH




SPILLWAY DESIGN FLOOD RISK ASSESSMENT ELEVATION HYDROGRAPH
948
946
944
942
940
938
ELEVATION IN FEET (NGVD)
PROJECT WITHOUT FAILURE
PROJECT WITH FAILURE
0
2
4
6
8
10
12
14
16
TIME IN DAYS
MARSH LAKE DAM
SDF RISK ASSESSMENT
ELEVATION HYDROGRAPH
ST. PAUL DISTRICT
U.S. ARMY CORPS OF ENGINEERS

Determination of Unit Hydrographs For Marsh Lake Inflow
With and Without Project

12-hr Unit Hydrograph Lac Qui Parle Excluding Area above Big Stone Dam *from 1971 PMF Study of Minnesota River		Adopted 12-hr Unit Hydrograph Marsh Lake Reservoir (MN River U/S) based on Drainage Area Translation Existing Conditions		**Adopted 12-hr Unit Hydrograph Marsh Lake Reservoir (MN River U/S) based on Drainage Area Translation with Rerouted PDT**	
D.A. =	2890	D.A. =	2853	**D.A. =**	**1948**
		Drainage Area Factor = 0.987		**Drainage Area Factor = 0.674**	
Hour	Flow	Hour	Flow	**Hour**	**Flow**
12	630	12	622	**12**	**425**
24	1350	24	1333	**24**	**910**
36	2340	36	2310	**36**	**1577**
48	3700	48	3653	**48**	**2494**
60	5650	60	5578	**60**	**3808**
72	8100	72	7996	**72**	**5460**
84	11700	84	11550	**84**	**7886**
96	**15960**	96	**15756**	**96**	**10758**
108	15200	108	15005	**108**	**10246**
120	12650	120	12488	**120**	**8527**
132	10200	132	10069	**132**	**6875**
144	8400	144	8292	**144**	**5662**
156	7250	156	7157	**156**	**4887**
168	6300	168	6219	**168**	**4247**
180	5640	180	5568	**180**	**3802**
192	5100	192	5035	**192**	**3438**
204	4620	204	4561	**204**	**3114**
216	4200	216	4146	**216**	**2831**
228	3750	228	3702	**228**	**2528**
240	3380	240	3337	**240**	**2278**
252	3000	252	2962	**252**	**2022**
264	2620	264	2586	**264**	**1766**
276	2320	276	2290	**276**	**1564**
288	1980	288	1955	**288**	**1335**
300	1700	300	1678	**300**	**1146**
312	1480	312	1461	**312**	**998**
324	1280	324	1264	**324**	**863**
336	1100	336	1086	**336**	**741**
348	950	348	938	**348**	**640**
360	800	360	790	**360**	**539**
372	710	372	701	**372**	**479**
384	560	384	553	**384**	**377**
396	400	396	395	**396**	**270**
408	280	408	276	**408**	**189**
420	200	420	197	**420**	**135**
432	100	432	99	**432**	**67**

Determination of Peak Inflow Frequency for Marsh Lake

Flow Frequency at Pomme de Terre Gage
Drainage Area = 905 mi²

Event	Flow	Flow Adjusted for Marsh existing DA = 2853 Ratio (2853/905) = 3.15	Flow Adjusted for Marsh w/o PDT DA = 1948 Ratio (1948/905) = 2.15
2-yr	704	2219	1515
5-yr	1470	4634	3164
10- yr	2130	6715	4585
25-yr	3140	9899	6759
50-yr	4010	12641	8631
100-yr	4980	15699	10719

Flow Frequency at Lac Qui Parle Gage
Drainage Area = 4050 mi²

Event	Flow	Flow Adjusted for Marsh existing DA = 2853 Ratio (2853/4050) = 0.70	Flow Adjusted for Marsh w/o PDT DA = 1948 Ratio (1948/4050) = 0.48
2-yr	3600	2536	1732
5-yr	8000	5636	3848
10- yr	11400	8031	5483
25-yr	16300	11482	7840
50-yr	20500	14441	9860
100-yr	25000	17611	12025

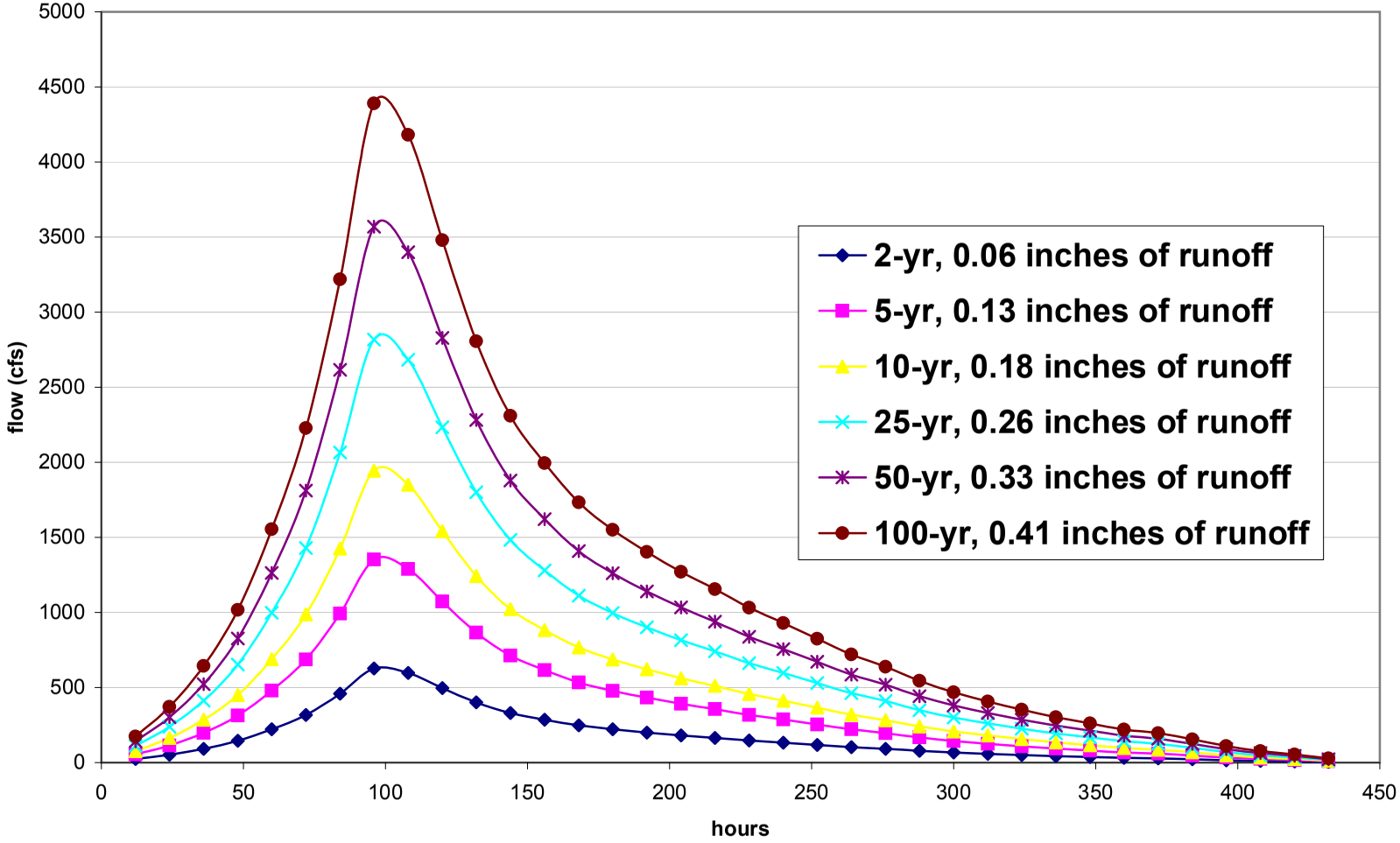
Adopted Inflow Frequency Estimate For Marsh Lake
Average of Estimates from Translations from Two Nearby Frequency Curves

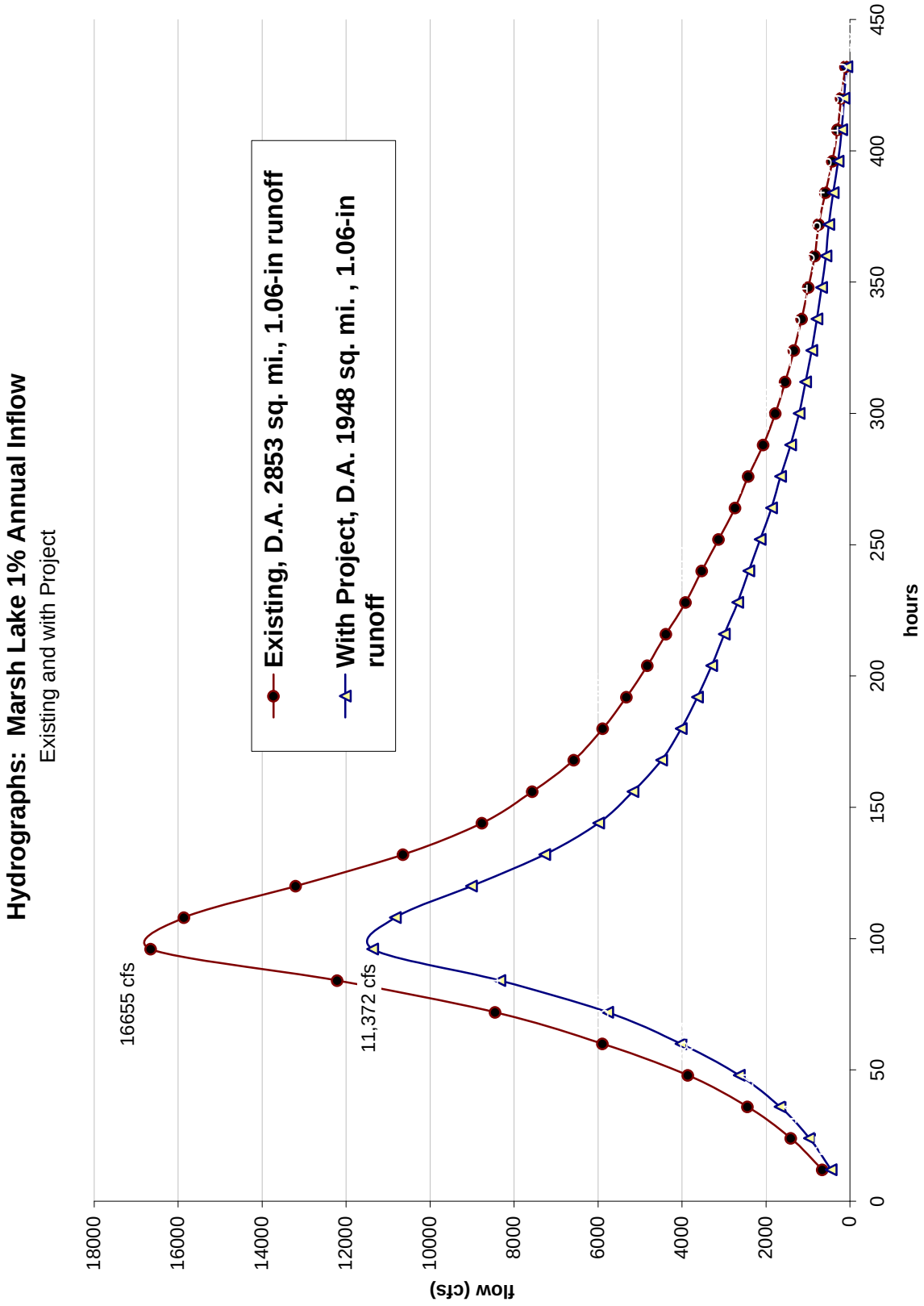
Event	Marsh Lke Inflow w/o PDT DA = 1948	Marsh Lake Inflow existing DA = 2853	Inches of Runoff
2-yr	1623	2378	0.15
5-yr	3506	5135	0.33
10- yr	5034	7373	0.47
25-yr	7299	10691	0.68
50-yr	9246	13541	0.86
100-yr	11372	16655	1.06

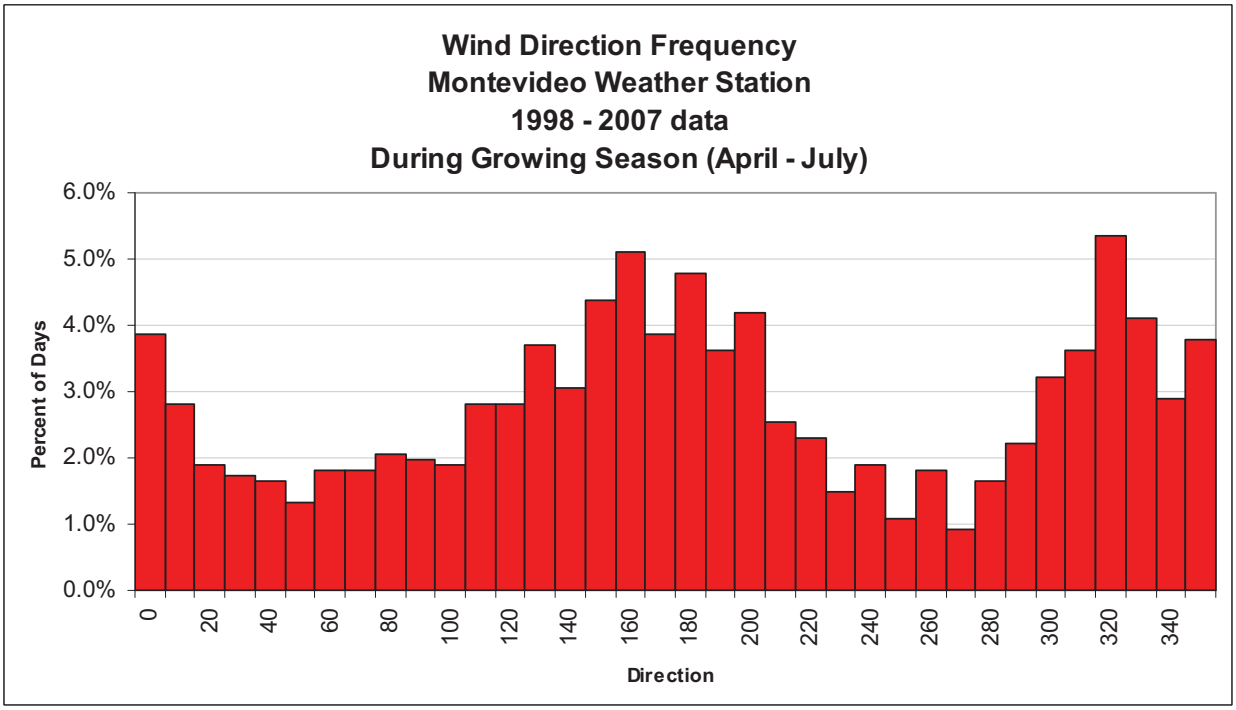
Adopted Summer (May-Sept) Frequency Estimate for Marsh Lake
Based on ratio of Annual to Summer Peak flow from (1931-1997)
Ratio = 0.386

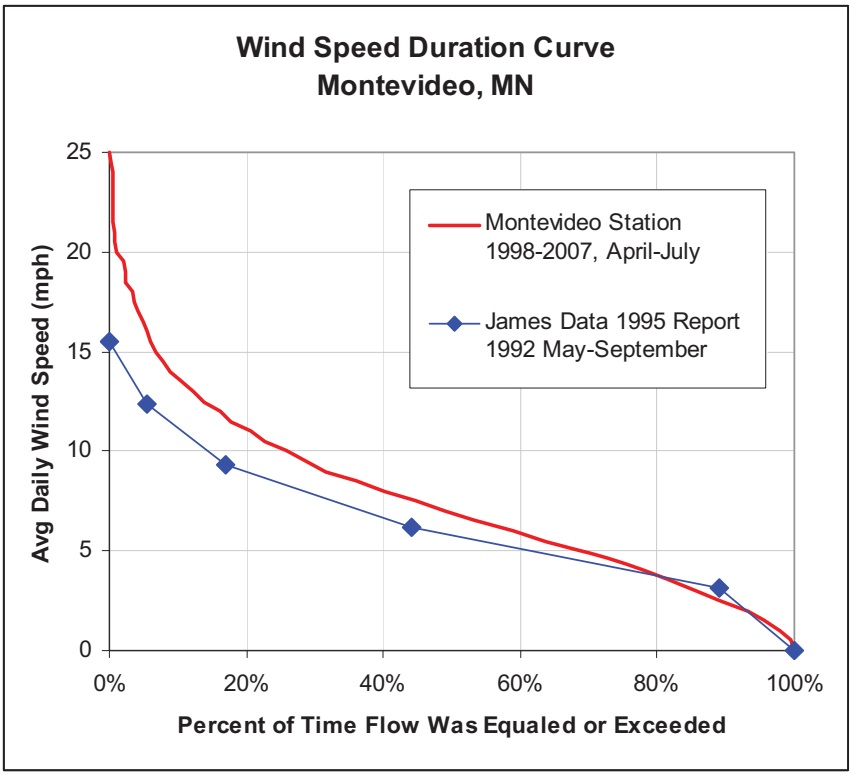
Event	Marsh Lke Summertime Inflow w/o PDT DA = 1948	Marsh Lke Summertime Inflow existing DA = 2853	Inches of Runoff
2-yr	627	918	0.06
5-yr	1353	1982	0.13
10- yr	1943	2846	0.18
25-yr	2818	4127	0.26
50-yr	3569	5227	0.33
100-yr	4390	6429	0.41

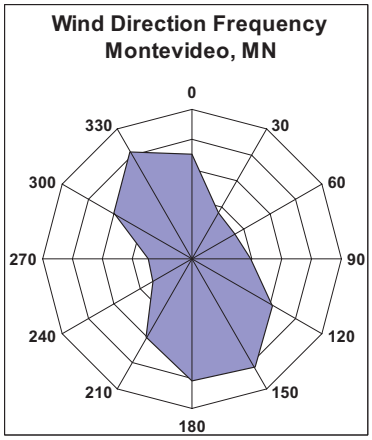
Hydrographs: Marsh Lake Frequency Event Inflows
with Project (i.e. Rerouted Pomme De Terre)
Drainage Area = 1948 mi^2
Summertime Events (May 1 - Sept 30)




Hydrographs: Marsh Lake 1% Annual Inflow
Existing and with Project
Existing, D.A. 2853 sq. mi., 1.06-in runoff
With Project, D.A. 1948 sq. mi. , 1.06-in runoff
16655 cfs
11,372 cfs
flow (cfs)
hours
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
0
50
100
150
200
250
300
350
400
450


Wind Direction Frequency
Montevideo Weather Station
1998 - 2007 data
During Growing Season (April - July)
Percent of Days
6.0%
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
Direction

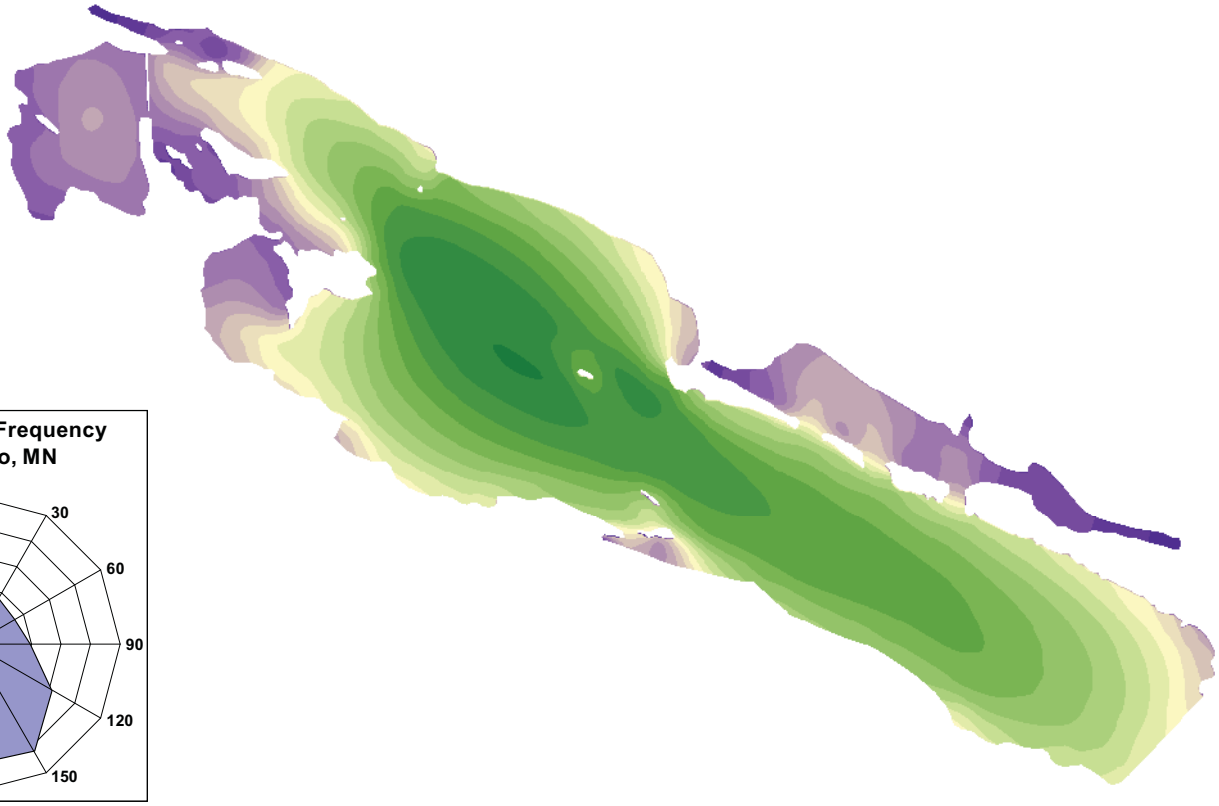

Wind Speed Duration Curve
Montevideo, MN
Avg Daily Wind Speed (mph)
25
20
15
10
5
0
0%
20%
40%
60%
80%
100%
Percent of Time Flow Was Equaled or Exceeded
Montevideo Station
1998-2007, April-July
James Data 1995 Report
1992 May-September

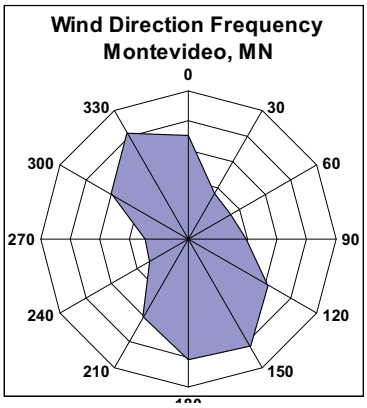

Wind Direction Frequency
Montevideo, MN
0
30
60
90
120
150
180
210
240
270
300
330

Marsh Lake Reservoir

Weighted Wind Fetch

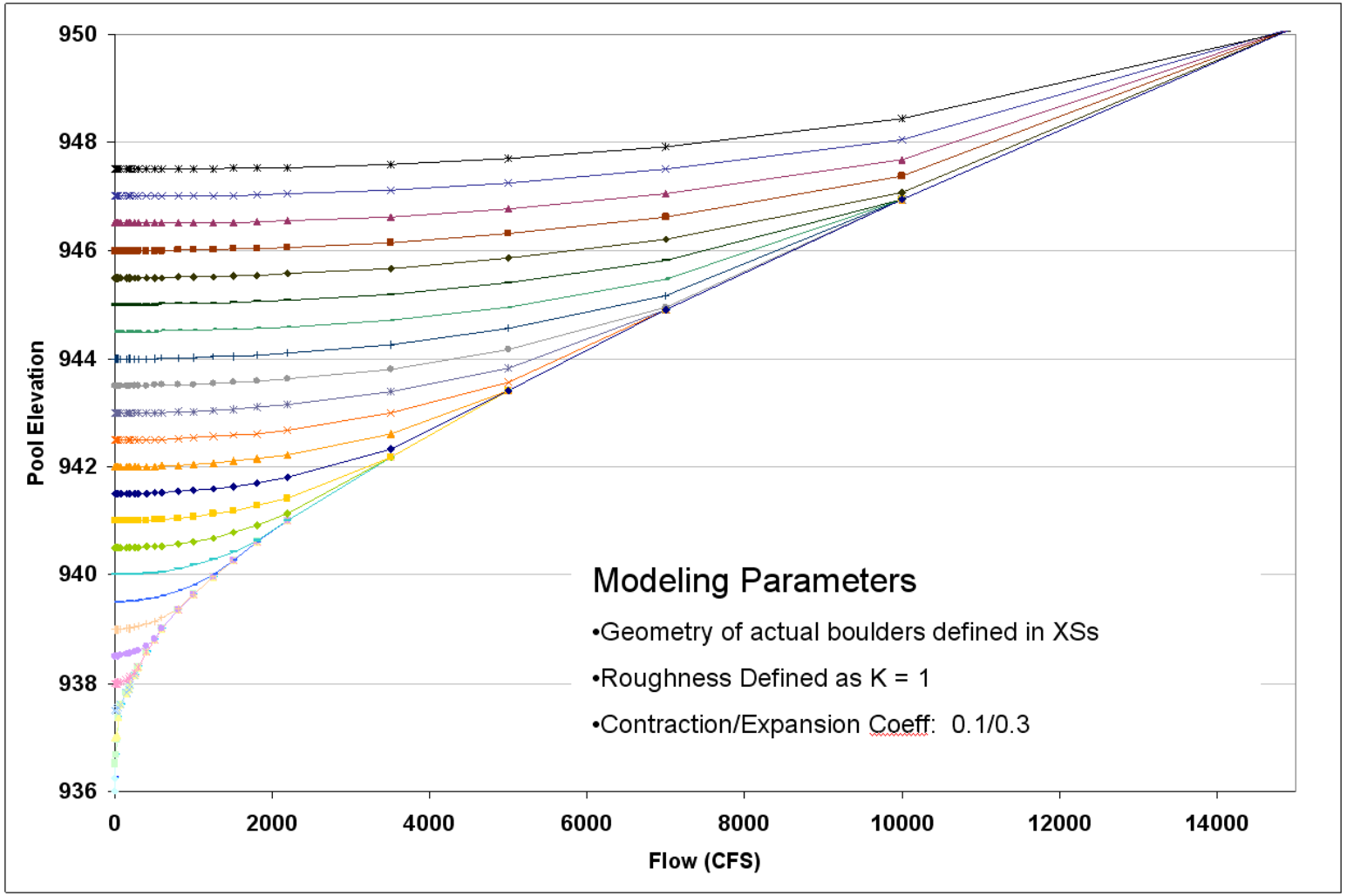
Existing Conditions



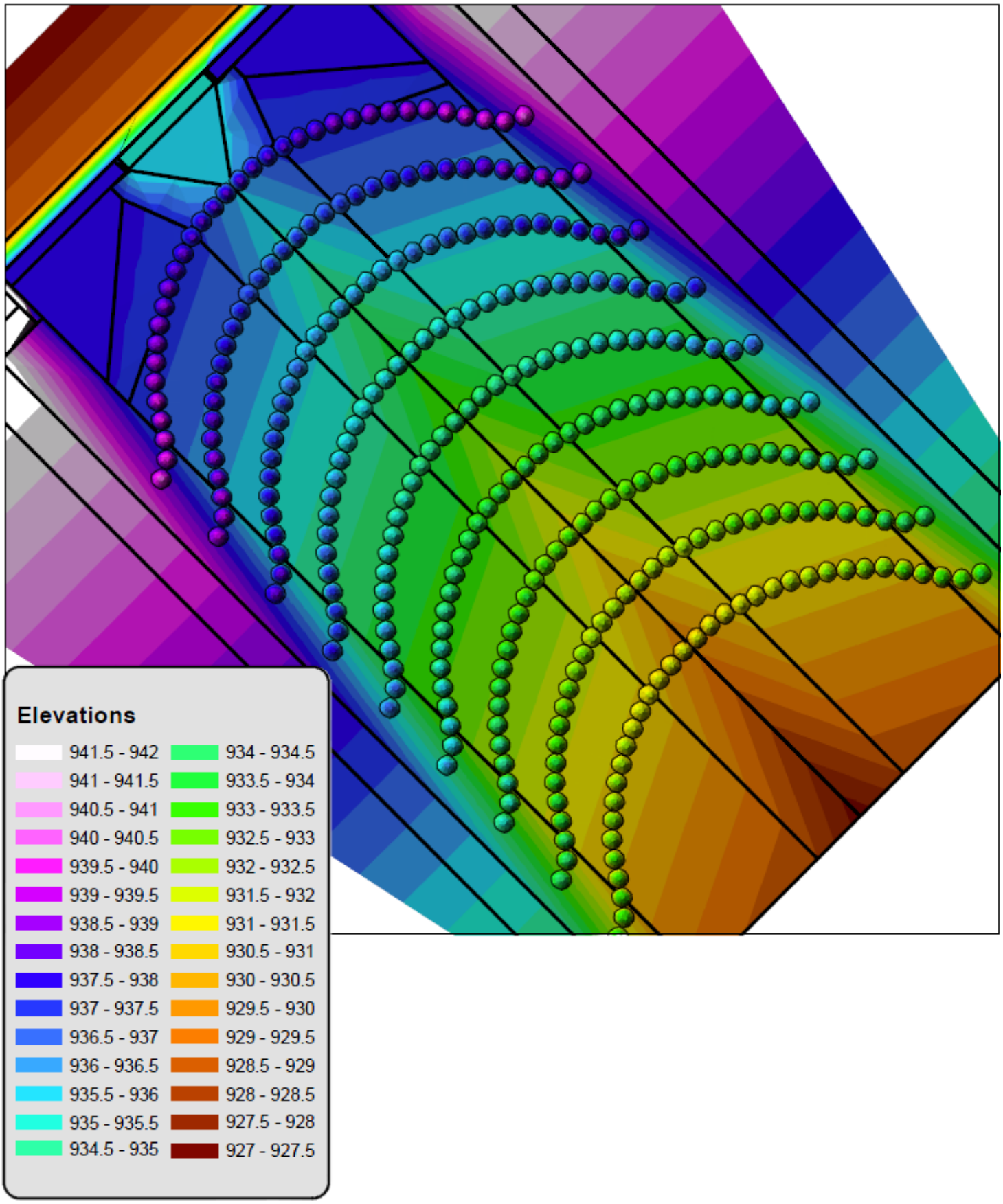


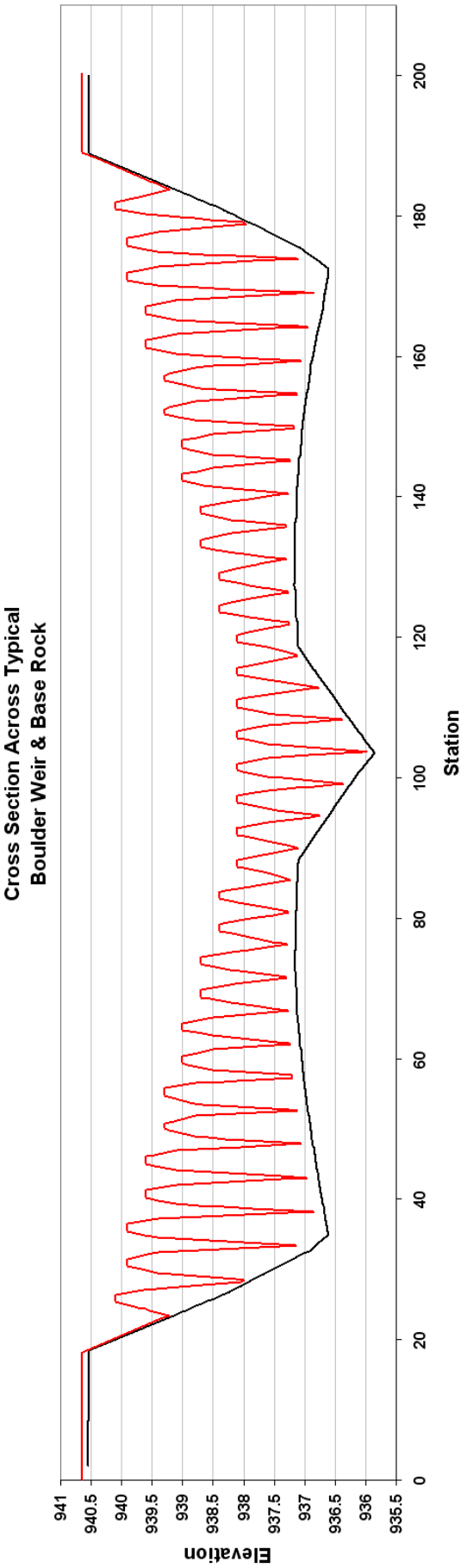
Marsh Lake Proposed Primary Spillway Modifications

Estimated Discharge Rating Curve for Various Tailwater Conditions



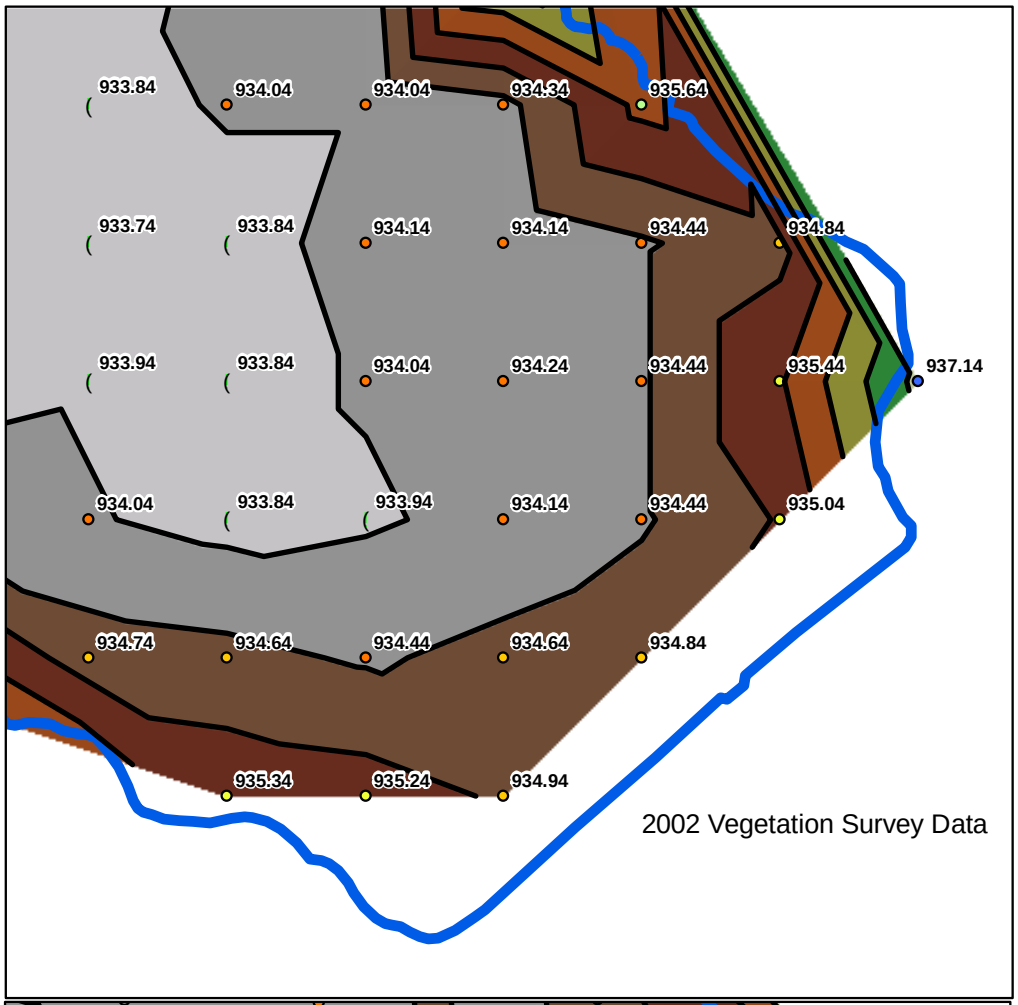
Marsh Lake Dam
Proposed Modification to Primary Spillway

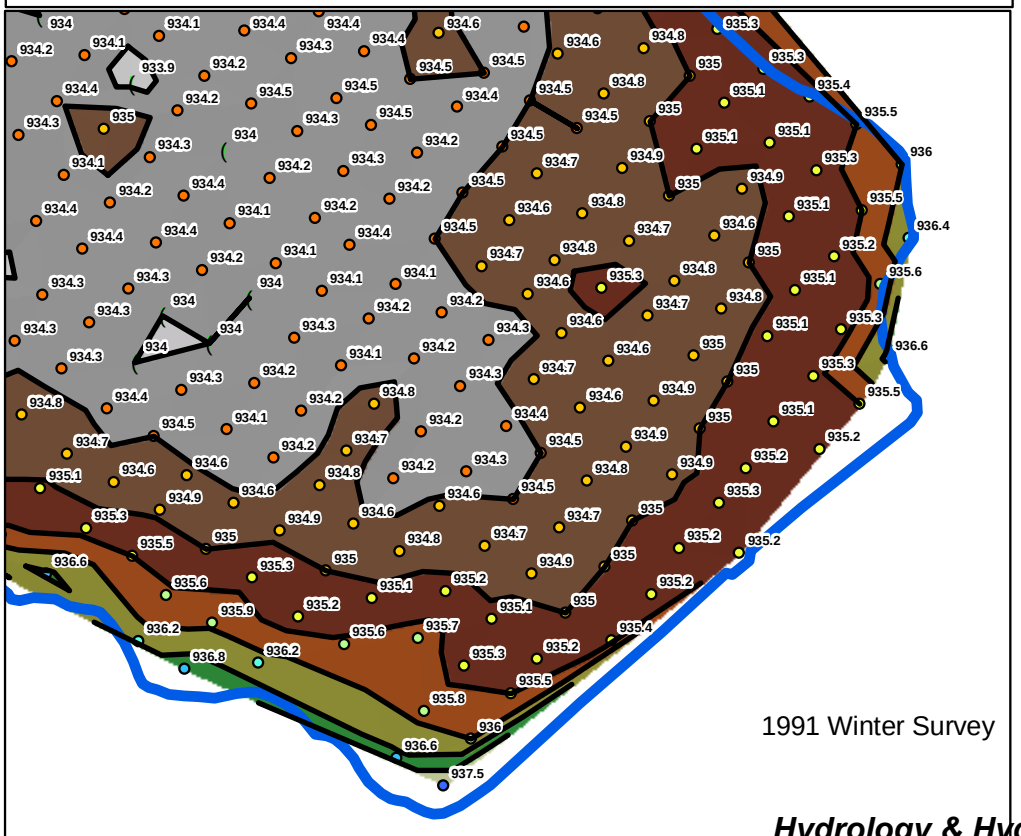



Cross Section Across Typical
Boulder Weir & Base Rock
Elevation
941
940.5
940
939.5
939
938.5
938
937.5
937
936.5
936
935.5
Station
0
20
40
60
80
100
120
140
160
180
200

Marsh Lake Bathymetry Near Outlet

Simple interpolation of raw survey points



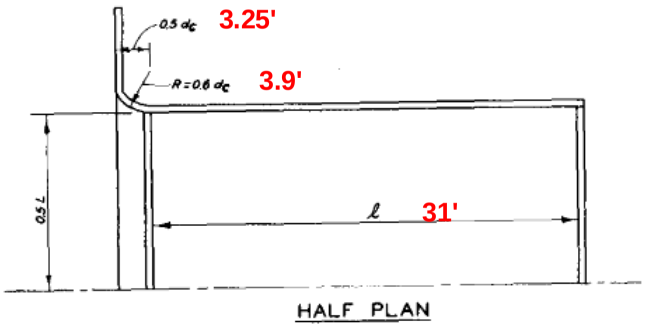


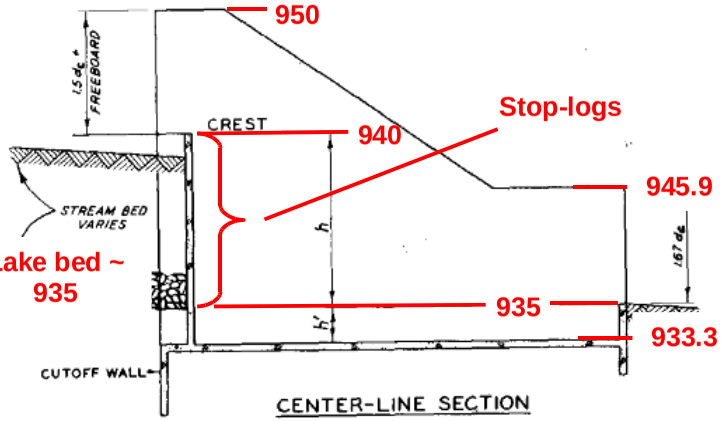
Elevations

- 937.5 - 938
- 937 - 937.5
- 936.5 - 937
- 936 - 936.5
- 935.5 - 936
- 935 - 935.5
- 934.5 - 935
- 934 - 934.5
- 933.5 - 934

Datum: NGVD 1929

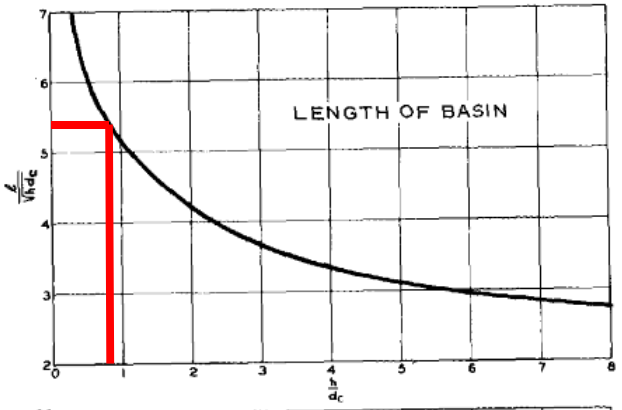
Hydrology & Hydraulics Appendix: Plate 17

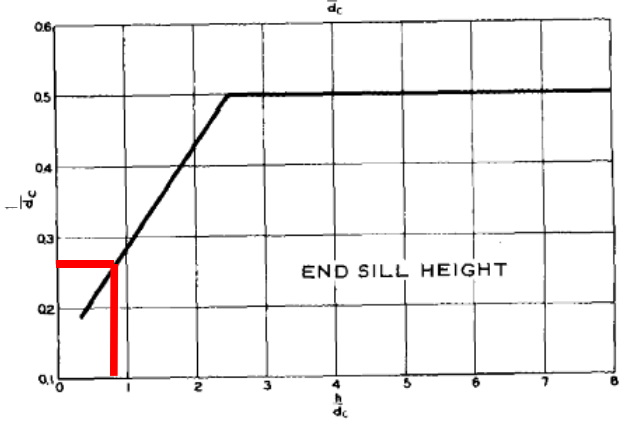




C = WEIR DISCHARGE = 3.0
d_c = CRITICAL DEPTH OVER CREST
h = HEIGHT OF DROP
h' = HEIGHT OF END SILL
H = HEAD ON WEIR = 3/2(d_c)

ℓ = LENGTH OF BASIN
L = LENGTH OF WEIR CREST
Q = DISCHARGE, $CLH^{3/2}$





DETAILS AND DESIGN CHART
FOR TYPICAL DROP STRUCTURE

Marsh Lake Drawdown Structure

Hydraulic Design Parameters

Design Pool	950'
Q (cfs)	8500
q (cfs/ft)	94
d_c (ft)	6.5
h (ft)	5
h/d_c	0.77

$$\frac{l}{\sqrt{h d_c}} = 5.4$$

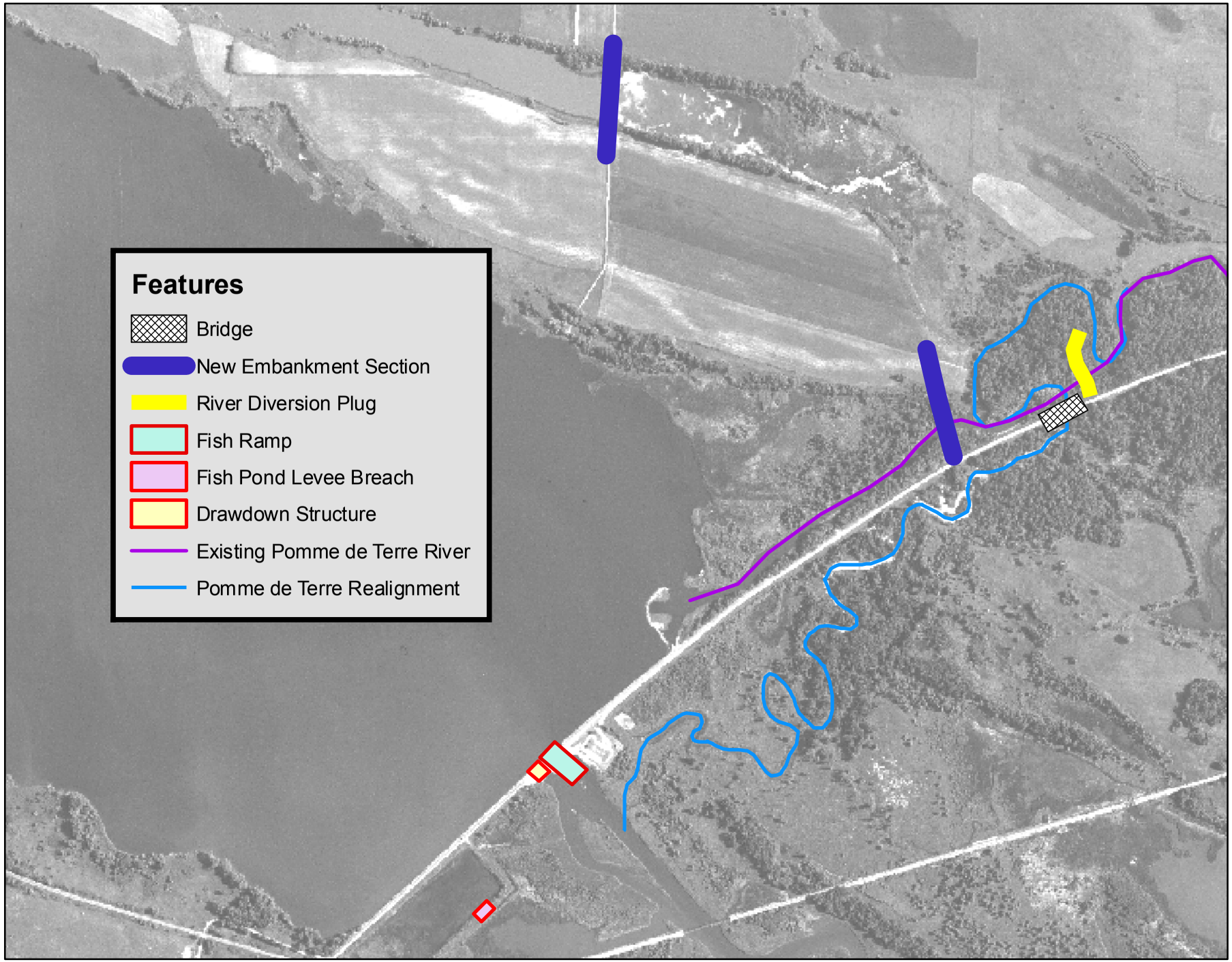
$$\frac{h'}{d_c} = 0.25$$

Sizing & Dimensions

Length of Basin	31'
Elevation of Crest (top of stop logs)	940.0
Elevation of Crest (bottom of stop logs)	935.0
Elevation of Basin	933.3
Elevation of Top of End Sill	935.0
Elevation of Top of Wingwall (upstream)	950.0
Elevation of Top of Wingwall (downstream)	945.9
Abutment Radius	3.9'
Abutment upstream offset	3.25'

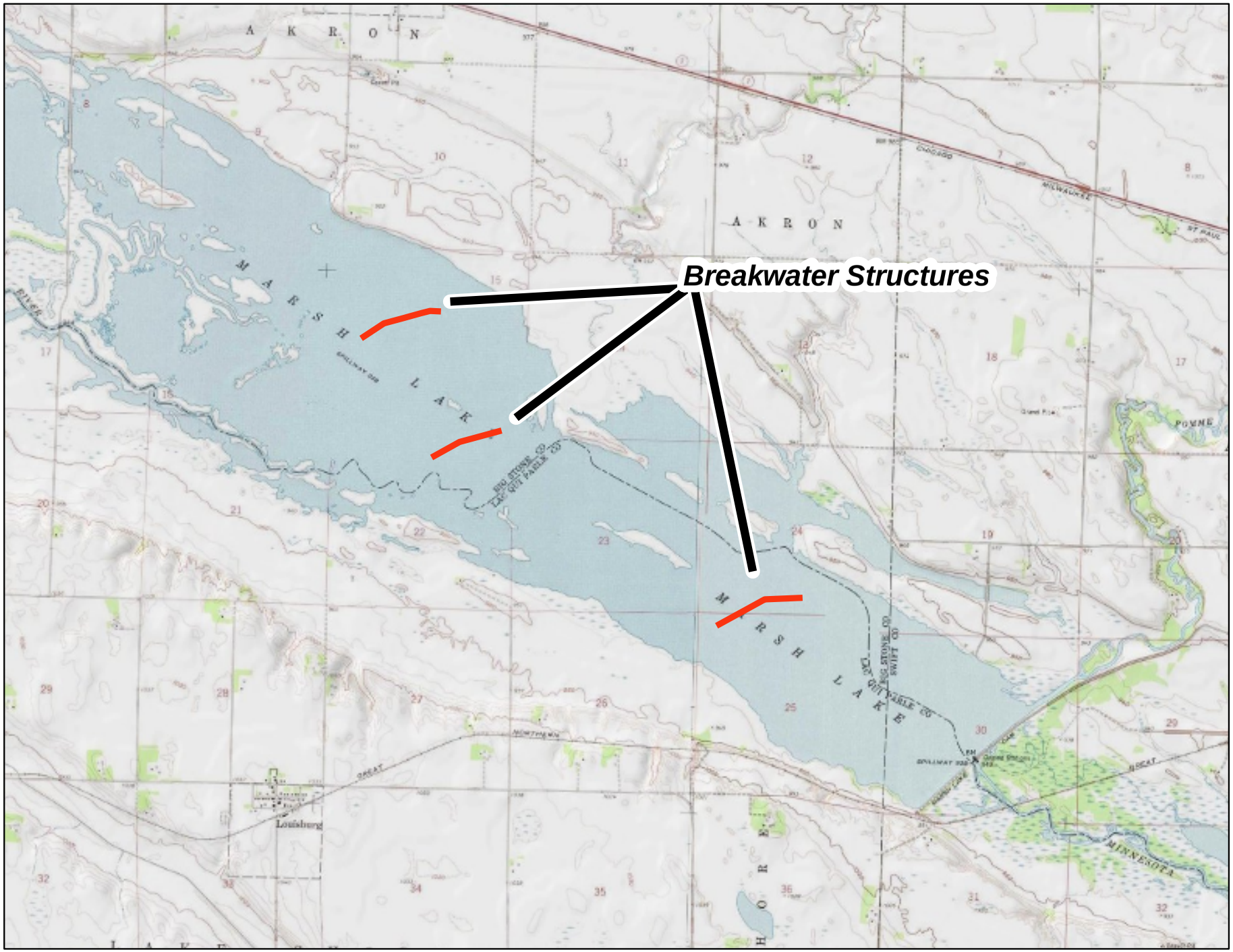
Marsh Lake Reservoir

Dam Modification / Pomme de Terre Realignment / Fish Pond Breach



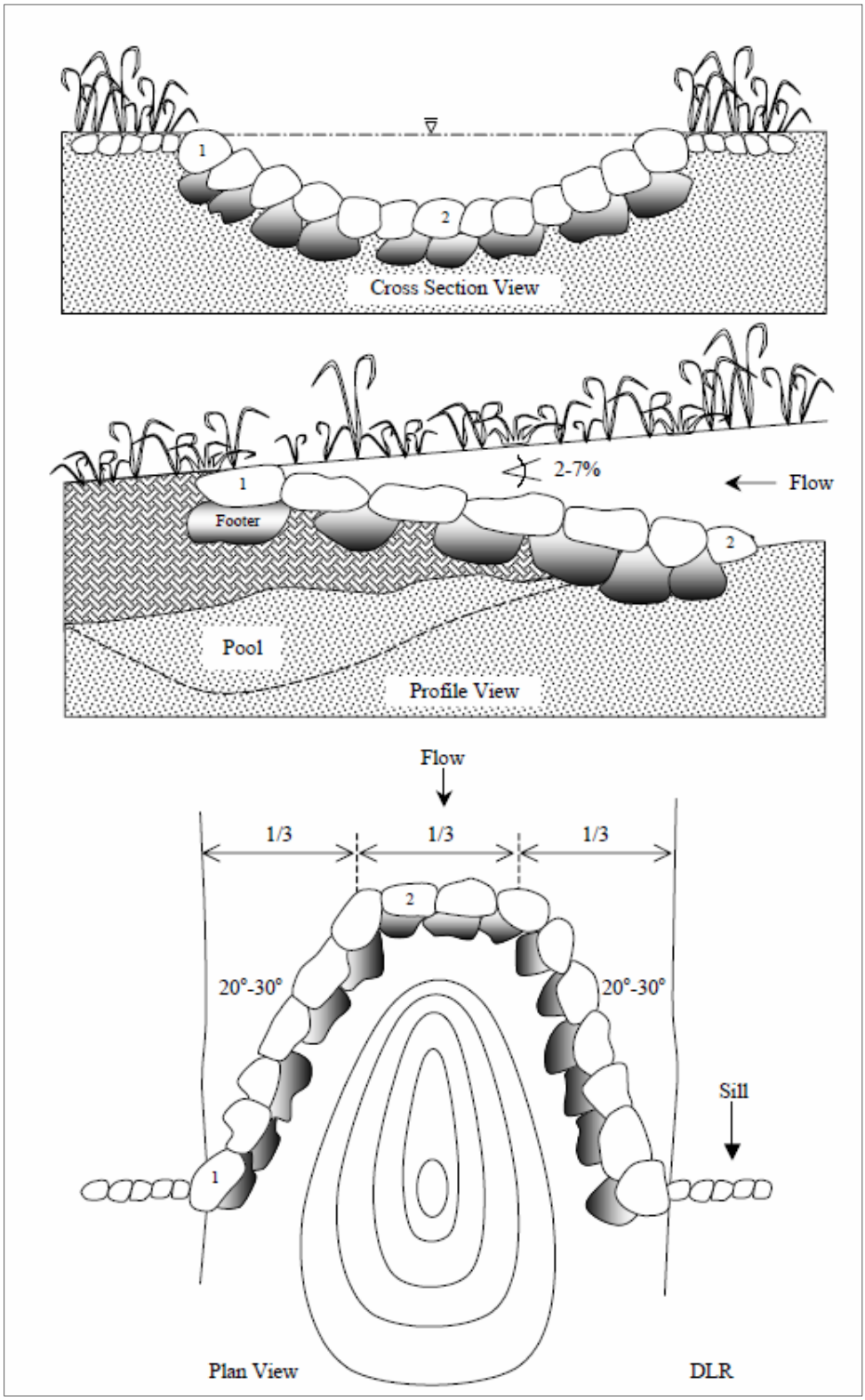
Marsh Lake Reservoir

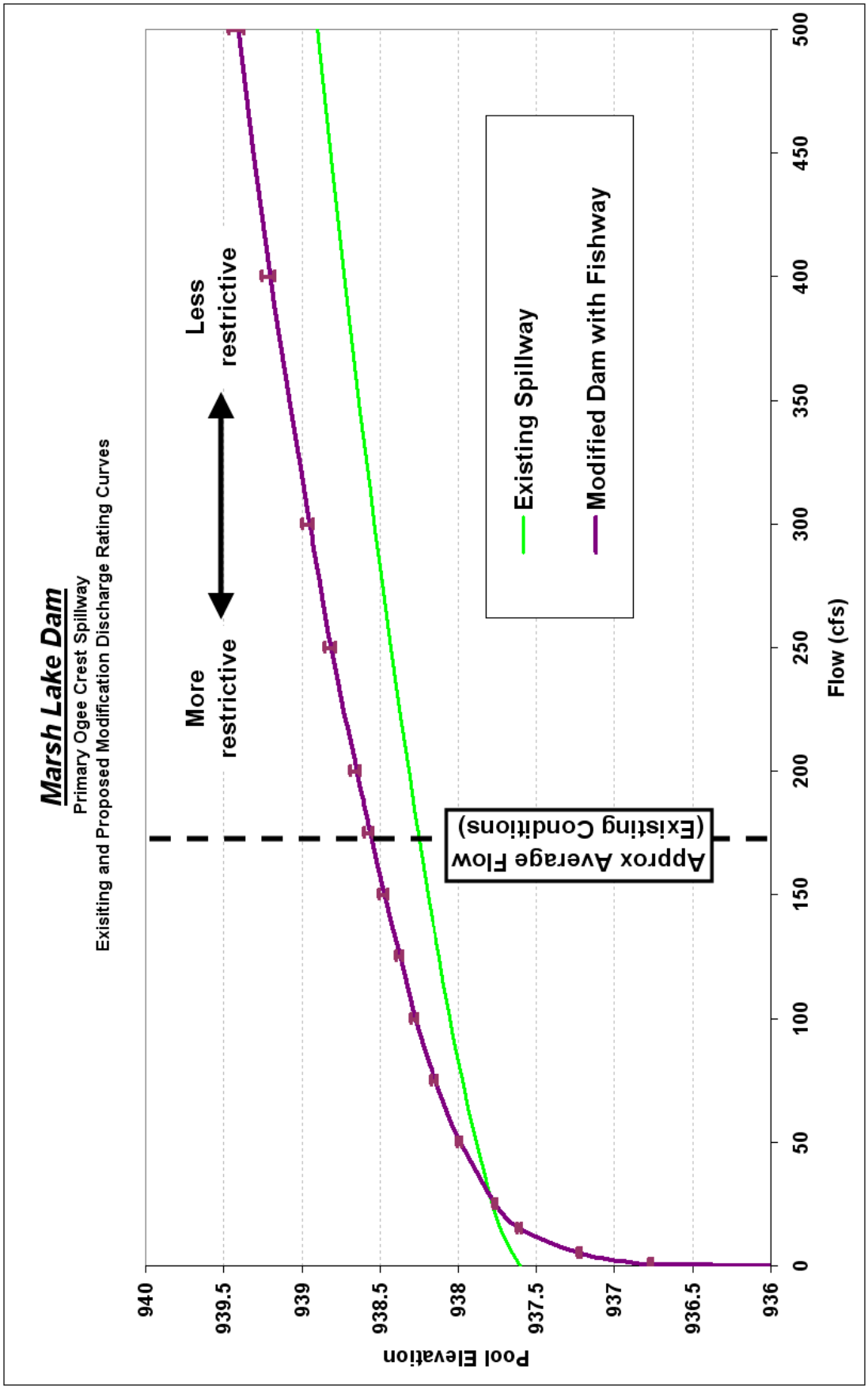
Proposed Breakwater Structure Layout



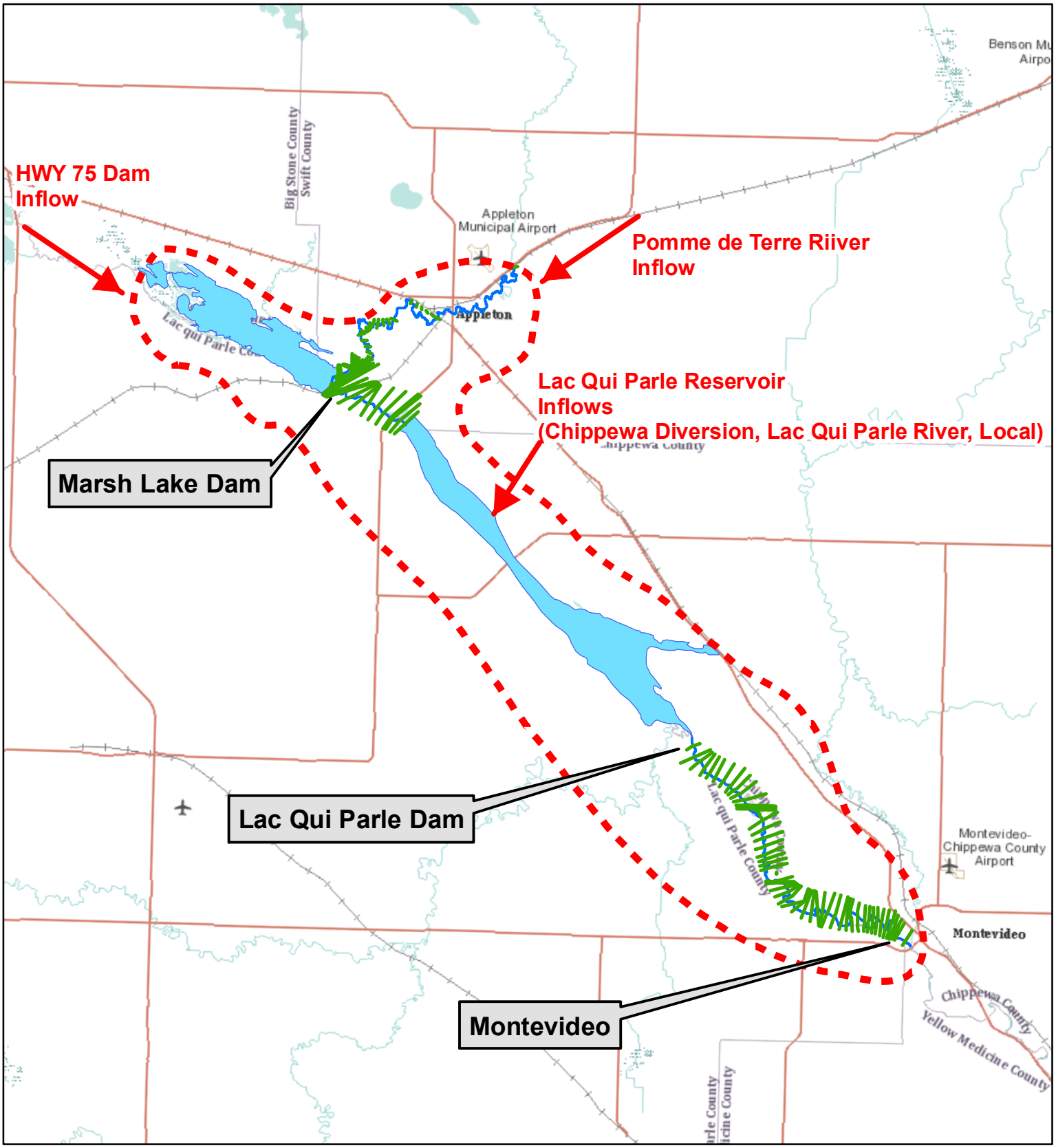
Conceptual Design of Re-routed Pomme de Terre Grade Control Structures

*per Reference 9: Wildland Hydrology/Dave Rosgen



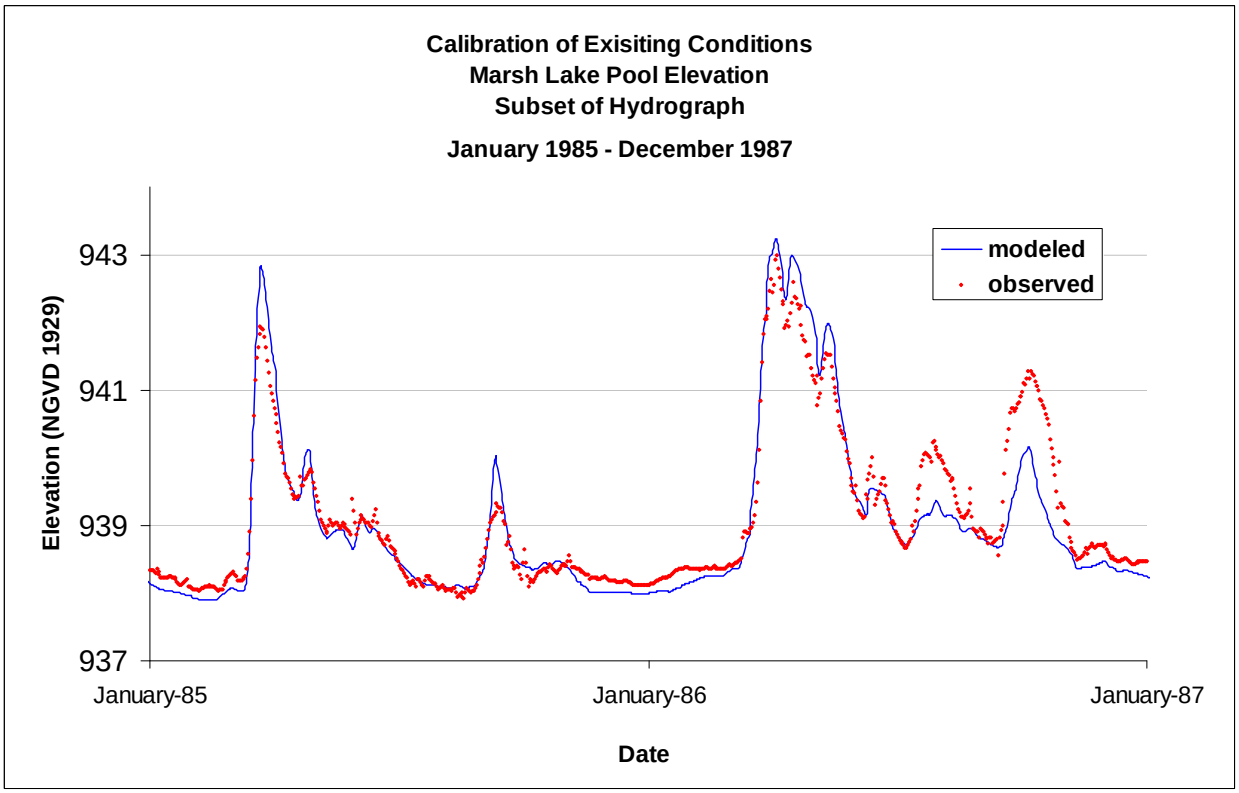

Marsh Lake Dam
Primary Ogee Crest Spillway
Exisiting and Proposed Modification Discharge Rating Curves
Less restrictive
More restrictive
Approx Average Flow (Existing Conditions)
Existing Spillway
Modified Dam with Fishway
Pool Elevation
940
939.5
939
938.5
938
937.5
937
936.5
936
Flow (cfs)
0
50
100
150
200
250
300
350
400
450
500

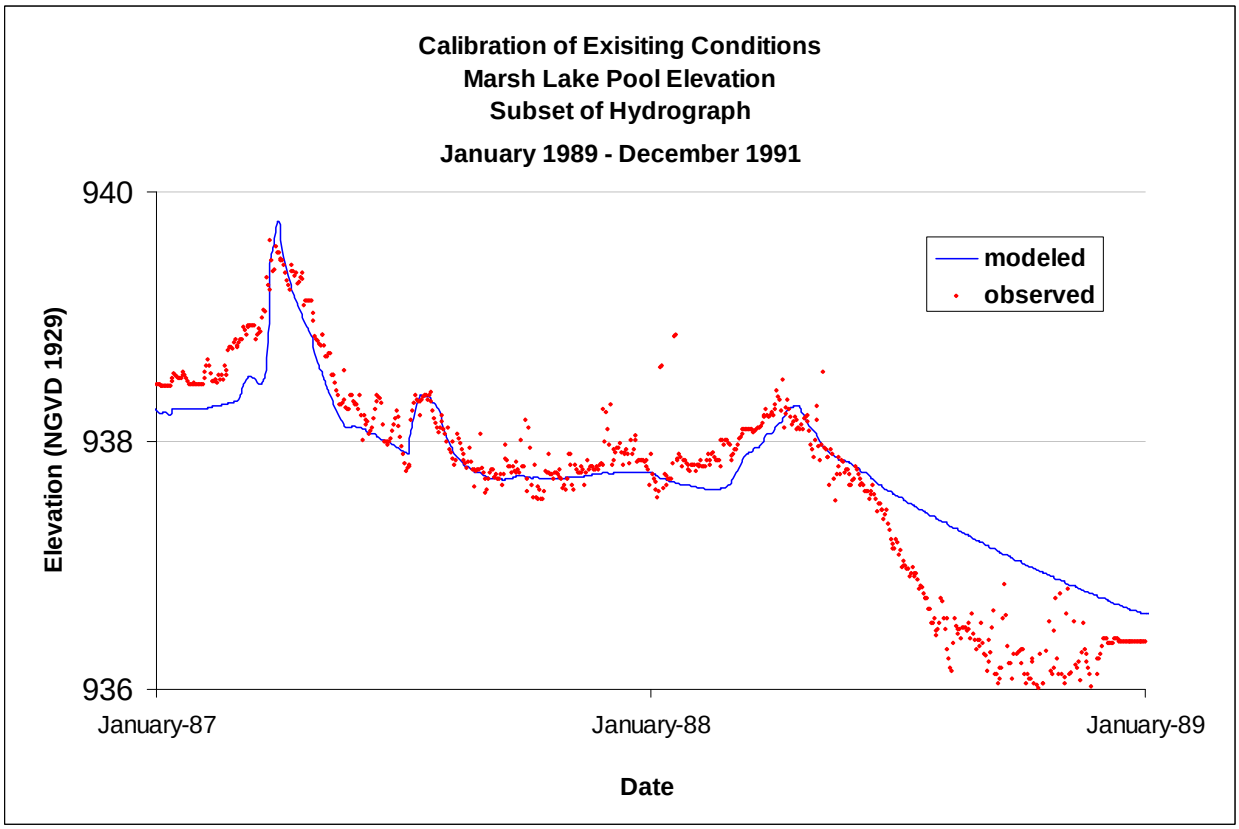
Marsh Lake
Unsteady HEC-RAS Model Schematic



Water Level Hydraulic Model Calibration and Validation

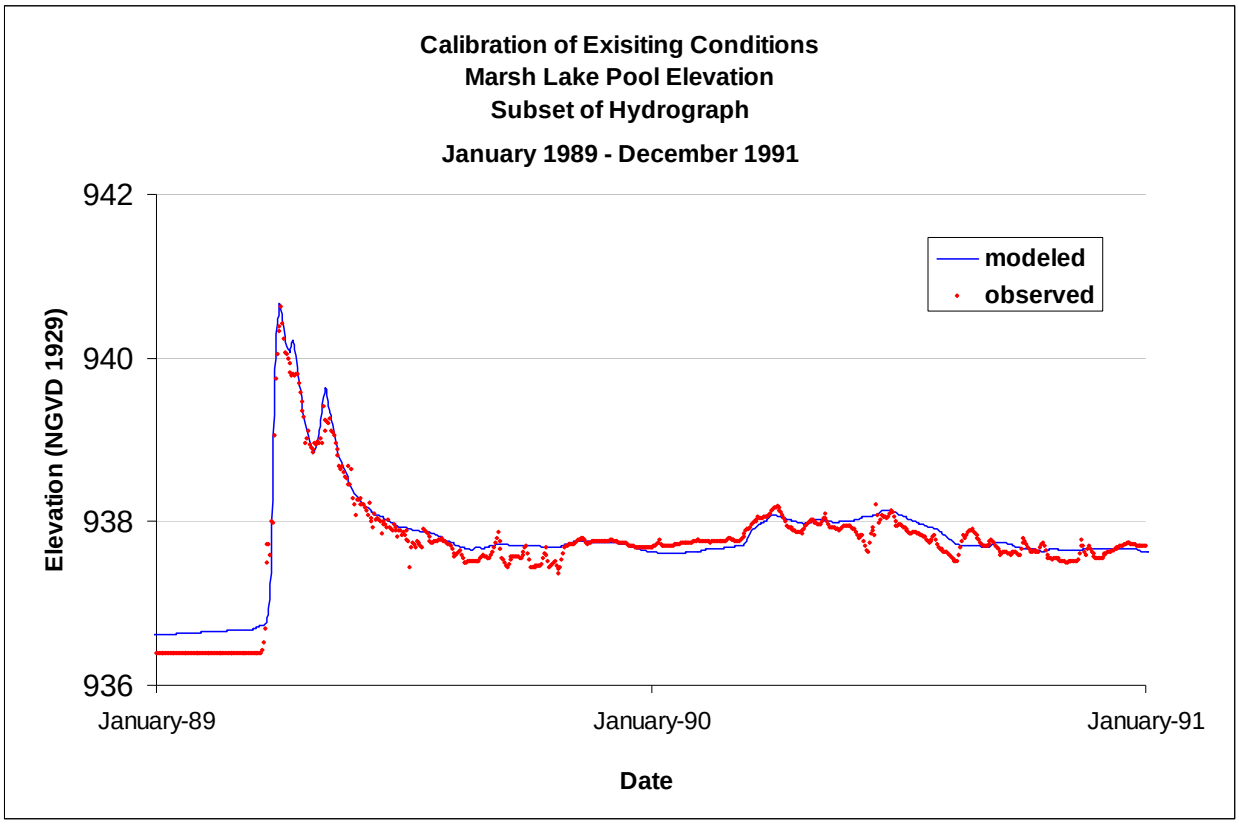
Marsh Lake Water Surface Elevation
Modeled and Observed Data

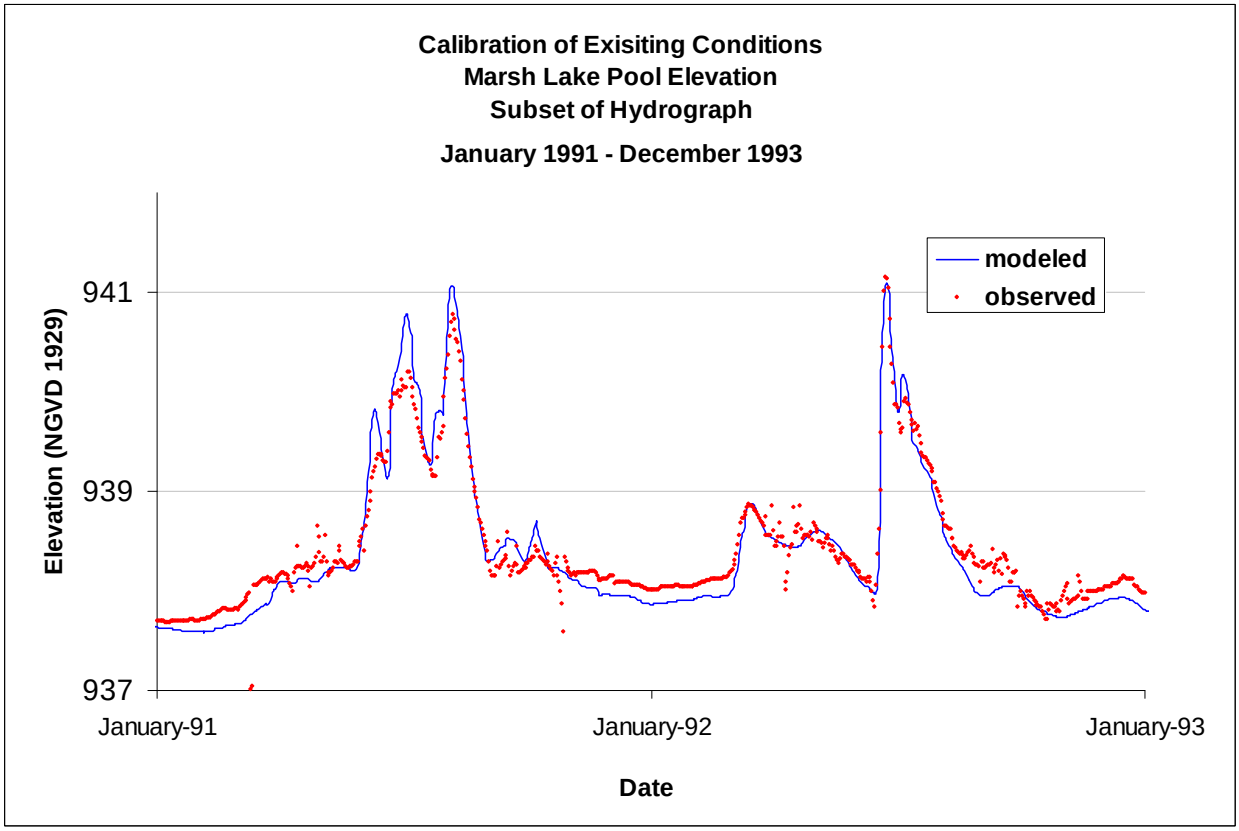




Water Level Hydraulic Model Calibration and Validation

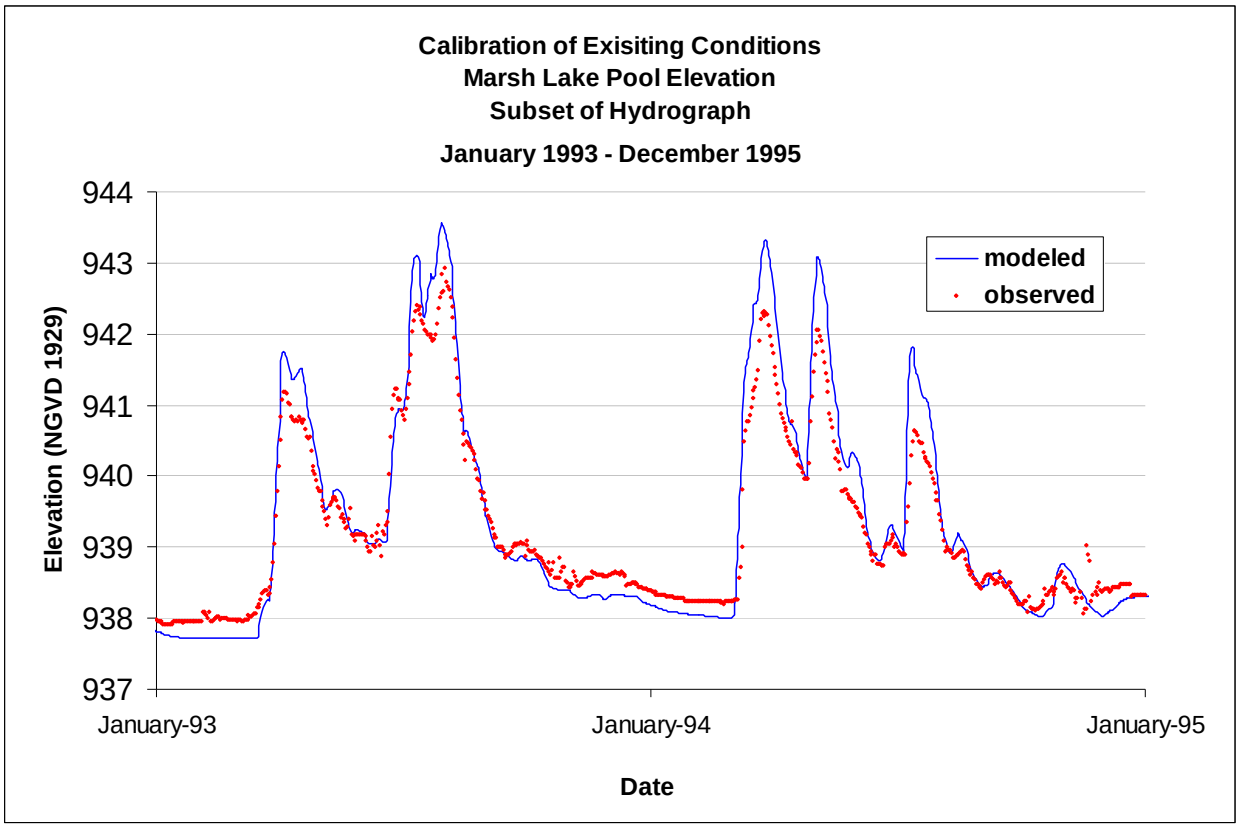
Marsh Lake Water Surface Elevation
Modeled and Observed Data

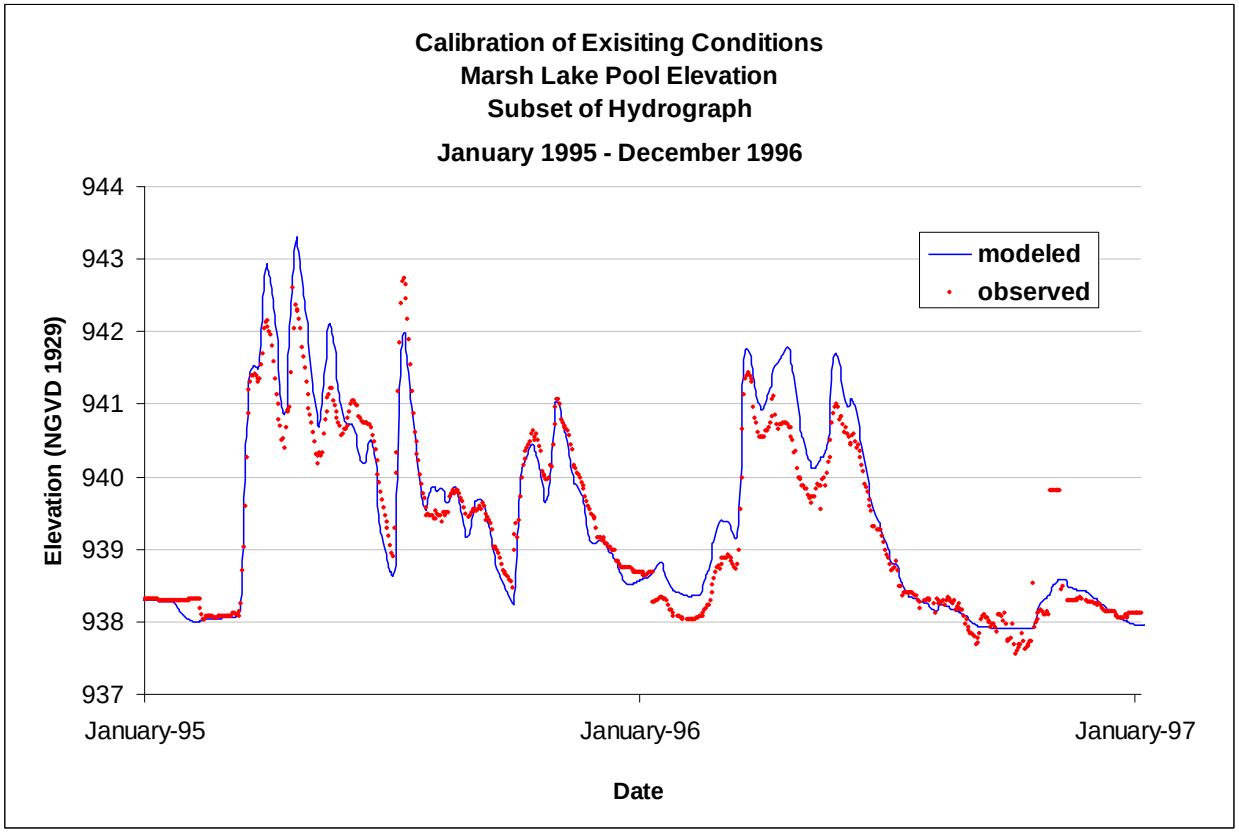




Water Level Hydraulic Model Calibration and Validation

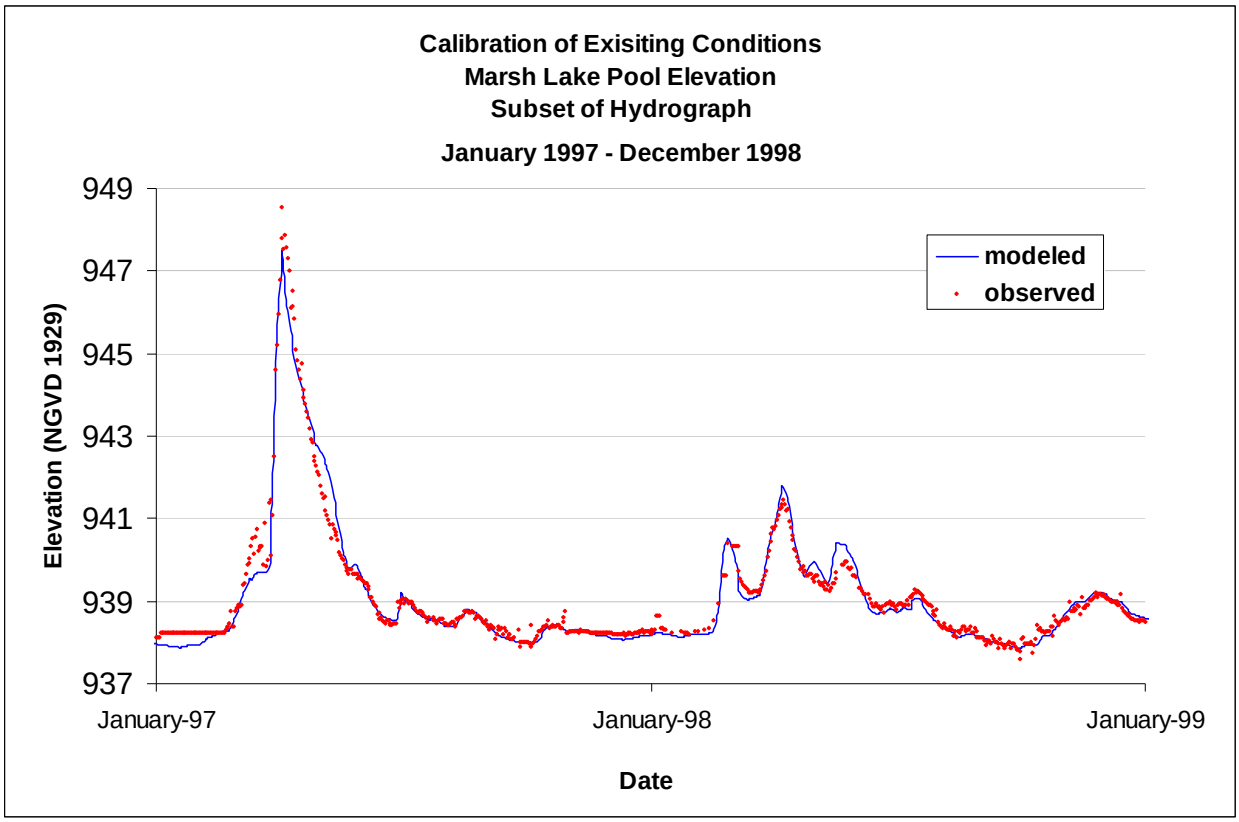
Marsh Lake Water Surface Elevation
Modeled and Observed Data

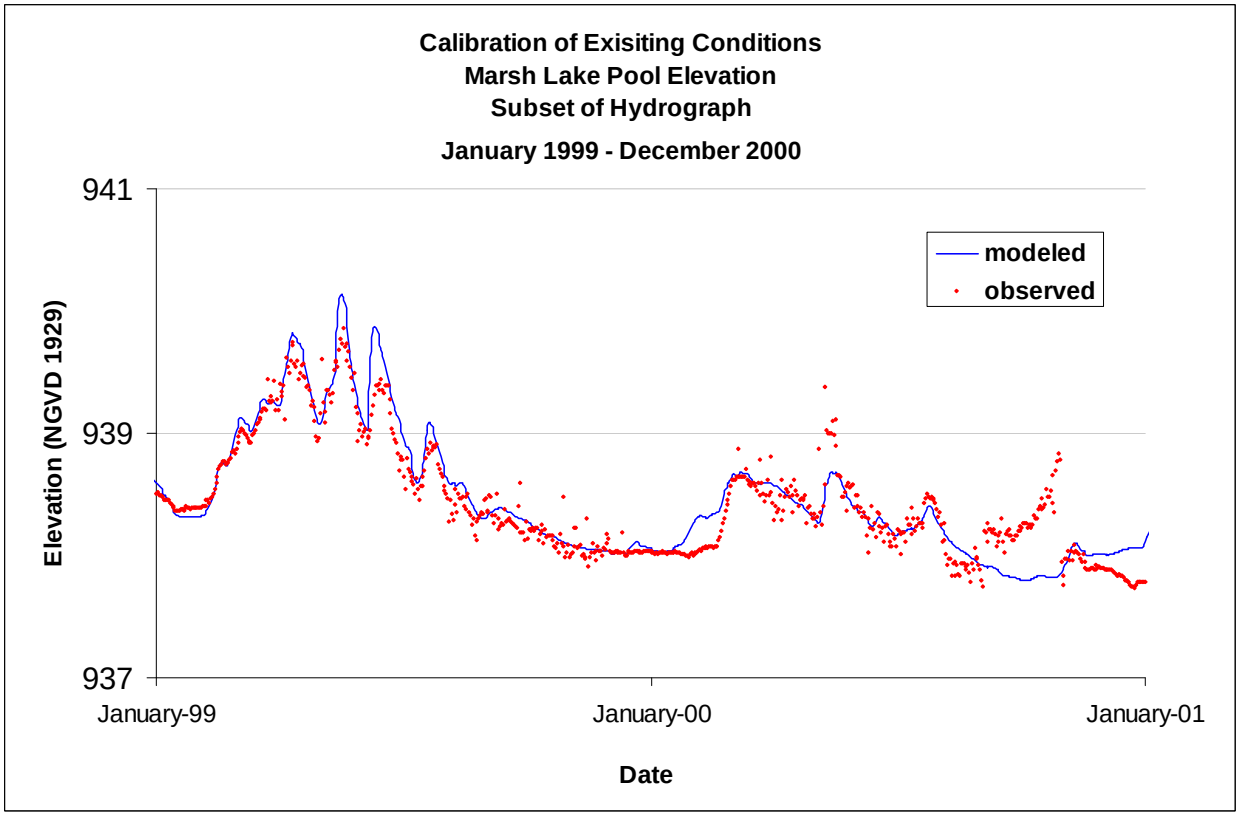




Water Level Hydraulic Model Calibration and Validation

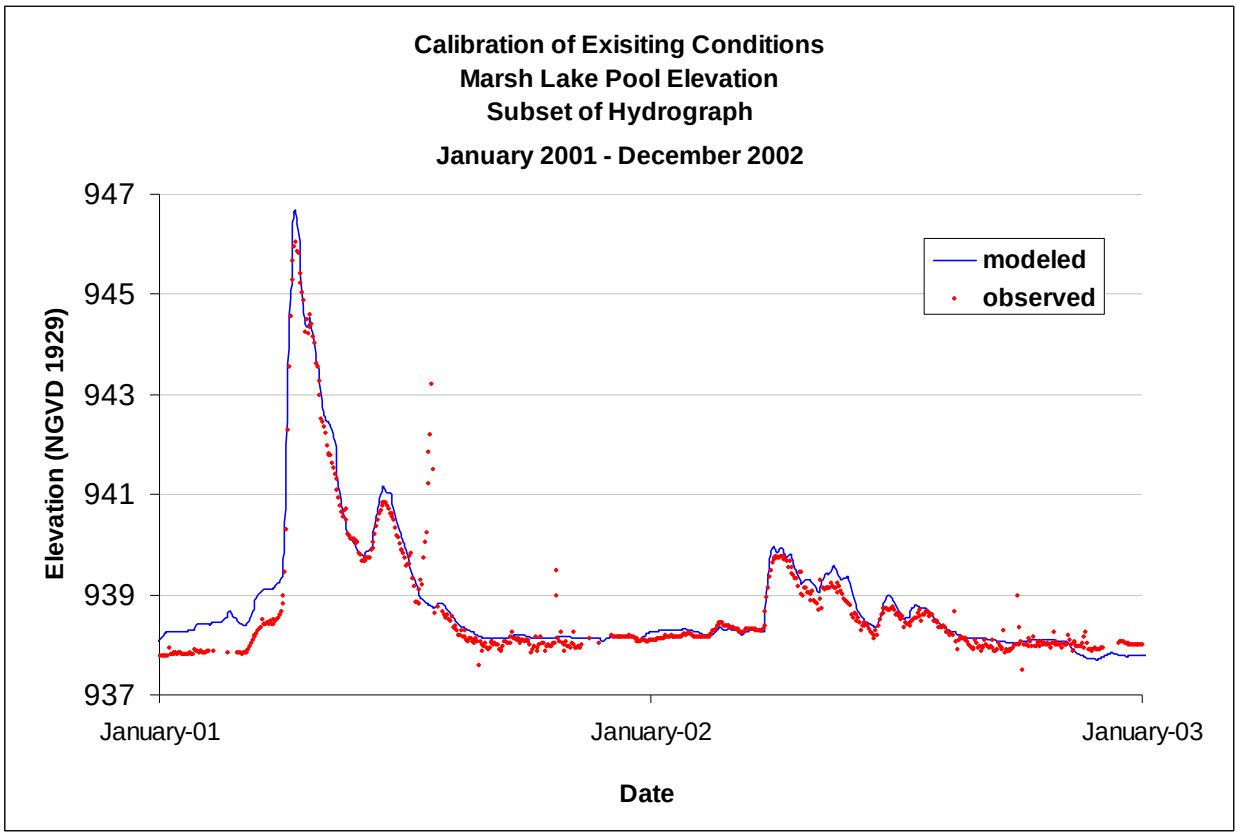
Marsh Lake Water Surface Elevation
Modeled and Observed Data





Water Level Hydraulic Model Calibration and Validation

Marsh Lake Water Surface Elevation
Modeled and Observed Data



Appendix K – Structural Analysis

Marsh Lake Aquatic Ecosystem Restoration Project
Structural Feasibility Study

1 General

This study outlines five proposed structures for the Marsh Lake Aquatic Ecosystem Restoration Project. Concrete, excavation, sheet pile, and aluminum stoplog quantities are tabulated at the end of the report.

General Assumptions:

1. All concrete walls are assumed to be founded on 2' thick footings and extend 3' below grade. Bottom of footing elevation will be at 5' below grade.

2 Structural Features

2.1 Culverts beneath Louisburg Grade Road

Description:

Seven existing 60" diameter RCP culverts cross below Louisburg Grade Road connecting the upper and lower pools of Marsh Lake. As a result of Marsh Lake drawdown requirements, water level control will be required in 6" increments on all of these culverts, and therefore, headwalls with stop log tracks will be provided.

Assumptions:

1. Southern three existing RCP's replaced with a single 3 cell RCP box culvert (see Figure 1)
2. Northern four existing RCP's replaced with two 2 cell RCP box culvert (see Figure 1)

Questions and Uncertainties:

1. Is dewatering required?

2.2 Existing Spillway South East of Marsh Lake

Description:

The existing spillway requires removal of concrete to establish a new elevation of 935.5' down from 937.6' as shown in Figure 2.

Assumptions:

1. Removal of approximately 3' Deep x 10' Wide x 30' Length of existing concrete,
2. Dowel into existing concrete, and add 1' of new concrete (see quantities)

Questions and Uncertainties:

1. Is dewatering required?
2. Is there concrete repair required aside from the notch?

2.3 Drawdown Structure SW of Marsh Lake

Description:

A drawdown structure (see Figure 3) is required which would provide a top of water elevation between 935' and 940'.

Assumptions:

1. Stop logs will be used to achieve the elevation desired by the local sponsor
2. Soil conditions permit the use of a bearing foundation (no load bearing piles required)

3. Sheet piling extending six feet below the bottom of the footing at the head water to prevent seepage and scour
4. A concrete apron will be used down stream from the structure with sheet piling below to prevent erosion
5. Abutments will be assumed on either side of the drawdown structure to retain existing dam elevations on both sides
6. A 16’ wide concrete walkway will be assumed to span the entire 116’-6” length of the drawdown structure

Questions and Uncertainties:

1. Will walkway surface at (bottom @ 948.6’) cause a hydraulic concern during flood events?
2. Is dewatering required for construction?

2.4 Two Lane Bridge over Pomme Du Terre River

Description:

A vehicular bridge is required to cross the Pomme De Terre River. Two alternatives may be considered:

1. 5 span bridge with 46” deep precast concrete girders (plus an 8” deck)
2. 3 span bridge with 88” deep precast concrete girders (plus an 8” deck)

Assumptions:

1. 450’ Long x 32’ Wide, 2 vehicular lanes
2. The bridge will be supported on vertical concrete abutments
3. Unit cost of bridge: $150/sf

Questions and Uncertainties:

1. Deviations beyond assumptions may add to unit cost
2. Will additional concrete and/or riprap be required for hydraulic reasons?
3. Alternative 2 may require a raise in bridge deck height, and thus, sloped approaches

2.5 Pedestrian Bridge over Existing Spillway

Description:

A prefabricated pedestrian bridge crossing the existing spillway

Assumptions:

1. 120’ Long, Poured Concrete Deck, Weathering Steel, Design per AASHTO
2. 6’ Width ($64,000 per Continental Bridge, concrete deck not included)
3. 10’ Width ($85,000 per Continental Bridge, concrete deck not included)

Questions and Uncertainties:

1. Will repair work be required on the existing spillway structure to adequately support pedestrian bridge?

Table 1: Concrete Quantities

	Item	Quantity (yd^3)
2.1:	Culverts:	**322**
2.2:	Existing Spillway:	**10**
2.3a:	Drawdown (footing):	**685**
2.3b:	Drawdown (walls):	**333**
2.3c:	Drawdown (slab):	**70**
2.4:	2 Lane Bridge:	**90**
2.5:	Pedestrian Bridge:	*NA*
	Total:	**1,510**

Table 2: Excavation Quantities

	Item	Quantity (yd^3)
2.1:	Culverts:	**2,162**
2.2:	Existing Spillway:	*NA*
2.3:	Drawdown Structure:	**1,947**
2.4:	2 Lane Bridge:	*NA*
2.5:	Pedestrian Bridge:	*NA*
	Total:	**4,109**

Table 3: Sheetpiling

	Item	Area (ft^2)
2.1:	Culverts:	*NA*
2.2:	Existing Spillway:	*NA*
2.3:	Drawdown Structure:	**1,260**
2.4:	2 Lane Bridge:	*NA*
2.5:	Pedestrian Bridge:	*NA*
	Total:	**1,260**

Table 4: Aluminum Stop Logs

	Item	Weight (lb)
2.1:	Culverts:	**1,676**
2.2:	Existing Spillway:	*NA*
2.3:	Drawdown Structure:	**6,267**
2.4:	2 Lane Bridge:	*NA*
2.5:	Pedestrian Bridge:	*NA*

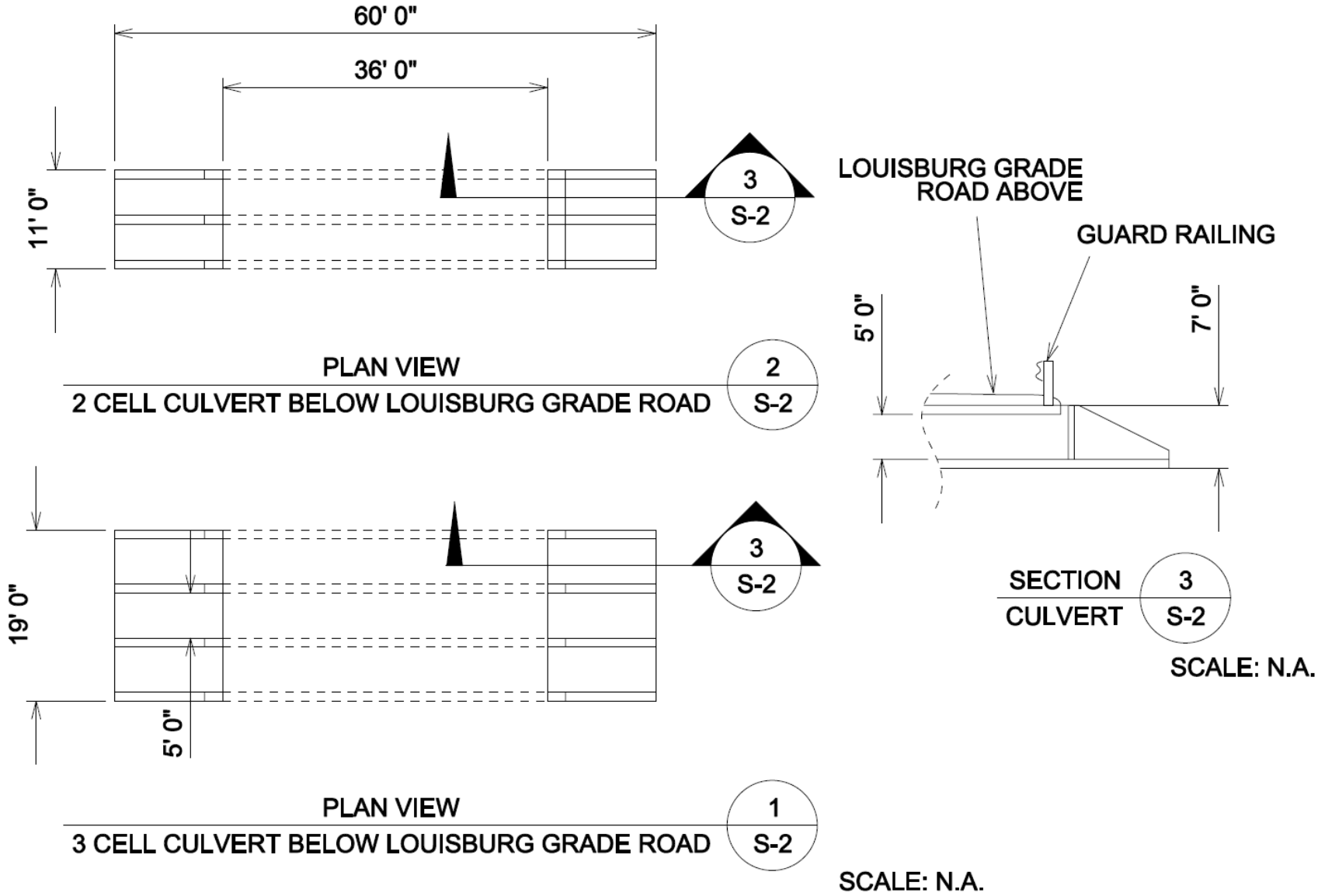


Figure 1: Culverts below Louisburg Grade Road

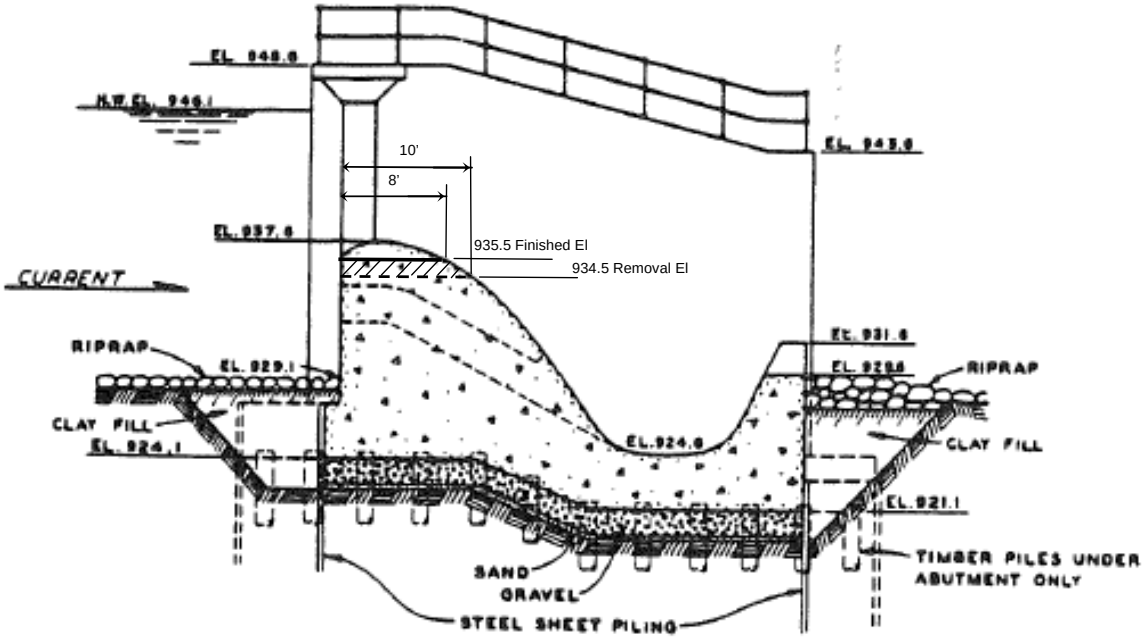


Figure 2: Concrete removal on existing spillway

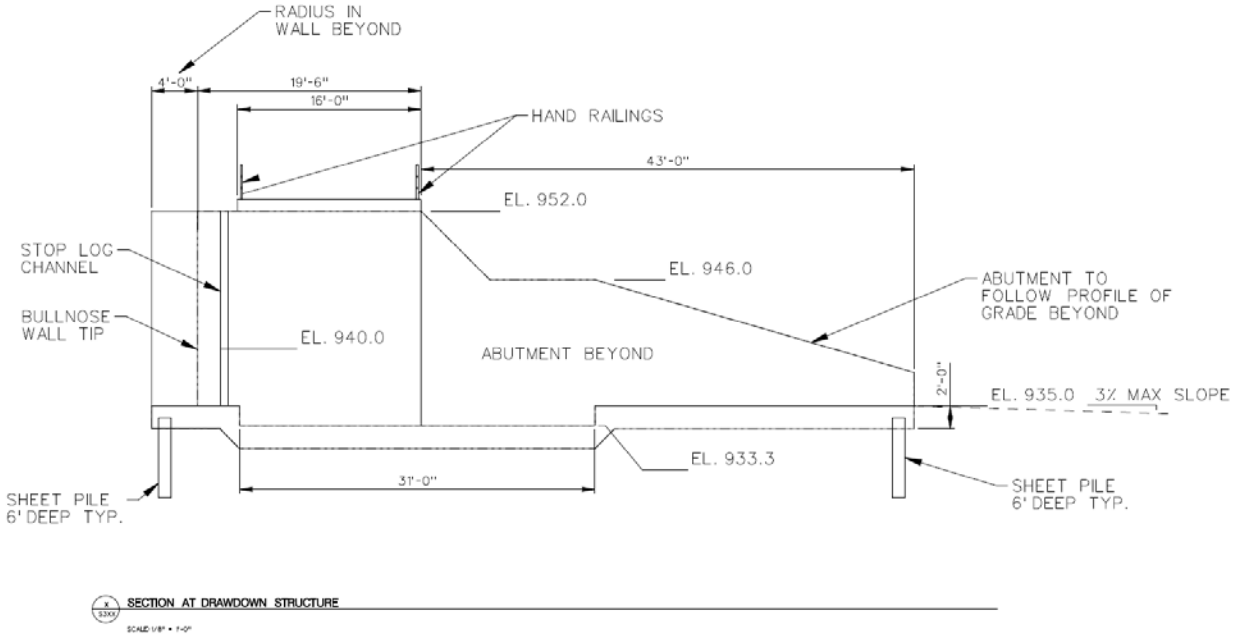


Figure 3: Drawdown Section Cut

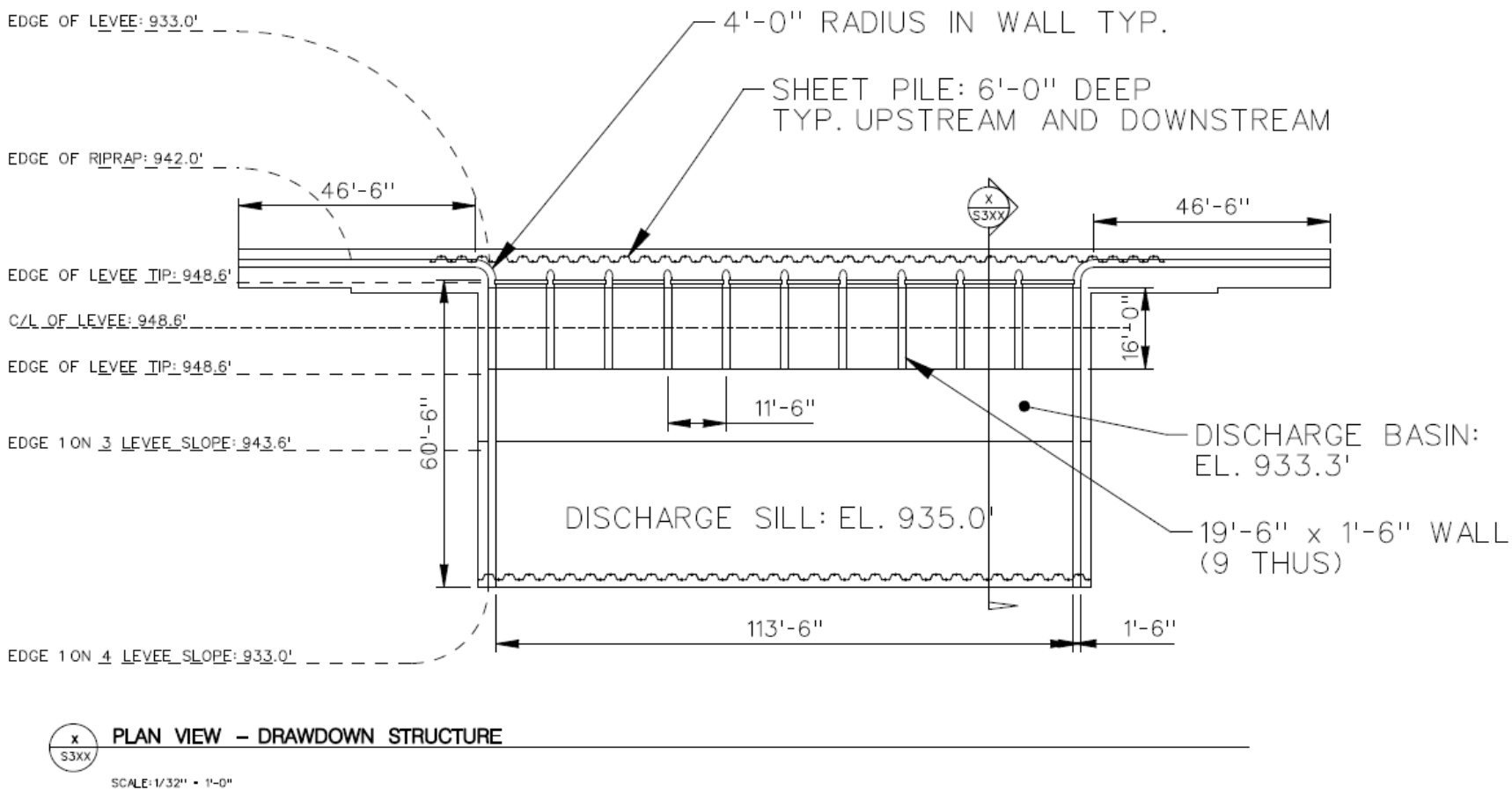


Figure 4: Drawdown Structure Plan View

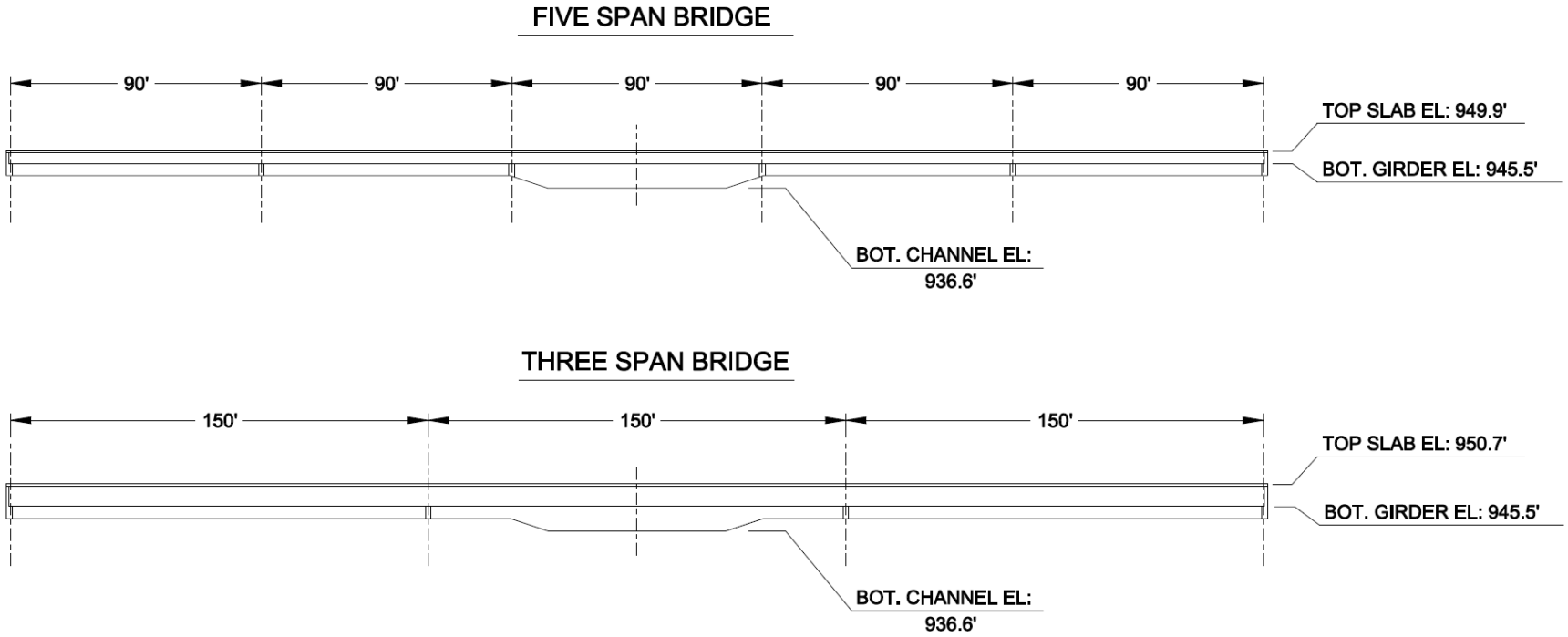


Figure 4: Bridge over Pomme De Terre River (2 alternatives)

Appendix L – Distribution List

Marsh Lake Mailing List

NEPA Coordination
May 2011

Federal

Mr. Kenneth Westlake (Separate Letter)
NEPA Implementation Section
USEPA REGION 5
77 West Jackson Boulevard
Mail Code: E-19J
Chicago, IL 60604-3507

Mr. Tony Sullins (Separate Letter)
Field Supervisor
Fish and Wildlife Service
Twin Cities Field Office
4101 East 80th Street
Bloomington, MN 55425-1665

cf: Alice Hanley, Manager
U.S. Fish and Wildlife Service
Big Stone National Wildlife Refuge
44843 County Road 19
Odessa, MN 56276

Tribes

Gabe Prescott
President
Tribal Council
Lower Sioux Indian Community
39527 Res. Highway 1
P.O. Box 308
Morton, MN 56270

Deb Dirlam
Office of the Environment Director
Lower Sioux Indian Community
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39527 Res Hwy 1
Morton, MN 56270

Robert Shepherd
Tribal Chairman
Sisseton-Wahpeton Oyate
P.O. Box 509
Agency Village, SD 57262

State

Mr. Steve Colvin (Separate Letter)
Environmental Review Section
Minnesota Department of Natural Resources
500 Lafayette Road-Box 10
St. Paul, Minnesota 55155-4010

Mr. Craig Affeldt (Separate Letter)
Municipal Division
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Ms Mary Ann Heidemann
Government Programs and Compliance Officer
State Historic Preservation Office
Minnesota Historical Society
345 Kellogg Boulevard West
St. Paul, MN 55102-1906

Local

Dawn Hegeland
Upper Minnesota Valley RDC
323 West Schlieman Ave.
Appleton, MN 56208

Big Stone County Board
20 SE 2nd Street
Ortonville, MN 56278

Lac qui Parle County Board
600 – 6th Street
Madison, MN 56256

Swift County Board
301 North 14th Street
Benson, MN 56215

Chippewa County Board
629 North 11th Street
Montevideo, MN 56265

Montevideo VCB/Chamber of Commerce
202 North 1st Street
Montevideo, MN 56265

Madison VCB/Chamber of Commerce
404 – 6th Avenue
Madison, MN 56256

Ortonville VCB/Chamber of Commerce
987 U.S. Highway 12
Ortonville, MN 56278

Western MN Prairie Waters
323 West Schlieman Ave.
Appleton, MN 56208

Randy Nelson
Prairie Country RC&D
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Willmar, MN 56201-2667

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Granite Falls, MN 56241

City of Montevideo
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Montevideo, MN 56265

City of Milan
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Ortonville, MN 56278

Krecia Leddy, District Conservationist
Natural Resources Conservation Service
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Minnesota Department of Natural Resources
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Commissioner Tom Landwehr
Minnesota Department of Natural Resources
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Dan Enke
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Appleton, MN 56208

Dr. William E. Faber
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NGOs

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Ryan Heidiger
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Lakeville, MN 55044

Josh Kavanagh
Biologist
Ducks Unlimited
7729 158th Ave NE
Spicer, MN 56288

Trudy Hastad
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Russ Borstad
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New London, MN 56273

Mark Martell
Director of Bird Conservation
Audubon
2357 Ventura Drive Suite 106
St. Paul, MN 55125

Michael Pressman
Director of Protection
The Nature Conservancy in Minnesota
1101 West River Parkway, Suite 200
Minneapolis, MN 55415-1291

Curt Leitz
Minnesota Division
Izaak Walton League of America
161 St. Anthony Ave., Ste. 910
St. Paul, MN 55103

Appendix M – Real Estate Plan

PRELIMINARY REAL ESTATE PLAN
MARSH LAKE ECOSYSTEM RESTORATION PROJECT

22 November, 2010

1. General Description: This Real Estate Plan is part of the draft Feasibility Report for the Marsh Lake Ecosystem Restoration Project. Marsh Lake is a shallow 5,000 acre reservoir with an average depth of approximately 3 feet. Marsh Lake is located in Big Stone County, approximately 4 miles west of Appleton, Minnesota. The Marsh Lake Dam has a fixed crest elevation and was built as a Works Progress Administration project sponsored by the State of Minnesota and was completed in 1938. The dam increased lake-like fish and wildlife habitat and created new colonial water bird habitat, but it also disrupted natural flood plain functions and blocked fish movement. The lack of natural flooding and drying cycles combined with increased sedimentation in the reservoir have caused a decline in plant diversity, water quality and associated fish and wildlife benefits over the years since the dam was built.

2. PROJECT AUTHORIZATION: Authorization was recommended in the December 2004 Minnesota River Reconnaissance study (approved January 13, 2005) and is authorized by a May 10, 1962 resolution of the House Committee on Public Works. Federal (Corps of Engineers) interest in Marsh Lake is based on the potential benefits of aquatic ecosystem restoration and the fact that the existing Marsh Lake Dam is owned and operated by the Corps of Engineers.

3. PROJECT DESCRIPTION: To restore aquatic and riparian habitat in Marsh Lake and restore connectivity between Lac qui Parle and the Pomme de Terre River. The major features include modifying the Marsh Lake Dam to allow for periodic drawdown, fish passage and more natural variation in water surface; returning the Pomme de Terre River to its pre-dam alignment; installation of rock island structures to reduce sediment resuspension within the lake; and developing a management plan to define how the new features would be used.

4. NON-FEDERAL SPONSOR-OWNED LER: The Minnesota Department of Natural Resources (DNR) is sponsoring the study. The DNR also has fee title to the entire lake area northwest of the dam and southeast of Corps fee title land in and around the dam. The State of Minnesota received LERRDs credits at the initial construction of the dam and surrounding area in 1938. DNR has agreed there will be no new lands for LERRDs crediting provided for this project.

5. ESTATES: The Minnesota Department of Natural Resources and U.S. Army Corps of Engineers own all necessary land in fee title required for the project.

6. EXISTING FEDERAL PROJECT: The lands required for this project are within the La Qui Parle Reservoir on the Minnesota River, Watson, Minnesota.

7. FEDERALLY-OWNED LANDS: All necessary LER required for this project are federal or state-owned lands.

8. NAVIGATIONAL SERVITUDE: The proposed work is not within the navigational servitude.

9. MAPS: Maps for reference are in the Appendix N, Plates.

10. INDUCED FLOODING: There will be no induced flooding as a result of the project

11. BASELINE COST ESTIMATE: The preliminary estimated value of the lands and damages for the project (including contingencies) are summarized below:

	Federal	Non-Federal	Total
Lands/damages	$0	$0	$ 0
RE Admin Costs	$10,000	$0	$ 10,000
Contingencies	$0	$0	$ 0
Total	$10,000	$0	$ 10,000
		Rounded	$ 10,000

The project is restoration in nature for lands that were previously provided with LERRDs credits in 1938. The only additional lands that may be necessary are from a potential 5.7 barrow site which will be restored to present condition at the completion of the project. The lands in and around this project are all low lying swamp ground with a value of $500.00 per acre. The difference in amount of land needed for the differing alternatives is insignificant for valuation purposes since each alternative is relatively the same amount of land.

Real Estate administrative costs include: realty specialist time, supervisory time, file openings, document review, document preparation to include the REP, data input, correspondence, meeting attendance and filing.

12. PUBLIC LAW 91-646 RESIDENCE/BUSINESS RELOCATIONS: No residential or business relocations are anticipated.

13. MINERAL ACTIVITY: No present or anticipated mineral activity is within the proposed project.

14. SPONSOR ASSESSMENT: An assessment was completed on the Sponsor. The Minnesota Department of Natural Resources has legal authority to acquire and hold title to real property for project purposes and has the power of eminent domain for this project.

15. ZONING: No application or enactment of zoning ordinances will be used for the proposed project.

16. ACQUISITION SCHEDULE: All lands necessary for this project are owned by either the Minnesota Department of Natural Resources or the U.S. Army Corps of Engineers.

17. FACILITY/UTILITY RELOCATIONS: No facility/utility relocations are required as part of the project.

18. ENVIRONMENTAL CLEARANCE: An environmental assessment will be prepared concurrently with the Feasibility Report. The Phase 1 HTRW report will be completed early in the design phase.

19. LANDOWNERS: The U.S. Army Corps of Engineers and the Minnesota Department of Natural Resources are both in favor of this project.

20. NON-FEDERAL SPONSOR NOTIFICATION: The Non-Federal Sponsor has been notified of the risk of acquiring LER prior to the execution of a Project Cooperation Agreement with the U.S. Army Corps of Engineers.

22 NOV 2010

Rodney Peterson
Realty Specialist
St. Paul District, COE

Appendix N - Plates

LOUISBURG GRADE ROAD CULVERTS

NEW EMBANKMENT B

NEW EMBANKMENT A, DIVERSION PULG & BRIDGE OVER POMME DE TERRE RIVER

POMME DE TERRE RIVER REALIGNMENT

FISH WAY & DRAWDOWN STRUCTURE

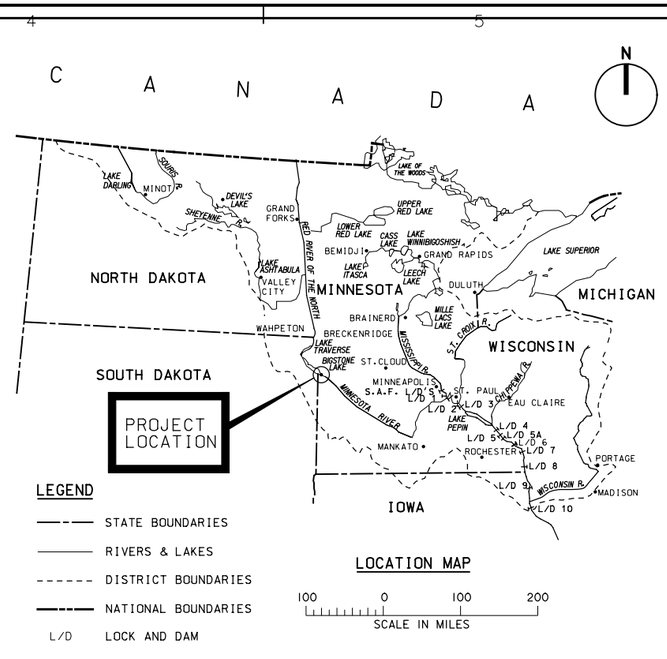
FISH POND LEVEE BREACH

MARSH LAKE DAM

VICINITY MAP

1200 0 1200 2400

SCALE IN FEET



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NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION COVER SHEET, LOCATION & VICINITY MAP

Sheet reference number:
G-001

Sheet 1 of 32

FEASIBILITY STUDY DRAWING INDEX

DRAWING NO.	SHEET REF.	DESCRIPTION	PRODUCT I.D.
		COVER SHEET	
DWG. NO. 1	G-001	COVER SHT - LOCATION, VICINITY MAP	MSHLKD01G001000G_001000.PDF
		INDEX DRAWINGS (CONTRACT AND REFERENCE DRAWINGS)	
DWG. NO. 2	G-002	DRAWING INDEX & LEGEND	MSHLKD01G002000G-002000.PDF
		CIVIL/SITE DRAWINGS	
DWG. NO. 3	C-001	GENERAL PLAN	MSHLKD05C001000C-103000.PDF
DWG. NO. 4	C-002	PLAN & PROF - FISH POND LEVEE BREACH, STA 0+75 TO 1+77	MSHLKD05C002000C-104000.PDF
DWG. NO. 5	C-003	PLAN - CHANNEL, STA 0+00 TO 10+60, FISHWAY, DRAWDOWN STRUC	MSHLKD05C003000C-105000.PDF
DWG. NO. 6	C-004	PLAN - CHANNEL, STA 10+60 TO 43+00	MSHLKD05C004000C-106000.PDF
DWG. NO. 7	C-005	PLAN - CHANNEL, STA 40+00 TO 61+60	MSHLKD05C005000C-107000.PDF
DWG. NO. 8	C-006	PLAN - CHANNEL, STA 61+60 TO 77+00	MSHLKD05C006000C-108000.PDF
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DWG. NO. 10	C-008	PLAN - CHANNEL, 94+00 TO C 113+90, DIVERSION PLUG 0+00 TO 5+39	MSHLKD05C006200C-108002.PDF
DWG. NO. 11	C-009	PLAN & PROF - NEW EMBANKMENT B, STA 0+00 TO 8+17	MSHLKD05C006300C-108003.PDF
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DWG. NO. 13	C-011	NOT USED	
DWG. NO. 14	C-012	NOT USED	
DWG. NO. 15	C-013	NOT USED	
DWG. NO. 16	C-014	NOT USED	
DWG. NO. 17	C-015	NOT USED	
DWG. NO. 18	C-016	PLAN - LOUISBURG ROAD CULVERT A	MSHLKD05C007000C-108010.PDF
DWG. NO. 19	C-017	PLAN - LOUISBURG ROAD CULVERT B	MSHLKD05C007100C-108011.PDF
DWG. NO. 20	C-018	PLAN - LOUISBURG ROAD CULVERT C	MSHLKD05C007200C-108012.PDF
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DWG. NO. 31	C-029	PROFILE - DRAWDOWN CHANNEL, SECTION 13	MSHLKD05C020600C-122006.PDF
DWG. NO. 32	C-030	PROFILE - LEFT, MIDDLE, & RIGHT CONTAINMENT LEVEE	MSHLKD05C020700C-122007.PDF

GENERAL CROSS-REFERENCING SYMBOLS

DETAIL/SECTION
SUPPLEMENTAL INFORMATION
SCALE:

A — SECTION/DETAIL TITLE ON SAME DRAWING (CENTERED UNDER SECTION/DETAIL)

DETAIL/SECTION
SCALE:

2 / 99/999 — SECTION/DETAIL TITLE ON ANOTHER DRAWING (CENTERED UNDER SECTION/DETAIL)

TOP FRONT SIDE
ELEVATION SECTION

VIEW SUBTITLE (CENTERED UNDER EACH VIEW)

2 — SECTION CUT W/ VIEW SHOWN ON SAME DRAWING

2 / 99/999 — SECTION CUT W/ VIEW SHOWN ON ANOTHER DRAWING

A — DETAIL SYMBOL W/ VIEW SHOWN ON SAME DRAWING

A / 99/999 — DETAIL SYMBOL W/ VIEW SHOWN ON ANOTHER DRAWING

ABBREVIATIONS

* UNLESS OTHERWISE NOTED ON EACH SHEET

APPROX	APPROXIMATE	HT	HEIGHT
ALT W/	ALTERNATE WITH	IF	INSIDE FACE
ALUM	ALUMINUM	LG	LONG
BITUM	BITUMINOUS	L/W	LANDWARD
BOT	BOTTOM	MAX	MAXIMUM
C/L	CENTER LINE	MIN	MINIMUM
C&G	CURB & GUTTER	MIRR	MIRRORED
CLR	CLEAR	MISC	MISCELLANEOUS
CJ	CONSTRUCTION JOINT	NF	NEAR FACE
CMP	CORRUGATED METAL PIPE	NO	NUMBER
CONC	CONCRETE	OF	OUTSIDE FACE
		OC	ON CENTER
DIA	DIAMETER	R/W	RIVERWARD
DWG	DRAWING	SAN	SANITARY
EF	EACH FACE	SPEC	SPECIFICATIONS
EJ	EXPANSION JOINT	SST	STAINLESS STEEL
EL	ELEVATION	T&B	TOP AND BOTTOM
EW	EACH WAY	TYP	TYPICAL
EXIST	EXISTING	UNO	UNLESS NOTED OTHERWISE
FF	FAR FACE	UGND	UNDERGROUND
FES	FLARED END SECTION	W	WIDTH
GALV	GALVANIZED	WM	WATER MAIN

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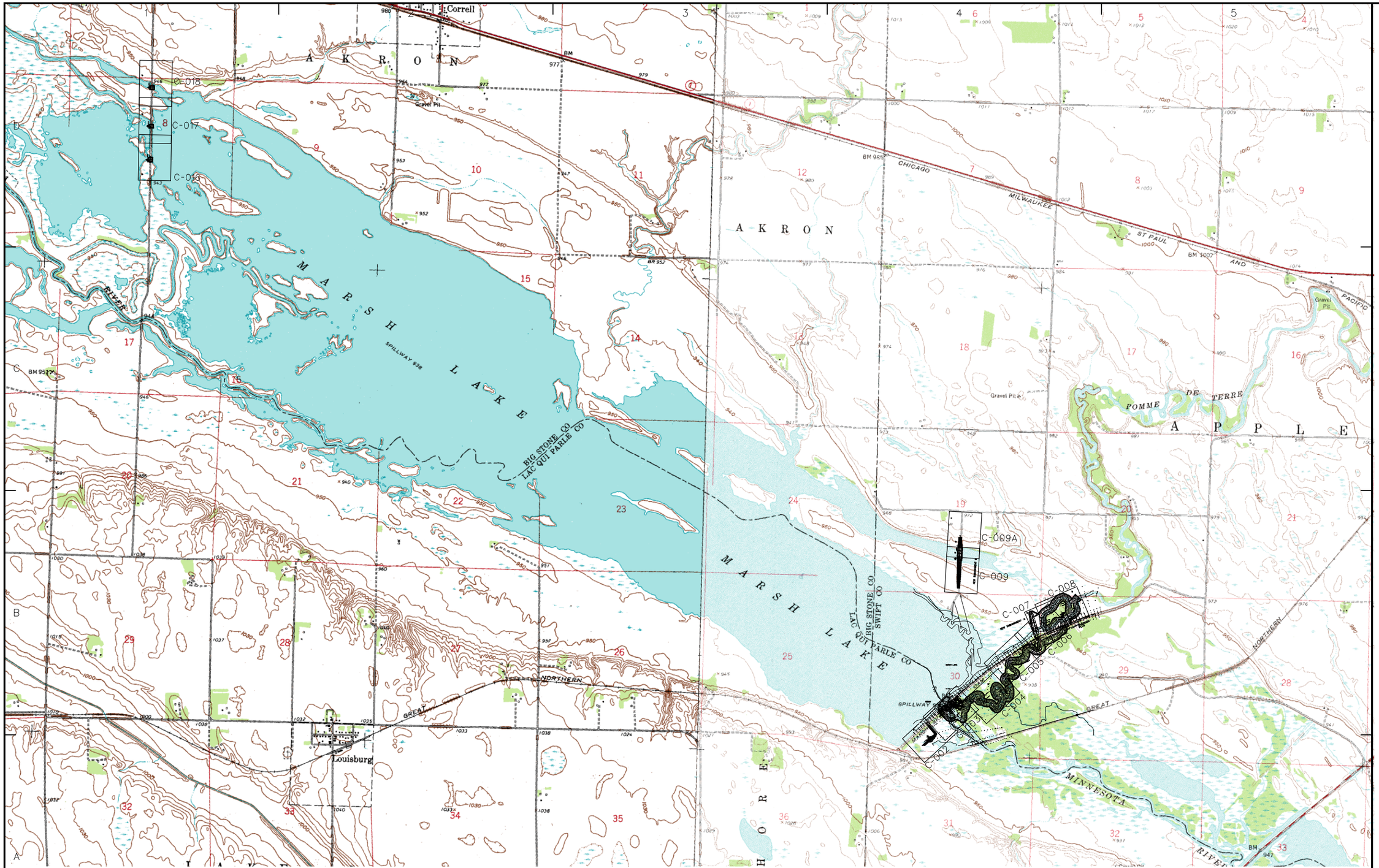
FEASIBILITY STUDY
MARSH LAKE ADAPTIVE ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
DRAWING INDEX & LEGEND

Sheet reference number:
G-002
Sheet 2 of 32



GENERAL PLAN

MARSH LAKE DAM

1500 0 1500 3000

SCALE IN FEET

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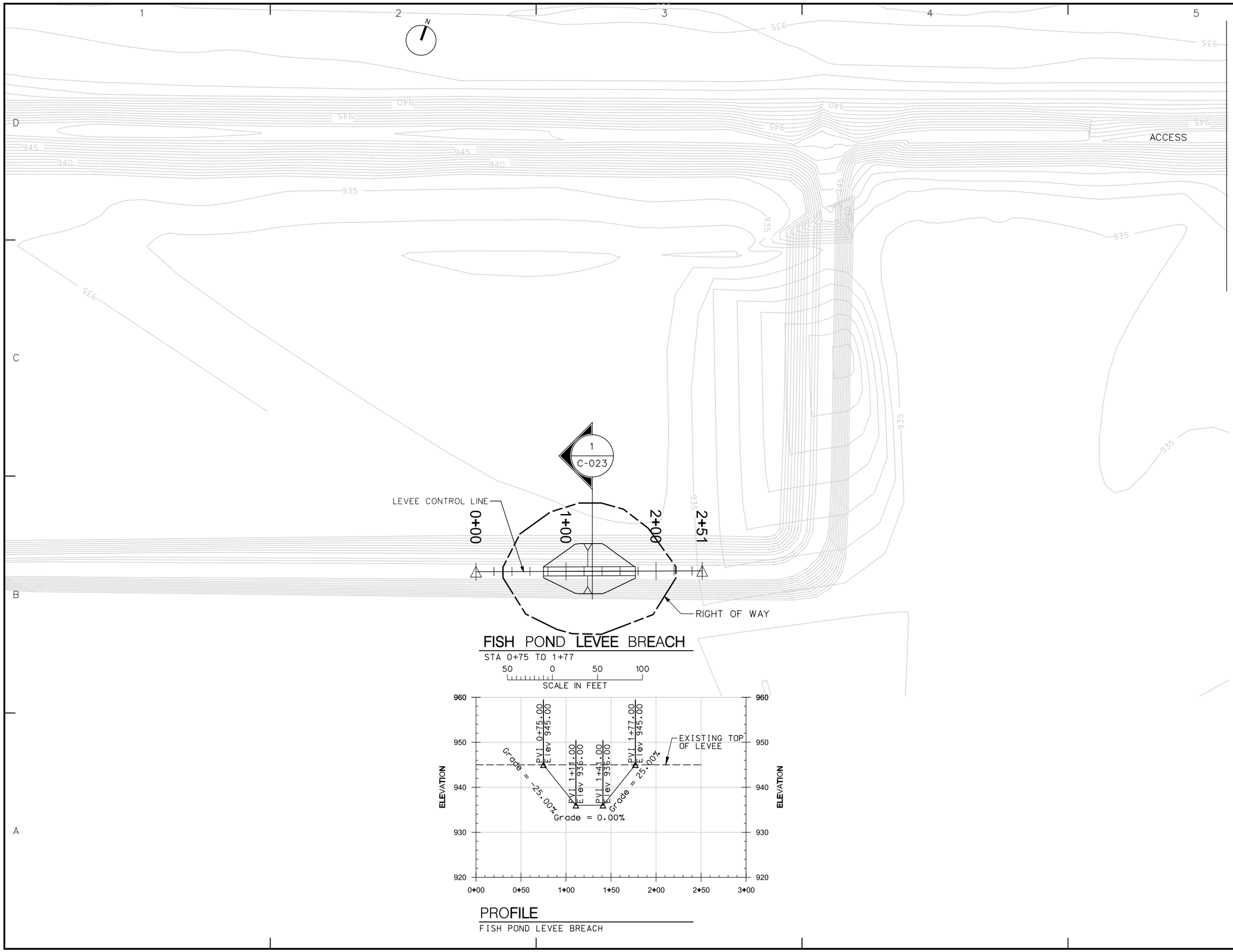
FEASIBILITY STUDY
MARSH LAKE ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
GENERAL PLAN

Sheet reference number:
C-001
Sheet 3 of 32



FISH POND LEVEE BREACH

STA 0+75 TO 1+77

50 0 50 100

SCALE IN FEET

PROFILE

FISH POND LEVEE BREACH

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FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN & PROFILE - FISH POND
LEVEE BREACH STA 0+75 TO 1+77

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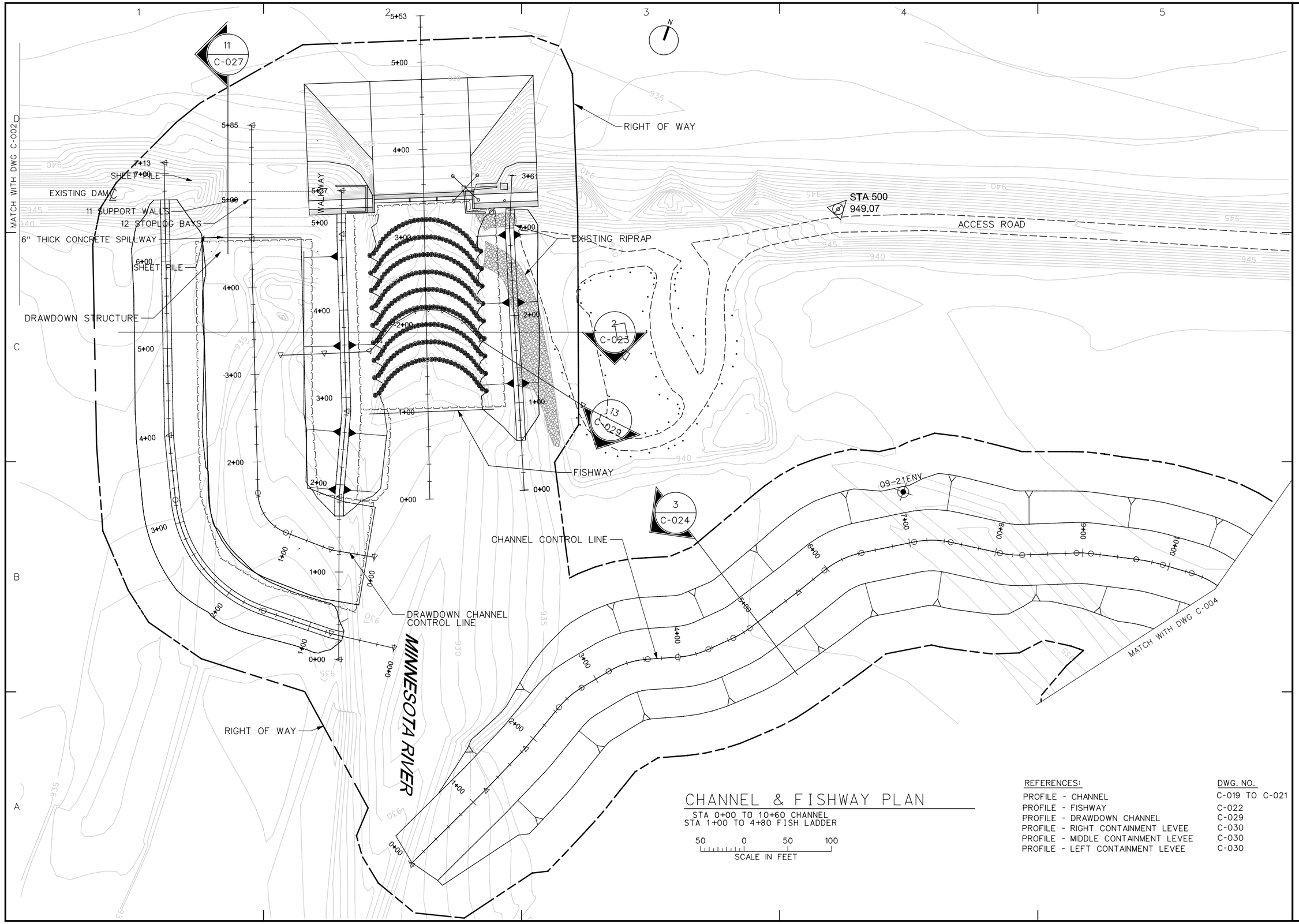

CHANNEL & FISHWAY PLAN

STA 0+00 TO 10+60 CHANNEL
STA 1+00 TO 4+80 FISH LADDER

50 0 50 100
SCALE IN FEET

REFERENCES:	DWG. NO.
PROFILE - CHANNEL	C-019 TO C-021
PROFILE - FISHWAY	C-022
PROFILE - DRAWDOWN CHANNEL	C-029
PROFILE - RIGHT CONTAINMENT LEVEE	C-030
PROFILE - MIDDLE CONTAINMENT LEVEE	C-030
PROFILE - LEFT CONTAINMENT LEVEE	C-030

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Vertical Coordinate System:
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Authority:
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FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN - CHANNEL STA 0+00 TO 10+60,
FISHWAY, DRAWDOWN STRUCTURE

Sheet reference number:
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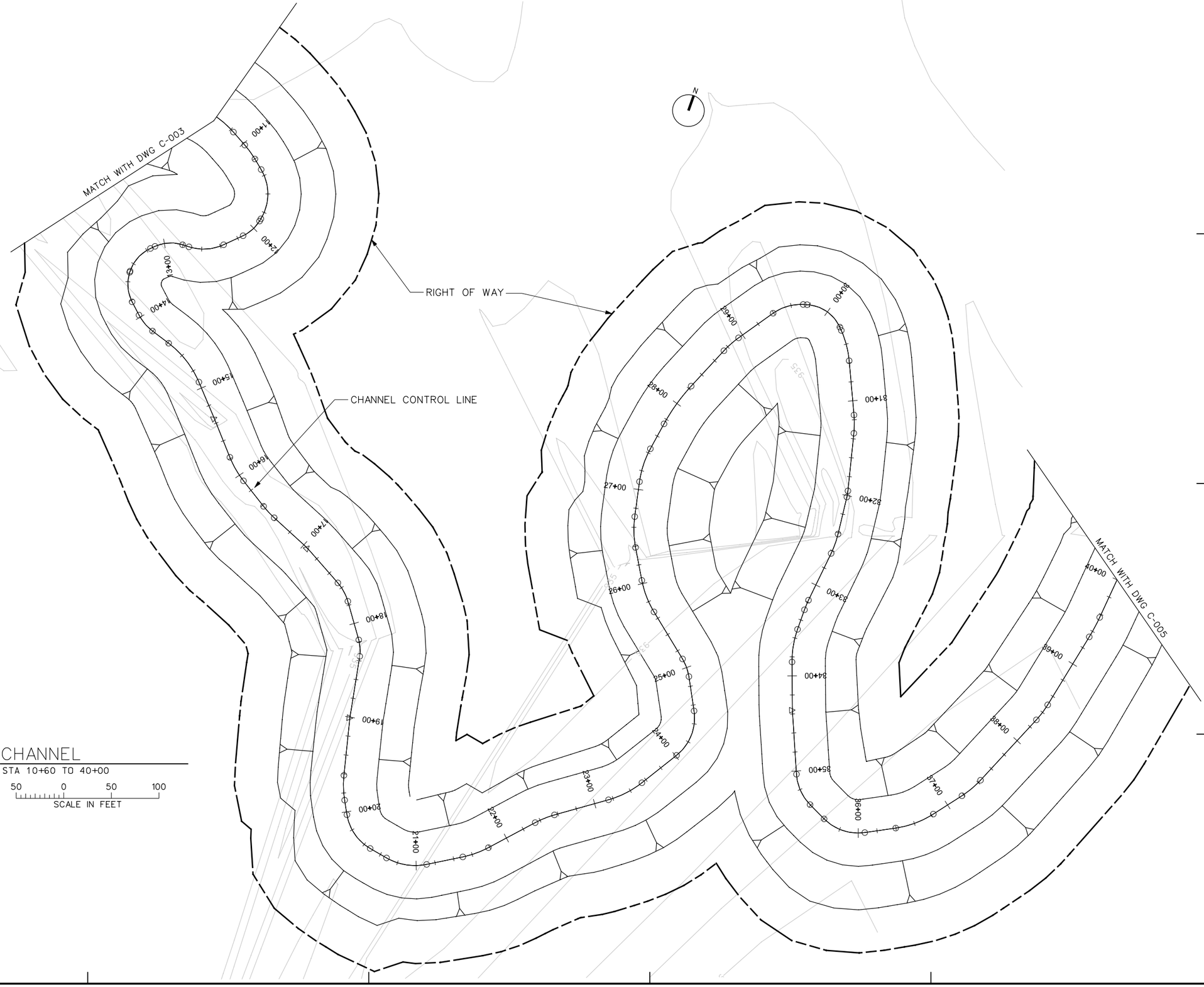

CHANNEL

STA 10+60 TO 40+00

50 0 50 100

SCALE IN FEET

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FEASIBILITY STUDY
MARSH LAKE ADDITIONAL ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION PLAN - CHANNEL STA 10+60 TO 40+00

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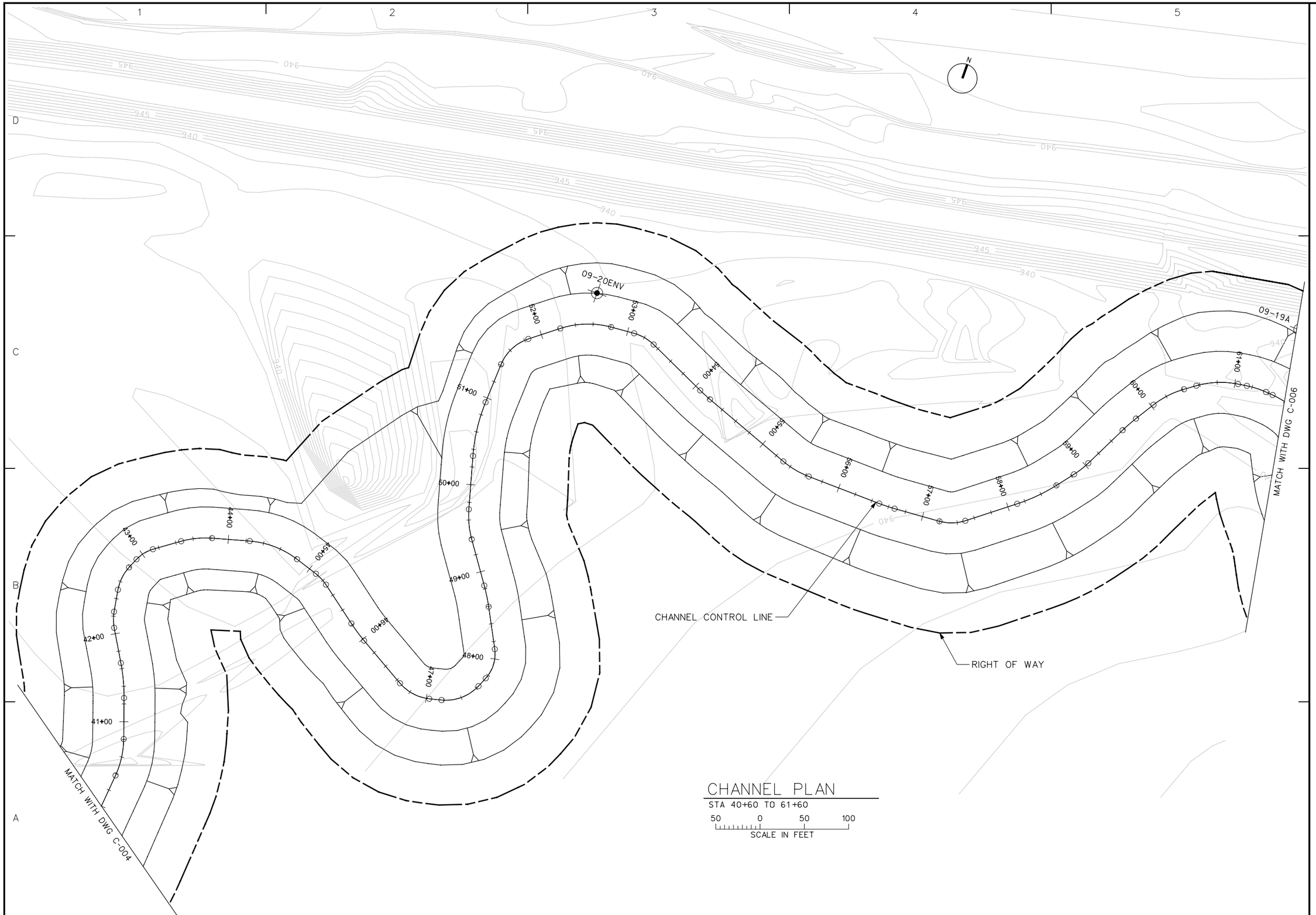

CHANNEL PLAN

STA 40+60 TO 61+60

50 0 50 100

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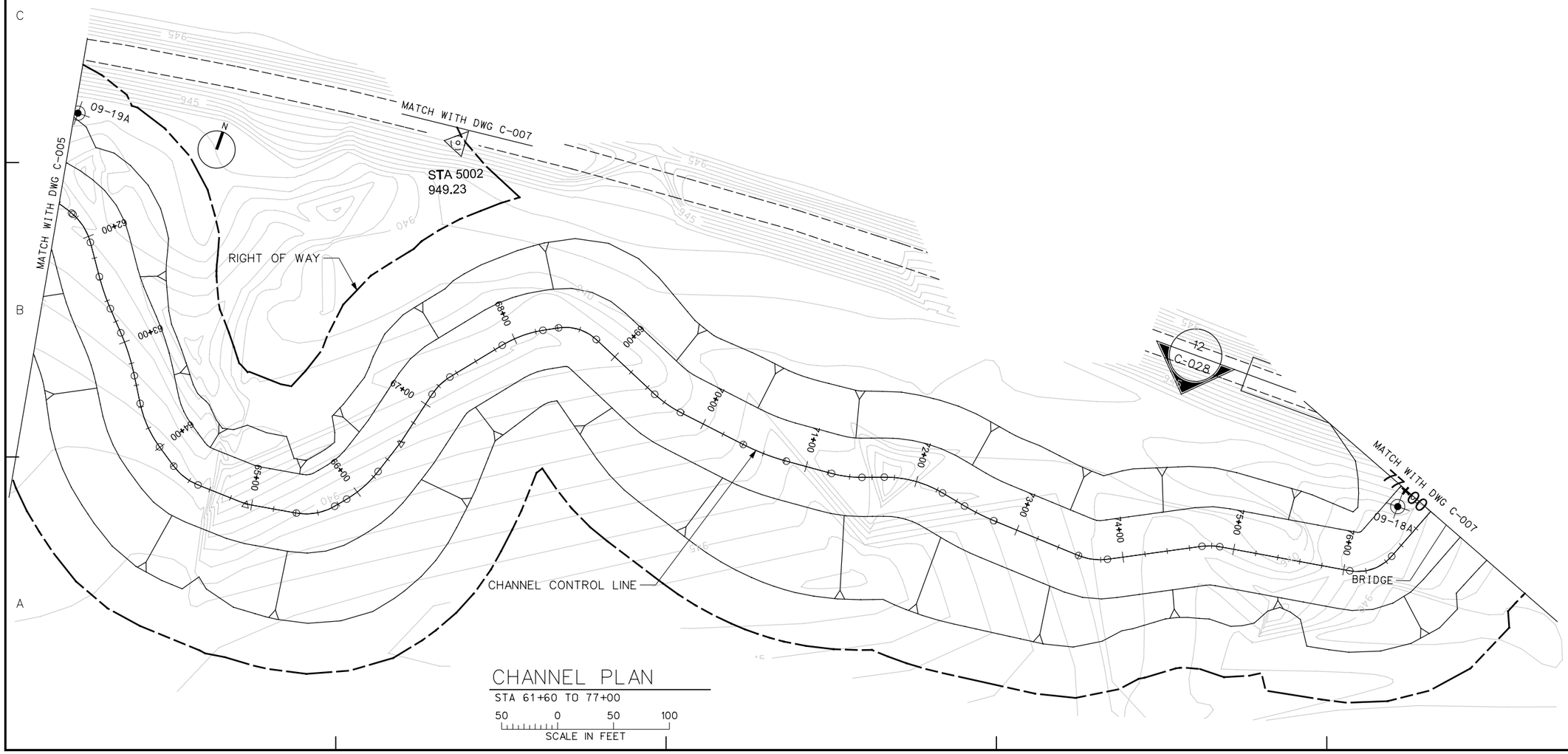
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN - CHANNEL
STA 40+00 TO 61+60

Sheet reference number:
C-005



CHANNEL PLAN

STA 61+60 TO 77+00

50 0 50 100

SCALE IN FEET

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FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION PLAN - CHANNEL STA 61+60 TO 77+00

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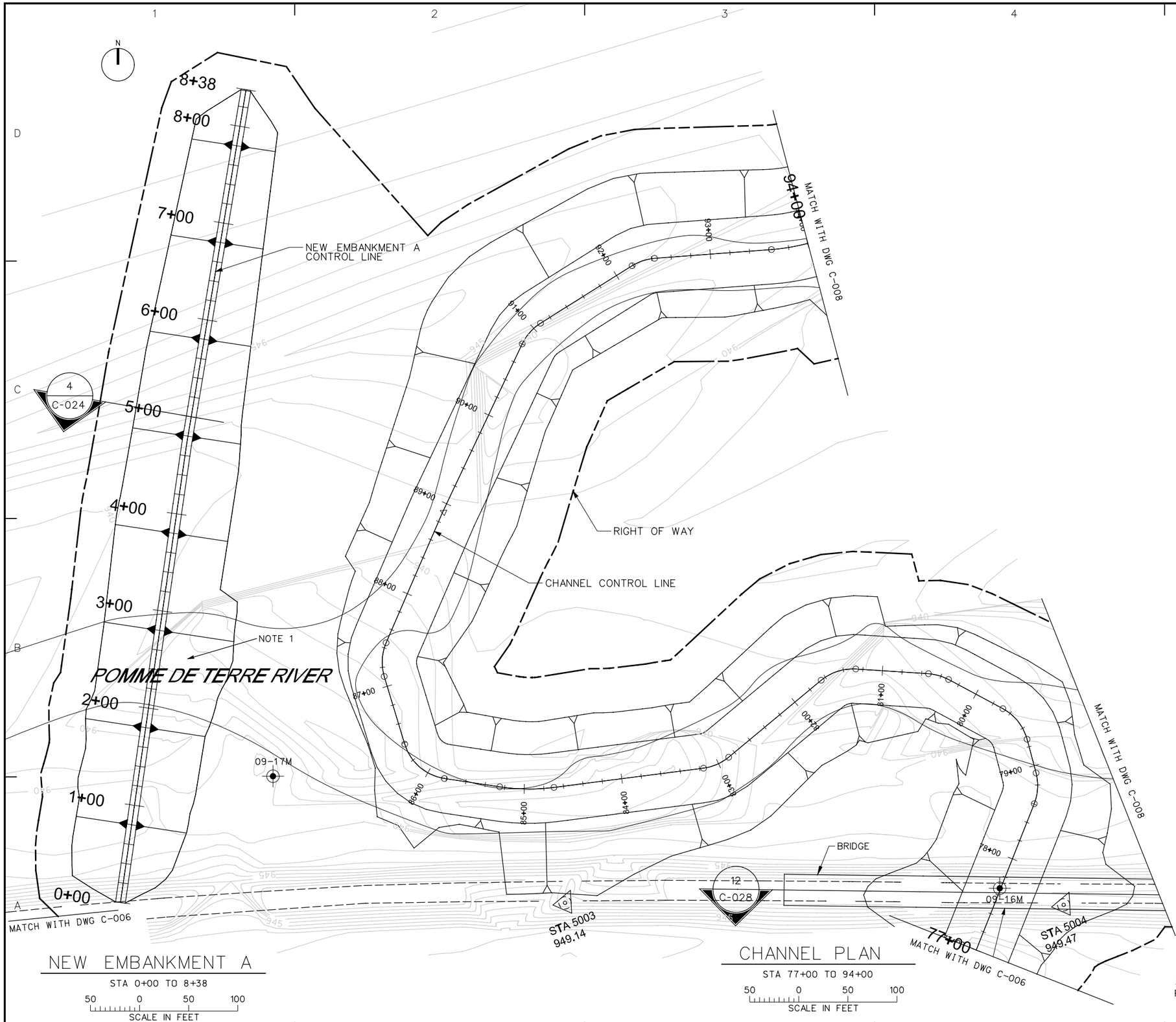

NEW EMBANKMENT A

STA 0+00 TO 8+38

50 0 50 100

SCALE IN FEET

CHANNEL PLAN

STA 77+00 TO 94+00

50 0 50 100

SCALE IN FEET

NOTES:

1. FOR PORTION OF NEW EMBANKMENT A IN RIVER, DEWATER AND COMPACT FILL.

REFERENCES:

	DWG. NO.
PROFILE - NEW EMBANKMENT A	C-022

US Army Corps of Engineers
St. Paul District

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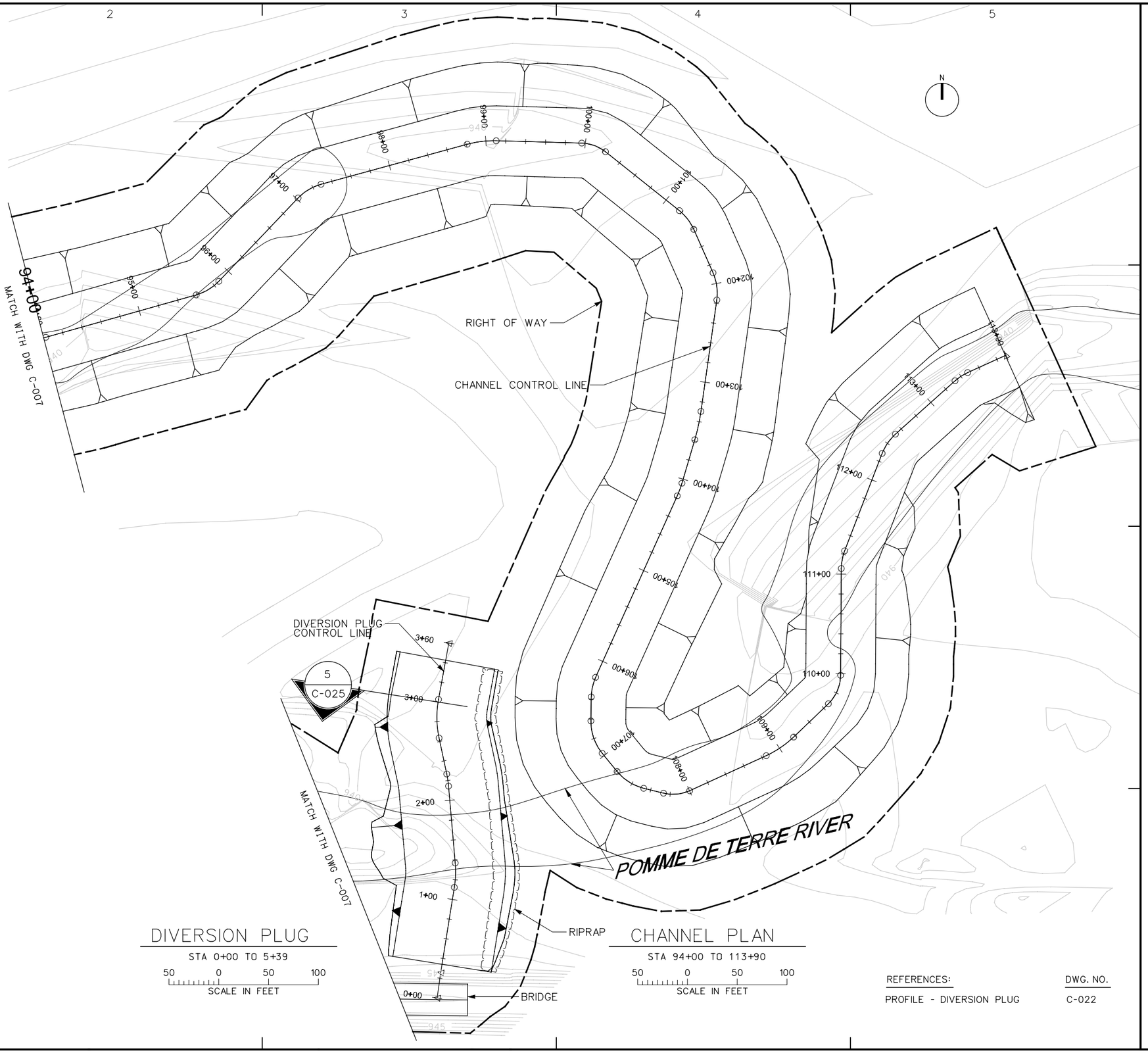
FEASIBILITY STUDY
MARSH LAKE ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN-CHANNEL STA 77+00 TO 94+00
NEW EMBANK A-STA 0+00 TO 8+38

Sheet reference number:
C-007
Sheet 9 of 32



DIVERSION PLUG

STA 0+00 TO 5+39

50 0 50 100

SCALE IN FEET

CHANNEL PLAN

STA 94+00 TO 113+90

50 0 50 100

SCALE IN FEET

REFERENCES:

PROFILE - DIVERSION PLUG

DWG. NO.

C-022

US Army Corps of Engineers
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Rev. XX

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN-CHANNEL STA 94+00 TO 113+90
DIVERSION PLUG-STA 0+00 TO 5+39

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MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
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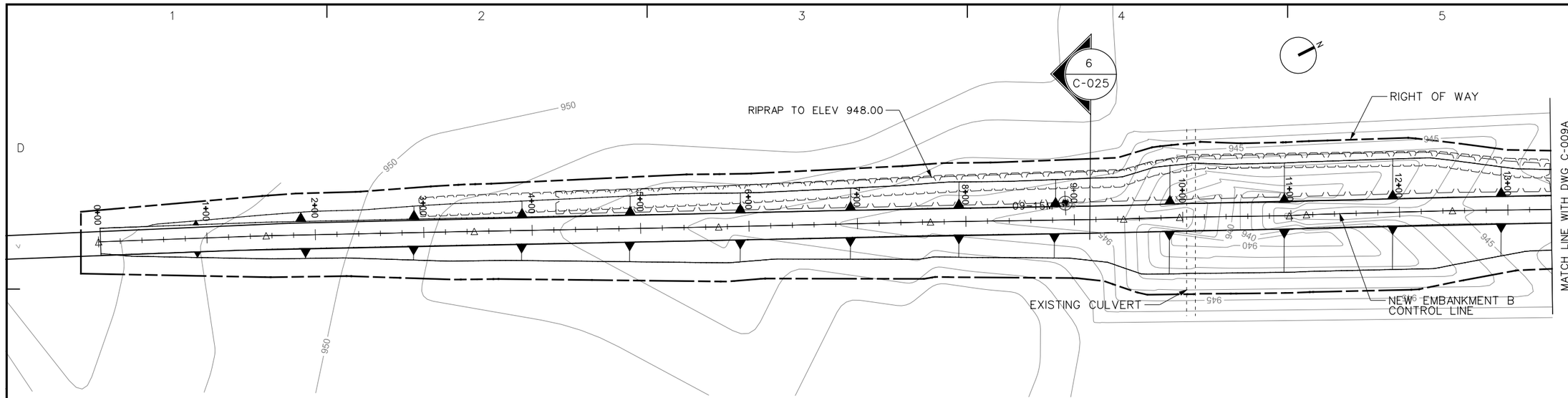
C-008

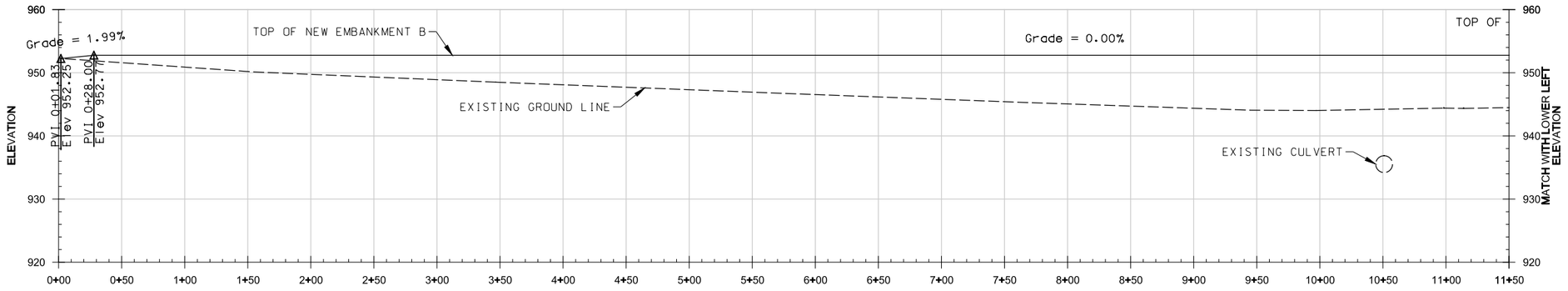


PLAN - NEW EMBANKMENT B

STA 1+28.55 TO 15+25.68

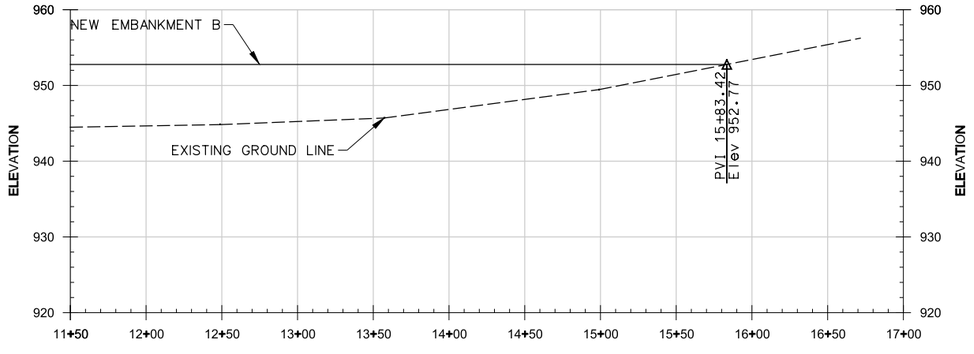
50 0 50 100

SCALE IN FEET



PROFILE - NEW EMBANKMENT B

STA 1+28.55 TO 15+25.68



PROFILE - NEW EMBANKMENT B

STA 1+28.55 TO 15+25.68

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

Date: APR 2011
Rev. XX
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Designed by: DMT/CPL
Drawn by: DMT
Ckd by: JBM
Authority: GI
File Name: WSHLKD05C0063000C-108003.DGN
Plot Date:
Plot Scale: 1=100'

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

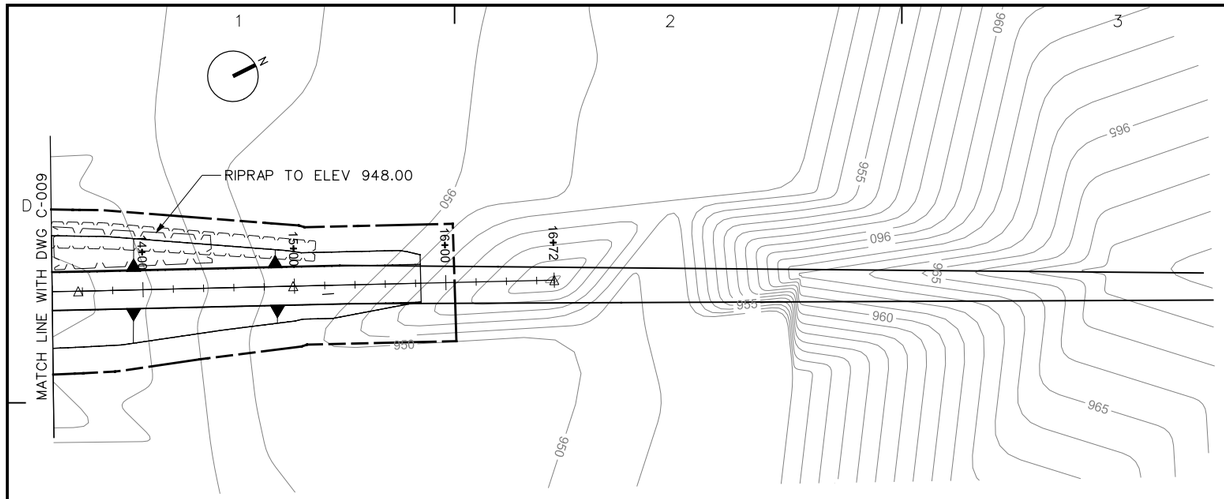
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ.)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN & PROFILE - NEW EMBANK B
STA 0+00 TO 13+40

Sheet reference number:
C-009

Sheet 11 of 32



PLAN - NEW EMBANKMENT B

STA 13+40 TO 15+85

50 0 50 100

SCALE IN FEET

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

Date: APR 2011		Rev. XX
Designed by: DMT/CRL		
Dwn by: DMT	Ckd by: dBM	Solicitation No.: DACW37-YR-B-0000
Authority: G1		Drawing Number:
File Name: M:\SHL\KD05C0063\00C-10800034.DGN		
Plot Scale: 1"=100'		Plot Date:

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

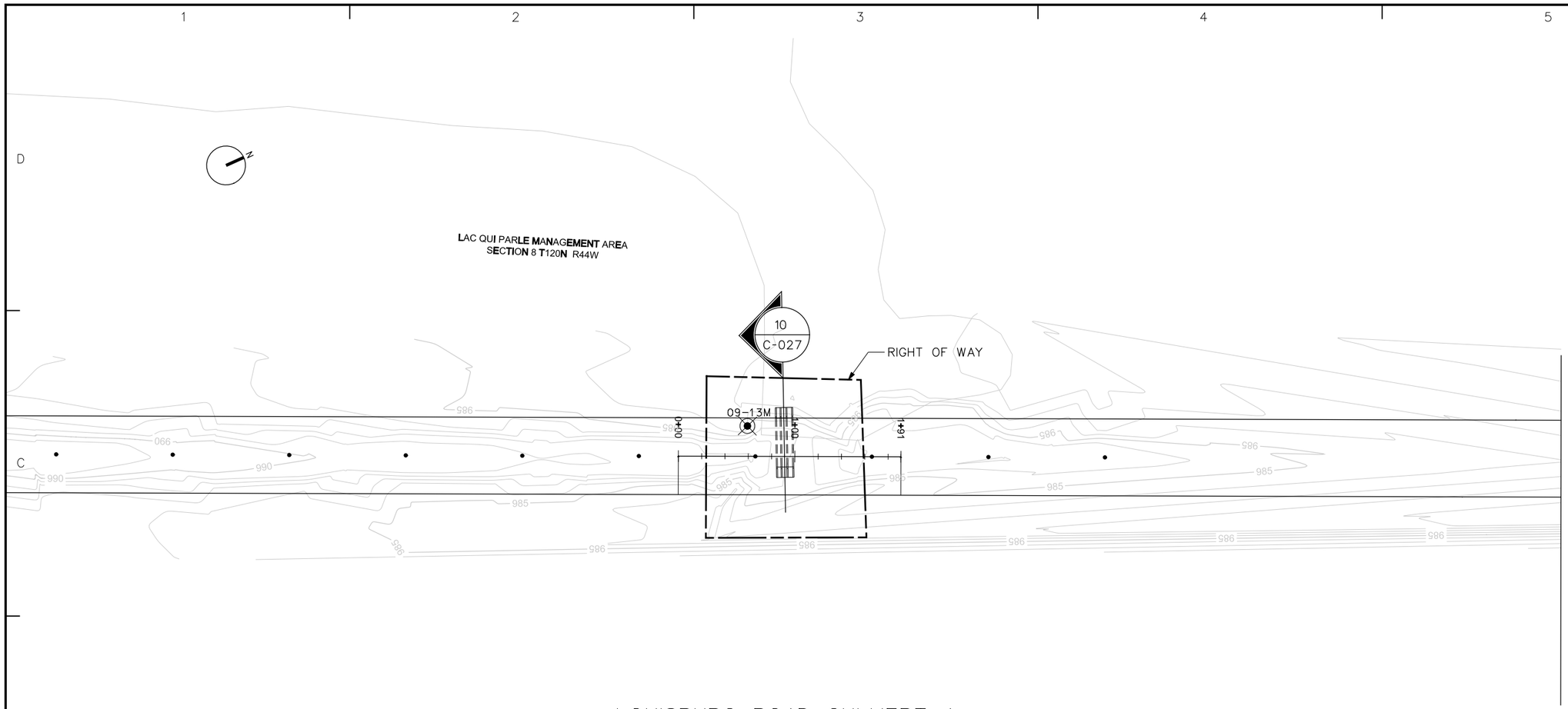
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ.)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN & PROFILE - NEW EMBANK B
STA 13+40 TO 15+85.0

Sheet reference number:
C-009A

Sheet 11A of 32



LOUISBURG ROAD CULVERT A

N.A.

50 0 50 100

SCALE IN FEET

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL		Date: APR 2011	Rev. XX
Dwn by: DMT	Ckd by: JBM	Solicitation No.: DACW37-YR-B-0000	
Authority: G1		Drawing Number:	
File Name=MSHLK005C0070000C-108010.DGN			Plot Date:
Plot Scale=1.100'			

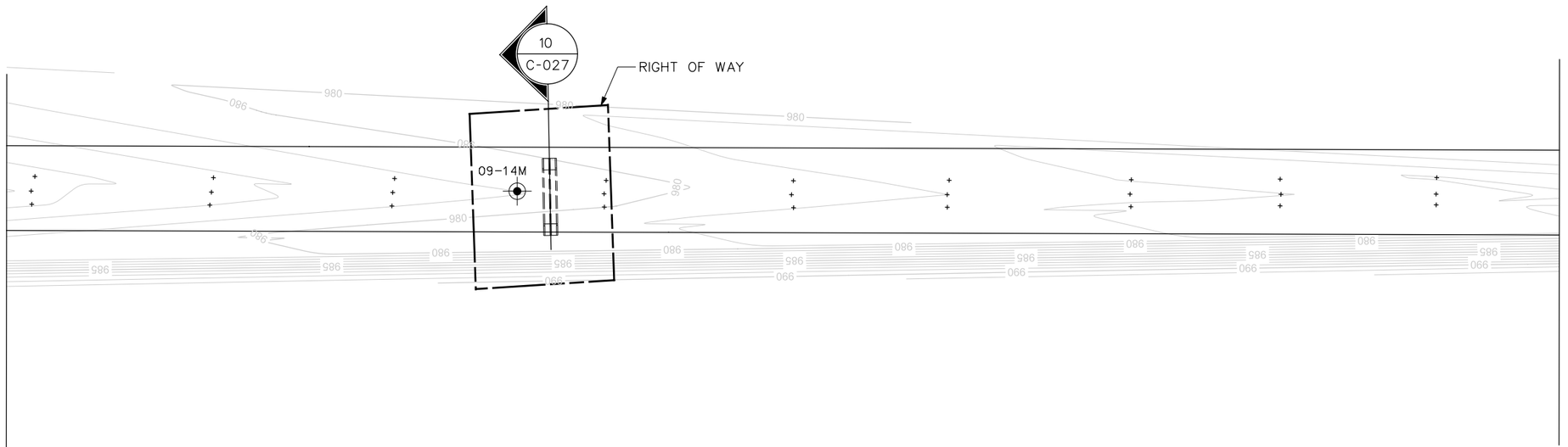
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN - LOUISBURG
ROAD CULVERT A

Sheet reference number:
C-016

Sheet 18 of 32



LOUISBURG ROAD CULVERT B

N.A.

50 0 50 100

SCALE IN FEET

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Authority: G1
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
File Name=MSHLK\D05C007100C-108011.DGN
Plot Date:
Plot Scale=1.100'

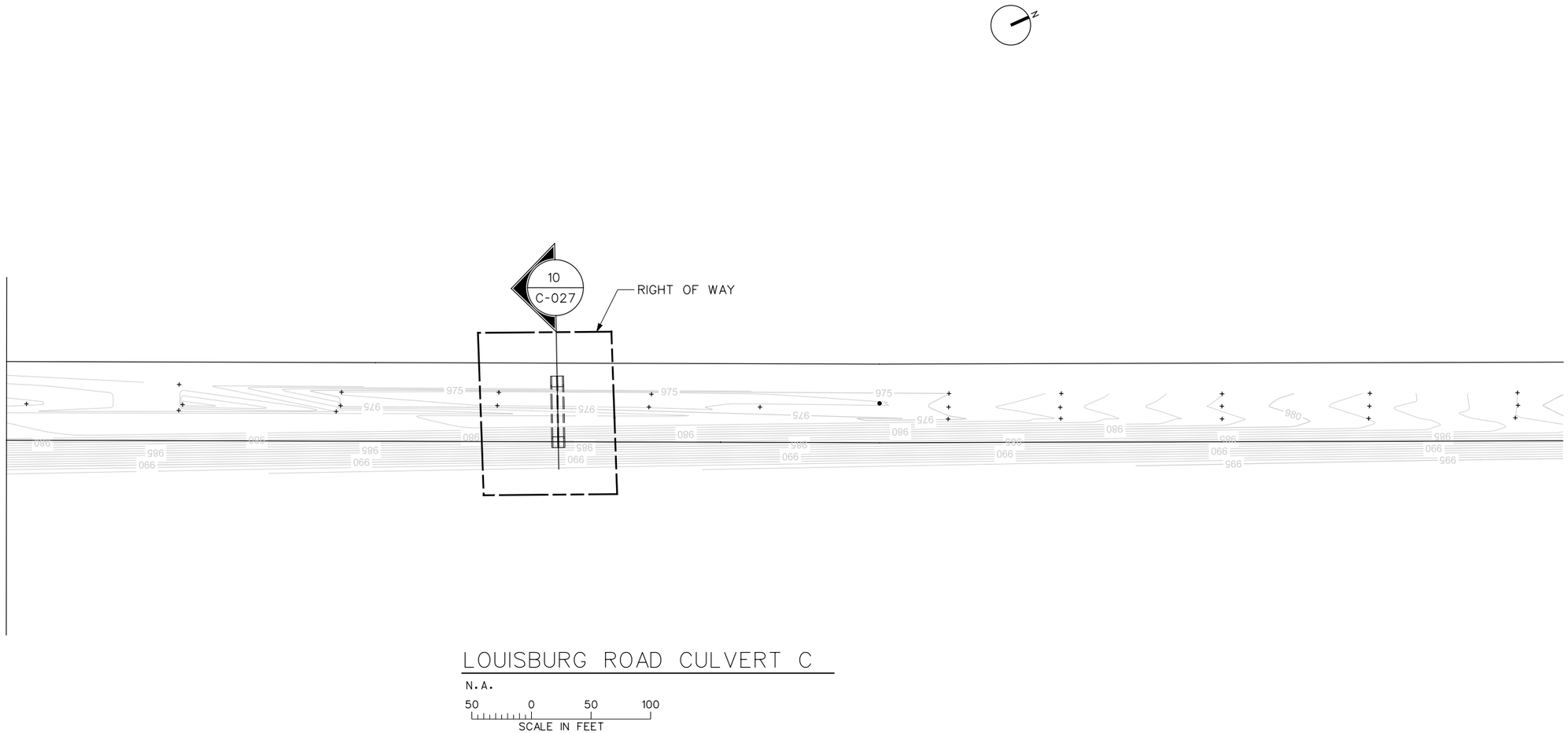
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN - LOUISBURG
ROAD CULVERT B

Sheet reference number:
C-017

Sheet 19 of 32



LOUISBURG ROAD CULVERT C

N.A.

50 0 50 100

SCALE IN FEET

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

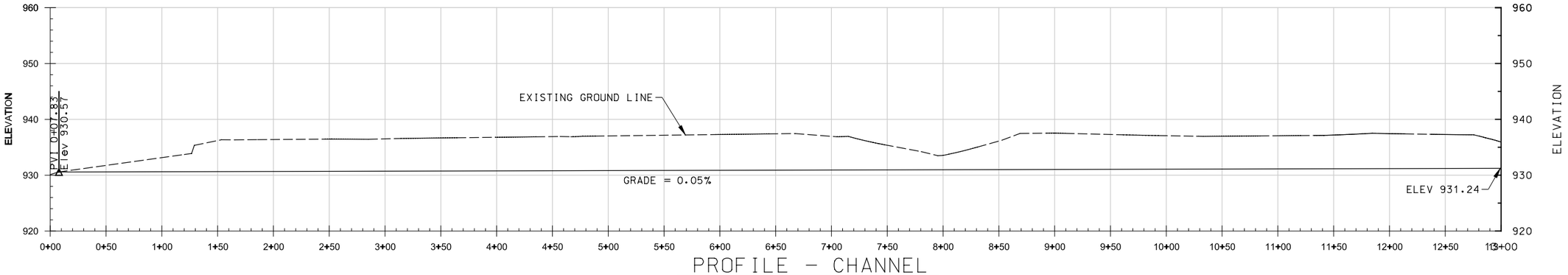
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Checked by: dBM
Authority: G1
Horizontal Coordinate System: MN STATE PLANE SOUTH ZONE NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System: NGVD 1929 (ADJ)
File Name: M:\SHL\KD05C007200C-108012.DGN
Plot Date:
Plot Scale: 1=100'
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Rev. XX

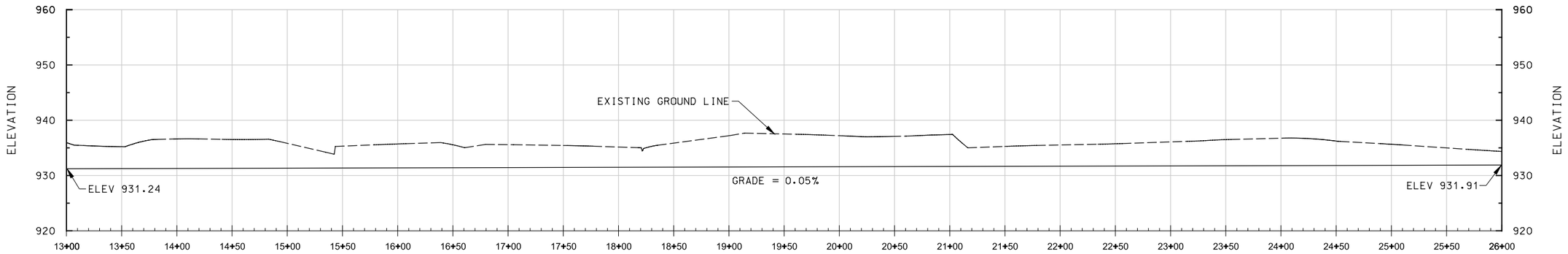
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PLAN - LOUISBURG
ROAD CULVERT C

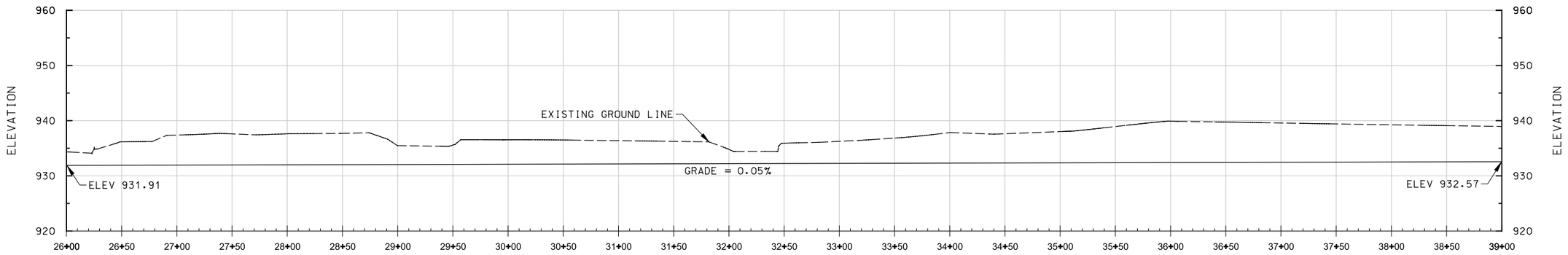
Sheet reference number:
C-018



PROFILE - CHANNEL



PROFILE - CHANNEL



PROFILE - CHANNEL

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

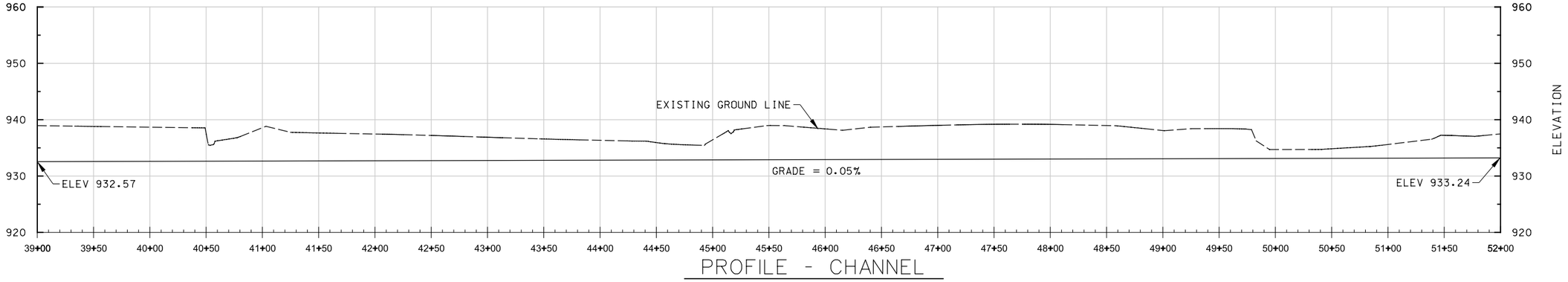
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Authority: G1
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Rev. XX
Horizontal Coordinate System: MN STATE PLANE SOUTH ZONE, NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System: NGVD 1929 (ADJ)
File Name=MSHLKD05C007900C-109000.DGN
Plot Date:
Plot Scale=1-50'

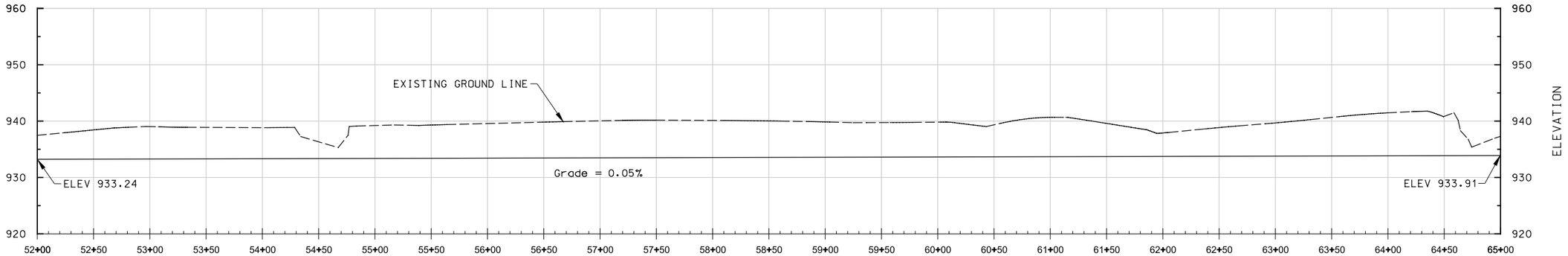
FEASIBILITY STUDY
MARSH LAKE ASSESSMENT
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE - CHANNEL
STA 0+00 TO 39+00

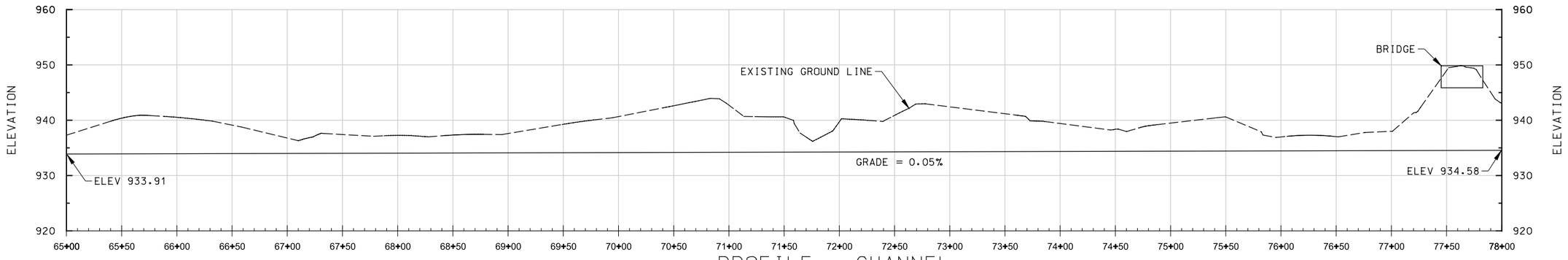
Sheet reference number:
C-019
Sheet 21 of 32



PROFILE - CHANNEL



PROFILE - CHANNEL



PROFILE - CHANNEL

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

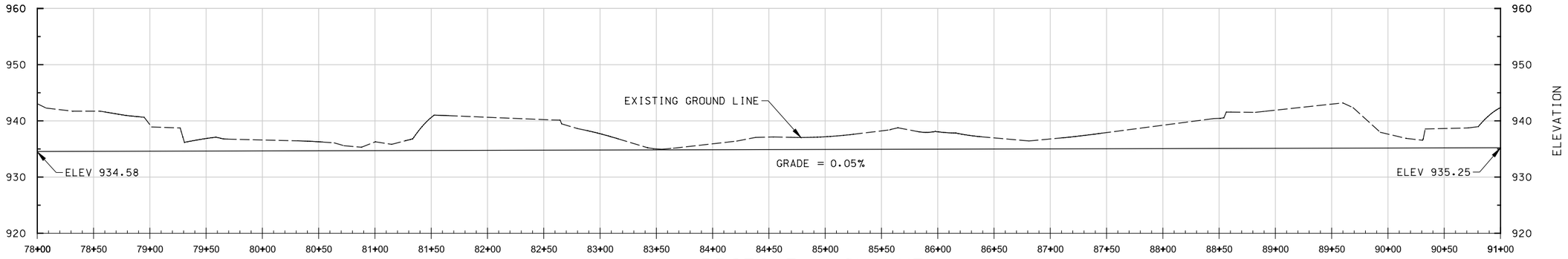
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Plot Date:
Rev. XX
Authority: G1
File Name: MSHLKDSCOOB000C-110000.DGN
Horiz. Scale: 1"=50'
Vert. Scale: 1"=50'
Horizontal Coordinate System: MN STATE PLANE SOUTH ZONE NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System: NGVD 1929 (ADJ)

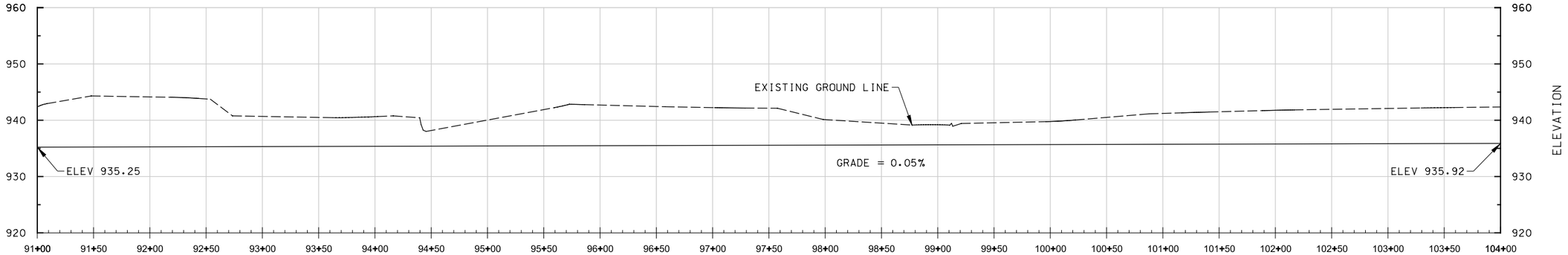
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE - CHANNEL
STA 39+00 TO 78+00

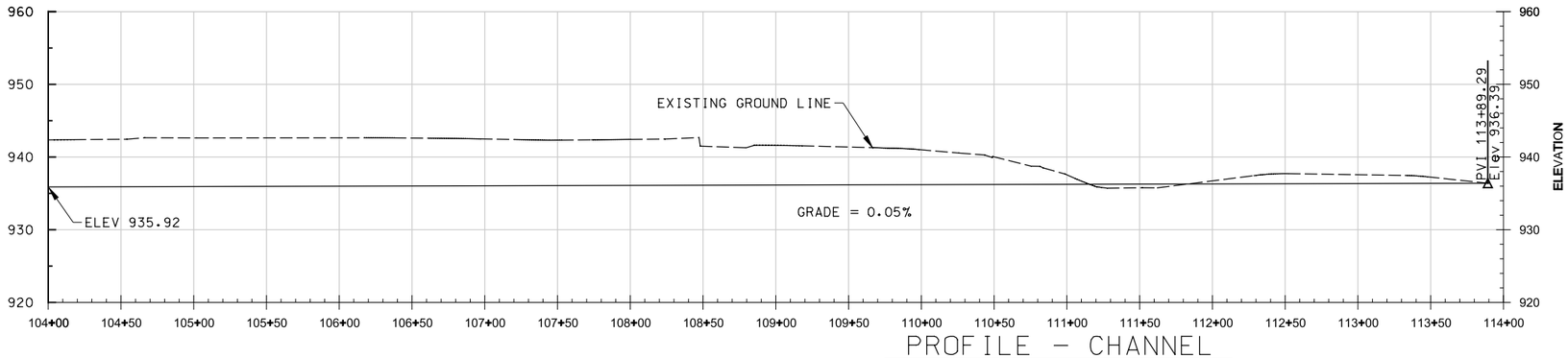
Sheet reference number:
C-020
Sheet 22 of 32



PROFILE – CHANNEL



PROFILE – CHANNEL



PROFILE – CHANNEL

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

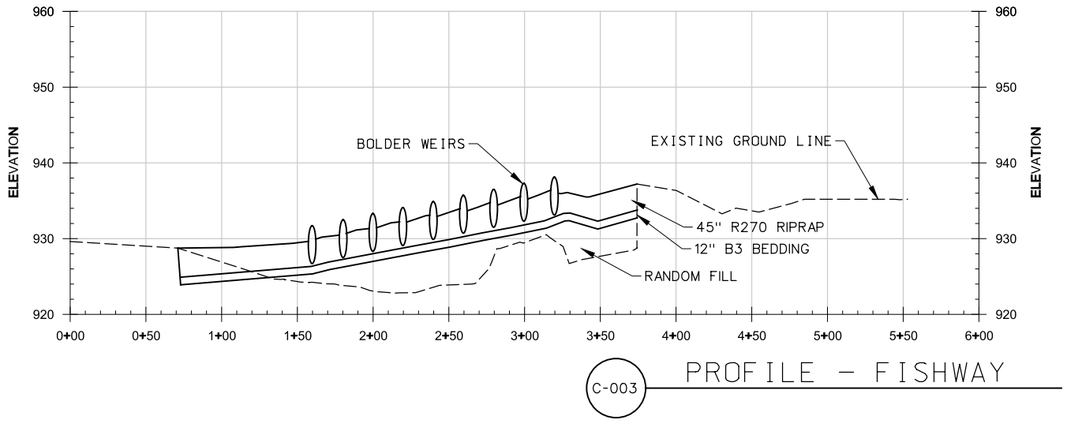
Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Date: APR 2011
Rev. XX
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Authority: G1
Plot Date:
File Name=\SHLK005C009000C-111000.DGN
Plot Scale=1'=50'

Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

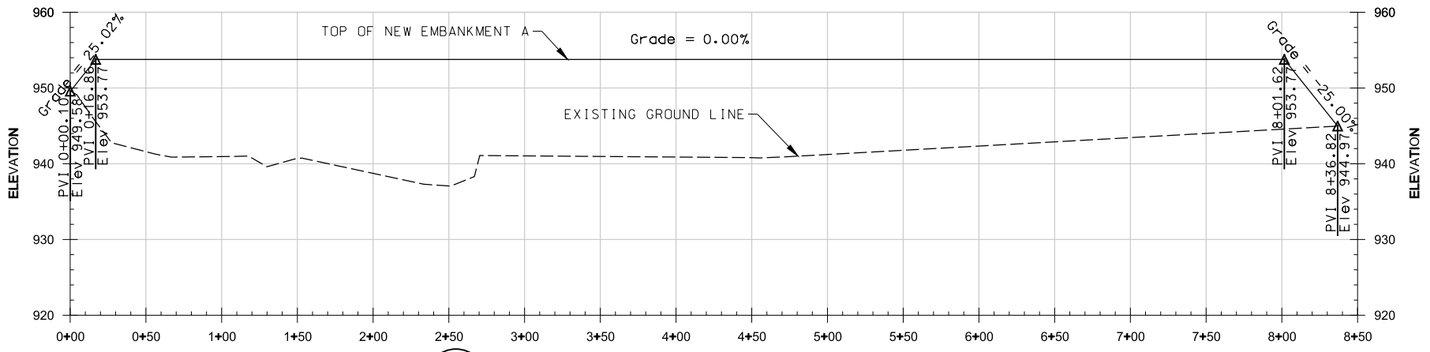
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE - CHANNEL
STA 78+00 TO 114+10

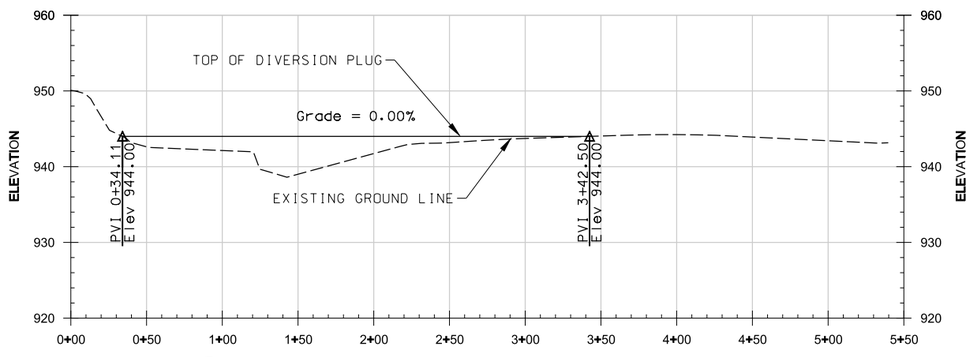
Sheet reference number:
C-021
Sheet 23 of 32



C-003 PROFILE – FISHWAY



C-007 PROFILE – NEW EMBANKMENT A



C-008 PROFILE – DIVERSION PLUG

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Authority: G1
File Name: MSHLK005C010000C-112000.DGN
Plot Scale: 1"=50'
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
Plot Date:
Rev. XX

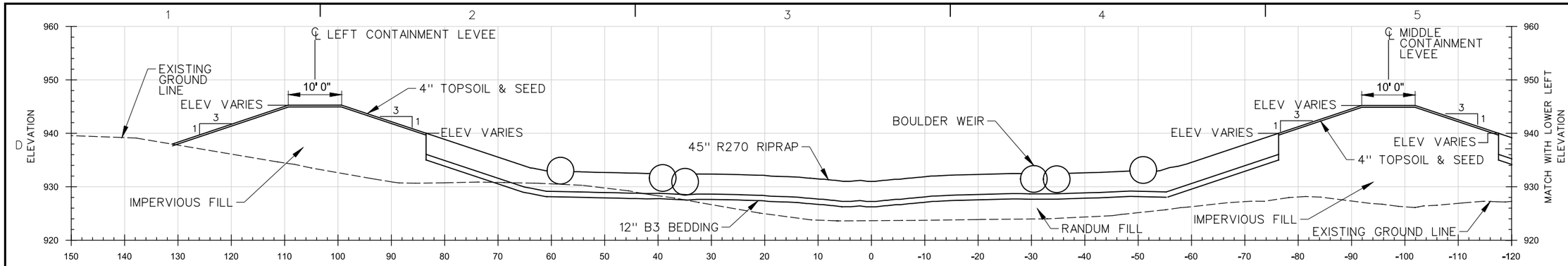
DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ.)

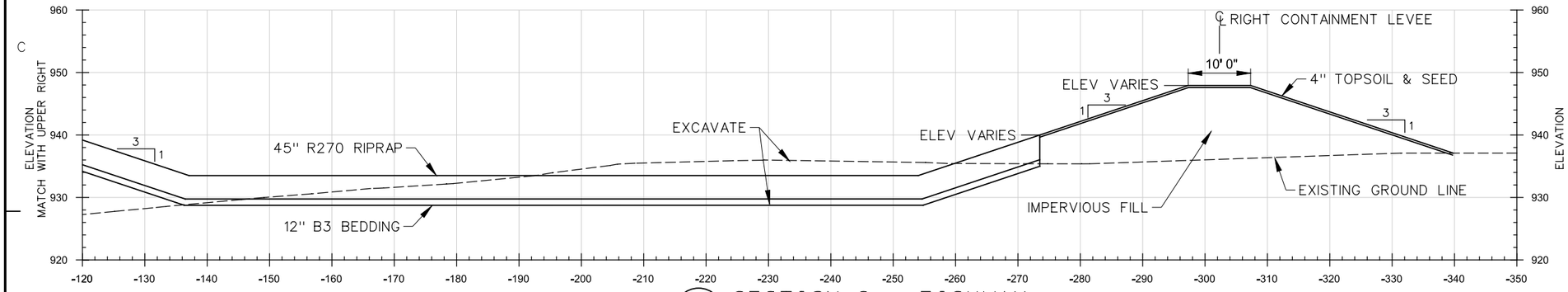
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE - FISH RAMP
NEW EMBANK A & DIV PLUG

Sheet reference number:
C-022
Sheet 24 of 32

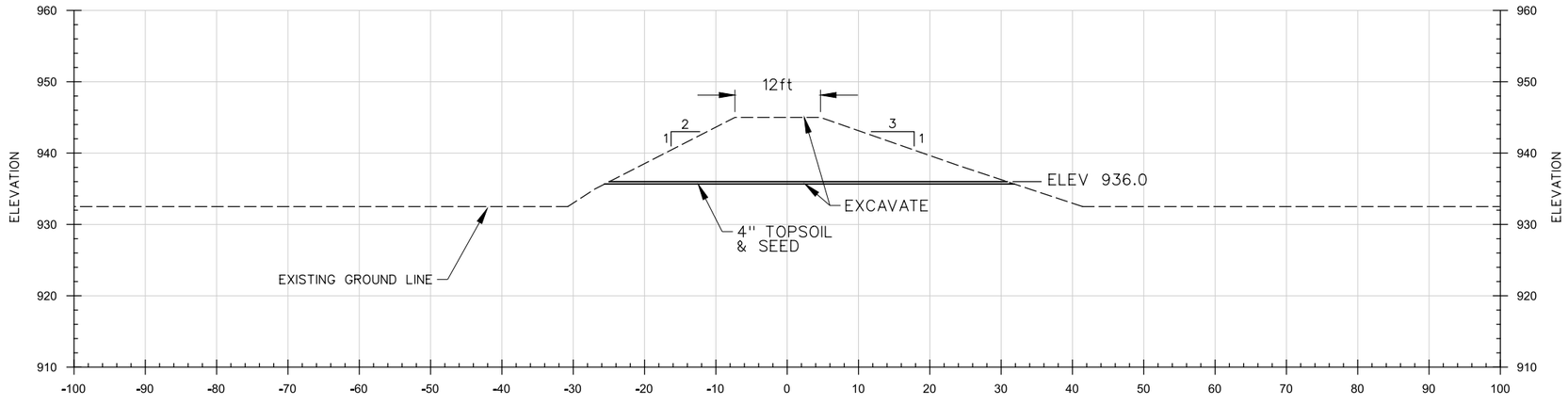


C-003 SECTION 2 - FISHWAY
TYPICAL SECTION



C-003 SECTION 2 - FISHWAY
TYPICAL SECTION

B



C-002 SECTION 1 - FISH POND LEVEE BREACH
TYPICAL SECTION

A

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

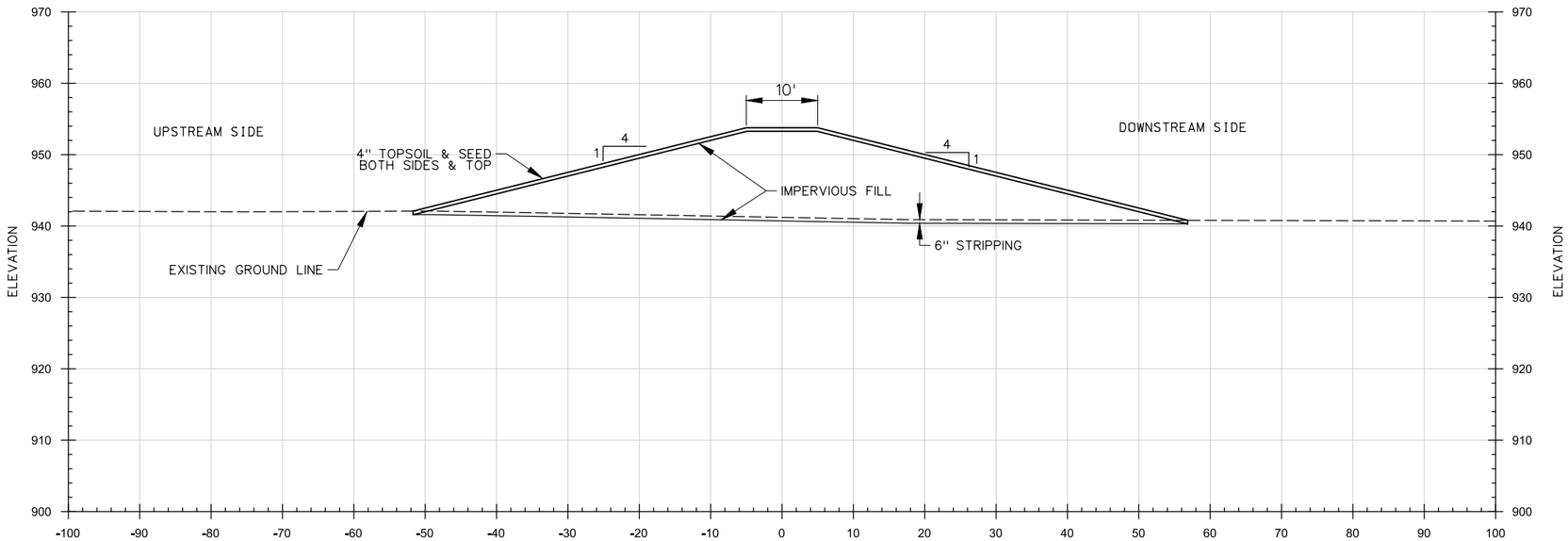
Designed by: DMT/CRL
Dwn by: DMT
Ckd by: JBM
Authority: 01
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
File Name=MSHLKD05C020000C-122000.DGN
Plot Scale=1-50'
Plot Date:
Rev. XX

Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

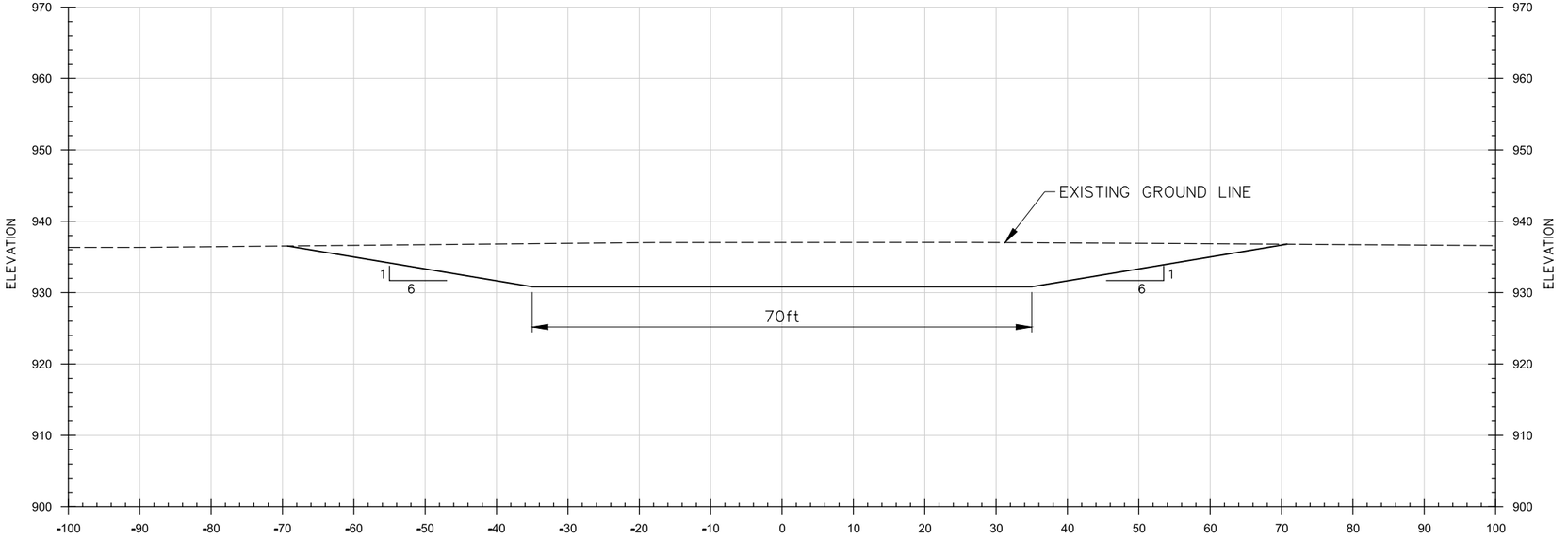
ECOSYSTEM RESTORATION
SECTIONS 1 & 2

Sheet reference number:
C-023
Sheet 25 of 32



C-007 SECTION 4 – NEW EMBANKMENT A

TYPICAL SECTION



C-003 SECTION 3 – CHANNEL

TYPICAL SECTION

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

Date: APR 2011 | Rev. XX
Designed by: DMT/CRL | Solicitation No.: DACW37-YR-B-0000
Dwn by: DMT | Ckd by: JdM | Drawing Number:
Authority: G1 | Plot Date:
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Plot Scale=1'=50'

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

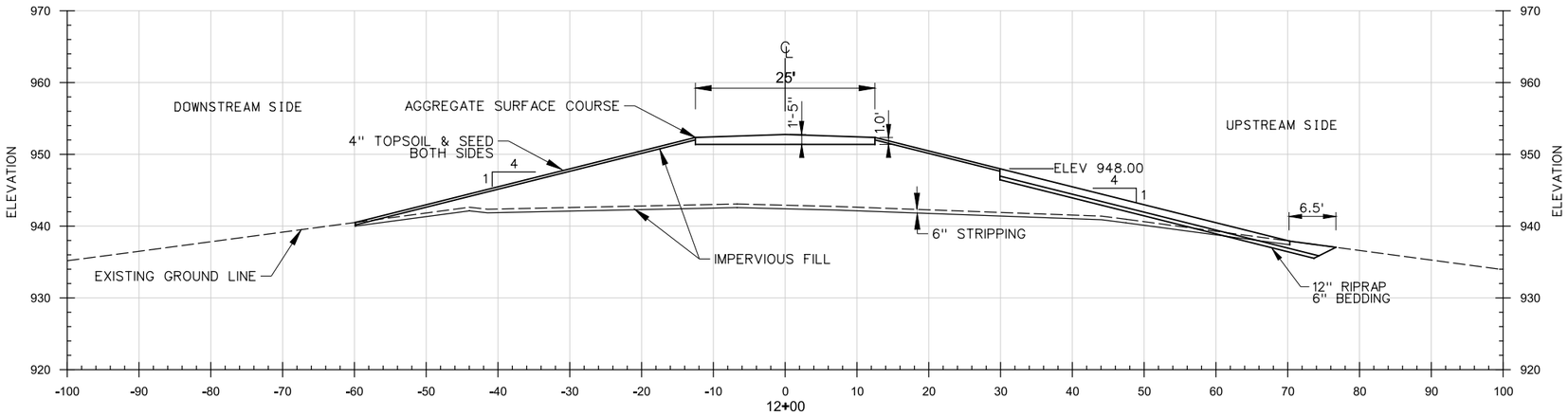
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ.)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
SECTIONS 3 & 4

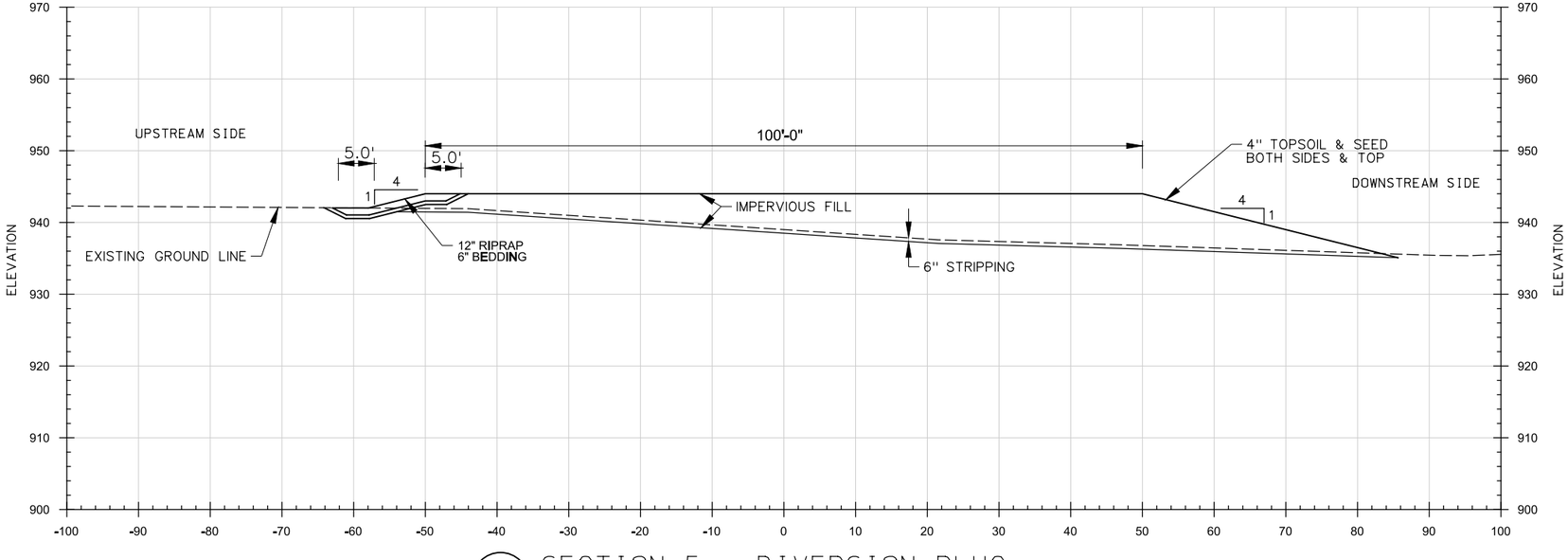
Sheet reference number:
C-024

Sheet 26 of 32



C-009 SECTION 6 – NEW EMBANKMENT B

TYPICAL SECTION



C-008 SECTION 5 – DIVERSION PLUG

TYPICAL SECTION

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT, CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Ckd by: JBM
Authority: 01
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
File Name=MSHLKD05020200C-122002.DGN
Plot Scale=1-50'
Plot Date:
Rev. XX

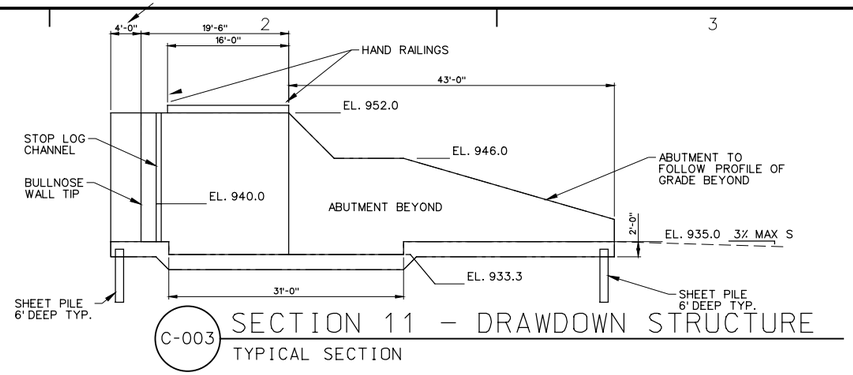
Horizontal Coordinate System: MN STATE PLANE SOUTH ZONE, NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System: NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
SECTIONS 5 & 6

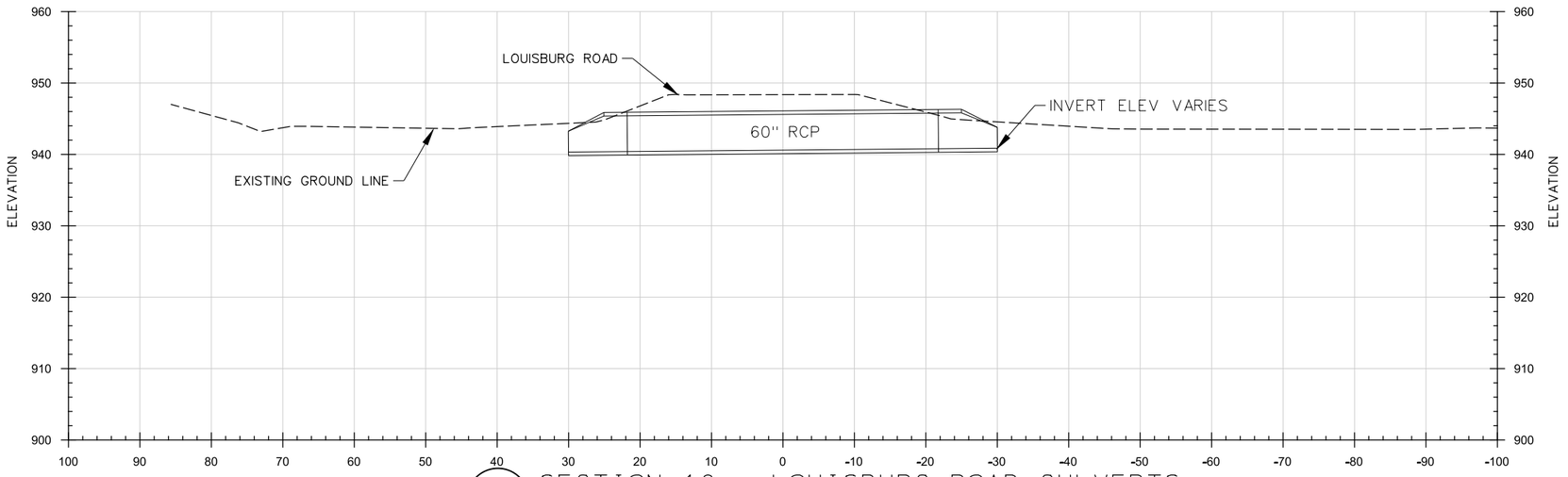
Sheet reference number:
C-025

Sheet 27 of 32



C-003 SECTION 11 – DRAWDOWN STRUCTURE

TYPICAL SECTION



C-016 SECTION 10 – LOUISBURG ROAD CULVERTS

TYPICAL SECTION

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

Designed by: DMT/CRL	Date: APR 2011
Drawn by: DMT	Ckd by: JBM
Authority: 01	Solicitation No.: DACW37-YR-B-0000
File Name=$(SHLKOO5C02040OC-122004.DGN	Drawing Number:
Plot Scale=1-50'	Plot Date:

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

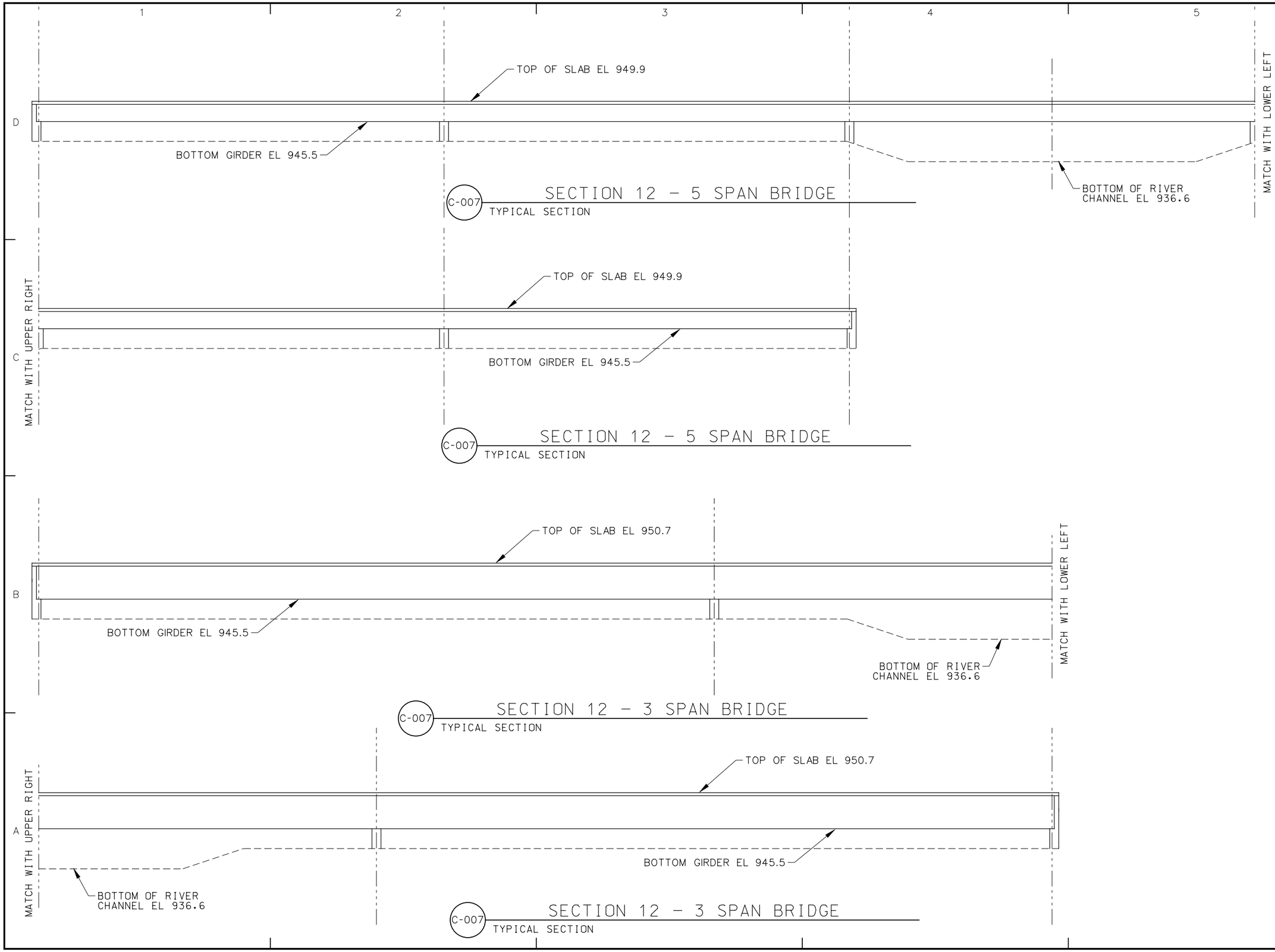
Horizontal Coordinate System:
MN STATE PLANE SOUTH ZONE
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
SECTIONS 10 - 11

Sheet reference number:
C-027

Sheet 29 of 32



US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Checked by: JBM
Date: APR 2011
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Drawing Number:
Authority: 01
Plot Scale=1-50'
Plot Date:
Rev. XX
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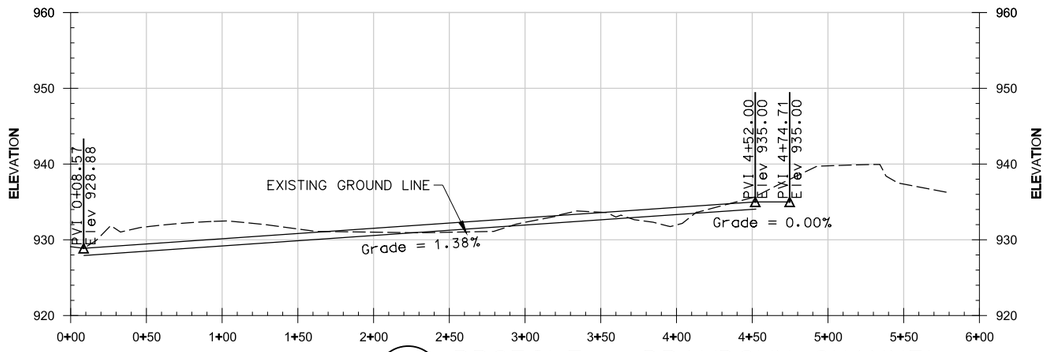
NAD 1983 (1996 ADJ.), US SURVEY FT
Vertical Coordinate System:
NGVD 1929 (ADJ)

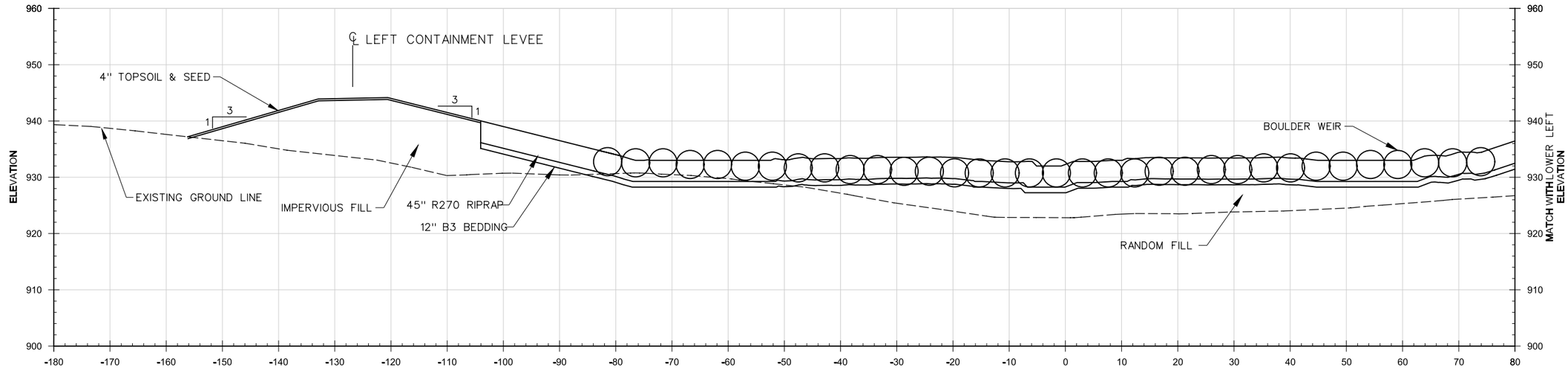
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
SECTION 12

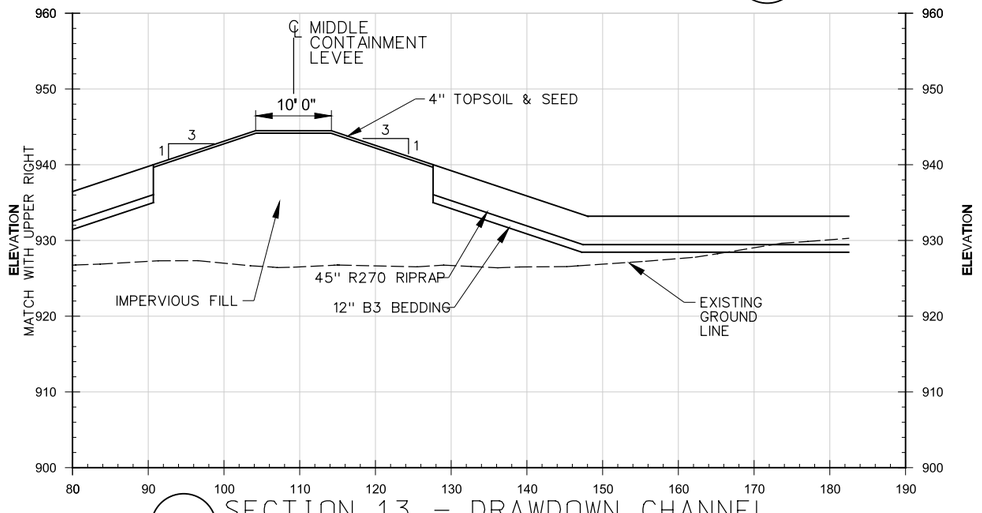
Sheet reference number:
C-028
Sheet 30 of 32



C-003 PROFILE – DRAWDOWN CHANNEL



C-003 SECTION 13 – DRAWDOWN CHANNEL
TYPICAL SECTION



C-003 SECTION 13 – DRAWDOWN CHANNEL
TYPICAL SECTION

US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drawn by: DMT
Ckd by: JBM
Date: APR 2011
Rev. XX
Authority: d1
Solicitation No.: DACW37-YR-B-0000
Drawing Number:
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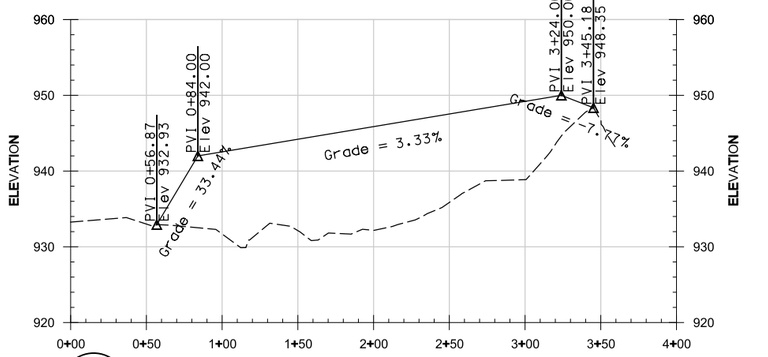
FEASIBILITY STUDY
MARSH LAKE AQUATIC ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE - DRAWDOWN CHANNEL
SECTION 13

Sheet reference number:
C-029
Sheet 31 of 32



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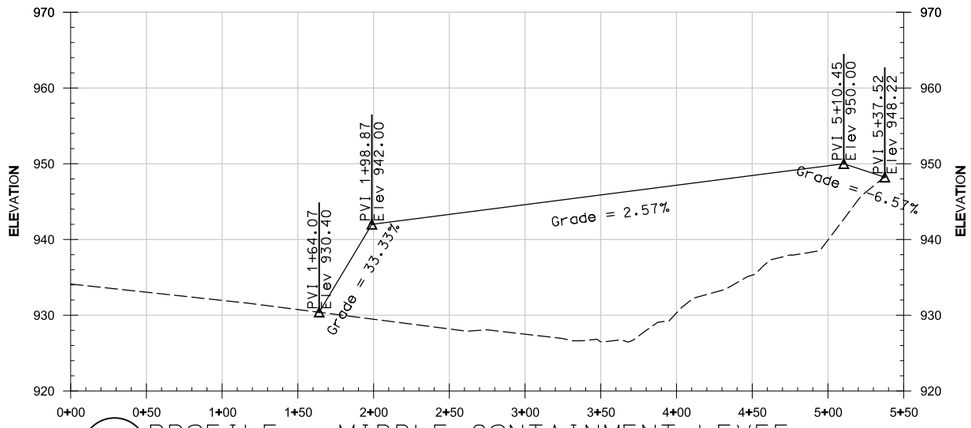

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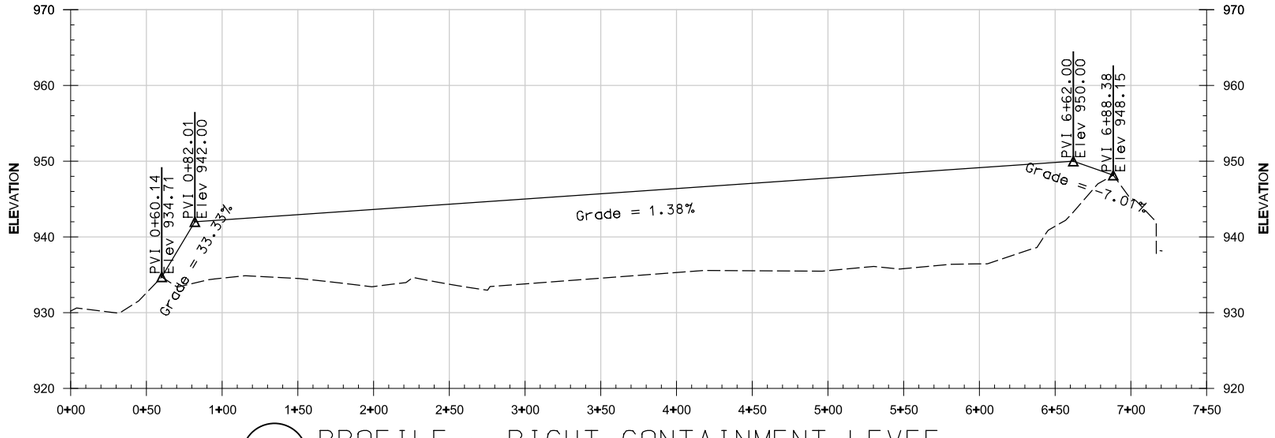

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US Army Corps of Engineers
St. Paul District

Symbol	Description	Date	Appr.

DEPARTMENT OF THE ARMY
ST. PAUL DISTRICT
CORPS OF ENGINEERS
ST. PAUL, MINNESOTA

Designed by: DMT/CRL
Drn by: DMT
Ckd by: JBM
Date: APR 2011
Solicitation No.: DACW37-YR-B-0000
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FEASIBILITY STUDY
MARSH LAKE ADJACENT ECOSYSTEM RESTORATION
MINNESOTA RIVER
APPLETON, MINNESOTA

ECOSYSTEM RESTORATION
PROFILE – LEFT MIDDLE
& RIGHT CONTAINMENT LEVEE

Sheet reference number:
C-030
Sheet 32 of 32

Appendix O

Appendix O
Public and Private Summarized Comments and Corps Responses

Marsh Lake Ecosystem Restoration Project

Final Feasibility Report and Environmental Assessment

July 2011

US Army Corps of Engineers ®

Prepared by:
U.S. Army Corps of Engineers
St. Paul District
180 Fifth Street East, Suite 700
St. Paul, Minnesota 55101-1678

Appendix O
Public and Private Summarized Comments and Corps Responses

Table of Contents

Written Comments Received During Feasibility Study Development

Included below are comments received during the plan formulation process for the study. Comments include the following:

1. March 10, 2006 letter from Ducks Unlimited to Minnesota Department of Natural Resources

2. February 11, 2008 letter from Ducks Unlimited to Minnesota Department of Natural Resources

Both letters are supportive of the study and the plan formulation process. No formal responses are provided to these two comment letters.

DUCKS UNLIMITED

Ryan P. Heiniger
Director of Conservation Programs – MN/IA

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March 10, 2006

Cheryl Heide
Minnesota Department of Natural Resources
261 Highway 15 South
New Ulm, MN 56073

Dear Ms. Heide:

As you know, Ducks Unlimited has recently begun a comprehensive program called the *Living Lakes Initiative*, a science-based, strategic effort to reverse the decline of migratory waterfowl and our waterfowling heritage in Minnesota. Marsh Lake is an important part of one of the key focus areas in our Living Lakes Initiative and we are fully supportive of efforts designed to improve Marsh Lake.

The volunteers and staff of Ducks Unlimited, Inc. fully support the Minnesota Department of Natural Resources efforts to collaborate with the U.S. Army Corps of Engineers to improve Marsh Lake for waterfowl and other wildlife. Marsh Lake represents a remarkable natural resource and desperately needs a timely public investment by the U.S. Army Corp of Engineers and other partners to restore the area for waterfowl habitat, flood storage retention, and improving water quality in the Minnesota River.

It is our understanding that a funding request for appropriations within the fiscal year 2007 Energy and Water Development Act for the U.S. Army Corps of Engineers are being pursued. Furthermore, the current effort targets appropriations for the completion of a feasibility study with a projected federal cost of $258,000, which will be leveraged with state resources.

Please feel free to contact me if you have any questions or concerns.

Sincerely,

Ryan Heiniger
Director of Conservation Programs – Minnesota/Iowa

Cc: Congressman Peterson, Senator Coleman, Senator Dayton
Mark Holsten – MN DNR

DUCKS UNLIMITED

Ryan P. Heiniger
Director of Conservation Programs – MN/IA

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February 11, 2008

Mark Matuska, Regional Director
Minnesota Department of Natural Resources
261 Highway 15 South
New Ulm, MN 56073

Dear Mr. Matuska:

RE: Support for Marsh Lake Study

Ducks Unlimited, Inc. (DU) fully supports the fiscal year 2009 Congressional appropriation request of $250,000 to complete the planning phase of the Marsh Lake Ecosystem Restoration Feasibility Study. DU has been pleased to be a partner in the planning process in cooperation with the Minnesota Department of Natural Resources, the U.S. Army Corps of Engineers and other stakeholders.

Marsh Lake is a remarkable natural resource for waterfowl, other wildlife and the citizens of Minnesota. As you know, through Ducks Unlimited's Living Lakes Initiative in Minnesota and Iowa, we are focused on restoring the ecological health of shallow lakes. This is a science-based, partnership driven effort to reverse the decline of migratory waterfowl and our waterfowling heritage in Minnesota. Marsh Lake is a high priority within one of the key focus areas in western Minnesota.

We are encouraged by the progress made to-date by the planning team and we remain optimistic that a viable and cost-effective solution can be identified and agreed upon by all the parties involved. Securing federal funding in fiscal year 2009 will be critical to completing the planning phase and allow for the project to continue moving forward in a time-sensitive manner.

Please feel free to contact me if you should need additional support from Ducks Unlimited.

Sincerely,

Ryan Heiniger
Director of Conservation Programs – Minnesota/Iowa
Ducks Unlimited, Inc.

Cc: Senator Coleman, Senator Klobuchar, Congressman Peterson
Mark Holsten, Commissioner – MN DNR

Public Comments Received During Public Review Period

Comments and Responses
Several comments were received from the general public during the public review process. Each was generally supportive of the project and the overall Feasibility Study Report. These comments include:

1. June 2, 2011 letter from Jay and Tracy Ronning
2. June 15, 2011 letter from Scott Sparlin, Coalition for a Clean Minnesota River
3. June 17, 2011 letter from Brent Ronning
4. June 24, 2011 letter from Ryan Heiniger, Ducks Unlimited

Response:
USACE appreciates the support of its ecosystem restoration mission and the Marsh Lake Ecosystem Restoration Project Feasibility Study.

From: JAY & TRACY RONNING [jayandtracyr@embarqmail.com]
Sent: Thursday, June 02, 2011 9:29 AM
To: Wyatt, Michael MVP
Subject: Marsh Lake Project

Mr. Wyatt,

I just learned of the public input meeting that was to be held on 5/26/2011. Obviously, a little too late. I am disapointed in the commuication of this meeting. I did not see any notice anywhere including the Outdoor News or Appleton Press. I was wondering if I could get meeting notes or a summary of what was discussed/decided at the meeting.

I grew up in Appleton and still have family living there. I would be in favor of the plan that has been proposed. Periodic draw downs of upper Marsh Lake could be a wonderful thing for both fish and waterfowl. There is a lot of untapped potential for improvement of habitat on the lake.

If you have any kind of mailing list for communication on the project, I would like to be included.

Thank you for your work on the project.

Jayson Ronning

9124 Prestwick Court North

Brooklyn Park, MN 55443

763 315 1088

From:	Scott Sparlin
To:	Wyatt, Michael MVP
Subject:	Written comments on Marsh Lake Project
Date:	Wednesday, June 15, 2011 3:00:21 PM

Subject: Written comments on Marsh Lake Project
To: Michael.d.wyatt@usace.army.mil

These comments are for the public record on behalf of the Coalition for a Clean Minnesota River (CCMR). CCMR is a basin-wide 501 c 3 non-profit organization working to clean up pollution while improving fish and natural habitats in the Minnesota River Basin.

The Coalition for a Clean Minnesota River believes this project has been in the talking stages far too long and that implementation can not come too soon. The approximately 10 million dollar price tag associated with the project is extremely small in comparison to the public benefits that clean water, fish and wildlife improvements will have on our state, country and the entire river system including the Gulf of Mexico. On site users from all over the region will get additional access improvements for all to enjoy which also includes those with physical challenges. We have a concern about fisheries and wildlife staff working together to achieve increases in populations of forage fish and wildife which originate in Marsh Lake. A major point of that will be during draw down years when it will be critical to allow for ample time for those forage fish and wildlife to escape into Lac Qui Parle and the entire Minnesota River system. The flexibility in the draft plan to allow for climatic and environmental conditions to dictate draw down management strategies is a positive action. With the focus being on fish and wildlife Marsh Lake can be allowed to return to its former glory as a phenomenal fish and waterfoul creation body of water not to mention a natural filtration basin for water qualtiy.

Most Sincerely, Delbert Wehrspann, Director CCMR

From: brandhr [brandhr1@msn.com]
Sent: Friday, June 17, 2011 8:44 PM
To: Wyatt, Michael MVP
Subject: Fwd: Marsh Lake Restoration

Begin forwarded message:

From: brandhr <brandhr1@msn.com>
Date: June 17, 2011 8:41:44 PM CDT
To: "michael.d.wyatt@suace.army.mil" <michael.d.wyatt@suace.army.mil>
Subject: Marsh Lake Restoration

Michael,

I fully support all efforts to restore the Marsh Lake ecosystem.

Brent Ronning

Sent from my iPhone

DUCKS UNLIMITED

Ryan Heiniger
Director of Conservation Programs

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24 June 2011

Michael Wyatt
U.S. Army Corps of Engineers, PD-F
180 East Fifth Street, Suite 700
St. Paul, MN 55101-1678

Dear Mr. Wyatt:

On behalf of nearly 40,000 Ducks Unlimited members and supporters in Minnesota, I am writing to provide comments and express our strong support for efforts by the U.S. Army Corps of Engineers to improve Marsh Lake in Swift and Lac Qui Parle Counties near Appleton, Minnesota. Specifically, I am providing comments in response to the St. Paul District – U.S. Army Corps of Engineers "Marsh Lake Ecosystem Restoration Feasibility Study" for the Lac Qui Parle Wildlife Management Area, Minnesota.

Improvement of water level management capabilities for Marsh Lake through the renovation of the Marsh Lake dam structure and restoration of the original Pomme de Terre River Channel is critically needed to allow for temporary water level manipulations and other active habitat management actions that will restore the lake's aquatic ecology and improve water quality for both waterfowl and humans alike. Ducks Unlimited has been actively involved in helping the Minnesota Department of Natural Resources (DNR) and U.S. Army Corps of Engineers develop ideas to Marsh Lake since we began conservation work in Minnesota in the late 1980s, and we have been specifically supporting the need to renovate the Marsh Lake Dam to include variable water level control since shortly after the dam structure was damaged in spring 1997.

Waterfowl have endured many challenges in Minnesota as prairies were plowed and wetlands drained. Today, shallow lakes are the cornerstones of the remaining waterfowl habitat throughout southern and western Minnesota. However, these unique wetland resources are not isolated from threats that jeopardize their productivity for waterfowl. Altered hydrology and invasive fish, among factors, now limit the ability of many shallow lakes to provide quality habitat for waterfowl and other wildlife, and for human recreation. Marsh Lake is no exception.

Marsh Lake is a 5,000-acre shallow lake with an average depth of only a few feet, and a long history of heavy waterfowl use during both spring and fall. It also has a history of heavy use by recreational waterfowl hunters, especially in the years immediately following dam construction when the lake was in prime condition. However, as with many shallow lakes in Minnesota, the waterfowl habitat and water quality in Marsh Lake has become degraded in recent years due to high, stable water levels, increased inflows of water and nutrients, and high

numbers of invasive fish such as common carp that have failed to significantly winterkill in decades.

One of the keys to improving and maintaining the quality of shallow lakes is the legal and physical ability to manage water levels and conduct period draw-downs. Just as fire maintains the health of prairies, we know through science that shallow lakes and wetlands require periods of low water or droughts to stay healthy and productive for wildlife. This temporal variation in water levels serves to consolidate soils, winterkill invasive fish, and allow aquatic plants to germinate and expand. Once reflooded, aquatic plants stabilize wetland bottom substrates during wind events, absorb and store nutrients, and provide important wetland wildlife habitat.

The Marsh Lake Ecosystem Restoration Feasibility Study for the Lac Qui Parle Wildlife Management Area in Minnesota does an excellent job of addressing the main drivers of poor water quality and turbidity in Marsh Lake. Primarily, these include the lack of variable water level control in Marsh Lake Dam, the alteration of the Pomme de Terre River that currently discharges into Marsh Lake directly instead of through its original channel into the Minnesota River below, and the corresponding lack of natural fish winterkill events that result. The high, stable water levels resulting from the fixed crest dam combined with constant water inflow from the Pomme de Terre River has allowed invasive common carp numbers in the lake to explode and dominate the ecology of the system. Thus, improving Marsh Lake will require the dam be modified to include a draw-down structure (and the structure be subsequently be actively managed), and the Pomme de Terre River be restored to it's natural channel that enters the Minnesota River downstream of the Marsh Lake dam.

The Study does a good job of laying out the alternatives and identifying the most cost-effective, critical elements to pursue with federal and state funding. Ducks Unlimited supports both Alternative Plan 3 and Alternative Plan 4 that calls for restoration of the Pomme de Terre River and the inclusion of a draw-down structure. Both Alternative Plans also include gated structures for the Louisburg Grade Road culverts, which if managed properly, could also be useful to enhanced water level management in the Marsh Lake system. Alternative Plan 4 also includes modifications of Marsh Lake Dam to include a fish way, which is forecasted to improve native fish passage into Marsh Lake and help balance the fishery to a more native state. If that indeed happens, then that aspect of the project will be beneficial too. However, given the abundance of carp in the system, we remain concerned that providing fish passage will also provide passage of carp and other invasive fish species, potentially negating the benefits from Pomme de Terre River restoration and periodic draw-downs of Marsh Lake.

Therefore, we highly recommend that if the Marsh Lake Dam is modified to allow fish passage into Marsh Lake from the Minnesota River below via Alternative Plan 4, state and federal fisheries specialists should closely monitor fish movements into Marsh Lake and fish populations that result, and plans made to modify the fish passage structure should additional invasive species be found to be problematic.

As noted above, we strongly endorse the use of periodic draw-downs to enhance Marsh Lake and associated wetlands, and the construction of both a draw-down feature in the Marsh Lake Dam and the construction of gated structures on Louisburg Grade Road culverts will provide

state and federal wildlife managers with the ability to actively manage water levels in both Marsh Lake and the West Pool. However, it will then be critical that state and federal agencies agree on an active water level management plan for the system, and follow through with the implementation of periodic, temporary water level draw-downs to improve the system. Because it tends to be human nature to avoid change and because some stakeholders will not appreciate the lower water levels in Marsh Lake, albeit even temporarily, there may be significant pressures to delay or not implement water level draw-downs after project completion. That would simply be unacceptable, and we urge advance planning among the Corps, Minnesota DNR, and stakeholders to reach agreement on future management actions to ensure future improvement of the overall system.

Ducks Unlimited looks forward to being part of these ongoing discussions and to helping the Corps and DNR seek federal and state funding to implement this important shallow lake improvement project.

Sincerely,

Ryan Heiniger
Director of Conservation Programs – Minnesota, Iowa, Nebraska, Colorado, & Wyoming

CC: Senator Amy Klobuchar
Senator Al Franken
Congressman Collin Peterson
Tom Landwehr, Minnesota DNR Commissioner
Dennis Simon, Minnesota DNR Chief of Wildlife
David Trauba, Minnesota DNR Area Wildlife Manager – Lac Qui Parle WMA
Jon Schneider, DU Manager – Minnesota Conservation Programs
Josh Kavanagh, DU Biologist - Minnesota

Agency Comments Received During Public Review Period

Two comment letters were received from State and Federal Agencies:

1. June 24, 2011 letter from Minnesota Pollution Control Agency (MPCA)
2. June 24, 2011 letter from the Environmental Protection Agency (EPA)

Response to MPCA Comments:

- General Comment
  Based on the responses included below, USACE is seeking concurrence that the Environmental Assessment is complete and that Section 401 Water Quality Certification will be issued following the development, submittal and concurrence of information completed during design phase. Section 10.3 has been updated to identify future permits required for construction from the Minnesota Pollution Control Agency.
- Section 4.1.4
  Efforts have been made to select the environmentally least impactful and cost-effective plan for restoration of ecosystem features in and around Marsh Lake. As noted in Section 4.1.4, there is approximately 0.5-feet of fine sediment covering the historic river channel of its approximate two-mile length. Rerouting of the river is estimated to discharge approximately 1425 cubic yards of sediment into Lac qui Parle. Mechanical removal of sediment from the historic Pomme de Terre River channel would result in impacts to environmentally sensitive areas during construction which is inconsistent with the plan formulation. As proposed the net sediment loads to the Lac qui Parle reservoir will not change as a result of the project, however, the entire sediment load to the upper pool of Marsh Lake originating from the Pomme de Terre River will be eliminated. The intent of this effort is to reduce the sediment loading and ultimately reduce turbidity within Marsh Lake.
- Section 4.1.6
  There is currently no plan to physically remove fish from the lake. Following construction, the project features will be operated by the State of Minnesota, the non-Federal sponsor. The State, at its expense, may choose to voluntarily remove fish killed as a result of winter drawdowns. No removal is currently performed for seasonal fish-kills at the site. Section 6.7.12 has been updated to clarify the potential impact on biological productivity.
- Section 6.7
  - Bullet 1
    Construction contractors will be directed to apply for NPDES Permits; Section 10.3 has been updated to clarify the need for future permits.
  - Bullet 2
    Construction contractors will be directed to apply for NPDES Permits and include the acreage of recreation facilities within the area calculation necessary for the permit. Section 10.3 has been updated to clarify the need for future permits.

- Bullet 3
  Best Management Practices will be incorporated into the final design of the project. Section 6.7.13 of the feasibility study and environmental assessment has been amended to include the acknowledgement of the potential for temporary impacts resulting from construction activities and the need for erosion control on site during construction.
- Bullet 4
  Best Management Practices will be incorporated into the final design of the project. Section 6.7.13 of the feasibility study and environmental assessment has been amended to include the acknowledgement of the potential for temporary impacts resulting from construction activities and the need for erosion control on site during construction.
- Bullet 5
  Efforts have been made to select the environmentally least impactful and cost-effective plan for restoration of ecosystem features in and around Marsh Lake. As noted in Section 4.1.4, there is approximately 0.5-feet of fine sediment covering the historic river channel of its approximate two-mile length. Rerouting of the river is estimated to discharge approximately 1425 cubic yards of sediment into Lac qui Parle. Mechanical removal of sediment from the historic Pomme de Terre River channel would result in impacts to environmentally sensitive areas during construction which is inconsistent with the plan formulation. As proposed the net sediment loads to the Lac qui Parle reservoir will not change as a result of the project, however, the entire sediment load to the upper pool of Marsh Lake originating from the Pomme de Terre River will be eliminated. The intent of this effort is to reduce the sediment loading and ultimately reduce turbidity within Marsh Lake.

- Miscellaneous Comments
  Thank you for your attention to detail. Changes and edits will be made as necessary.

Response to EPA Comments:

- **General Comment**
  USACE appreciates the support of its ecosystem restoration mission and watershed study efforts.
- **Mussels**
  Section 4.1 details options for potential relocation of mussels by the non-Federal sponsor. A decision on relocation will be made based on interest and available resources of Minnesota Department of Natural Resources.

Minnesota Pollution Control Agency

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

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

June 24, 2011

Mr. Michael Wyatt
Project Manager
St. Paul District, US Army Corps of Engineers PD-F
180 5th Street East, Suite 700
St. Paul, MN 55101-1678

Re: Marsh Lake Ecosystem Restoration Project Draft Environmental Assessment

Dear Mr. Wyatt:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (EA) for the Marsh Lake Ecosystem Restoration project (Project) located in Lac Qui Parle, Swift, and Big Stone Counties, Minnesota. The Project consists of restoration of the degraded Marsh Lake ecosystem. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility and other interests, MPCA staff has the following comments for your consideration.

General Comment

The Draft EA lacks an evaluation of the environmental impact of the construction efforts proposed and also lacks an acknowledgement and description of the regulatory/permit requirements for the Project. The document should describe the regulatory requirements and mitigation that would likely be required to construct the various components of the selected alternative. As the Project is further developed, the MPCA will need the details on how the Project will be carried out in order to issue any approvals and permits within its jurisdiction.

Request for Timely Section 401 Water Quality Certification Determination

By letter to the MPCA, dated May 11, 2011, the U.S. Army Corps of Engineers (USACE) requests a timely Clean Water Act Section 401 Water Quality Certification (401 Certification) determination from the MPCA for this Project. The MPCA concludes there is insufficient information within the Draft EA to demonstrate that the proposed Project can reasonably be anticipated to comply with the applicable water quality standards, which is what a favorable 401 Certification determination would indicate. There are two general options available for handling requests for timely 401 Certifications that do not contain sufficient information for the MPCA to make an informed determination:

(A) The MPCA can provide a formal Denial Without Prejudice on the request for the 401 Certification, which would allow the USACE to reapply for a 401 Certification after it can responsibly demonstrate how the Project will be able to comply with the applicable water quality standards (i.e., after plans and specifications have been prepared and site-specific, appropriate mitigative measures and best management practices (BMPs) are proposed); or

(B) The USACE can formally withdraw its request for the 401 Certification (e-mail correspondence would suffice) and reapply for it after plans and specifications are prepared and site-specific, appropriate mitigative measures and BMPs are proposed.

Please decide which of these two options the USACE would like to pursue, and notify the MPCA accordingly within 30 days of the date of this correspondence. For questions or information about the 401 Water Quality Certification process, please contact Kevin Molloy at 651-757-2577.

Section 4.1.4

The MPCA would prefer mechanical removal of the sediment in the natural channel, prior to restoration of flow in that channel, instead of the sediment being flushed into Lac Qui Parle. That sediment should also be tested to determine whether any contaminants of concern are present.

Section 4.1.6

There was no mention of what would be done with the carp killed through the use of a winter drawdown (page 127). The MPCA is concerned that, if not removed, the dead carp would contribute to the biological oxygen demand loading in the water body as they decompose.

Section 6.7

- The document did not list the permits/approvals (other than the 404(B)(1) evaluation and the mention of the need for a MPCA 401 certification) that would be required to implement the proposed Project and did not identify the impacted area measurements of the construction activity to determine if it would meet the threshold of the permits/approvals. Specifically, the MPCA National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Construction Stormwater Permit (CSW Permit) must be one of the permits discussed in the Final EA.

- Construction of the recreation facilities should be considered part of the ecosystem restoration project such that the acreage of land disturbing activities is included in the acreage of disturbance for the ecosystem restoration project and coverage under the CSW Permit is obtained to cover both activities if the combined total of disturbance is over one acre.

- The Final EA must identify potential BMPs that would be incorporated into the construction both in the upland areas and for the in water work in order to protect downstream water quality.

- The Final EA should identify and describe the additional (CSW Permit Appendix A) BMP efforts that must be undertaken to protect the Pomme de Terre River required because of its MPCA impaired waters listing status. In addition, the document should identify and discuss required BMPs if the Project activity will trigger requirements for permanent stormwater runoff treatment BMPs. See the CSW Permit for these requirements at the MPCA website: http://www.pca.state.mn.us/wfhya5b.

- The Draft EA indicated in 6.7.3. that as part of the construction proposal to restore the Pomme de Terre River channel, the old channel would not be dredged or otherwise modified so no disposal area would be needed. The document stated that the flow of the river would be allowed to scour accumulated sediment and debris from the old channel. This proposal to let the river scour the sediments in the old channel downstream in the impaired Pomme de Terre River and then to the Minnesota River must be evaluated regarding the potential impacts of this sediment redistribution downstream. If the conclusion is that it would adversely affect the downstream water quality, the document must evaluate alternatives (such as dredging) to avoid this type of in water sediment release as part of the channel restoration.

Miscellaneous Comments

- The MPCA believes that there is an error on page 102, just above section 3.3 in that there is reference to a dam on the Pomme de Terre 56 miles upstream of Marsh Lake at Marshall, Minnesota. The MPCA suspects that should be Morris, Minnesota.

- There is an error in the date of the Pool 8 drawdown on Figure 4-6, on page 124. Pool 8 of the Mississippi River was drawn down in 2000 and 2001.

- Table 5-1 on page 141 was missing and there was no placeholder listed on that page.

- Earlier in the document, the MPCA was named as having participated in Project discussions; however, the area (e.g., water quality, etc.) was not mentioned. Also, the MPCA was not listed in section 10.3 State Agencies on pages 201 – 202, nor listed with Other Partners on page 211. Please state who at the MPCA was involved in the discussions.

We appreciate the opportunity to review this Project. We look forward to seeing these comments adequately addressed in the Final EA. Please be aware that this letter does not constitute approval by the MPCA of any or all elements of the Project for the purpose of pending or future permit action(s) by the MPCA. Ultimately, it is the responsibility of the Project proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this Draft EA, please contact me at 651-757-2508.

Sincerely,

Karen Kromar

Karen Kromar
Planner Principal
Environmental Review and Feedlot Section
Regional Division

KK:mbo

cc: Craig Affeldt, MPCA, St. Paul
Larry Zdon, MPCA, St. Paul
Judy Mader, MPCA, St. Paul
Kevin Molloy, MPCA, St. Paul
Doug Wetzstein, MPCA, St. Paul

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 17 2011

REPLY TO THE ATTENTION OF:

E-19J

Michael Wyatt, Project Manager
St. Paul District, U.S. Army Corps of Engineers, PD-F
180 Fifth Street East, Suite 700
St. Paul, Minnesota 55101-1678

Re: Draft Marsh Lake Ecosystem Restoration Project Feasibility Report, Environmental Assessment and Draft Finding of No Significant Impact

Dear Mr. Birkenstock:

The U.S. Environmental Protect Agency has reviewed the above-mentioned document in accordance with our responsibilities under the National Environmental Policy Act, the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act.

The geographic area for the Marsh Lake project includes Marsh Lake, the Pomme de Terre River outlet, the Marsh Lake Dam, and the upper portion of the Lac qui Parle reservoir. The stated purpose of the proposed project is to restore the aquatic and riparian ecosystems in the Marsh Lake project area. EPA has only one comment to offer pertaining to the Tentatively Selected Plan.

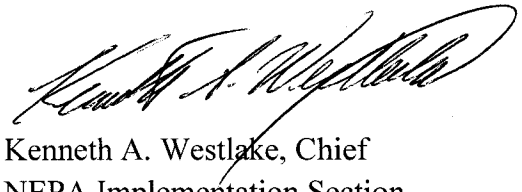
The lower Pomme de Terre River supports a diverse mussel community with two state-listed mussel species – elktoe and black sandshell. Mussels in the lower reach of the channelized Pomme de Terre River below the lower cut-off dike would no longer be located in a flowing river and would likely die following restoration activities. Likewise, mussels currently found in the locations of the proposed cut-off dikes would be buried. As these mussel species are not federally-listed species, there is no federal interest in a large-scale mussel relocation effort. The Minnesota Department of Natural Resources (MnDNR) is planning to monitor the recolonization of the restored river channel as part of the project. We encourage MnDNR to harvest mussels from the impact areas and temporarily relocate and stock them into the restored river channel. This effort is appropriate, given the low population numbers of most mussel species, and the relatively low cost of this effort in light of the overall project cost. It would dovetail with MnDNR's plan to monitor recolonization of the restored river channel.

EPA commends the Army Corps of Engineers (ACE) and MnDNR for addressing the need for ecosystem restoration in the study area. We acknowledge that problems in the Marsh Lake ecosystem are symptoms of larger watershed issues (i.e., high sediment and nutrient loading). As stated in the EA, the ongoing Minnesota River Basin Watershed, Water Quality and Ecosystem Restoration Study is designed to explore possible alternatives for watershed improvement, water quality management, and ecosystem restoration throughout the Minnesota River Basin. We realize potential solutions for watershed improvement may be outside of ACE's authority. Nevertheless, a comprehensive study outlining the full array of problems plaguing the basin and possible solutions creates opportunities for unique partnerships to develop and address basin-wide problems.

Lastly, we commend ACE for including potential climate change-related impacts into the analysis.

We appreciate the opportunity to comment on this project. If you have any questions regarding the contents of this letter, please do not hesitate to contact me or Kathleen Kowal of my staff at (312) 353-5206 or via email at kowal.kathleen@epa.gov.

Sincerely,



Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Enforcement and Compliance Assurance

Appendix P – Sediment Resuspension/Aquatic Plant Growth

Modeling the Effects of Fetch Reduction on the Potential for Persistence of Sago Pondweed in Marsh Lake, Minnesota River System

2 April, 2010

William F. James
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Objectives:

The objectives of this research were to explore the potential for improving underwater light climate in shallow Marsh Lake (Minnesota) to promote growth and reproduction of Sago Pondweed for waterfowl habitat. An empirical sediment resuspension model was used to evaluate the effects of island establishment on reduction in fetch and wind-generated sediment resuspension, and improvement in light attenuation. A submersed macrophyte growth model (SAGO) was used to evaluate the potential for growth and persistence of Sago Pondweed under current and future conditions.

Methods:

The critical bottom shear stress (τ_c) of sediments in Marsh Lake was determined experimentally using a particle entrainment simulator (PES) designed exactly as described by Tsai & Lick (1986). The PES consisted of a vertically-oscillating, perforated acrylic grid that was driven by a computer-controlled motor. The grid was positioned so that the bottom of its oscillation cycle occurred exactly 5.08 cm (2 inches) above the interface of an intact sediment core. A cam on the motor shaft allowed the grid to oscillate up and down for a distance of 2.54 cm (1 inch).

Intact sediment cores, 10 cm in depth, were collected using a 15 by 15 cm box corer (Wildco Wildlife Supply Company, Saginaw, Michigan) for determination of τ_c. The sediment contained in the box corer was transferred to a 13 cm (5 inch) diameter by 20 cm acrylic cylinder by carefully slipping the cylinder over the sediment enclosed by the box core sleeve and sliding a thin plexiglass disk underneath the cylinder to contain the sediment. The sediment cores were stored in cushioned coolers filled with water and transported to the laboratory via vehicle with water overlying the sediment to minimize changes in physical characteristics (moisture content and density) that would have occurred due to desiccation. In the laboratory, the overlying water was removed and 1.36

L (to a height of 5 inches) of local tap water was then carefully siphoned onto the sediment surface of the sediment core system.

To determine τ_c, the motor of the PES was programmed to oscillate above the sediment interface in a stepwise manner from 0 to 800 revolutions per minute (RPM) at 100 RPM increments every 10-min intervals. At 8 min into each RPM cycle, a 50 mL sample was collected 2.54 cm below the water surface using a peristaltic pump. Water removed as a result of sampling was simultaneously replaced with filtered lake water using a peristaltic pump. Samples were analyzed for TSS and turbidity. Values were corrected for dilution effects by replacement water. RPM was converted to τ using the calibration curve developed by Tsai & Lick (1986; Fig. 5, page 317) for levels ranging between 430 and 750 RPM. I used linear interpolation to estimate τ for levels that occurred below 450 RPM and above 750 RPM. Thus, τ ranged from 0 to nearly 6 dynes cm^{-2}. The τ_c was estimated as the inflection point where TSS and turbidity increased in the water column above background conditions. Sediment collected at historical station 1 (James and Barko 1994) was used to determine τ_c. Sediment resuspension was predicted to occur at this station when calculated bottom τ exceeded τ_c.

The theoretical bottom τ was calculated as:

$$\tau = H\left[\frac{\rho\left(\upsilon(2\pi / T)^3\right)^{0.5}}{2\sinh(2kh)}\right]$$

where τ is the calculated bottom shear stress, H is the wave height (cm), ρ is the density of water (1 g cm^{-3}), T is the wave period (s), v is the kinematic viscosity, k is the wave number (2π/L where L = wave length, cm), and h is the water depth (cm). Since H, T, and L are related to effective fetch (CERC 1977), shear stress will change (i.e., decline) as a function of decreasing fetch due to island placement.

The concentration of TSS (C_{TSS}; mg L^{-1}) in the water column at station 1 was predicted using the equation (Bengtsson & Hellström, 1992; Hamilton & Mitchell, 1996; Bailey & Hamilton, 1997):

$$C_{TSS} = C_e + C_{background} + (C_i - C_e - C_{background}) \bullet \exp\left(\frac{-\omega_s}{h} t\right)$$

where C_e is the TSS equilibrium concentration when sediment resuspension balances sediment deposition, $C_{background}$ is the TSS concentration under quiescent periods, C_i is the initial TSS concentration, ω_s is the depth-averaged settling velocity (cm s^{-1}), h is the depth of the water column (cm), and t is the time step (seconds). The ω_s of particles was determined via particle size analysis (Plumb 1981). C_e was estimated from the following equation:

$$C_e = 0$$

when $\tau_c < \tau$

$$C_e = A\left(\frac{\tau - \tau_c}{\tau_{ref}}\right)^n$$

when $\tau_c > \tau$

where τ_{ref} is 1 dyne cm^{-2} (i.e., to make τ dimensionless; Luettich et al., 1990; Hamilton and Bailey 1996); and A and n are constants determined via regression analysis of resuspended TSS concentration versus excess τ. The resuspension model was calibrated against TSS information collected at station 1 in 1992 (James and Barko 1994). A summary of values used as model parameters for determination of TSS are shown in Table 1.

The model POTAM (Best and Boyd 2003a and b) was used to simulate Sago Pondweed growth and tuber production at station 1 under 1992 conditions with and without fetch reduction due to island establishment. Inputs to the model included a daily light attenuation coefficient (k_d), water depth, and water temperature. k_d was estimated from simulated TSS using the regression relationship $k_d = 0.097 \cdot TSS + 0.942$ developed for Peoria Lake, Illinois (James et al. 2004). The model was initialized using model defaults developed for northern temperate regions of the United States. The initial tuber dry mass was 0.155 g DW tuber^{-1}, the dormant tuber number density was 240 tubers m^{-2}, and the tuber number per plant was set at 8. The model was run for a 5 year period using estimated daily k_d for 1992 as input for each year. The tuber dry mass produced at the end of the growing season was used as input for the next year and so on.

Summary of Results:

Variations in turbidity versus shear stress for an intact sediment core subjected to the particle entrainment simulator are shown in Figure 1. Turbidity was low and relatively constant below 2 dynes cm^{-2}. Above a critical shear stress of 2.3 dynes cm^{-2}, turbidity increased substantially. During 1992, high TSS concentrations in the water column coincided with peaks in wind speed in May, mid-June, and September through November (Figure 2). There was generally good agreement between simulated and observed TSS. The model overpredicted TSS in May; however, observed values represented an average of a daily sample that was composited at 8-hour intervals whereas simulated results represented instantaneous values.

Variations in mean daily TSS and daily k_d and mean effective fetch before and after island establishment are shown in Figure 3. Under 1992 conditions, daily TSS and k_d were very high during period of sediment resuspension, coinciding with large fetches during periods of high winds. Simulated daily TSS and kd declined in June and early September as a result of reduced fetch after island establishment.

POTAM simulations suggested that Sago Pondweed shoot biomass and tuber production were impacted as a result of frequent resuspension and low k_d (Figure 4). Low tuber dry mass after the first year of growth resulted in low shoot and tuber biomass production during the second year. Growth and persistence was unsustainable over the 5-year period. In contrast, simulated Sago growth and tuber production were persistent under conditions of island establishment. Maximum shoot biomass, tuber dry mass density and dry mass per tuber for September are shown in Figure 5. In general, model simulations suggested that island establishment and fetch reduction resulted in improvement in underwater light condition for successful Sago growth and persistence over a five year period.

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Best, E. P. H., & W.A. Boyd. 2003a. POTAM (Version 1.0): A Simulation Model for Growth of Sago Pondweed. ERDC/EL SR-03-1, U. S. Army Engineer Research and Development Center, Vicksburg, MS.

Best, E. P. H., & W.A. Boyd. 2003b. A Simulation Model for Growth of the Submersed Aquatic Macrophyte Sago Pondweed (*Potamogeton pectinatus L.*). ERDC/EL TR-03-6, U. S. Army Engineer Research and Development Center, Vicksburg, MS.

Coastal Engineering Research Center, 1984. Shore protection manual, Volume 1. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, USA.

Hamilton, D.P., & S.F. Mitchell, 1996. An empirical model for sediment resuspension in shallow lakes. Hydrobiologia 317**:** 209-220.

James, W.F., & J.W. Barko, 1994. Macrophyte influences on sediment resuspension and export in a shallow impoundment. Lake and Reservoir Management 10:95-102.

Luettich, R.A., D.R.F. Harleman, & L. Somyódy, 1990. Dynamic behavior of suspended sediment concentration in a shallow lake perturbed by episodic wind events. Limnology and Oceanography 35: 1050-1067.

Plumb, R.H., 1981. Procedures for handling and chemical analysis of sediment and water samples. Technical Report EPA/CE-81-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi

Tsai, C.H., & W. Lick, 1986. A portable device for measuring sediment resuspension. Journal of Great Lakes Research 12:314-321.

Table 1. Values used as model parameters for estimating TSS in Marsh Lake.

Parameter	Value	
τ_c	2.3	dynes cm^{-2}
A	1275	
n	0.8	
ω_s	0.0005	cm s^{-1}
h	0.6	m
t	15	min
$C_{background}$	20	mg/L
$C_{initial}$	20	mg/L

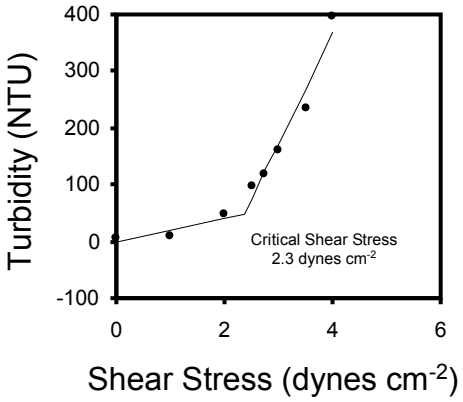


Figure 1. Variations in turbidity versus applied shear stress measured in the laboratory using a particle entrainment simulator.

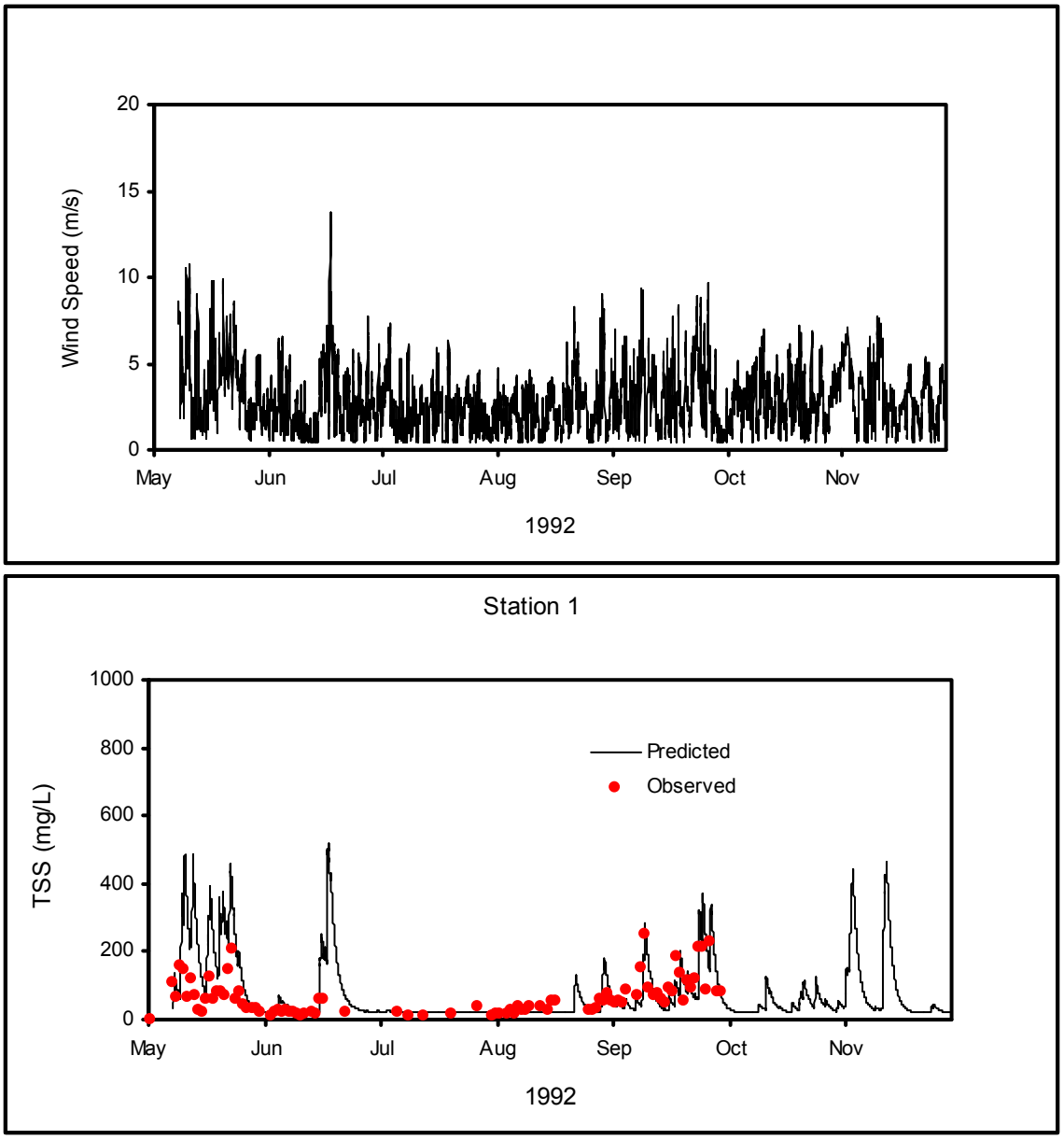


Figure 2. Seasonal Variations in wind speed (upper) and predicted versus observed total suspended sediment (TSS; lower).

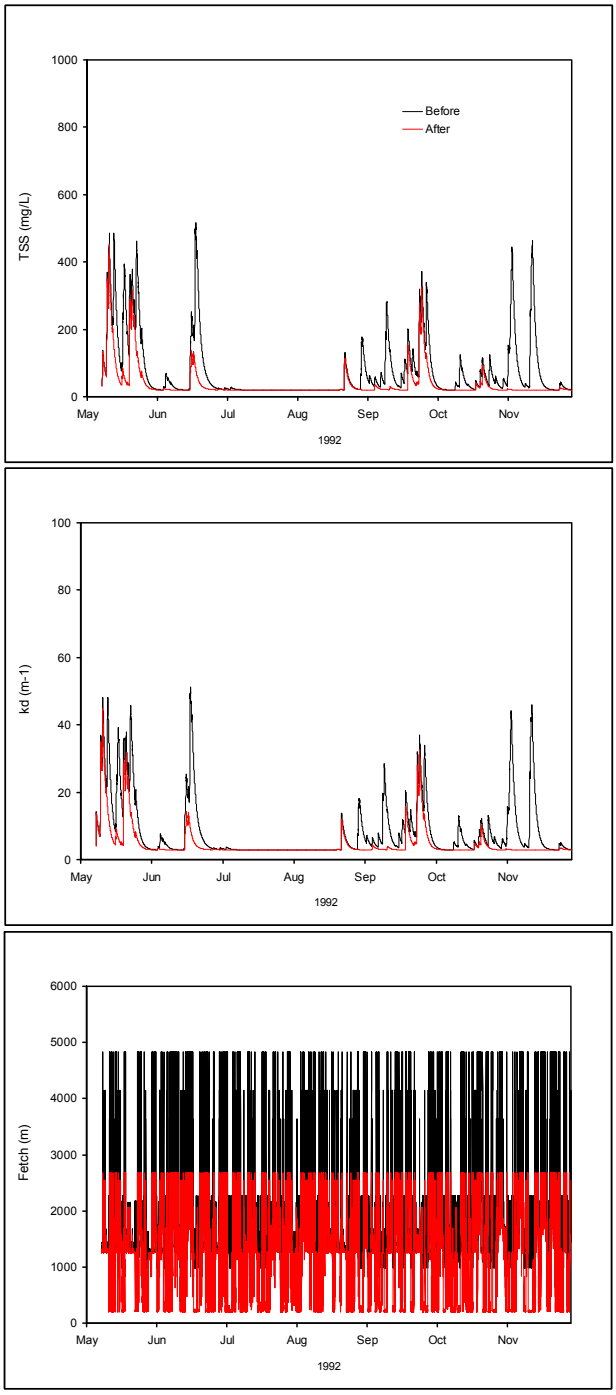


Figure 3. Seasonal variations in simulated total suspended sediment (upper), the light attenuation coefficient (middle), and effective fetch (lower) before and after island establishment in Marsh Lake.

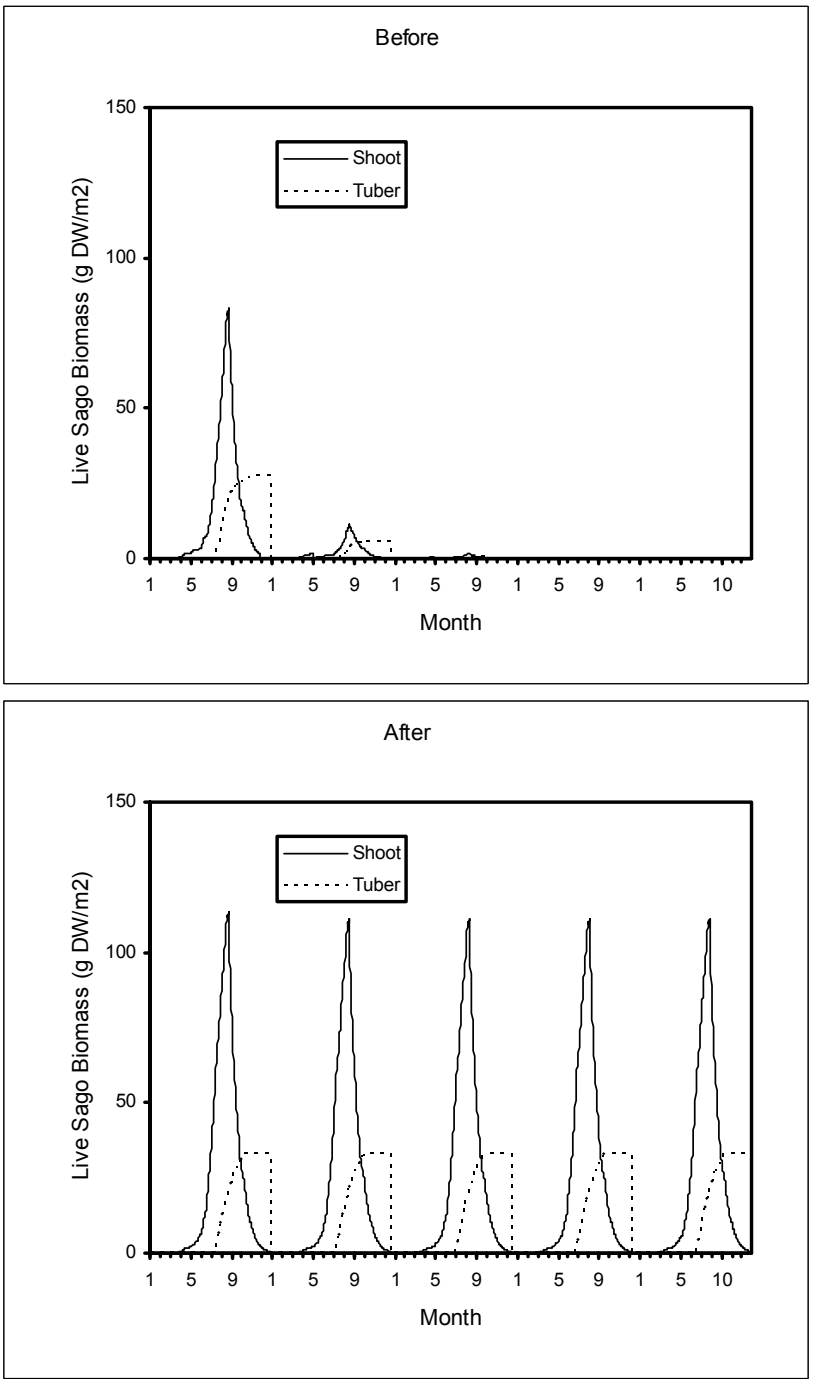


Figure 4. Variations in live sago shoot and tuber biomass over a 5 year period before (upper) and after (lower) island establishment in March Lake.

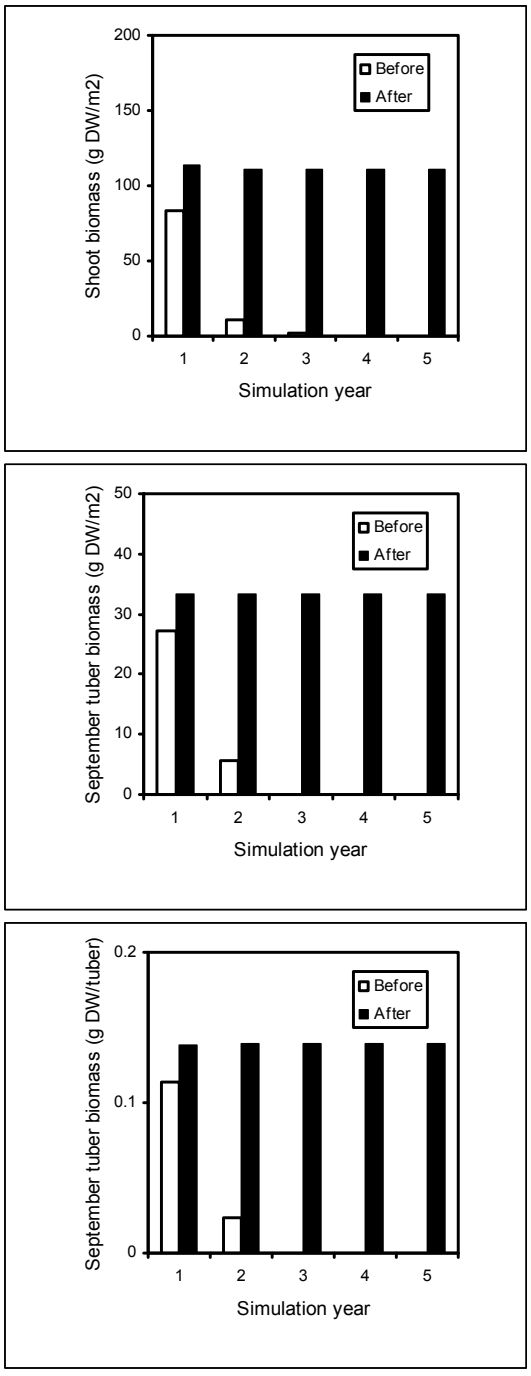


Figure 5. Variations in simulated maximum Sago shoot biomass (upper), tuber density (middle), and tuber biomass in September (lower) over a 5 year period before and after island establishment.

Appendix Q – Mussel Survey

Lower Pomme de Terre River Channel Restoration – Pre-project Mussel Surveys, 2007 and 2010

Introduction

Currently, the channelized lower Pomme de Terre River flows into Marsh Lake flowing a short distance to the overflow spillway at Marsh Lake Dam. Bed sediment has been depositing a delta in Marsh Lake, and the suspended sediment flows into the Minnesota River and on into Lac qui Parle. Rerouting the lower Pomme de Terre River to its former channel and floodplain at the confluence with the Minnesota River downstream of Marsh Lake Dam (Figure 1) would restore natural floodplain processes. Sediment would be deposited overbank in the floodplain during higher discharge events. The Pomme de Terre River would be re-routed into its former channel in a meander loop upstream of Marsh Lake Dam and into the longer former channel downstream of the Marsh Lake Dam by constructing earthen cut-off dikes (Figure 1).

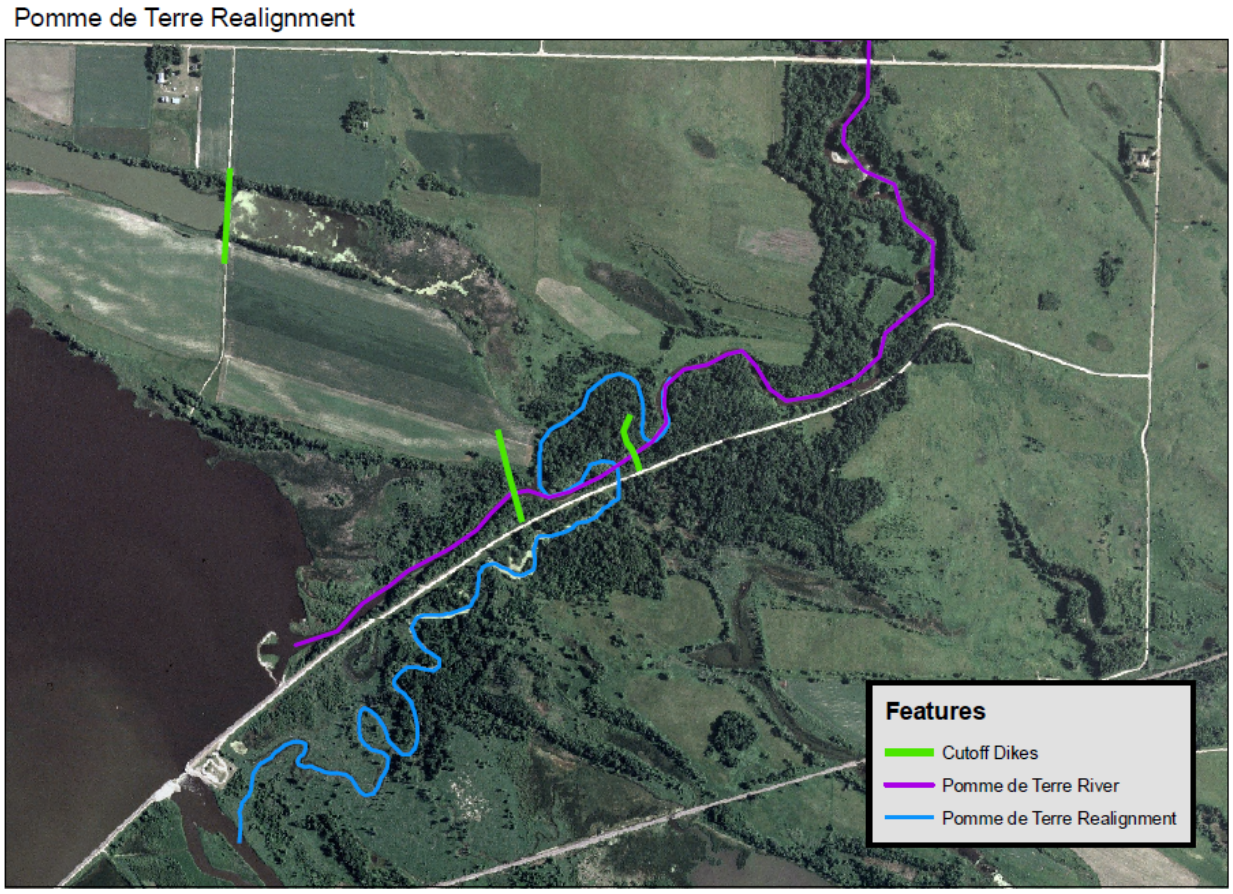


Figure 1. Lower Pomme de Terre River showing the current channelized reach cutoff dikes and proposed realignment with the historic channel.

The lower Pomme de Terre River supports an abundant and diverse mussel community. Mussels in the lower reach of the channelized Pomme de Terre River below the lower cut-off dike would no longer be in a flowing river and would probably die eventually. Mussels in the locations of the cut-off dikes would be buried. Mussels are expected to recolonize the reconnected segments of the old channel over time. Mussel surveys were designed to allow for monitoring the impact to mussels in the proposed cut off areas, the ongoing status of mussels in a reference area upstream of the channel realignments, and colonization of the reconnected channel segments that presently do not support mussels.

Methods – timed searches

In 2007 and 2010, timed searches for mussels were done at five sites within the area of channel to be cutoff during the project and five within a reference reach upstream of the proposed channel realignment (Figure 2).

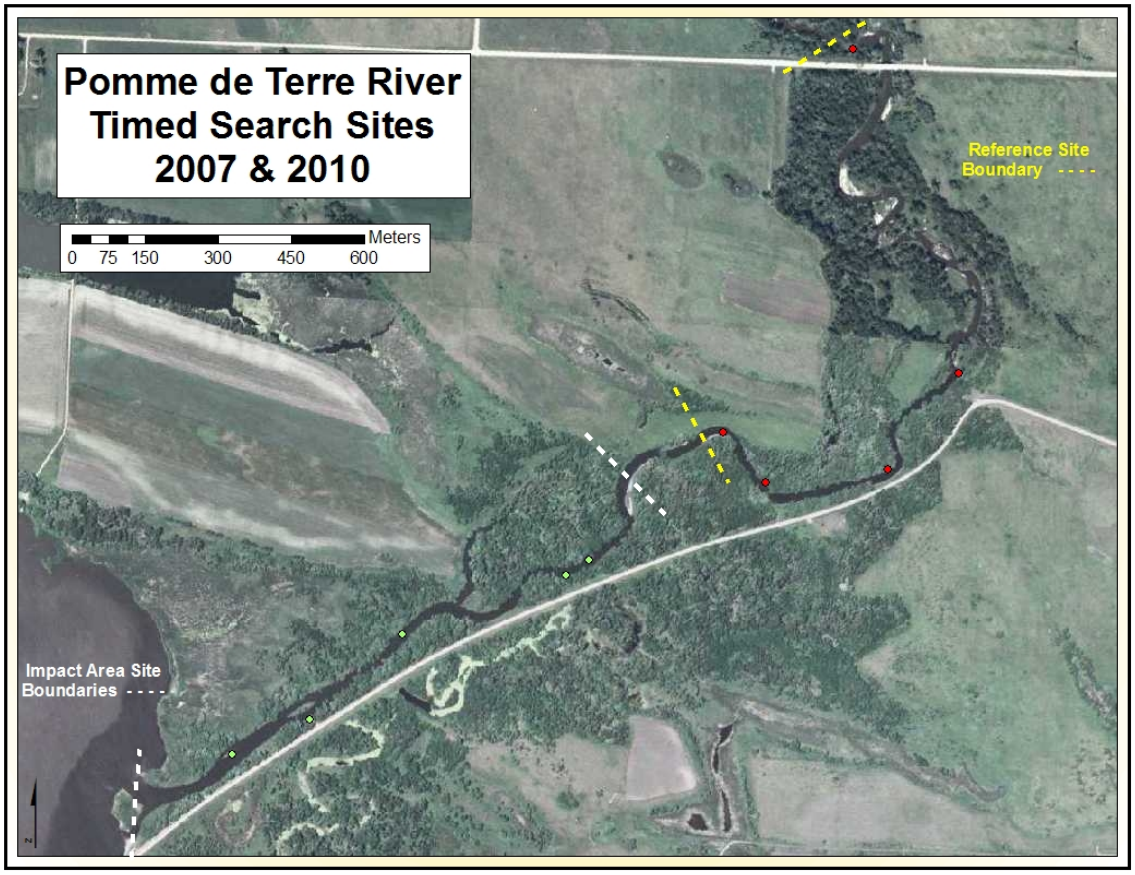


Figure 2. Timed search sample sites in the lower Pomme de Terre River.

Timed searches were conducted by wading, snorkeling or SCUBA diving. In turbid water like we encountered in the Pomme de Terre, searching is mostly by feel with the searcher sweeping the bottom surface and digging into the substrate a few centimeters to find mussels. After a period of time, usually 20-30 minutes for each person searching, all live mussels and empty shells collected are brought to shore and sorted and enumerated by species. Catch Per Unit Effort (CPUE) is calculated for each site by dividing the number of live mussels collected by the time spent searching. Each species is then sorted into two age categories; ≤5 years and >5 years. For each species collected the minimum and maximum lengths represented in each age category is recorded. Species collected only as empty shells were recorded as fresh dead, weathered dead, or in sub-fossil condition. All live mussels were returned to the river by scattering them within the collection area.

Methods – quantitative sampling

We used a systematic sampling approach with a random start for quantitative sampling. Systematic sample sites form a grid pattern that eliminates the potential for odd clustered groups of sample sites that are common with simple random sampling plans (Cochran 1977). When establishing a grid using ArcMap software it often will include sample sites that are not actually in the target area (a meandered river channel), these are eliminated from actual sampling as needed during the field work. Figure 3 shows the quantitative sampling sites on the Pomme de Terre River.

Samples are collected using a ¼ m^2 aluminum frame with a 6.35 mm square mesh bag attached. Each quadrat sample site is located by navigating with a GPS unit programmed with the systematic grid of sites to be sampled. Upon reaching the coordinates of a site the sample frame is dropped to the bottom and the material within the frame is scooped into the attached bag, excavation within the frame is to a depth of approximately 15 cm. When the excavation of bottom material is complete the frame and bag are rinsed in the water to remove material smaller than 6.35mm. Any remaining material is placed on a sorting platform where any mussels or shells are removed, species identified, aged by counting growth arrest rings (assumed to be annual), and total length recorded to the nearest millimeter using a caliper. Samples collected in this way are assumed to be free of the bias that samples collected by sight or touch would introduce, sometimes producing different results in terms of species relative abundance (small species may be under sampled when search methods depend on the collectors skills and experience) or size distributions within a species' population.

Data was collected from 97 quadrat samples within the impact area and 141 samples within the reference area (Figure 3). To estimate the surface area of the river in each area a polygon was created by tracing the shoreline in 2009 aerial photo using ArcMap to calculate the area in square meters.

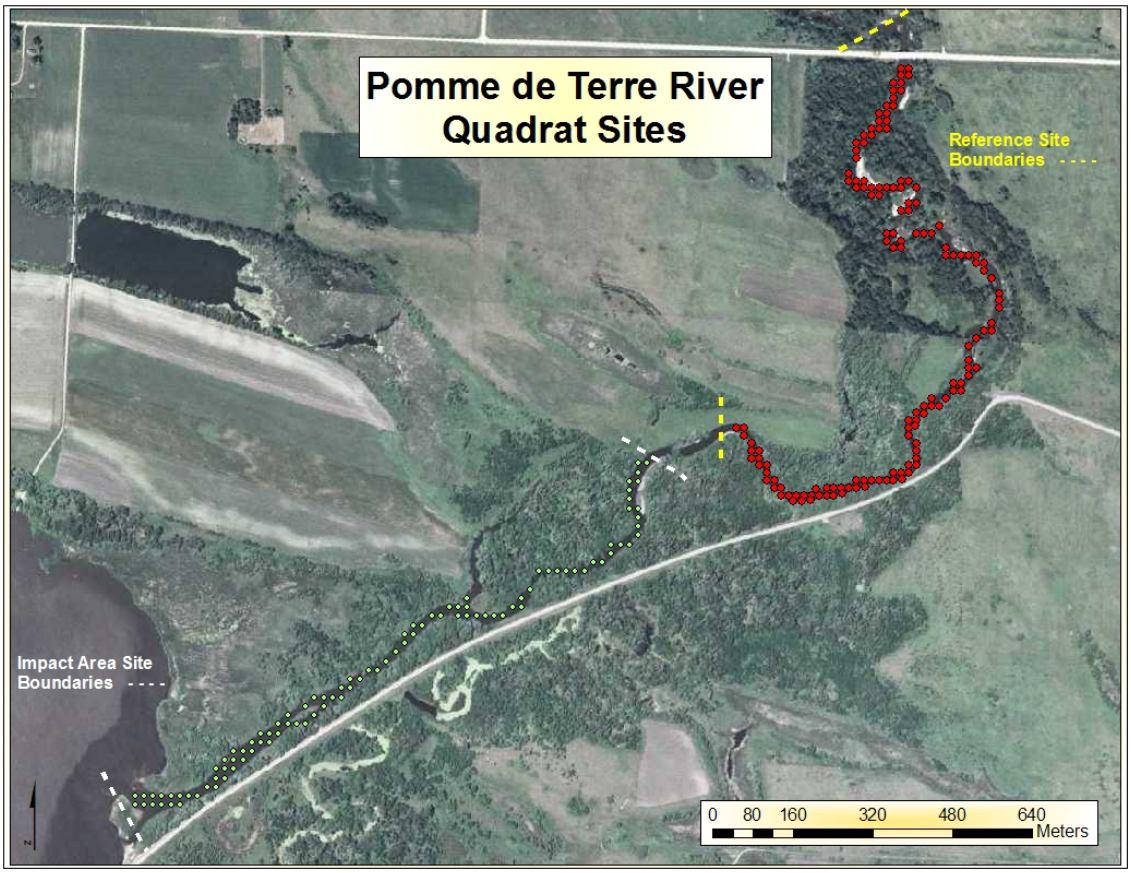


Figure 3. Quantitative sample sites in the lower Pomme de Terre River.

Results – timed searches

Timed searches in the impact area produced 1,457 live mussels representing 11 species (Table 1), including *Ligumia recta* (black sandshell) a species of Special Concern in Minnesota that was collected at all 10 timed search sites. *Amblema plicata* (threeridge) was the species collected in greatest abundance. CPUE in the impact area ranged from a low of 0.8 mussels/minute to a high of 6.12 mussels/minute (Figure 4.).

Impact area

Species	**Number**

	Found Live
Threeridge	
Amblema plicata	938
Plain Pocketbook	
Lampsilis cardium	162
Deertoe	
Truncilla truncata	117
Fat Mucket	
Lampsilis siliquoidea	96
Pigtoe	
Fusconaia flava	51
Black Sandshell	
Ligumia recta	33
Pink Heelsplitter	
Potamilus alatus	21
White Heelsplitter	
Lasmigona complanata	18
Fragile Papershell	
Leptodea fragilis	16
Giant Floater	
Pyganodon grandis	3
Creeper	
Strophitus undulatus	2
Grand Total	**1,457**

Table 1. Relative abundance of mussel species collected during timed searches in the Lower Pomme de Terrre impact area.

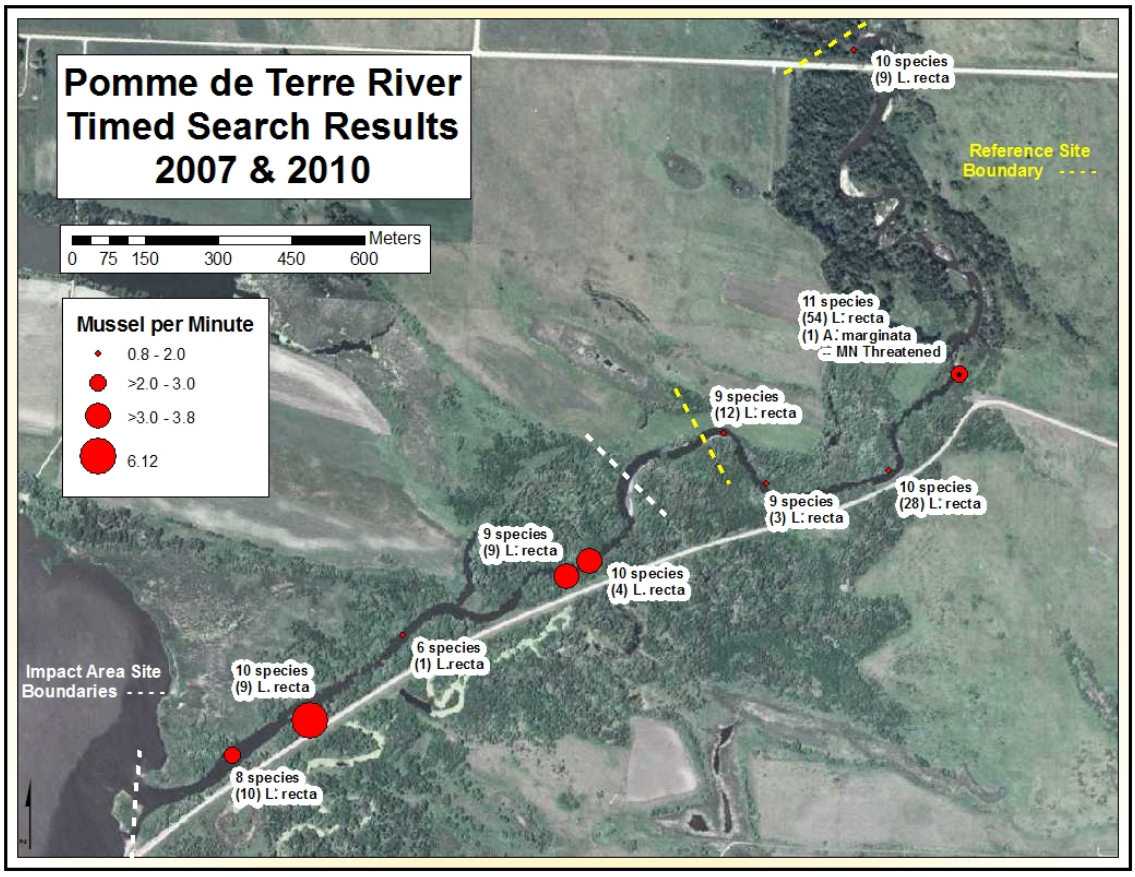


Figure 4. Timed search results in the Pomme de Terre River.

Timed searches in the reference area produced a total of 1,037 live mussels representing 11 species including *Alasmidonta marginata* (elktoe) a state Threatened species and *Ligumia recta* (black sandshell) a state species of Special Concern (Table 2).

Reference Area

Species	Number Found Live
Plain Pocketbook	
Lampsilis cardium	412
Threeridge	
Amblema plicata	285
Black Sandshell	
Ligumia recta	106
Fat Mucket	
Lampsilis siliquoidea	88
Pigtoe	
Fusconaia flava	46

Deertoe	
Truncilla truncata	45
Pink Heelsplitter	
Potamilus alatus	20
Creeper	
Strophitus undulatus	13
Fragile Papershell	
Leptodea fragilis	13
White Heelsplitter	
Lasmigona complanata	8
Elktoe	
Alasmidonta marginata	1
Grand Total	**1037**

Table 2. Timed search results in the reference area, lower Pomme de Terre River.

CPUE at sites within the reference area were lower with a maximum of 3.76 mussels/minute (Figure 4).

Results – Quadrat sampling

Data were recorded from 97 ¼ M^2 quadrats within the impact area (Figure 3). Fifty-two live mussels representing 8 species were collected. *Truncilla truncata* (deertoe) was the most abundant species found in quadrat samples within the impact area (Table 3). A single specimen of the state Threatened elktoe mussel was collected during this sampling. Density in live mussels/M^2 is estimated by dividing the number of live mussels by the number of samples and dividing the result by the fraction of a square meter sampled (¼ $M^{2)}$. In this case (52 live mussels/97 samples)/(1/4 M^2 /sample) = 2.14 live mussels/M^2. Using the estimated area of the sampled river reach the mussel population can be estimated by multiplying the density by the area; in the impact area (2.14 live mussels/M^2)(33,330 M^2 impact area) = 71,470 live mussels/impact area (Table 4).

Impact Area

Species	Number Found Live
Deertoe	
Truncilla truncata	27
Plain Pocketbook	
Lampsilis cardium	9
Threeridge	
Amblema plicata	7
Fragile Papershell	
Leptodea fragilis	2
Wabash Pigtoe	
Fusconaia flava	2
Creeper	
Strophitus undulatus	2
Fat Mucket	
Lampsilis siliquoidea	2
Elktoe (Threatened)	
Alasmidonta marginata	1
Grand Total	**52**

Table 3. Species abundance from quadrat results in impact area.

Impact Area		Population Estimate
Mean(no/m^2)	2.103093	70,096.1
SD	3.790021	
SE	0.384818	
95%UCL (Upper Confidence Limit)	2.857337	95,235.0
95%LCL (Lower Confidence Limit)	1.348849	44,957.1

Table 4. Population estimate for Impact Area.

Data were recorded from 141 ¼ M^2 quadrats within the reference area (Figure 3). Forty one live mussels were found representing 8 species including the state species of Special Concern black sandshell. Relative abundance of mussel species collected in the reference area differed from the impact area in that *Lampsilis cardium* (pocketbook) was the most abundant species. (Table 4).

Density of live mussels was (41 live mussels/141 samples)/(1/4 M^2 /sample) = 1.16/M^2 From the mussel density and estimated size of the reference area, the number of live mussels occupying the reference area is (1.16 live mussels/M^2)(34,030 M^2 impact area) = 39,581 live mussels (Table 5).

Reference Collection Area	
Species	**Number Found Live**
Plain Pocketbook	
Lampsilis cardium	16
Threeridge	
Amblema plicata	9
Deertoe	
Truncilla truncata	7
Black Sandshell (Special Concern)	
Ligumia recta	3
Wabash Pigtoe	
Fusconaia flava	2
Fat Mucket	
Lampsilis siliquoidea	2
Pink Heelsplitter	
Potamilus alatus	1
Fragile Papershell	
Leptodea fragilis	1
Grand Total	**41**

Table 5. Quadrat results from Reference area.

Reference Area	Density	Population Estimate
Mean(no/m^2)	1.163120567	39,580.99291
SD	1.943355938	
SE	0.163660094	
95%UCL (Upper Confidence Limit)	1.483894351	50,496.92476
95%LCL (Lower Confidence Limit)	0.842346784	28,665.06105

Table 6. Population estimate for Reference Area

Twelve species of live mussels were collected by all sampling methods during these surveys and a single species was collected only as a weathered dead shell at a single site, *Anodontoides ferussacianus* (cylinder mussel), a species typically found in headwaters creeks.

Populations of the three most abundant mussel species (deertoe, pocketbook and threeridge) varied in age distribution by area (Figure 7). Most notably there was considerable evidence for ongoing recruitment of deertoe in the impact area but very little in the reference area and no evidence for recent recruitment of threeridge in the impact area.

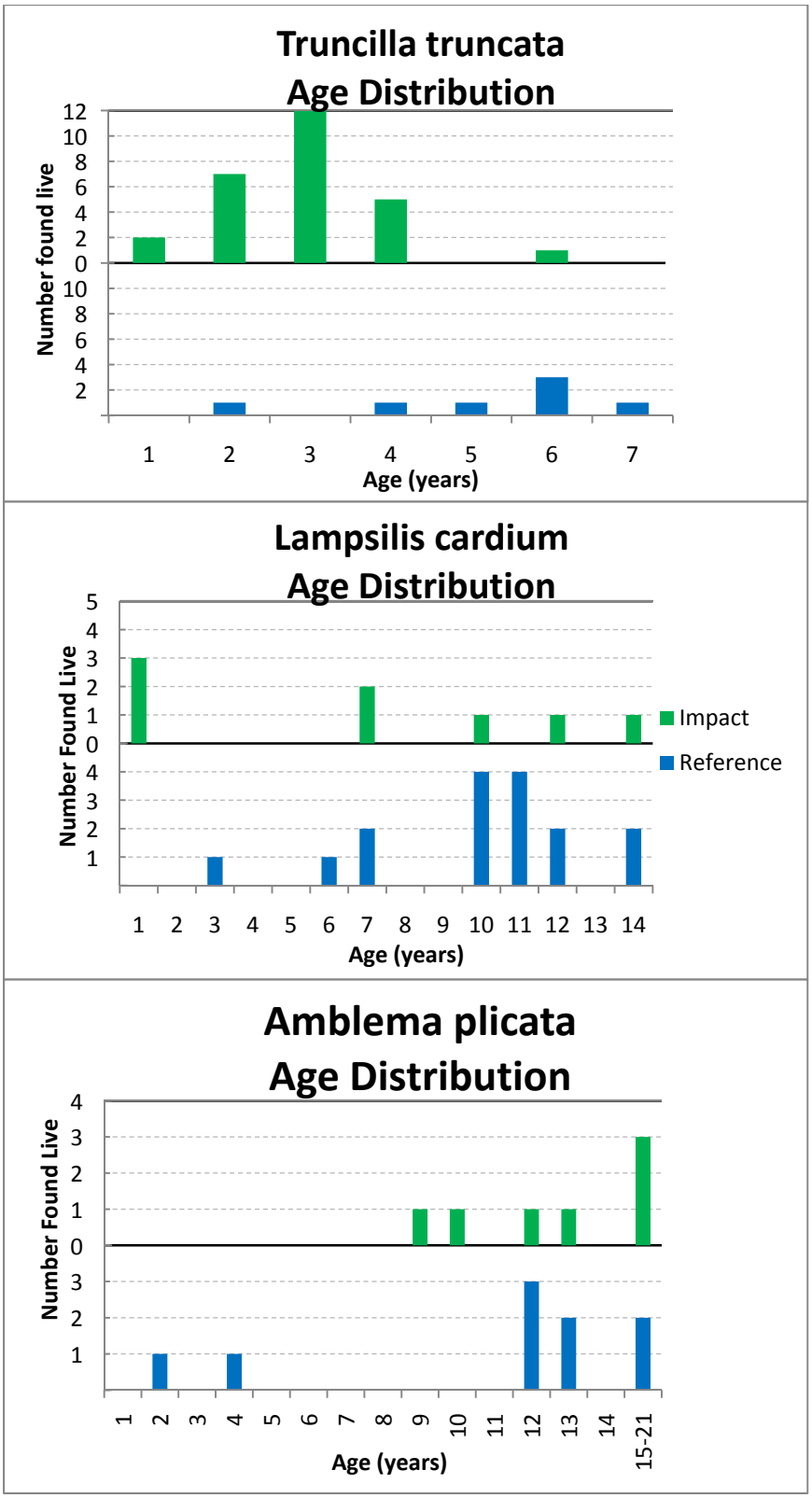


Figure 7. Age distribution of the three most abundant mussel species in the lower Pomme de Terre River from quadrat data.

Discussion

Physical habitat within the two areas differed in that the impact area appeared to be more stable as the river neared Marsh Lake and the river's delta. Stability and the predominance of firm sandy substrate (Figure 6) may favor the establishment of mussel populations. In the reference area the channel appeared to be quite unstable, with actively eroding outside bends, and had recently abandoned some channel segments while forming new channels though the floodplain forest. Many trees were in the process of being washed into the river often making it difficult to traverse. Substrate in the reference area appeared to be unstable and freshly deposited, even gravel and cobble deposits were soft and easily penetrated when traversed on foot. Quantitative data on the hydrogeomorphic characteristics of these two areas were not available for comparison at the time of this report.

Mussels were considerably more abundant in the impact area than in the reference area (density of 2.12 vs. 1.16). Relative abundance of the top three species collected during surveys also differed with deertoe mussels the most abundant in the impact area and pocketbook mussels most abundant in the reference area (Figure 5). It is likely that the estimated 70,000 mussels in the impact area will be adversely affected by the channel rerouting that will cut off Pomme de Terre River flows. These affects will depend on the final restoration plan but could result in the loss of most or all of the existing mussel population in the cutoff channels. Options for mitigating the loss of existing mussels could range from no action and accepting loss to translocation of some mussels, or provision of a minimum flow into the cutoff channels through the cutoff dikes. It is hypothesized that the reconnected former river channel will be colonized by mussels recruited from upstream and from the Minnesota River below the Marsh Lake Dam, replacing any loss of mussels from the impact area over time.

Future surveys within the impact area will document any changes that occur in the existing mussel population. Reference area sampling in the future will serve as an index to changes in the mussels that may be unrelated to this project. Sampling within the reconnected channel will be done in years following project completion and accomplished using comparable methods to determine the rate of mussel recolonization.

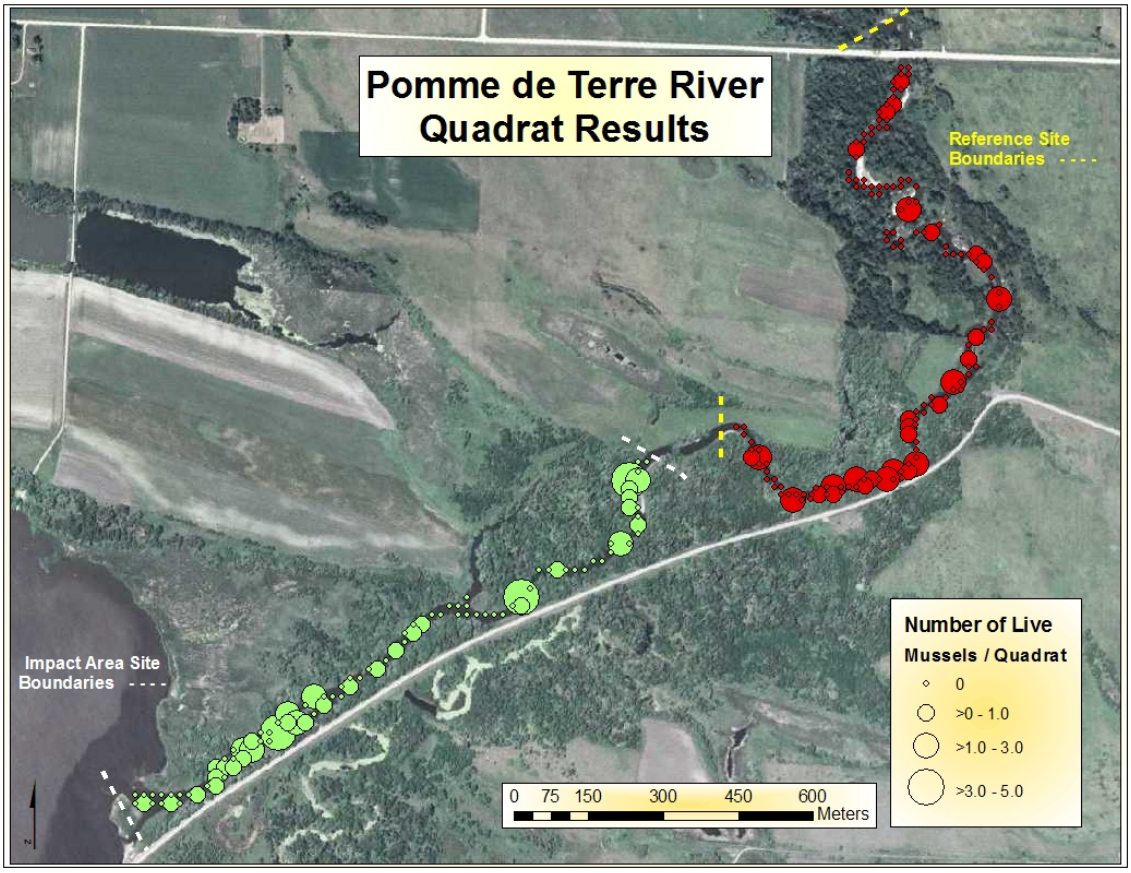
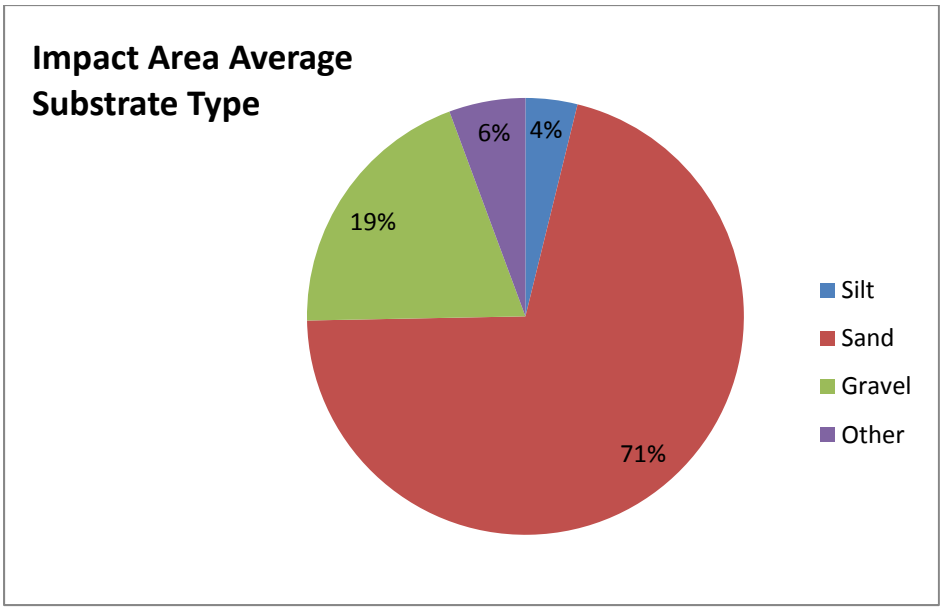


Figure 5. Abundance of live mussels collected in quadrat sample s in the impact and reference areas.



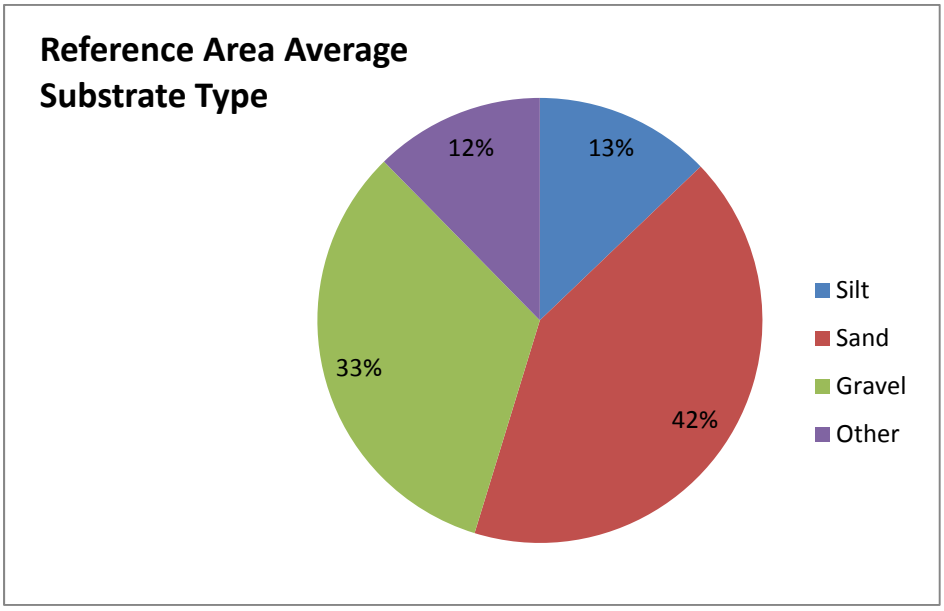


Figure 6. Distribution of substrate types estimated at quadrat sites.

References: Cochran W.G. 1977. *Sampling Techniques. Wiley series in probability and mathematical statistics-applied. John Wiley and Sons. New York.*

Appendix R – Adaptive Management and Monitoring Plan

Appendix R

Monitoring and Adaptive Management

Marsh Lake Ecosystem Restoration Project

Minnesota River

Big Stone, Lac qui Parle, and Swift Counties, Minnesota

April 2011

Introduction

Adaptive management (AM) is a structured process of learning by doing and adapting based on what's learned. AM is a process that promotes flexible decision making and implementation that can be adapted as outcomes from management actions become better understood. Careful monitoring of outcomes advances scientific understanding and helps adjust policies or operations as part of an iterative learning process.

Section 2039 of WRDA 2007 directs the Secretary of the Army to ensure that when conducting a feasibility study for ecosystem restoration that the recommended project includes a plan for monitoring the success of the ecosystem restoration. The monitoring plan shall include a description of the monitoring activities, the criteria for success, and the estimated cost and duration of the monitoring as well as specify that monitoring will continue until such time as the Secretary determines that the success criteria have been met. Within a period of ten years from completion of construction of an ecosystem restoration project, monitoring shall be a cost-shared project cost. Any additional monitoring required beyond ten years will be a non-Federal responsibility.

Monitoring and Evaluation of the Response of Native Mussels to Pomme de Terre River Restoration

The native mussel community in the Pomme de Terre River is described in Section 2.8.7 of the main report. The alternative measure to restore the Pomme de Terre River to its former channel is described in Section 4.1.4.

The lower Pomme de Terre River supports an abundant and diverse mussel community with two state-listed threatened and endangered species. Mussels in the lower reach of the channelized Pomme de Terre River below the lower cut-off embankent would no longer be in a flowing river and would probably die. Mussels in the river channel in the footprint of the cut-off embankment would be buried. Mussels are expected to recolonize the restored historic channel of the Pomme de Terre River after the fine-grained sediment that has been deposited there is washed out. Uncertainty exists about the recolonization of native mussels in the restored Pomme de Terre River channel.

Restoring the native mussel community in the historic channel of the Pomme de Terre River is not one of the project objectives and there have been no performance criteria set to evaluate ecological success. There are no Federally-listed endangered or threatened species in the Pomme de Terre River. A mussel relocation effort prior to construction is not in the Federal interest. The Minnesota Department of Natural Resources (DNR) may choose to relocate mussels from the impact area to other parts of the Pomme de Terre River.

Based on discussions with the DNR, restoring the Pomme de Terre River to its former channel includes pre-project monitoring to quantitatively characterize the mussel community and to estimate impacts of construction. Post construction monitoring would include a series of mussel and habitat surveys in the restored river channel.

Pre-Project Monitoring

A reference reach of the Pomme de Terre River upstream of the impact area was surveyed for mussels in 2010 (Appendix Q). A systematic survey of the impact area of the lower Pomme de Terre River was done in 2010 by collecting 0.25 m2 randomly located quadrat samples (Appendix Q). Additional sites not sampled in the 2007 survey were sampled by qualitative timed searches to better assess the species richness of the mussel community. From these data a population estimate, population demographics and community composition descriptors were generated and will be used as perspective when characterizing the recruitment of mussels into the restored channel over time. A map of the river showing the density of mussels, number of mussels <3 years old, and number of species found at each collection site was generated (Appendix Q).

A cursory survey of several sites within the old channel consisting of wading and snorkeling where needed will be done prior to construction to support or refute the assumption that there are no live mussels currently in the former Pomme de Terre River channel to be restored. The former Pomme de Terre River channel to be restored has had six or more inches of silt deposited there since the river was diverted when the Marsh Lake Dam was built. Mussels are unlikely to occur there now.

Post-Construction Monitoring

Following three years of flow through the restored channel areas above and below the Marsh Lake Dam, the DNR will survey the restored river channel using qualitative timed searches at a minimum of 5 sites to assist in finding all species present and systematic quantitative sampling similar to that used within the impact area. This monitoring will be done three times at three year intervals. At least 100 0.25 m2 quadrat samples will be collected to allow for a population estimate of mussels that may have been recruited since restoration of flows. Mussels collected during this sampling will be identified to species, measured (TL) and growth arrest lines counted. Qualitative information on the substrate types represented at each sample will be estimated and recorded as a percent among 7 substrate categories: Woody debris, Organic Detritus, Silt, Sand, Gravel, Cobble, or Boulder. A map of the river showing the density of mussels, number of mussels <3years old, and number of species found at each collection site will be generated.

The pre-project monitoring of the existing mussel community and post-construction monitoring to assess reestablishment in restored channel, their habitat, and the ecosystem services they provide is an important part of this project to the DNR. Approaches to accomplish that include: organism identification, enumeration, and valuation using American Fisheries Society (AFS) replacement numbers; habitat mapping and valuation, and ecosystem service identification and valuation. The DNR will conduct the monitoring work, reporting and evaluation. A more complete experimental design will be developed in the detailed design phase of the project.

A comparison of the density, species composition and age structure of the native mussels in the restored channel to the pre-project mussel community in the Pomme de Terre River will allow assessment of the ecological success of mussels in recolonizing the restored channel. There are no performance criteria for mussels that would indicate a need to modify the project. This AM activity will provide increased understanding of the ecological effects of river restoration on native mussels.

Estimated cost for the lower Pomme de Terre pre-project survey and three years of post-project monitoring was provided by the DNR (main report Table 4-2). The estimated total cost of $128,000 includes data analysis and reporting.

Table 4-2 (from main report). Estimated cost of Pomme de Terre River survey and monitoring mussel recolonization in the restored Pomme de Terre River channel.

Tasks	Days	# Crews	Per Day/one crew	Report	Total
Est. Current Channel Pop & Reference site	6	2	$ 2,000.00	$ 2,000.00	$ 26,000.00
Evaluate New Channel	1	2	$ 2,000.00	$ 2,000.00	$ 6,000.00
Cutoff Channel Mussel Salvage	2	2	$ 2,000.00	$ 1,000.00	$ 9,000.00
Yr3 Monit; New Channel/Reference site	6	2	$ 2,000.00	$ 5,000.00	$ 29,000.00
Yr6 Monit; New Channel/Reference site	6	2	$ 2,000.00	$ 5,000.00	$ 29,000.00
Yr10 Monit; New Channel/Reference site	6	2	$ 2,000.00	$ 5,000.00	$ 29,000.00
				Total	$ 128,000.00

Project Objectives and Performance Criteria to Evaluate Success in Ecosystem Restoration

Performance criteria for each of the project objectives have been identified (Table 1). Performance criteria are SMART; Specific, Measurable, Achievable, Relevant, and Time-bound. The performance criteria set by the PDT include target values and ranges where appropriate, considering inter-annual variation, future management actions and natural disturbance regimes.

Table 1. Ecosystem objectives and performance criteria for the Marsh Lake Project.

Marsh Lake Project Ecosystem Objectives	Performance Criteria
1. Reduced sediment loading into Marsh Lake	Pomme de Terre River re-routed into Lac qui Parle.
2. Restored natural fluctuations to hydrologic regime in Marsh Lake	Maintain water levels in Marsh Lake at 938.3 feet or higher 70% of the time in August, and 937.6 feet or higher 70% of the time in September and October, excluding years in which a draw down is completed.
	Low growing season water levels as needed to restore aquatic vegetation.
	Low winter water levels (following growing season drawdowns) to reduce carp abundance in Marsh Lake.
3. Restored natural geomorphic and floodplain processes in Pomme de Terre River	Delta area of the lower Pomme de Terre River with more natural hydrologic regime, distributary complexity, rates of change and vegetation communities by 2015.
4. Reduced sediment resuspension in Marsh Lake	Growing season average Secchi disc water transparency equal or greater than 0.5 m by 2020.
5. Increased extent, diversity and abundance of emergent and submersed aquatic plants in Marsh Lake	Increase the area of EAV in Marsh Lake to 1500 acres by 2015 with 200 acres of EAV other than cattail (e.g., bulrush, arrowhead)
6. Increased availability of waterfowl habitat within Marsh Lake	Increase the area of SAV in Marsh Lake to 2000 acres in 6 out of 10 years by 2020 with 400 acres of submersed plants other than Sago pondweed (e.g., coontail, milfoil). Detect SAV at 2/3 of sampled sites in Marsh Lake where water depth is less than 3 ft.
	Increase fall waterfowl use on Marsh Lake from 6,000 to 25,000 birds by 2015. As a subset, increase diving duck use from 400 to 5,000 birds by 2015 (measured by summarizing the peak count recorded for each species from weekly aerial surveys, mid-September through freeze-up, Marsh Lake. Survey area is from the Marsh Lake Dam to Louisburg Grade Road).
	Increase shorebird use on Marsh Lake from a current peak count now estimated in the hundreds to a peak count measured in the thousands by 2015. Criteria will only apply to those years of a natural or targeted growing season drawdown providing extensive mudflats.
	Maintain colonial waterbird numbers on Marsh Lake at approximately 19,000 American pelican and 1,000 double-crested cormorant nests, respectively (2006 & 2007 average). Maintain species diversity associated with nesting islands: ring-billed gulls, great egrets, great blue herons, black-crowned night herons, and Forster's terns. Breeding pairs of western grebes return to Marsh Lake by 2020.
7. Restored habitat connectivity for fish to migrate between Marsh Lake, the Pomme de Terre River and Lac Qui Parle	Increased natural reproduction of walleyes in the Pomme de Terre River by 2015 with naturally reproduced year classes 7 out of 10 years. Increase natural reproduction of northern pike by 2015 in Marsh Lake with naturally reproduced year classes in 3 out of 5 years.
8. Reduced abundance of carp in Marsh Lake	Modify fish community composition in Marsh Lake to less than 40 percent carp by weight by 2015.
9. Increased diversity and abundance of native fish in Marsh Lake and the Pomme de Terre River	Increased species richness and relative abundance (catch per unit effort by electrofishing) of native fish in the Pomme de Terre River by 2015.

Objectives and Monitoring Activities

Table 2 outlines the monitoring and evaluation activities and provides an estimated cost. For those activities that are routine and will be conducted regardless of the restoration project

(e.g., Corps monitoring of water levels in Marsh Lake, DNR montoring fall waterfowl use), no additional costs would be incurred. The water quality monitoring work would be done by the Corps. The biological response (vegetation cover, fish, mussel monitoring) would be done by the DNR. The monitoring activities would be conducted in the first 10 years following project construction.

Table 2. Monitoring Activities and Estimated Cost.

Marsh Lake Project Ecosystem Objectives	**Monitoring Activities**	**Estimated Cost**
1. Reduced sediment loading into Marsh Lake	None	
2. Restored natural fluctuations to hydrologic regime in Marsh Lake	Water levels at Marsh Lake Dam	None - Monitored daily at dam
3. Restored natural geomorphic and floodplain processes in Pomme de Terre River	Vegetation cover in Pomme de Terre River delta, interpreted from aerial photography at years 1, 5 and 10	$10,000
4. Reduced sediment resuspension in Marsh Lake	Secchi transparency measurements measured weekly May through September	$5,000
5. Increased extent, diversity and abundance of emergent and submersed aquatic plants in Marsh Lake	Vegetation cover in Marsh Lake, interpreted from aerial photography in years 1, 5 and 10	(included in above)
6. Increased availability of waterfowl habitat within Marsh Lake	SAV rake survey in years 5, 10	$10,000
	Fall waterfowl surveys	None - Monitored annually by DNR
	Late summer shorebird surveys during drawdown years	$5,000
	Colonial waterbird colony surveys conducted annually	None - Monitored annually by DNR
7. Restored habitat connectivity for fish to migrate between Marsh Lake, the Pomme de Terre River and Lac Qui Parle	Fall fish surveys in Lac qui Parle conducted every other year	$10,000
8. Reduced abundance of carp in Marsh Lake	Fall fish surveys in Marsh Lake in years following drawdown	(included in above)
9. Increased diversity and abundance of native fish in Marsh Lake and the Pomme de Terre River	Stream electrofishing surveys in years 1, 5 and 10	$15,000
	Estimated Monitoring Cost over 10 years:	$55,000
	Evaluation and Reporting:	$15,000
	Total Monitoring and Evaluation:	$70,000

The total estimated cost for monitoring and evaluation of the Marsh Lake project to evaluate success in meeting the project objectives is $70,000 over 10 years following project construction. Monitoring to evaluate the response of native mussels to Pomme de Terre River restoration is estimated to cost $87,000 over 10 years following project construction. Pre-project monitoring work conducted in 2010 cost $26,000. Pre-project surveys and mussel relocation is estimated to cost $15,000.

7.2.3 Evaluation and Adaptive Management

Reports on condition of the Marsh Lake ecosystem with results of the monitoring activities will be prepared annually. Results of the monitoring activities will be used to evaluate ecosystem response to the project. Should the restoration and management actions not meet the performance criteria, the Corps and the DNR will evaluate adaptive management actions (management or project modifications) to best attain the ecosystem objectives for the project.

The tentatively recommended plan (Alternative Plan 4) includes measures to restore submersed aquatic vegetation (SAV) by reducing sediment loading, restoring the water level regime, and by reducing the abundance of carp (restore the Pomme de Terrre River to its former channel, modify Marsh Lake Dam with a fishway to attain target water levels, construct a water control structure in Marsh Lake Dam to enable drawdowns of the lake). Uncertainty exists about the response of SAV to these measures.

One alternative measure, constructing islands in Marsh Lake (included in Alternative Plan 5 in the feasibility report), is considered for implementation in the future if needed to attain the objectives submersed aquatic vegetation. Islands would reduce wind fetch and sediment resuspension, improving conditions for SAV growth. SAV aquatic vegetation and Secchi disc water transparency will be monitored to determine the success of the project in restoring SAV and to determine the need to construct islands.