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AN ALLETE COMPANY

Via Electronic Filing

May 28, 2019

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: Grand Rapids Hydroelectric Project (FERC No. 2362)
Prairie River Hydroelectric Project (FERC No. 2361)
Filing of Proposed Study Plan for Relicensing Studies

Dear Secretary Bose:

ALLETE, Inc., doing business as Minnesota Power (MP or Applicant), is the Licensee, owner, and operator of the Grand Rapids Hydroelectric Project (FERC No. 2362), and Prairie River Hydroelectric Project (FERC No. 2361), collectively, the "Projects." The Grand Rapids Project is a 2.1 megawatt (MW), run-of-river (ROR) facility located on the Mississippi River in the City of Grand Rapids in Itasca County, Minnesota. The Prairie River Project is a 1.1 MW, ROR facility located on the Prairie River, near the City of Grand Rapids in Arbo Township, Itasca County, Minnesota. The existing Federal Energy Regulatory Commission (FERC or Commission) licenses for the Projects expire on December 31, 2023. Accordingly, MP is pursuing a new license for the Grand Rapids Project and a subsequent license for the Prairie River Project pursuant to FERC's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5. Although these are separate processes, due to the proximity of the Projects to each other, MP is conducting the processes concurrently with combined documents, meetings, and overall relicensing schedules. In accordance with 18 CFR §5.11 of FERC's regulations, MP is filing the Proposed Study Plan (PSP) with FERC describing the studies that the Licensee is proposing to conduct in support of relicensing the Projects.

On December 13, 2018, MP filed a Pre-Application Document and associated Notice of Intent with FERC to initiate the ILP. FERC issued Scoping Document 1 (SD1) for the Projects on February 7, 2019. SD1 was intended to advise resource agencies, Indian Tribes, non-governmental organizations, and other stakeholders as to the proposed scope of FERC's Environmental Assessment (EA) for the Projects and seek additional information pertinent to FERC's analysis.

On March 6 and 7, 2019, FERC held public scoping meetings in Grand Rapids, Minnesota. During these meetings, FERC staff presented information regarding the ILP and details regarding the study scoping process and how to request a relicensing study, including FERC's study criteria. In addition, FERC staff solicited comments regarding the scope of issues and analysis for the EA. Pursuant to 18 CFR §5.8(d), a public site visit of the Project was conducted on March 6, 2019.

Resource agencies, Indian Tribes, and other interested parties were afforded a 60-day period to request studies and provide comments on the PAD and SD1. The comment period was initiated with FERC's February 11, 2019 notice and concluded on April 12, 2019. During the comment period, a total of three stakeholders filed letters with FERC providing general comments, comments regarding the PAD, comments regarding the SD1, and/or study requests.

Proposed Study Plan

MP has evaluated all the study requests and comments submitted by the stakeholders, with a focus on the requests that specifically addressed the seven criteria for study requests as set forth at 18 CFR §5.9(b) of FERC's ILP regulations. For the study requests that did not address the seven study criteria, where appropriate, MP considered the study in the context of providing the requested information in conjunction with one or more of MP's proposed studies.

The purpose of the PSP is to present the studies that are being proposed by MP and to address the comments and study requests submitted by resource agencies and other stakeholders. The PSP also provides FERC, regulatory agencies, Indian tribes, and other stakeholders with the methodology and details of MP proposed studies. At this time, MP is proposing to conduct the following studies as described in detail in the PSP:

Grand Rapids Project

- Water Quality Study
- Desktop Entrainment and Impingement Study
- Recreation Resources Study
- Cultural Resources Study

Prairie River Project

- Water Quality Study
- Desktop Entrainment and Impingement Study
- Recreation Resources Study
- Cultural Resources Study

MP is filing the PSP with FERC electronically and is distributing this letter to the parties listed on the attached distribution list. For parties who have provided an email address, MP is distributing this letter via email; otherwise, MP is distributing this letter via U.S. mail. One paper copy of the PSP is being sent to the Minnesota State Historic Preservation Office. All parties interested in the relicensing process may obtain a copy of the PSP electronically through FERC's eLibrary at https://elibrary.ferc.gov/idmws/search/fercgensearch.asp under docket numbers P-2362 and P-2361 or on MP's website www.mnpower.com/Environment/Hydro. If any stakeholder would like a CD copy of the PSP, please contact me at nrosemore@mnpower.com.

Comments on the PSP must be filed within 90 days which is no later than August 25, 2019. Comments must include an explanation of any study plan concerns, and any accommodations reached

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with MP regarding those concerns (18 CFR §5.12). Any proposed modifications to this PSP must address FERC's criteria as presented in 18 CFR §5.9(b).

As necessary, after the comment period closes, MP will prepare a Revised Study Plan (RSP) that will address interested parties' comments to the extent practicable. Pursuant to the ILP, MP will file the RSP with FERC on or before September 24, 2019, and FERC will issue a final Study Plan Determination by October 24, 2019.

Initial Proposed Study Plan Meeting

In accordance with 18 CFR §5.11(e) of FERC's regulations, MP intends to hold an initial Proposed Study Plan Meeting (PSP Meeting) to describe the background, concepts, and study methods described in the PSP. The PSP Meeting will begin at 1:00pm on June 20, 2019, at Timberlake Lodge Hotel located at 144 SE 17th Street, Grand Rapids, MN 55744.

To assist with meeting planning and logistics, MP respectfully requests that individuals or organizations who plan to attend the meeting please RSVP by sending an email to me at nrosemore@mnpower.com on or before June 10, 2019.

Our relicensing team looks forward to working with FERC's staff, resource agencies, Indian Tribes, local governments, non-governmental organizations, and members of the public, in developing license applications for these renewable energy facilities. If there are any questions regarding the PSP or PSP Meeting, please do not hesitate to contact me at (218) 725-2101 or at the email address above.

Sincerely,

Nora Rosemore

Nora Rosemore
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Minnesota Power

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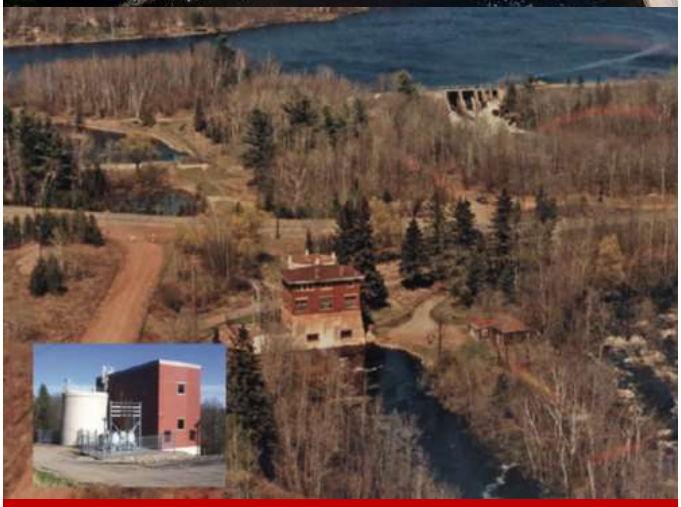

Proposed Study Plan

Grand Rapids Hydroelectric Project

(FERC No. 2362)

Prairie River Hydroelectric Project

(FERC No. 2361)

May 28, 2019

Prepared by:
HDR Engineering, Inc.

Prepared for:
Minnesota Power

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Appendix D. Grand Rapids Project Recreation Resources Study

Appendix E. Grand Rapids Project Cultural Resources Study

Appendix F. Prairie River Project Water Quality Study

Appendix G. Prairie River Project Desktop Entrainment and Impingement Study

Appendix H. Prairie River Project Recreation Resources Study

Appendix I. Prairie River Project Cultural Resources Study

Appendix J. Grand Rapids Bathymetric Surveys

Appendix K. MP Aquatic Invasive Species Management Procedure

Appendix L. MDNR IFIM Study Report

Appendix M. 2018 Rapids Energy NPDES Permit Renewal

List of Acronyms

AIRs	additional information requests
ALLETE	ALLETE, Inc.
CFR	Code of Federal Regulations
cfs	cubic feet per second
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
GIS	geographic information systems
IFIM	instream flow incremental methodology
ILP	Integrated Licensing Process
ISR	Initial Study Report
ISWCD	Itasca Soil and Water Conservation District
Licensee	Minnesota Power
LMF	Laurentian Mixed Forest
MDNR	Minnesota Department of Natural Resources
MP	Minnesota Power
MPCA	Minnesota Pollution Control Agency
msl	mean sea level
MW	megawatt
MWh	megawatt hours
NEPA	National Environmental Policy Act
NGO	non-governmental organizations
NOI	Notices of Intent
NPDES	National Pollutant Discharge Elimination System
PAD	Pre-Application Document
PM&E	protection, mitigation, and enhancement
PSP	Proposed Study Plan
ROR	run-of-river
RSP	Revised Study Plan
RTE	rare, threatened, and endangered
SD1	Scoping Document 1
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USR	Updated Study Report

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1 Introduction and Background

ALLETE Inc., doing business as Minnesota Power (MP or Licensee), is the Licensee, owner, and operator of the Grand Rapids Hydroelectric Project (FERC No. 2362) and the Prairie River Hydroelectric Project (FERC No. 2361). The Grand Rapids Project is a 2.1 megawatt (MW), run-of-river (ROR) facility located on the Mississippi River in the City of Grand Rapids in Itasca County, Minnesota. The Prairie River Project is a 1.1 MW, ROR facility located on the Prairie River, also near the City of Grand Rapids in Arbo Township, Itasca County, Minnesota.

The Grand Rapids Project and Prairie River Project, collectively known as the "Projects," are licensed by the Federal Energy Regulatory Commission (FERC or Commission) under the authority granted to FERC by Congress through the Federal Power Act (FPA), 16 United States Code (USC) §791(a), *et seq.*, to license and oversee the operation of non-federal hydroelectric projects on jurisdictional waters and/or federal land. There are no federal lands associated with the Projects. The Projects previously underwent licensing in the early 1990s, and the current operating licenses for the Projects expire on December 31, 2023. Accordingly, MP is pursuing new licenses for the Projects pursuant to FERC's Integrated Licensing Process (ILP), as described at 18 Code of Federal Regulations (CFR) Part 5. In accordance with 18 CFR §5.11 of FERC's regulations, MP is filing this joint Proposed Study Plan (PSP) describing the studies that the Licensee is proposing to conduct in support of relicensing the Projects.

1.1 Study Plan Overview

MP filed a joint Pre-Application Document (PAD) and two separate Notices of Intent (NOI) with FERC on December 13, 2018, to initiate the ILP. The PAD provided a description of the Projects and summarized the existing, relevant, and reasonably available information to assist FERC, resource agencies, Indian Tribes, non-governmental organizations (NGOs), and other stakeholders to identify issues, determine information needs, and prepare study requests.

The National Environmental Policy Act of 1969 (NEPA), FERC's regulations, and other applicable statutes require FERC to independently evaluate the environmental effects of issuing new licenses for the Projects, and to consider reasonable alternatives to relicensing. At this time, FERC has expressed its intent to prepare a multi-project Environmental Assessment (EA) that describes and evaluates the site-specific and cumulative potential effects (if any) of issuing the new licenses, as well as potential alternatives to relicensing. The EA is being supported by a scoping process to identify issues, concerns, and opportunities for resource enhancement associated with the proposed action. Accordingly, FERC issued Scoping Document 1 (SD1) for the Projects on February 7, 2019. SD1 was intended to advise resource agencies, Indian Tribes, NGOs, and other stakeholders as to the proposed scope of the EA and to seek additional information pertinent to FERC's analysis. As provided in 18 CFR §5.8(a) and §5.8(b), FERC issued a notice of commencement of the relicensing proceeding associated with SD1.

On March 6 and 7, 2019, the FERC held public scoping meetings in Grand Rapids, Minnesota. During these meetings, FERC staff presented information regarding the ILP and details regarding the study scoping process and how to request a relicensing study, including FERC's study criteria. In addition, FERC staff solicited comments regarding the scope of issues and analyses for the EA. Pursuant to 18 CFR §5.8(d), a public site visit of the Projects was conducted on March 6, 2019.

Resource agencies, Indian Tribes, and other interested parties were afforded a 60-day period to request studies and provide comments on the PAD and SD1. The comment period was initiated with FERC's February 11, 2019 notice and concluded on April 12, 2019.

FERC's ILP regulations require that stakeholders who provide study requests include specific information in the request in order to allow the Licensee, as well as FERC staff, to determine a requested study's appropriateness and relevancy to the Project and proposed action. As described in 18 CFR §5.9(b) of FERC's ILP regulations, and as presented by FERC staff during the March 6 and 7, 2019 scoping meetings, the required information to be included in a study request is as follows:

(1) Describe the goals and objectives of each study and the information to be obtained (§5.9(b)(1));

This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study must clearly relate to the need to evaluate the potential effects of the Project on a particular resource. The objectives of the study are the specific types of information that need to be gathered to achieve the study goals.

(2) If applicable, explain the relevant resource management goals of the agencies or Indian Tribes with jurisdiction over the resource to be studied (§5.9(b)(2));

This section must clearly establish the connection between the study request and management goals or resource of interest. A statement by an agency connecting its study request to a legal, regulatory, or policy mandate needs to be included that thoroughly explains how the mandate relates to the study request, as well as the Project's potential impacts.

(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study (§5.9(b)(3));

This section is for non-agency or Indian Tribes to establish the relationship between the study request and the relevant public or tribal interest considerations.

(4) Describe existing information concerning the subject of the study proposal and the need for additional information (§5.9(b)(4));

This section must discuss any gaps in existing data by reviewing the available information presented in the PAD or information relative to the Project that is known from other sources. This section must explain the need for additional information and why the existing information is inadequate.

(5) Explain any nexus between project operation and effects (direct, indirect, and/or cumulative) on the resource to be studied and how the study results would inform the development of license requirements (§5.9(b)(5));

This section must clearly connect Project operations and potential Project effects on the applicable resource. This section should also explain how the study results would be used to develop protection, mitigation, and enhancement (PM&E) measures that could be implemented under a new FERC license. The PM&E measures can include those related to any mandatory conditioning authority under Section 401 of the Clean Water Act[1] or Sections 4(e) and 18 of the Federal Power Act, as applicable.

(6) Explain how any proposed study methodology is consistent with generally accepted practices in the scientific community or, as appropriate, considers relevant tribal values and knowledge. This includes any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration (§5.9(b)(6));

This section must provide a detailed explanation of the study methodology. The methodology may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs (§5.9(b)(7));

This section must describe the expected level of cost and effort to conduct the study. If there are proposed alternative studies, this section can address why the alternatives would not meet the stated information needs.

During the comment period, a total of three stakeholders, including the FERC, filed letters with FERC providing general comments, comments regarding the PAD, comments regarding SD1, and/or study requests. These comments and study requests are discussed in Section 3 of this document. Additionally, FERC filed additional information requests (AIRs), which are addressed in Section 6 of this document. Copies of the letters filed with FERC are provided in Appendix A of this document. The ILP requires MP to file this PSP within 45 days from the close of the April 12, 2019 comment period (i.e., on or before May 27, 2019).

[1] 33 United States Code (U.S.C.) §1251 *et seq.*

The purpose of this PSP is to present the studies that are being proposed by MP and to address the comments and study requests submitted by resource agencies and other stakeholders. This PSP also provides FERC, regulatory agencies, Indian Tribes, and other stakeholders with the methodology and detail of MP's proposed studies. As necessary, after the comment period closes, MP will prepare a joint Revised Study Plan (RSP) that will address interested parties' comments to the extent practicable. Pursuant to the ILP, MP will file the RSP with FERC on or before September 24, 2019, and the FERC will issue a final Study Plan Determination by October 24, 2019.

1.2 Minnesota Power's Proposed Study Plan

MP has evaluated all study requests submitted by the stakeholders, with a focus on the requests that specifically addressed the seven criteria set forth in §5.9(b) of the FERC's ILP regulations, as discussed in Section 1.1 of this document. For the study requests that did not attempt to address the seven study criteria, where appropriate, MP considered the study in the context of providing the requested information in conjunction with one of MP's proposed studies. Section 3 of this PSP discusses the comments and study requests submitted by stakeholders.

Based on MP's review of the requested studies, FERC criteria for study requests under the ILP, and other available information (i.e., associated with the previous licensing effort or resulting from ongoing monitoring activities), MP is proposing four studies for each project to be performed in support of issuing a new license for the Project. The proposed studies are listed as follows:

Grand Rapids Project

- Water Quality Study (Appendix B)
- Fish Entrainment and Impingement Study (Appendix C)
- Recreation Resources Study (Appendix D)
- Cultural Resources Study (Appendix E)

Prairie River Project

- Water Quality Study (Appendix F)
- Fish Entrainment and Impingement Study (Appendix G)
- Recreation Resources Study (Appendix H)
- Cultural Resources Study (Appendix I)

These study plans are attached as Appendices B through I. For each PSP it describes:

1. The goals and objectives of the study;
2. The defined study area;
3. A summary of background and existing information pertaining to the study;
4. The nexus between Project operations and potential effects on the resources to be studied;
5. The proposed study methodology;

6. Level of effort, cost, and schedules for conducting the study; and
7. Discussion of alternative approaches.

1.2.1 Comments on the Proposed Study Plan

Comments on this PSP, including any additional or revised study requests, must be filed within 90 days of the filing date of this PSP (i.e., no later than August 25, 2019). Comments must include an explanation of any study plan concerns, and any proposed modifications to this PSP must address the FERC's criteria as presented in 18 CFR §5.9(b).

1.2.2 Proposed Study Plan Meeting

In accordance with 18 CFR §5.11(e), MP plans to hold a PSP Meeting on June 20, 2019, in Grand Rapids, Minnesota. The purpose of the PSP Meeting will be to clarify the intent and contents of this PSP, explain information-gathering needs, and resolve outstanding issues associated with the proposed studies. Additional details regarding the meeting are presented in Section 5 of this document.

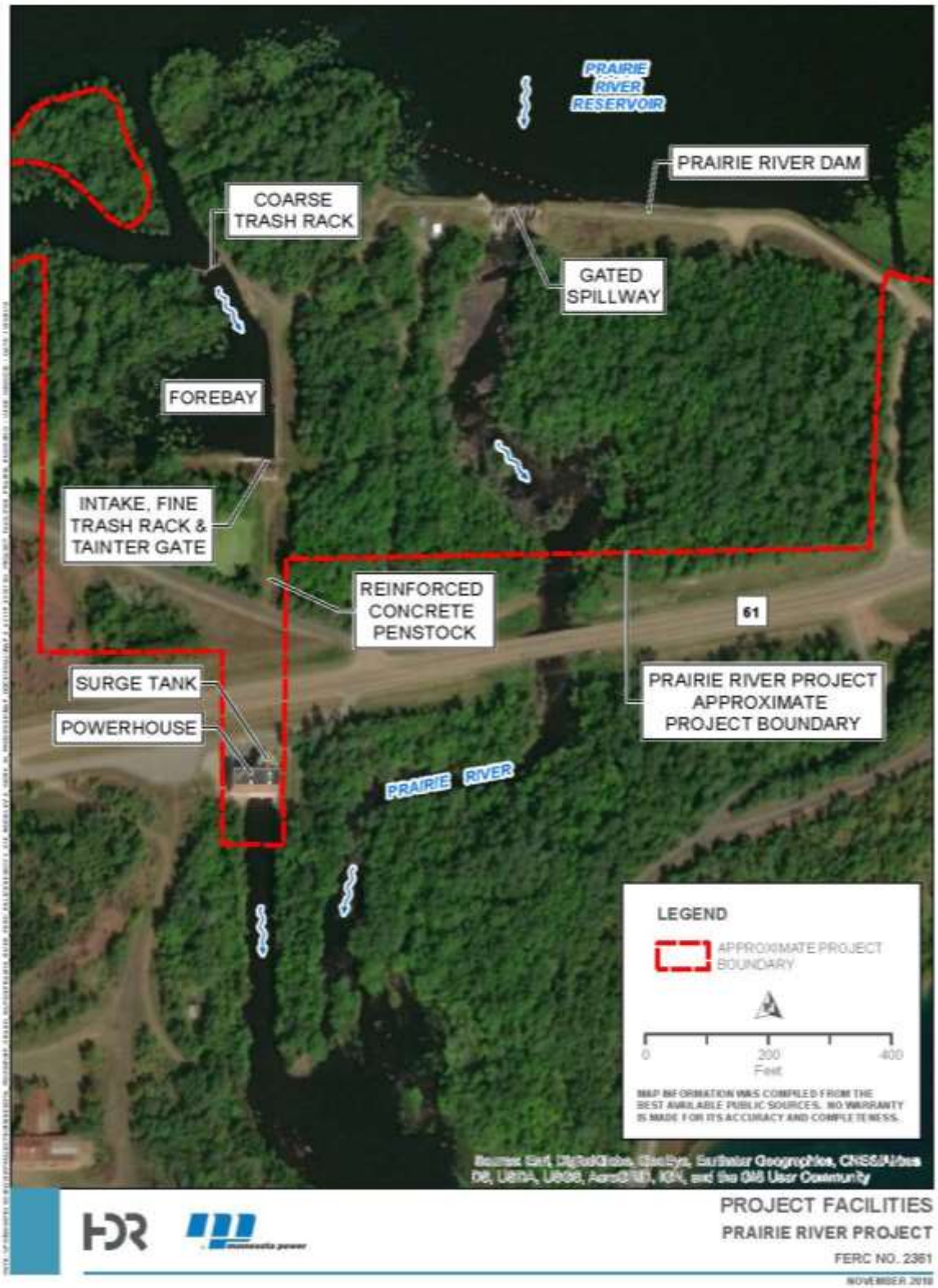
1.3 Project Description and Location

The Grand Rapids Project is a 2.1 MW, ROR facility located on the Mississippi River in the City of Grand Rapids in Itasca County, Minnesota. The Project consists of a 21-foot-high concrete dam; a 465-acre reservoir; a powerhouse containing two generating units; a short transmission line extending from the powerhouse to Blandin Paper Mill; and other appurtenances (Figure 1-1). Original construction on the Project dam started in May of 1901 by the Grand Rapids Power and Boom Company, and the powerhouse came on line in 1902. Blandin Paper Company sold the Project to MP in 2000. The Grand Rapids Project primarily serves to supplement the power supply for Blandin Paper Mill, an important economic asset and employment base in Grand Rapids. The Project generates approximately 6,000 megawatt hours (MWh) of renewable energy annually.

The Prairie River Project is a 1.1 MW, ROR facility located on the Prairie River near the City of Grand Rapids in Arbo Township, Itasca County, Minnesota. The Project consists of a 17-foot-high concrete dam; a 1,305-acre reservoir; a forebay; a 450-foot-long by 10-foot-diameter, reinforced-concrete penstock extending from the forebay to a surge tank and on to the powerhouse; a powerhouse with two generating units; and appurtenant facilities (Figure 1-2). The Project dam was constructed in 1920 by the Prairie River Power Company, and MP purchased the Project from Blandin Paper Company in 1982. The Project generates approximately 3,000 MWh of renewable energy annually.

Figure 1-1. Grand Rapids Hydroelectric Project Facilities

Figure 1-2. Prairie River Hydroelectric Project Facilities



2 Execution of the Study Plan

As required by Section 5.15 of FERC's ILP regulations, MP will file an Initial Study Report (ISR), hold a meeting with stakeholders and FERC staff to discuss the initial study results (ISR Meeting), prepare and file an Updated Study Report (USR), and convene an associated USR Meeting, if required. MP will submit all study documents that must be filed with FERC via FERC's eFiling system.

2.1 Process Plan and Schedule

The Process Plan and Schedule is presented in Table 2-1. Gray shaded milestones are unnecessary if there are no formal study disputes. If the due date falls on a weekend or holiday, the due date is the following business day. Early filings or issuances will not result in changes to these deadlines.

Table 2-1. Process Plan and Schedule

Responsible Party	Pre-Filing Milestone	Date[1]	FERC Regulation
ALLETE	Issue Public Notice for NOI/PAD	12/13/18	5.3(d)(2)
ALLETE	File NOI/PAD with FERC	12/13/18	5.5, 5.6
FERC	Tribal Meetings	1/12/19	5.7
FERC	Issue Notice of Commencement of Proceeding; Issue SD1	2/11/19	5.8
FERC	Prairie River and Grand Rapids Projects Environmental Site Review and Scoping Meetings	3/6/19 & 3/7/19	5.8(b)(viii)
All Stakeholders	PAD/SD1 Comments and Study Requests Due	4/12/19	5.9
FERC	Issue Scoping Document 2	5/27/19	5.10
ALLETE	File PSP	5/27/19	5.11(a)
All Stakeholders	PSP Meeting	6/26/19	5.11(e)
All Stakeholders	PSP Comments Due	8/25/19	5.12
ALLETE	File RSP	9/24/19	5.13(a)
All Stakeholders	RSP Comments Due	10/9/19	5.13(b)
FERC	Director's Study Plan Determination	10/24/19	5.13(c)
Mandatory Conditioning Agencies	Any Study Disputes Due	11/13/19	5.14(a)
Dispute Panel	Third Dispute Panel Member Selected	11/28/19	5.14(d)
Dispute Panel	Dispute Resolution Panel Convenes	12/3/19	5.14(d)(3)

Responsible Party	Pre-Filing Milestone	Date[1]	FERC Regulation
ALLETE	Applicant Comments on Study Disputes Due	12/8/19	5.14(j)
Dispute Panel	Dispute Resolution Panel Technical Conference	12/13/19	5.14(j)
Dispute Panel	Dispute Resolution Panel Findings Issued	1/2/19	5.14(k)
FERC	Director's Study Dispute Determination	1/22/19	5.14(l)
ALLETE	First Study Season	2020	5.15(a)
ALLETE	ISR	10/23/20	5.15(c)(1)
All Stakeholders	ISR Meeting	11/7/20	5.15(c)(2)
ALLETE	ISR Meeting Summary	11/22/20	5.15(c)(3)
All Stakeholders	Any Disputes/Requests to Amend Study Plan Due	12/22/20	5.15(c)(4)
All Stakeholders	Responses to Disputes/Amendment Requests Due	1/21/21	5.15(c)(5)
FERC	Director's Determination on Disputes/Amendments	2/20/21	5.15(c)(6)
ALLETE	Second Study Season	2021	5.15(a)
ALLETE	USR Due	10/23/21	5.15(f)
All Stakeholders	USR Meeting	11/7/21	5.15(f)
ALLETE	USR Meeting Summary	11/22/21	5.15(f)
All Stakeholders	Any Disputes/Requests to Amend Study Plan Due	12/22/21	5.15(f)
All Stakeholders	Responses to Disputes/Amendment Requests Due	1/21/22	5.15(f)
FERC	Director's Determination on Disputes/Amendments	2/20/22	5.15(f)
ALLETE	File Preliminary Licensing Proposal or Draft License Application	8/3/21	5.16(a)
All Stakeholders	Preliminary Licensing Proposal Comments Due	11/1/21	5.16(e)
ALLETE	File Final License Application	12/31/21	5.17
FERC	Issue Public Notice of License Application Filing	1/14/22	5.17(d)(2)

[1]Documents or meetings are due no later than the indicated date. If the due date falls on a weekend or holiday, the deadline is the following Monday or business day.

3 Responses to FERC's and Stakeholder Study Requests and Comments

Stakeholder comments on the PAD and SD1 as well as study requests were due April 12, 2019. Three letters were filed on the Project dockets in response to MP's filing of the NOI and PAD and FERC's filing of SD1:

- U.S. Environmental Protection Agency (EPA) letter dated April 1, 2019, providing comments on SD1.
- FERC letter dated April 5, 2019, providing comments on preliminary study plans, requests for studies, and additional information.
- Minnesota Pollution Control Agency (MPCA) letter dated April 11, 2019, providing comments and study requests.

The FERC and MPCA letters are discussed below. The EPA letter is not discussed, as the comments were directed to FERC concerning FERC's NEPA analysis.

3.1 FERC Letter dated April 5, 2019

FERC filed comments on preliminary study plans, requests for studies, and additional information by letter on April 5, 2019. This section documents MP's responses to the study requests (Schedule A of FERC's letter) and responses to comments on preliminary study plans (Schedule B of FERC's letter). Section 6 of this PSP addresses FERC's AIRs (Schedule C of FERC's letter).

3.1.1 Botanical Resources Study Request

FERC requested a Botanical Resources Study to develop additional information to address the potential effects of project operation and maintenance activities on botanical resources within the Project Boundary for each project. FERC stated the objectives of the botanical resources study are to map vegetation types within the Project Boundary; identify any rare, threatened, and endangered (RTE) plant species or potential habitats; and document the presence, abundance, and location of invasive plant species. MP has not adopted this study request for the reasons discussed below.

Because the Grand Rapids and Prairie River Project Boundaries closely follow the reservoir shoreline, there is limited terrestrial acreage and associated vegetation affected by either Project. Additionally, because of the Projects' limited pool fluctuation ranges and ROR mode of operations, the Projects have effectively no ability to affect botanical resources within the Project Boundaries. Therefore, a botanical resources study is not needed. The Grand Rapids Project Boundary is defined as the 1,268.5-foot above mean sea level (msl) contour of the reservoir and the structures of the powerhouse, dam, and abutments. Similarly, the Prairie River Project Boundary is defined as the elevation 1,290-foot msl contour of the reservoir and Project features (defined as "a line 110 feet

north of and parallel with, the south line of the S.W. ¼ of the N.W. ¼ of Section 16, TWP. 56 N., and RNG 25W"). Both Projects currently operate in an ROR mode and MP is not proposing any substantial modifications in Project operations. The Grand Rapids Project maintains a target elevation of 1,268.2 feet msl at Blandin Reservoir and limits reservoir fluctuations to ± 0.1 feet per the current license. The Prairie River Project maintains a target elevation of 1,289.4 feet msl at the Prairie River Reservoir and limits fluctuations to ± 0.1 feet per the current license.

Existing botanical resources are adequately described in the PAD (Section 5.5). Both Projects are located in the Chippewa Plains Subsection of the Laurentian Mixed Forest (LMF) Province as defined by the Minnesota Department of Natural Resources (MDNR). In Minnesota, the LMF Province is characterized by broad area of conifer forest, mixed hardwood, and conifer forest (MP 2018).

Based on consultation with the U.S. Fish and Wildlife Service (USFWS), there are no plant species listed under the Endangered Species Act potentially occurring in the vicinity of the Projects. A search of the MDNR's National Heritage Information System database indicated one plant species of state special concern, the least moonwort, potentially occurring within ½ mile of the Grand Rapids Project. Prairie moonwort, pale moonwort, and least moonwort, all species of state special concern, were listed as potentially occurring within ½ mile of the Prairie River Project, but none are known to occur within the Project Boundary. Most lands within the Project Boundary for the Grand Rapids and Prairie River Projects are not owned or managed by MP, and MP's ROR operations and limited reservoir fluctuations suggest that, it is unlikely for any potential species of special concern to be affected by the relicensing of these Projects (MP 2018).

Invasive species in the vicinity of the Projects are the result of regional invasions that are adequately described and not under the control of MP. The Itasca Soil and Water Conservation District (ISWCD) maintains a geographic information systems (GIS) database of aquatic invasive species in Itasca County. The database includes documented occurrences of starry stonewort, flowering rush, Eurasian water milfoil, purple loosestrife, and curly leaf pondweed. The database indicates the presence of purple loosestrife in the area of Grand Rapids, Minnesota, including the perimeter of Blandin Reservoir. Curly leaf pondweed are documented as occurring in Blandin Reservoir and Prairie Lake Reservoirs. Given that the ISWCD maintains this up-to-date database documenting aquatic invasive species in Itasca County, it would be duplicative in effort for MP to conduct a study of invasive plant species within each Project Boundary (ISWCD undated). Additionally, MP's ROR operations and limited reservoir fluctuations provide for nearly no Project influence on botanical resources, and, therefore, no Project nexus that might require a study or a potential for future license conditioning.

3.1.2 Cultural Resources Study Request

FERC requested a Cultural Resources Study to determine the potential effects of Project operation on archaeological and historic resources that are included in or eligible for the National Register of Historic Places. FERC further requested a Phase I field inventory within the area of potential effect of each Project to locate any historic or archaeological

resources. MP acknowledges this request and has prepared a Grand Rapids Project Cultural Resources Study (Appendix E) and a Prairie River Project Cultural Resources Study (Appendix I).

3.1.3 Desktop Entrainment and Impingement Study Comments

MP acknowledges FERC's comments on the Desktop Entrainment and Impingement Study, and has generally incorporated these comments into the attached Grand Rapids Project Fish Entrainment and Impingement Study (Appendix C) and Prairie River Fish Entrainment and Impingement Study (Appendix G).

3.1.4 Water Quality Study Comments

MP acknowledges FERC's comments on the Water Quality Study and has generally incorporated these comments into the attached Grand Rapids Project Water Quality Study (Appendix B) and Prairie River Project Water Quality Study (Appendix F).

3.1.5 Recreation Resources Study Comments

MP acknowledges FERC's comments on the Recreation Resources Study and has generally incorporated these comments into the attached Grand Rapids Recreation Resources Study (Appendix D) and Prairie River Project Recreation Resources Study (Appendix H).

3.2 MPCA Letter dated April 11, 2019

The MPCA filed a request for information and studies with FERC on April 11, 2019. Responses to the request for information and studies are documented by resource topic below.

3.2.1 Impoundment Bathymetry Survey, Sediment Accumulation, and Sediment Contaminant Study Request

The MPCA requested an Impoundment Bathymetry Survey, Sediment Accumulation, and Sediment Contaminant Study to assist with the development of the Clean Water Act Section 401 Water Quality Certification of the Projects. MP has not adopted this study request for the reasons discussed below.

MPCA has not demonstrated a resource issue requiring study, nor how the information collected during a bathymetry or sediment study would inform license conditions. Existing information regarding sediments upstream of Blandin Dam at the Grand Rapids Project are available from MP's periodic bathymetry studies conducted beginning in 1988; the studies indicate a natural fluctuation of sediment with no apparent trending of sediment accumulation. Copies of the bathymetric surveys are attached as Appendix J. MP notes that upstream dams including the nearby Pokegama Dam are likely restricting sediment

inputs into Blandin Reservoir, and MP has no control over sediment inputs or sediment composition at either Project.

MPCA has not demonstrated a nexus between Project operations and stated concerns regarding sediment. The Projects are operated in ROR mode with minimal reservoir fluctuations, and MP is not proposing any substantial changes in operation. As ROR facilities, the Projects have no control over upstream sediments transported naturally downstream with varying river flows. The ROR mode continues the mobilization of sediments throughout the river system rather than deposition of sediments. No work is proposed in either reservoir; therefore, any naturally occurring, stored sediments will not be disturbed.

MPCA has not demonstrated a nexus between Project operations and any negative effect on water quality. In fact, the MPCA's Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report documented good to excellent water quality with improving water quality trends in the reservoirs, rivers, and watershed associated with the Projects (MPCA 2018).

3.2.2 Requested Monitoring of Phosphorus at Prairie Lake

The MPCA requested monitoring of phosphorous at Prairie Lake, stating the lake was recently removed from the MPCA 303(d) Impaired Waters List but is still near the threshold. MP has not adopted this study request for the reasons discussed below.

Existing monitoring frameworks are adequate to assess water quality at Prairie Lake. The passage of Minnesota's Clean Water Legacy Act in 2006 provided a policy framework and the initial resources for state and local governments to monitor, assess, restore, and protect surface waters. This monitoring is implemented on an on-going basis with funding from the Clean Water Fund created by the passage of the Clean Water Land and Legacy Amendment to the state constitution. With this funding, the MPCA has developed an approach to intensively monitor streams and lakes within a major watershed to determine the overall health of water resources, identify impaired waters, and identify waters in need of additional protection. This approach was implemented in the Mississippi River-Grand Rapids Watershed beginning in the summer of 2015 (MPCA 2018).

The MPCA has not demonstrated a resource issue requiring study, nor how a monitoring effort could be used to inform license conditions. The MPCA's Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report (MPCA 2018), documenting the watershed monitoring approach, indicated that the phosphorous levels in Prairie Lake meet the Minnesota State water quality standards (Minnesota statute 7050) and the impaired designation listing was removed from the MPCA 303(d) Impaired Water List. Additionally, fish index biological integrity assessment comments provided by the MDNR for the 2018 Report indicate the fish communities generally perform well in this watershed (MPCA 2018). Given the phosphorous levels in Prairie Lake meet the Minnesota State water quality standards and the fact that MP is not proposing any

substantial changes in operation, it is expected that the phosphorous parameter will continue to meet state standards; therefore, additional monitoring is unnecessary.

The MPCA has not demonstrated a nexus between Project operations and phosphorus concentrations. As a ROR facility with limited reservoir fluctuations, there is no mechanism by which the Prairie River could affect phosphorus concentrations.

3.2.3 Requested Assessment of Effects of Climate Change

The MPCA requested an assessment of probable effects of climate change on the Projects' operation and contingency plans relating to those effects. MP has not adopted this study request for the reasons discussed below.

FERC's precedents uniformly maintain that climate change studies are not needed in hydropower licensing proceedings, and under NEPA and Council on Environmental Quality regulations, FERC is afforded discretion based on its expertise and experience to determine the scope of an environmental analysis based on available information[2]. FERC has explained that climate change models would not allow it "to predict matters such as water supply or flow within a given basin during the 30 to 50-year term of a typical hydropower license in such a manner to assist FERC in analyzing alternatives and determining appropriate mitigation for environmental impacts."[3] In addition, FERC has determined that climate change studies are not likely to yield reliable data that can be used to develop license requirements.[4] Additionally, MP notes that the Projects are a clean, reliable, and renewable power source that do not contribute to climate change; as a result, there is no clear nexus between the Projects and the requested study.

3.2.4 Requested Monitoring of Invasive Species

The MPCA requested that MP monitor the Projects' aquatic and terrestrial areas for invasive and exotic species and take action to eliminate existing populations, and prevent and/or reduce their spread, including ongoing monitoring of zebra mussel activity at Blandin Dam. MP has not adopted this study request for the reasons discussed below.

Invasive species in the vicinity of the Projects are the result of regional invasions that are adequately described and not under the control of MP. The ISWCD maintains a GIS database of aquatic invasive species in Itasca County. The database includes documented occurrences of zebra mussels, starry stonewort, flowering rush, Eurasian water milfoil, purple loosestrife, and curly leaf pondweed. The database indicates the presence of purple loosestrife is occurring in Blandin Reservoir and curly leaf pondweed is located in both Blandin and Prairie River reservoirs . The database also documents zebra mussels within the Mississippi River including upstream and downstream of Blandin Dam. In addition to the ISWCD database, Blandin Reservoir is listed on the recently updated (as of April 2019) "infested waters list" with a zebra mussel infestation

[2] *See Eagle Crest Energy* Company, 153 FERC ¶ 61,058, at P 39 (2015).
[3] *See Id.*, *see also Alabama Power Company*, 155 FERC ¶ 61,080, P 29 (2016).
[4] See Alaska Energy Authority, 144 FERC ¶ 61,040, at P 8 (2013).

(MDNR 2019). Given that the ISWCD maintains this up-to-date database documenting aquatic invasive species in Itasca County, it would be duplicative in effort for MP to conduct a study of invasive species within each Project Boundary.

Regarding terrestrial invasive and exotic species, there are limited terrestrial lands within each Project Boundary. Terrestrial lands managed by MP are limited to the lands on which the Project structures are located. Both Projects operate in a ROR mode with limited reservoir fluctuations, and MP is not proposing any substantial changes in operation. Operation of the Projects does not contribute to the spread of terrestrial or aquatic species in any way.

To help address this state-wide invasive species issue, MP has developed an internal procedure for aquatic invasive species management. The procedure was developed to ensure all MP watercraft meet regulatory requirements, limit the environmental impacts of activities, protect the environment, and demonstrate the conservation of water resources by preventing the spread of aquatic invasive species. The procedure provides direction to MP staff to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6216 to prevent the spread of aquatic invasive species. This procedure is provided in Appendix K of this document for reference. Additionally, the MP Vegetation Management group maintains state and local certifications to spray for terrestrial invasive species on the embankments at the Prairie River Project to prevent growth of woody vegetation, including some invasive plant species.

3.2.5 Requested Identification and Protection of Native Vegetation

The MPCA requested that MP identify, protect, and/or restore native vegetation ecosystems where they occur or historically occurred on Project lands. MP has not adopted this study request for the reasons discussed below.

Existing vegetation is adequately described in the PAD, requiring no further study. As documented in the PAD (Section 5.5), the Projects are located in the Chippewa Plains Subsection of the LMF Province as defined by the MDNR. In Minnesota, the LMF Province is characterized by broad area of conifer forest, mixed hardwood, and conifer forest. Lands within the Prairie River Project vicinity include forests, well-vegetated shorelines, and residential properties. Lands within the Grand Rapids Project vicinity include well-vegetated shorelines, residential properties, and substantial industrial and commercial development near Blandin Dam and Blandin Paper Mill, which is not affiliated with the Project (MP 2018).

MPCA has not demonstrated a nexus between the Projects and native vegetation ecosystems, nor how such a study would inform license conditions. Terrestrial lands managed by MP are limited to the lands on which Project structures are located. Both Projects operate in an ROR mode with limited reservoir fluctuations, and MP is not proposing any substantial changes in operation that would impact existing vegetation ecosystems. As a result, Project operations do not substantially affect native vegetation ecosystems.

3.2.6 Requested Monitoring of Bypass Flows

The MPCA requested that MP monitor flows in the Prairie River bypass reach and determine if the bypass minimum flows as outlined in the current license are adequate for aquatic life and downstream resources. MP has not adopted this study request for the reasons discussed below.

A detailed instream flow incremental methodology (IFIM) study was conducted in the bypass reach in 1990 in support of the previous relicensing to determine the flows necessary to prevent fish stranding in the bypass reach, and secondarily, to address flow requirements for fish spawning. MDNR analyzed data to develop habitat versus discharge relationships for walleye spawners, juvenile smallmouth, and habitat guild representatives.

Based on the IFIM results, MDNR recommended a minimum flow of 75 cubic feet per second (cfs) during April and May to enhance walleye spawning, and 50 cfs during June to allow the remaining fingerling fish to leave the bypass reach. MP agreed to these minimum flow rates. This bypass flow regime enhances the spawning habitat of approximately 2,500 linear feet of channel in the bypass reach. Additionally, in evaluating channel depths across three transects established within the bypass, the MDNR recommended ramping rates to avoid adult fish or spawn stranding. In consultation with MDNR, USFWS, and the U.S. Geological Survey, MP created a ramping rate regime for flows at or below 400 cfs when implementing, reducing, and ceasing minimum flows as follows:

- 200-400 cfs = 50 cfs per hour
- 75-200 cfs = 25 cfs per hour
- Below 75 cfs = 15 cfs per hour

FERC concluded in 1993 that the minimum flow regime and ramping rates agreed upon by MP and MDNR satisfied the management objectives for the bypass reach and provided appropriate resource protection. These flows were incorporated into the license as Article 404 (bypass minimum flows) and 405 (ramping rates). This IFIM study used industry-standard methods that are still in use to determine flow adequacy, and no party has provided information demonstrating that the study results warrant reassessment. As a result, MP believes the study results remain relevant, and the current seasonal minimum flow and ramping rate requirements in the bypass reach are appropriate and adequate to protect fisheries, and MP notes that the MPCA has not provided any data refuting MP's contention. The MDNR's October 24, 1991 report discussing the IFIM study and providing recommendations is provided in Appendix L of this document for reference.

3.2.7 Water Quality Study Comments

The MPCA requested that MP collect data on certain water quality parameters in the Main Upper Basin of Prairie Lake three times per year (spring, mid-summer, and fall)

every other year. The parameters included Chlorophyll-a, secchi disk, temperature profiles, and total phosphorous. Although MP plans to conduct the Grand Rapids Water Quality Study (Appendix B) and the Prairie River Water Quality Study (Appendix F), MP has not adopted these additional water quality parameters for the reasons discussed below.

Existing monitoring frameworks are adequate to monitor water quality at Prairie Lake, and the MPCA has not demonstrated a need for additional study. The MPCA's Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report (MPCA 2018) indicates that the phosphorous levels in Prairie Lake meet the Minnesota State water quality standards (Minnesota statute 7050) and the impaired designation listing was removed from the MPCA 303(d) Impaired Water List. The 2018 Report denotes that Prairie Lake and Prairie River (upstream and downstream) typically either meet or exceed Minnesota's water quality standards including Fish IBI, Chloride, Total Phosphorous, Chlorophyll-a, Secchi, Aquatic Life Use, and Aquatic Recreation Use (bacteria). According to the 2018 Report, the Prairie River Reservoir meets the Minnesota water quality standards with good to excellent water quality and has been demonstrating improved water quality over time.

The MPCA has not demonstrated a nexus between the Projects and the identified water quality parameters. The Grand Rapids Project and Prairie River Project both currently operate in an ROR mode with minimal reservoir fluctuations, and MP is not proposing any substantial modifications in operation. Therefore, the existing water quality at each Project will not be impacted by relicensing and can be expected to continue to meet Minnesota State water quality standards.

4 Study Reports

MP expects to report on the results of studies within the framework afforded by the ISR and associated ISR Meeting, as well as the USR and associated USR Meeting, if required. At this time, MP is proposing to file technical study reports with FERC and provide stakeholders access to the study reports consistent with the schedule presented in Table 4-1. Progress reports will be filed currently with FERC until the final Study Report is filed. MP notes that adverse weather conditions or other circumstances may necessitate modifications to this schedule. As necessary, MP will update stakeholders of changes in the schedule in quarterly study progress reports.

Table 4-1. Preliminary Schedule for Study Reporting

Study	Anticipated Date of Study Report
1. Water Quality Study (Grand Rapids and Prairie River)	8/3/2021
2. Fish Entrainment and Impingement Study (Grand Rapids and Prairie River)	10/23/2020
3. Recreation Resources Study (Grand Rapids and Prairie River)	10/23/2020
4. Cultural Resources Study (Grand Rapids and Prairie River)	8/3/2021

5 Proposal for the PSP Meeting

Pursuant to 18 CFR §5.11(e) of FERC's ILP regulations, MP is providing information regarding the PSP Meeting that will be held for the purposes of clarifying the PSP, explaining information-gathering needs, and resolving outstanding issues associated with the proposed studies. FERC's regulations and the approved Process Plan and Schedule require MP to conduct the PSP Meeting within 30 days of filing this PSP. Accordingly, MP will hold the PSP Meeting on June 20, 2019, in Grand Rapids, Minnesota.

MP respectfully requests that individuals or organizations that plan on attending the PSP Meeting RSVP no later than June 10, 2019, by emailing Nora Rosemore at the address below.

- Date: June 20, 2019
- Time: 1:00 PM
- Location: The Timberlake Lodge
  144 SE 17th Street
  Grand Rapids, Minnesota 55744
- For additional information, please contact:

  Nora Rosemore
  Hydro Operations Superintendent
  Minnesota Power
  30 West Superior Street
  Duluth, Minnesota 55802
  (218) 725-2101
  nrosemore@mnpower.com

6 FERC's Additional Information Requests

In its comments dated April 5, 2019, FERC staff requested additional information on the Projects based on their review of the PAD. The following sections identify the additional information requests (AIRs) and MP's response to each requested item. Additional information related to developmental resources will be addressed in the Preliminary Licensing Proposal or Draft License Application as requested by FERC.

Aquatic Resources

AIR 1:

Section 5.4.2.1, Previous Fisheries Surveys and Habitat Assessments, of the Pre-Application Document (PAD) states that a fish impingement characterization study was performed in 2017 by Allete, Inc. (Allete) at the cooling water intake structure located near the Grand Rapids Project. Please file a copy of this report.

MP Response:

A fish impingement and characterization study was performed in 2017 by ALLETE in support of a National Pollutant Discharge Elimination System (NPDES) permit renewal for the Rapids Energy Center. This report is attached as Appendix M.

AIR 2:

Section 5.4.7, Aquatic Invasive Species, of the PAD indicates that zebra mussels have been identified in the Blandin Reservoir. The PAD also states that Allete has an internal procedure for aquatic invasive species management to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6216 to prevent the spread of aquatic invasive species. However, no details of this internal procedure were provided with regard to the monitoring or management of zebra mussels. Therefore, please provide details of your aquatic invasive species program/management protocol related to zebra mussels. Additionally, please provide information on the abundance of zebra mussels in the Blandin Reservoir, as well as the location of zebra mussels in relation to the Grand Rapids Project's physical structures and recreational facilities, if available.

MP Response:

MP maintains an internal procedure for aquatic invasive species management to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6126. The procedure provides step-by-step directions for a variety of situations including: prior to leaving and entering public roadways; what to do if invasive species are found on the watercraft; and what to do when leaving a body of water. The procedure includes a list of infested waters and contact numbers of MP's aquatic invasive species specialists. This procedure is provided in Appendix K of this document for reference.

The ISWCD maintains a GIS database of zebra mussel presence in the county, as well as state-wide. The database indicates the presence of zebra mussels throughout the Mississippi River both upstream and downstream of the Grand Rapids Project including Blandin Reservoir (ISWCD undated). During Project

inspections in which the wheel pit was dewatered in 2015 and a gate bay was dewatered in 2016, no evidence of zebra mussels was noted (Pers. Comm. Daniel Nordling, Supervising Engineer to Gregory Prom, Senior Environmental Compliance Specialist). Additionally, no evidence of zebra mussels has been identified by MP or reported by the general public at the FERC-approved recreational site at the Project.

AIR 3:

Section 5.4.8, Resource Summary, of the PAD states that Allete currently provides a minimum of 75 cubic feet per second (cfs) flow into the bypass reach downstream of the Prairie River Project during the months of April and May and a minimum of 50 cfs during June to enhance walleye spawning habitat and protect young-of-year from April to June. These flows were established based on an Instream Flow Incremental Methodology (IFIM) study conducted in the bypass reach during the previous licensing process. Please file a copy of the IFIM study report that was used to determine these minimum flows.

MP Response:

An IFIM study was conducted at the Prairie River Dam by the MDNR's Division of Waters in 1990. The MDNR's October 24, 1991 report discussing the IFIM study and providing recommendations is provided in Appendix L of this document for reference.

Terrestrial Resources

AIR 4:

In sections 5.4.7, Aquatic Invasive Species and 5.6.1.1, Invasive Plants, there is reference to an operating procedure for the management of aquatic invasive species. However, there are no details provided with regard to this plan or operating procedure with reference to the monitoring or management of the known aquatic invasive species that you have noted in the project area at the Grand Rapids Project, such as purple loosestrife. Please provide details of your aquatic invasive species program or management protocol with respect to invasive plants for each respective project. In addition, section 5.6.1.1, Invasive Plants, also indicates that purple loosestrife has been identified in the Blandin Reservoir. However, there is no historical information the abundance or location of the purple loosestrife. Thus, please provide historical information on the abundance of purple loosestrife in the Blandin Reservoir, as well as the location of purple loosestrife in relation to the Grand Rapids Project's physical structures and recreational facilities, if available.

MP Response:

The plan mentioned above is the internal procedure for aquatic invasive species management that MP implements to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6126. The procedure provides step-by-step directions for a variety of situations including: prior to leaving and entering public roadways; what to do if invasive species are found on the watercraft; and what to do when leaving a body of water. The procedure includes a list of infested waters and contact numbers of MP's aquatic invasive species specialists. The procedure is reviewed

annually and updated as necessary. This plan is provided in Appendix K of this document for reference.

The ISWCD maintains a GIS database of purple loosestrife presence in the county, as well as state-wide. The database indicates the presence of purple loosestrife in the area of Grand Rapids, Minnesota, including the perimeter of Blandin Reservoir (ISWCD undated).

7 Literature Cited

Itasca Soil and Water Conservation District (ISWCD). Undated. Aquatic Invasive Species in Itasca County. [Online] URL: https://itascaswcd.maps.arcgis.com/apps/MapSeries/index.html?appid=49553377c49e4b6d8a2bf970326323ac. Accessed: April 15, 2019.

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Minnesota Pollution Control Agency (MPCA). 2018. Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report. Published June 2018.

Minnesota Power (MP). 2018. Grand Rapids Hydroelectric Project and Prairie River Hydroelectric Project Pre-Application Document. December 2018.

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Appendix A. Comments and Study Requests

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 0 1 2019

REPLY TO THE ATTENTION OF:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, Northeast
Washington, District of Columbia 20426

Re: Scoping Document 1, Prairie River and Grand Rapids Hydroelectric Projects, Itasca County, Minnesota, Federal Energy Regulatory Commission Project 2361

Dear Ms. Bose:

EPA appreciates the opportunity to review the document referenced above, dated February 7, 2019. We are providing scoping comments pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act. The Federal Energy Regulatory Commission (FERC) is the lead agency under NEPA. EPA offers comments with the goal of facilitating project efficiency by identifying environmental issues and recommending solutions early in the planning process. We also aim to assist with meeting project goals in a manner that best protects natural resources and human health. Please find EPA's project recommendations enclosed.

The proposal considers relicensing two discrete hydroelectric projects without changes to structures or operations. Both projects operate in run-of-river mode. The Prairie River Project is located on the Prairie River near the township of Arbo. The Grand Rapids Project is located on the Mississippi River near the City of Grand Rapids. Both projects received original licenses in 1965, and current licenses expire on December 31, 2023. The scoping notice states that FERC's current intent is to prepare an environmental assessment (EA), and there is a possibility that an environmental impact statement (EIS) may be required. FERC explains that the current process will satisfy NEPA scoping requirements irrespective of whether FERC issues an EA or EIS.

If you would like to discuss our recommendations, please contact Jen Blonn Tyler, the lead NEPA reviewer for this project, at 312-886-6394 or tyler.jennifer@epa.gov. Please send all future NEPA documents related to this project to Ms. Tyler at the address listed above.

Sincerely,

Kenneth A. Westlake
Chief, NEPA Implementation Section
Office of Enforcement and Compliance Assurance

Enclosure: EPA's Detailed Scoping Comments

ENCLOSURE

EPA'S DETAILED SCOPING COMMENTS ON THE PRAIRIE RIVER AND GRAND RAPIDS HYDROELECTRIC PROJECTS, ITASCA COUNTY, MINNESOTA, FEDERAL ENERGY REGULATORY COMMISSION PROJECT 2361

Resiliency

The National Climate Assessment finds that in the Midwest extreme heat, heavy downpours, and flooding will affect infrastructure and water quality.[1] It is important for the Federal Energy Regulatory Commission (FERC) to consider the current condition and likely integrity of the project's physical infrastructure over the 30 to 50-year term of the proposed new licenses. The project's potential environmental impacts may also change as temperature and precipitation patterns intensify.

Recommendations for the National Environmental Policy Act (NEPA) Document:

- Consider precipitation and temperature trends and modeled future conditions for the project area, which are available in the National Climate Assessment.
- Assess whether the existing project structures are likely to be resilient to changing precipitation and temperature conditions over the life of the licenses.
- Consider whether the projects' environmental impacts may change with increases in average temperatures and increases in the frequency and intensity of precipitation events.
- If needed, incorporate resiliency and adaptation measures or plans. See EPA's Adaptation Resource Center[2] for assistance.

Water Quality

On Jan. 28, 2019, EPA approved Minnesota's 2018 list of impaired waters under Section 303(d) of the Clean Water Act. Prairie River, Prairie Lake, Lower Prairie Lake, Blandin Reservoir, and the stretch of the Mississippi River immediately upstream of Blandin Reservoir are impaired due to mercury in fish tissue. The adjacent portion of the Prairie River is also impaired due to Escherichia coli. [3]

Recommendations for the NEPA Document:

Describe existing water quality conditions and ensure that the proposed project would not harm water quality or delay remediation of current impairments.

Project Boundary

Scoping Document 1 includes a map with proposed project boundaries. The Prairie River Project boundary includes Prairie Lake and Lower Prairie Lake, but it does not include adjacent stretches of the Prairie River. The Grand Rapids Project boundary includes Blandin Reservoir, but it does not include adjacent stretches of the Mississippi River.

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[1] U.S. Global Change Research Program, 2018 Fourth National Climate Assessment, Volume II, available at: https://nca2018.globalchange.gov/

[2] EPA's Climate Adaptation Resource Center, available at: https://www.epa.gov/arc-x

[3] Minnesota 303(d) waters report, available at: https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list.

Recommendations for the NEPA Document:
Extend the project boundary so that includes portions of the Prairie River and the Mississippi River that would be impacted by the decision to issue or not issue a new license. Consider potential impacts to water quality, aquatic species, and other resources when determining the applicable project boundary.

Species and Habitat
Continuing to operate the Prairie River and Grand Rapids Hydroelectric Projects may impact species in the project area.

Recommendations for the NEPA Document:
- Identify all state and federally-listed threatened and endangered species known to occur in the project area.
- Assess potential impacts to threatened and endangered species from the proposed actions.
- Disclose historic impacts on species from the operation of the hydroelectric projects, including fish impingement and entrainment.
- Discuss spacing, materials, and design of trash racks.
- Consider best practices for protecting species. Commit to protective measures where needed, such as upgrading trash racks if warranted.
- Coordinate with the U.S. Fish and Wildlife Service and the Minnesota Department of Natural Resources on methodologies for assessing impacts and opportunities to protect species. Describe coordination in the NEPA document.

Invasive Species
The spread of noxious weeds and exotic (non-indigenous) plants is a threat to biodiversity. Many noxious weeds can out-compete native plants and produce a monoculture that has little or no plant species diversity or benefit to wildlife. Noxious weeds tend to gain a foothold where there is disturbance in the ecosystem. Early recognition and control are essential to stopping the spread of infestation and avoiding future widespread use of herbicides, which could have more adverse impacts on biodiversity and water quality.

Recommendations for the NEPA Document:
- Consider whether issuing new permits would lead to future maintenance activities that could introduce invasive species.
- Prepare or update a vegetation management plan to control invasive species. Include a list of noxious weeds and exotic plants known to exist in the area. Detail a strategy for prevention, early detection of invasion, and control procedures for each species. Provide details in the EA.

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
April 5, 2019

OFFICE OF ENERGY PROJECTS

Project No. 2361-055 – Minnesota
Prairie River Hydroelectric Project
Project No. 2362-043 – Minnesota
Grand Rapids Hydroelectric Project
Allete, Inc.

Nora Rosemore, Superintendent
Allete, Inc.
30 West Superior Street
Duluth, MN 55802-2093

Reference: Comments on Preliminary Study Plans, Request for Studies, and Additional Information

Dear Ms. Rosemore:

After reviewing the Prairie River and Grand Rapids Hydroelectric Projects' Pre-Application Document, and participating in the scoping meetings held March 6 and 7, 2019, and the environmental site review held on March 6, 2019, we have determined that additional information is needed to adequately assess potential project effects on environmental resources. We have two study requests (enclosed in Schedule A) for cultural resources and botanical resources, and recommend that you consider our comments on two of your preliminary proposed studies (enclosed in Schedule B). We also have additional information needs (enclosed in Schedule C). Please provide the requested additional information when you file your proposed study plan, which must be filed by May 27, 2019, unless otherwise noted.

Please include a master schedule in your proposed study plan that includes the steps for conducting each proposed study (i.e., data collection, data analysis, consultation, and report preparation), the distribution of progress reports, the filing date of the initial study report, and the date of the initial study report meeting. If, based on the study results, you are likely to propose any plans for measures to address project effects, drafts of those plans should be filed with your Preliminary Licensing Proposal (or draft license application).

Project No. 2361-055
Project No. 2362-043

Please note that we may, upon receipt and review of scoping comments/study requests from other entities due April 12, 2019, as well as your proposed study plan, request additional studies or information at a later time.

If you have any questions, please contact Laura Washington at (202) 502-6072, or via e-mail at laura.washington@ferc.gov.

Sincerely,

Janet Hutzel

Janet Hutzel, Chief
Midwest Branch
Division of Hydropower Licensing

Enclosures: Schedule A
Schedule B
Schedule C

Schedule A

Study Requests

After reviewing the information in the Pre-Application Document (PAD), we have identified information that is needed to assess project effects. As required by section 5.9 of the Commission's regulations, we have addressed the seven study request criteria in the study requests that follow.

Botanical Resources Study

§5.9(b)(1) – *Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of the study is to develop additional information necessary to address the potential effects of project operation and maintenance activities on botanical resources within the project boundary for each project. The results of this study would be used to determine how potential effects can be avoided, minimized, or otherwise mitigated.

The objectives of the botanical resources study are as follows:

1. map and/or confirm vegetation types within the project boundary for each project, including age-class and composition of forested areas;

2. identify and map any rare, threatened, or endangered plant species or potential habitats; and

3. document the presence, abundance, and location of invasive plant species.

§5.9(b)(2) – *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

§5.9(b)(3) – *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. In making its license decision, the Commission must equally consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

The Prairie River and Grand Rapids Projects provide habitat for a variety of plants and animals. An understanding of the botanical resources within the project boundary for each project would provide information on the type, abundance, and location of habitat potentially affected by continued operation and maintenance of the projects. Understanding the projects' effects on botanical resources is relevant to the Commission's public interest determination.

§5.9(b)(4) – *Describe existing information concerning the subject of the study proposal, and the need for additional information.*

In the PAD, Allete, Inc. (Allete) provides a general discussion of vegetation types common to the ecoregion, but omits a substantive discussion of botanical resources at the projects. Therefore, we cannot determine the potential project effects on botanical resources in the project boundary for each project.

§5.9(b)(5) – *Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Project operation and maintenance activities have the potential to disturb botanical resources in the project boundary for each project. This study would assist in identifying plant species and their habitats within the projects and provide baseline information from which to evaluate the effects of continued operation and maintenance of the Prairie River and Grand Rapids Projects on those resources.

§5.9(b)(6) – *Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Field Survey

There would be one field survey at each project with multiple components. The spatial boundaries of the field study area would consist of the project facilities and the riparian corridors at both projects within the project boundary for each project. A general inventory of plants, including any state listed rare, threatened, or endangered botanical species, should be conducted within the study area. Age class, species composition and relative density of any forested understory should be recorded, as well as the presence of snags or old-growth hardwoods with sloughing bark. The invasive species portion of the survey should focus on non-native species, examining disturbed habitats (including areas adjacent to infrastructure and roadside ditches) and natural terrestrial habitats (woodlands, meadows, Prairie River and Grand Rapids shorelines)

where invasive species are observed or likely to occur in the project boundary for each project. The survey should be conducted during the spring and summer months when diagnostic features are most identifiable. Each invasive species occurrence should be mapped with a handheld GPS unit and depicted on an aerial photograph. Data should be recorded for each invasive species occurrence, including species name, GPS location, approximate density, and area of coverage. Representative photos should be taken and general observations should be noted regarding habitat and site conditions, including type and quality.

The methods described above are consistent with accepted methods for conducting botanical resources surveys.

Report Preparation

Allete would prepare a report that summarizes the botanical resources encountered within the project boundary of the projects. The report should include species occurrence data, high-resolution land cover maps, approximate land cover by type and acreage, age class and composition of any forested habitat, and mapping of invasive species. Captioned photographs of typical and/or significant habitat conditions should be included in the report. Documentation of rare, threatened, or endangered species occurrence should be filed with the Commission as privileged.

§5.9(b)(7) – *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of a reconnaissance-level botanical resources survey and the preparation of a report containing the above criteria is approximately $5,000 for each survey respectively.

Cultural Resources Study

§5.9(b)(1) – Describe the goals and objectives of each study proposal and the information to be obtained.

The goal of this study is to determine the potential effects of project operation on archaeological and historic resources that are included in or eligible for the National Register of Historic Places (National Register or historic properties). The survey and study report, including identification of the area of potential effects (APE) for each project,[1] should be developed after consultation with the Minnesota State Historic

[1] For each project, the APE should, at a minimum, include the lands enclosed by

Preservation Officer (Minnesota SHPO), any federally-recognized tribes[2] who have an active interest in the projects, and other interested parties. The specific objectives of the survey and subsequent report are to:

(a) identify the projects' APEs;[3]

(b) after consultation with the Minnesota SHPO and interested Tribes, conduct a Phase I pedestrian field inventory within the APE of each project to locate any historic or archeological resources;

(c) assess the National Register-eligibility of historic resources, including the project themselves, or archaeological resources within each APE;

(d) evaluate the potential effects the projects would have on historic properties; and

(e) assess the condition of the area where any historic and archaeological sites are located for shoreline stability and evidence of erosion.

§5.9(b)(2) – If applicable, explain the relevant resource management goals of the agencies or Indian Tribes with jurisdiction over the resource to be studied.

Not applicable.

§5.9(b)(3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.

Sections 4(e) and 10(a) of the FPA require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish

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the project boundary including both in-water and on-shore project lands and facilities, and lands or properties outside the project boundary where project operation or other project-related activities may cause changes in the character or use of historic properties, if any historic properties exist.

[2] The tribes which have expressed interest in the projects during initial tribal consultation for the projects include the Cheyenne and Arapaho Tribes, the Bois Forte Band of Chippewa, and the Leech Lake Band of Ojibwe; however, other tribes may express an interest in the future.

[3] The APE for each project should be developed after consultation with the Minnesota SHPO and interested Tribes. Once the APE is defined, please request that the Minnesota SHPO concur with the APE for each project prior to conducting any field surveys within the APE.

and wildlife, and other non-developmental values of the project, as well as power generation and other developmental values.

Cultural resources are resources of particular interests to the public. Preserving and protecting cultural resources provides a venue for understanding our Nation's past and respecting the various cultures of this country. Project operation and maintenance may affect the value and integrity of National Register-eligible historic properties in the vicinity of each project. Ensuring that potential measures associated with cultural resources are analyzed is relevant to the Commission's public interest determination.

Furthermore, pursuant to section 106 of the National Historic Preservation Act (section 106), the licensing of the proposed projects would be a federal undertaking and a license issued by the Commission would permit activities that may "…cause changes in the character or use of historic properties, if any such historic properties exist…" (see 36 CFR part 800.16(d) of the regulations implementing section 106). The Commission must, therefore, comply with section 106, which requires the head of any federal department or independent agency having authority to license an undertaking to take into account the effect of the undertaking on historic properties. In the case of the proposed projects, assessment of historic properties would be conducted in consultation with the Commission, Minnesota SHPO, any tribes which express an interest in the projects, and other interested parties.

§5.9(b)(4) – Describe the existing information concerning the subject of the study proposal, and the need for additional information.

The PAD provides information on archaeological and historic resources identified during previous cultural resources surveys conducted in the early 1990s. However, because the existing information is over 25 years old, there may be unknown historical or archeological sites that may be affected by project operation and maintenance for each project, or the projects themselves may be eligible for the National Register. Allete does not propose to conduct a study to determine the presence of archeological or historic resources in the vicinity of the proposed projects. Due to the potential for cultural resources, a Phase I archaeological survey of the each project's APE is needed to determine the presence of any archaeological or historic sites[4] within each project's APE. If any historic properties are identified, the nature and extent of potential effects and measures to avoid, lesson, or mitigate adverse effects, can be properly determined.

[4] Project facilities should be evaluated to determine if they are eligible for the National Register.

§5.9(b)(5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.

Section 106 requires that federal agencies take into account the effect of proposed undertakings on any district, site, building, structure, or object that is included in or eligible for the National Register. Operation and maintenance of project facilities could adversely affect historic properties through ground-disturbing activities and cause other indirect adverse effects on historic properties.

A cultural resources survey would provide information on potential cultural resources located within each APE. The subsequent report would provide information on cultural resources that would be potentially eligible for the National Register and any potential effects on historic properties. If there would be an adverse effect on historic properties at either project, an applicant-prepared historic properties management plan (HPMP), would be necessary to avoid, lessen, or mitigate for adverse effects. If an HPMP is needed for either project, the draft and final HPMP should be filed with the preliminary licensing proposal and the final license application, respectively.[5]

§5.9(b)(6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.

The scope of work that would be required to complete a cultural resources survey and evaluation of each project for National Register-eligibility would be identified through consultation with the Minnesota SHPO, the federally-recognized tribes who have an active interest in the projects, and other interested parties. At a minimum, the study should include a literature review and a Phase I field inventory of each project's APE. Prior to conducting the survey and completing a survey report, the applicant should consult with the Minnesota SHPO and interested Tribes on: (a) appropriateness of the APEs for each project; (b) methods and techniques on how the survey should be conducted at each project; (c) anticipated effects (direct and indirect) on cultural resources; (d) what properties, including the project themselves, are and are not considered eligible for the National Register; and (e) any other relevant details involving

[5] If an HPMP is needed for both projects, each project should have its own separate HPMP.

the surveys and report. All methods used to conduct either additional survey for archaeological sites or for the National Register-eligibility evaluation of sites should conform to the Minnesota SHPO guidelines.[6]

A preliminary report identifying any discovered cultural resources should be completed after the field inventory phase. At a minimum, this report should be reviewed by the Minnesota SHPO, interested Tribes, and the Commission. Allete should seek concurrence with the Minnesota SHPO on its determination of what properties are or are not considered eligible for the National Register. Allete should also seek concurrence with the Minnesota SHPO on what, if any, adverse effects may occur on historic properties as a result of project operation and/or maintenance, or project-related activities.

The evaluation of project effects on cultural resources should include both site-specific effects and indirect effects. The report should also be kept confidential, and filed with the Commission and other consulting parties as "privileged," a non-public document.

If historic properties are identified and would be adversely affected by proposed operation or maintenance of either project or from project-related activities, then an HPMP should be developed after consultation with the Minnesota SHPO, interested Tribes, and other interested parties. When developing an HPMP the generally acceptable practice is to use the "Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines" (*Federal Register*, September 29, 1983, Vol. 48, No. 190, Part IV, pp. 44716-44740) and the Advisory Council on Historic Preservation and Commission's "Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects"[7] (issued May 20, 2002), and consider and/or address the following items:

(a) completion, if necessary, of identification of historic properties, within the project's APE;

(b) continued use and maintenance of historic properties;

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[6] Survey methodology should conform to the guidelines provided at http://www.mnhs.org/shpo/survey/archsurvey.pdf, unless the Minnesota SHPO provides alternative guidance.

[7] This document was issued jointly by the Commission and the Advisory Council on Historic Preservation on May 20, 2002. The document is available at http://www.ferc.gov/industries/hydropower/gen-info/guidelines/hpmp.pdf.

(c) maintenance and operation of the hydroelectric projects according to the Secretary of Interior's "Standards for the Treatment of Historic Properties" (36 C.F.R. Part 68) and applicable National Park Service Preservation Briefs;[8]

(d) treatment of historic properties threatened by project-induced shoreline erosion,[9] other project-related ground-disturbing activities, and vandalism;

(e) identification and evaluation of historic properties, determination of effects, and ways to avoid, minimize, or mitigate adverse effects;

(f) consideration and implementation of appropriate treatment that would minimize or mitigate unavoidable adverse effects on historic properties;

(g) treatment and disposition of any human remains that may be discovered, taking into account any applicable state laws and the Advisory Council on Historic Preservation's "Policy Statement Regarding Treatment of Human Remains and Grave Goods" (September 27, 1988, Gallup, NM);

(h) discovery of previously unidentified properties during project operation;

(i) public interpretation of the historic and archaeological values of the project;

(j) list of activities, including routine repair, maintenance, and replacement in kind at the project not requiring consultation with the Minnesota SHPO; since these activities would have little or no potential to affect historic properties;

(k) procedures to address effects during project emergencies; and

(l) coordination with the Minnesota SHPO, interested Tribes, and any other identified parties during implementation of the HPMP.

§5.9(b)(7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.

The anticipated cost for the literature review and Phase I archeological survey is between $25,000 and $55,000.

[8] This portion of the HPMP is necessary if the Grand Rapids Project or the Prairie River Project, respectively, is determined to be eligible for the National Register.

[9] Project-induced shoreline erosion does not include shoreline erosion attributable to flood flows or phenomena, such as wind driven wave action, erodible soils, and loss of vegetation due to natural causes.

Schedule B

Comments on Preliminary Study Plans

Based on our review of your preliminary study plans outlined in your Pre-Application Document (PAD), we request the following modifications. Please address our requests in your proposed study plans.

Aquatic Resources

Fish Entrainment and Impingement Study

1. In section 6.2.3.2, of the PAD, *Fish and Aquatic Proposed Studies,* you propose to conduct a desktop fish entrainment and impingement study at each project. To help us better understand how operation of the projects may affect fish populations in the Mississippi River, your study should:

(a) describe the physical characteristics of each of the projects that may influence fish impingement and entrainment rates, including intake location and dimensions, the velocity distribution in front of the intake structure, and the clear spacing between the trashrack bars;

(b) analyze target species (i.e., individual species and guilds/groups) for factors that may influence their vulnerability to entrainment and mortality;

(c) assess the potential for target fish species impingement;

(d) estimate entrainment rates and numbers for target fish species;

(e) estimate turbine passage survival rates and numbers for target fish species; and

(f) describe how existing information and data collected in other studies (e.g., recent Minnesota Department of Natural Resources fish community surveys) would be used to estimate entrainment/impingement and survival rates.

Temperature and Dissolved Oxygen Study

2. In section 6.2.3.2, of the PAD, *Fish and Aquatic Proposed Studies,* you propose to conduct a temperature and dissolved oxygen (DO) study from May through October at each project to determine if the projects are meeting state water quality standards. To help us better understand how operation of the projects may affect temperature and DO in the Mississippi River, your study should:

(a) identify the DO concentration and temperature of water entering each project's intakes;

(b) describe any temporal variations of DO concentration and temperature;

(c) identify the DO and temperature profile within each project reservoir in the vicinity of the intakes; and

(d) describe any changes of DO concentrations and temperature in the river downstream of each project, including the Prairie River Project's bypass reach.

Recreation Resources

Recreation Assessment

3. In section 6.2.7.2, of the PAD, *Recreation and Land Management Proposed Studies,* you propose to conduct a recreational assessment to evaluate current recreational opportunities and potential improvements at each project. However, details of the methodology, analysis of the data, and schedule are not included in the study proposal. Understanding the amount of current and projected future use and how these sites and facilities are managed is essential in determining the adequacy of project recreation facilities to meet current and future recreation needs; and therefore, is relevant to the Commission's public interest determination.

In the absence of recreational use data and facility conditions, we cannot determine that the existing information is adequate for us to assess the adequacy of existing recreation facilities to meet current and future demand. So that we may fully understand and evaluate the effects of continued project operation and maintenance on recreation use at each project, please include the following in your study proposal for recreation resources:

(a) identify the condition of all informal and formal recreation sites and facilities, and identify if they are located within, outside, or partially within the project boundary for each project;

(b) determine the current at each recreation site and/or facility and the projected capacity for those sites and facilities;

(c) identify who owns, operates, and maintains each recreation site and/or facility; and

(d) conduct visitor surveys during the recreation season to determine the adequacy of project recreation facilities and if changes or upgrades to the sites would be needed to meet current or future recreation needs.

Recreation Use Surveys

A schedule should be developed for the distribution of the recreation use surveys. All sampling days should be randomly selected and survey routes should be completed on a rotating basis and at different times of day to account for time-of-day use patterns. These counts should last for at least two hours per site on each day and should be conducted on four (4) days per month which should include two (2) randomly selected weekdays and two (2) randomly selected weekend days. If a month contains a three-day holiday weekend, one (1) day per holiday weekend should be included in addition to the standard survey days. The recreation use survey should occur during the recreation season to capture recreational use occurring while the various project facilities are open to the public.

The recreation use survey should be administered to users to gain user opinions with regard to the existing project recreation facilities and opportunities. The survey should record the number of people in a party, their primary reason (recreational activity) for visiting the project, their perception of level of use, and their opinions with regard to the amount and types of recreation opportunities offered within the project boundary for each project.

Spot Counts

Spot counts should also be conducted on survey days. The spot counts represent short-term counts (approximately 5 minutes per site) and should record the number of vehicles parked at a site/facility and the number of users observed. This information should be statistically analyzed to develop the recreational use figures for each project. Final recreation use for the recreation facilities and sites within each project should be summarized by season and activity type for each site.

Report Preparation

Allete should prepare a report that includes information on the number of recreation days spent at project recreation sites, average number of persons per party, and a determination of the percent of the each facility’s capacity that is currently being utilized. The above information should be entered into spreadsheets for statistical analysis. The collected information should be used to project changes to project recreation demand over the term of any new license, if issued.

Schedule B
Project No. 2361-055
Project No. 2362-043

The report should also include the following for each project:

(a) the location of project recreation facilities in relation to the project boundary, including facilities/amenities that may straddle the project boundary, and a map that identifies each facility;

(b) the types and number of amenities provided at each facility;

(c) identification of entities responsible for the ownership, operation, and maintenance of the formal project recreation facilities;

(d) hours/seasons of operation;

(e) photographs of the facilities;

(f) recreation use figures for each formal recreation site, overall recreational use figures, and projected use figures; and

(g) a compilation of responses to the recreation use survey.

Schedule C

Additional Information

Aquatic Resources

1. Section 5.4.2.1, *Previous Fisheries Surveys and Habitat Assessments,* of the Pre-Application Document (PAD) states that a fish impingement characterization study was performed in 2017 by Allete, Inc. (Allete) at the cooling water intake structure located near the Grand Rapids Project. Please file a copy of this report.

2. Section 5.4.7, *Aquatic Invasive Species,* of the PAD indicates that zebra mussels have been identified in the Blandin Reservoir. The PAD also states that Allete has an internal procedure for aquatic invasive species management to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6216 to prevent the spread of aquatic invasive species. However, no details of this internal procedure were provided with regard to the monitoring or management of zebra mussels. Therefore, please provide details of your aquatic invasive species program/management protocol related to zebra mussels. Additionally, please provide information on the abundance of zebra mussels in the Blandin Reservoir, as well as the location of zebra mussels in relation to the Grand Rapids Project's physical structures and recreational facilities, if available.

3. Section 5.4.8, *Resource Summary,* of the PAD states that Allete currently provides a minimum of 75 cubic feet per second (cfs) flow into the bypass reach downstream of the Prairie River Project during the months of April and May and a minimum of 50 cfs during June to enhance walleye spawning habitat and protect young-of-year from April to June. These flows were established based on an Instream Flow Incremental Methodology (IFIM) study conducted in the bypass reach during the previous licensing process. Please file a copy of the IFIM study report that was used to determine these minimum flows.

Terrestrial Resources

4. In sections 5.4.7, *Aquatic Invasive Species* and 5.6.1.1, *Invasive Plants,* there is reference to an operating procedure for the management of aquatic invasive species. However, there are no details provided with regard to this plan or operating procedure with reference to the monitoring or management of the known aquatic invasive species that you have noted in the project area at the Grand Rapids Project, such as purple loosestrife. Please provide details of your aquatic invasive species program or management protocol with respect to invasive plants for each respective project. In addition, section 5.6.1.1, *Invasive Plants,* also indicates that purple loosestrife has been identified in the Blandin Reservoir. However, there is no historical information the abundance or location of the purple loosestrife. Thus, please provide historical

information on the abundance of purple loosestrife in the Blandin Reservoir, as well as the location of purple loosestrife in relation to the Grand Rapids Project's physical structures and recreational facilities, if available.

Developmental Resources

5. Section 5.6(d)(2)(iii) of the Commission's regulations require, in part, that a PAD must include a detailed description of all existing and proposed project facilities including the composition, dimensions, and configuration of dams, spillways, penstocks, powerhouses, tailraces, and any structure proposed to be included as part of the project; a detailed description of existing and proposed facilities; the reservoir area, gross and usable capacity, and elevation; the number, type and capacities of turbines and generators, and installed (rated) capacity of proposed turbines or generators; transmission line numbers, lengths, voltage, and interconnections (including diagrams); and energy production (estimate of dependable capacity, average annual, and average monthly energy production). The following omissions and inconsistencies/discrepancies are noted between the written project descriptions contained in the PAD and existing project features for both projects.

Prairie River Project

a. The PAD does not provide information on the following project features: (1) the length and height of each dam section of Prairie River Dam; (2) the length and width of the total and each section of the forebay structure including intake, earth dam, fine and coarse trashracks, switchyard/substation, etc.; (3) the length, width, and height of the powerhouse and outlet works/tailrace; (4) dimensions for the surge tank; and (5) length and voltage of the transmission line.

b. The "additional emergency spillway" is incorrectly described as being 169 feet long in the PAD. However, recently available updated Exhibit F drawings (dated 8/18/17 and 10/23/17), show it as 160 feet long.

c. The 10.0-foot-high Tainter Gates' sill elevations are incorrectly described as 1280.2 feet in the PAD. However on the updated Exhibit F drawings, they are shown as 1280.05 feet.

d. The 8.0-foot-high Tainter Gates' sill elevations are incorrectly described as 1283.7 feet in the PAD. However on the updated Exhibit F drawings, they are shown as 1284.0 feet.

e. The PAD provides information on the average annual and average monthly energy production, but not does not provide information of the dependable capacity.

Please resolve the data omissions and discrepancies and submit the requested information in your applicant proposed preliminary licensing proposal (PLP) or draft license application (DLA). Also, all reported elevations within the PAD should be stated with the appropriate vertical datum in the PLP or DLA. Further, please provide a cross section profile of and a detailed discussion on "additional emergency spillway" on the Exhibit F drawings and in the supporting design report, respectively. This should include discussions on activation flood, activation mechanism, protection measures from erosion between the emergency spillway and the main dam, etc. Additionally, the Exhibit F drawings should provide a profile view of the 450-foot-long concrete penstock. The profile view should cover from forebay to the surge tank and should also include Itasca County HWY 61 with elevation details.

Grand Rapids Project

a. The PAD does not provide information on the following: (1) the total length and height of the Blandin Dam and similar dimensions for each dam section; and (2) the length and width of intake and outlet works/tailrace, trashracks, powerhouse, switchyard/substation; and dimensions for the turbine pits and draft tubes.

b. The gated spillway is incorrectly described as consisting of six stop log gates, three slide gates, and one Tainter gate. Per the Supporting Technical Information Document and other data review, there are four stop log gates, two slide gates, and one Tainter gate.

c. Existing Exhibit F-3 drawing shows (section AA) steel sheet pile cut-off walls at upstream and downstream ends. However, no detailed descriptions on these sheet piles are found in the PAD, especially about the downstream sheet pile and the extent of it. In addition, the existing Exhibit F-4 (section BB) does not show this downstream cut-off wall.

d. The elevation of the permanent crest of the dam is incorrectly described as 20.2 feet in the PAD (Table 4.3-1). However, the Exhibit F drawings on record, show the crest elevation of the dam as 1269.2 feet.

e. The PAD provides information on the average annual and average monthly energy production, but not does not provide information of the dependable capacity.

Please resolve the data omissions and discrepancies and submit the requested information in your applicant proposed preliminary licensing proposal (PLP) or draft license application (DLA). Also, all reported elevations within the PAD should be stated with the appropriate vertical datum in the PLP or DLA. Further, please note that all Exhibit F drawings on record are dated from 1990-1991. However after 1991, there were

several upgrades made to various parts of the dam structure including: (1) the replacement two of the six stop log gates on the overflow section with vertical steel lift gates in 2000-2001; and (2) re-grading of the downstream right bank and installation of an erosion matt to stabilize the slope in year 2008, but the filed Exhibit F drawings have not been updated to reflect these and other changes.

MINNESOTA POLLUTION CONTROL AGENCY

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April 11, 2019

Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, Northeast
Washington, District of Columbia 20426

RE: Prairie River and Grand Rapids Hydroelectric Projects Scoping Document 1
Federal Energy Regulatory Commission Project Numbers P-2361-055 and P-2362-043

Dear Kimberly Rose:

Thank you for the opportunity to review and comment on Scoping Document 1 for the Prairie River and Grand Rapids Hydroelectric Projects (Projects). The Prairie River Project is located on the Prairie River near Arbo Township, and the Grand Rapids Project is located on the Mississippi river near the City of Grand Rapids. Both Projects are located in Itasca County, Minnesota. These are two discrete Federal Energy Regulatory Commission (FERC) relicensing projects that will not require new power generation structures, increase capacity, dredge and/or fill requirements or other modifications. Regarding matters for which the Minnesota Pollution Control Agency (MPCA) has regulatory responsibility or other interests, the MPCA staff has the following comments for your consideration.

6.0 Request for Information and Studies

Impoundment Bathymetry Survey and Sediment Accumulation and Sediment Contaminant Study
The MPCA requests that Minnesota Power Company/Allete conduct an Impoundment Bathymetry Survey and a Sediment Accumulation and Sediment Contaminant Study. There is relatively little existing information on the sediment accumulation and chemical composition in the impoundments behind the Prairie River and Grand Rapids Dams. Because of the long duration of a FERC license (40 to 50 years), we believe that conducting these studies will help to inform development of the Clean Water Act Section 401 Water Quality Certification for the current relicensing projects, as well as for potential future relicensing activities.

For the survey/study request, the MPCA recommends a total of ten samples be collected, five from each dam/impoundment. Both of the impoundments trap and retain sediments and contribute to a gradual silting-in of the impoundment area directly above the dams. Minnesota Power Company has extensive knowledge and experience at each hydroelectric generation dam/facility and should select specific locations within the impoundments with a history of heavy sediment deposition.

The MPCA recommends the survey/study include parameters and methodologies proposed in previous study plans at similar hydroelectric power generation facilities. All samples should be sent to a certified laboratory for analysis. Sample parameters and methodologies include:

- Characterize physical sediment properties (e.g. size, volume, location);
  - Size - the sediment study will conduct particle size analysis on each sample
  - Volume - estimates of the volume of accumulated sediment will be provided in the bathymetry study

  - Location - the sediment study will document the location where each sample was collected
- Estimate the amount of sediment accumulated;
  - This will be part of the bathymetry study
- Characterize the composition of sediment and provide baseline information necessary to identify potential environmental, human health, and safety concerns;
  - 7 Total Metals (ICP/MS) — Arsenic, Cadmium, Chromium, Copper, Lead, Nickle, Zinc
  - Total Mercury (CVAA)
  - Polycyclic Aromatic Hydrocarbons (GC/MS SIM)—13 specific analytes
  - Polychlorinated Biphenyls Aroclors (GC/ECD)—standard list
  - Organochlorine Pesticides (GC/ECD)—specific analytes)
- Analyze sediment quantity, thickness, and particle composition;
  - Sediment quantity and thickness - this will be part of the bathymetry study
  - Particle composition – the sediment study will conduct particle size analysis on each sample

Additional Recommended Studies

- Monitoring of phosphorus at Prairie Lake. The lake was recently removed from the MPCA 303(d) Impaired Waters List but is still near the threshold so additional monitoring beyond the MPCA's two years of data collection per decade is warranted.
- Assessment of probable effects of climate change on the Projects operation and contingency plans relating to those effects.
- Monitor the Projects aquatic and terrestrial areas for invasive and exotic species and take action to eliminate existing populations, and prevent and/or reduce their spread. This includes ongoing monitoring of zebra mussel activity at the Blandin Dam.
- Identify, protect and/or restore native vegetation ecosystems where they occur or historically occurred on the Projects lands.
- During the ice free season, continuously monitor streamflow in the Prairie River bypass, and work with resource agencies to determine if the bypass minimum flows currently in the license (75 cubic feet per second (cfs) in April & May, and 50 cfs in June) need to be increased to protect aquatic life and downstream resources, within the context of presumed climate change effects and the duration of the new license. The 90th percentile flow rate at the U.S. Geological Survey (USGS) Prairie River gage is approximately 48 cfs, based on data from 1967-2017). Confirm with Minnesota Power, Minnesota Department of Natural Resource and USGS that this metric was used to derive the current minimum flows in the license.

Additional Parameters

The MPCA supports Allete's proposal to conduct temperature and dissolved oxygen studies at each Project from May through October. We would also request monitoring for the following additional parameters at Main Upper Basin Prairie Lake site - 31-0384-02-201:

- Chlorophyll-a
- Secchi disk
- Temperature profiles
- Total phosphorus

This monitoring should be completed at the Main Upper Basin of Prairie Lake three (3) times per year (spring, mid-summer, and fall) every other year. All data must be electronically submitted to the MPCA.

At the end of three monitoring cycles, the data should be examined for temporal trends. The MPCA will discuss with Minnesota Power/Allete if monitoring should continue. These procedures are similar to past license requirements for other FERC projects.

Additional Available Information

- Studies and reports for the Mississippi River - Grand Rapids watershed are at the following website: https://www.pca.state.mn.us/water/watersheds/mississippi-river-grand-rapids
- MPCA Watershed reports
  https://www.pca.state.mn.us/sites/default/files/wq-ws4-50a.pdf
  https://www.pca.state.mn.us/sites/default/files/wq-ws4-50b.pdf
  https://www.pca.state.mn.us/sites/default/files/wq-iw8-08ab.pdf
- One Watershed One Plan information
  http://www.bwsr.state.mn.us/planning/1W1P/1W1P_Fact_Sheet_2018.pdf
  http://www.bwsr.state.mn.us/planning/1W1P/1W1P_Participating_Watersheds_Map.pdf
- The MISSISSIPPI RIVER HEADWATERS RESERVOIRS MASTER PLAN, USACE 2016, should also be referenced as part of the Project and is located here: https://www.mvp.usace.army.mil/Portals/57/docs/Environmental/EA/Mississippi%20River%20Headwaters%20Master%20Plan.pdf?ver=2016-10-11-163650-150

We appreciate the opportunity to review this Project. 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 Projects proposer to secure any required permits and to comply with any requisite permit conditions. If you have any questions concerning our review of this Scoping Document 1, please contact me by email at Karen.kromar@state.mn.us or by telephone at 651-757-2508.

Sincerely,

Karen Kromar

Karen Kromar
Project Manager
Environmental Review Unit
Resource Management and Assistance Division

KK:mb

cc: Dan Card, MPCA, St. Paul
Bill Wilde, MPCA, St. Paul
Anna Bosch, MPCA, Brainerd
Phil Votruba, MPCA, Brainerd
Amy Adrihan, MPCA, Duluth
Ken Westlake, U.S. Environmental Protection Agency

Appendix B. Grand Rapids Project Water Quality Study

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Water Quality Study Plan

Grand Rapids Hydroelectric Project

(FERC No. 2362)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Grand Rapids Hydroelectric Project (Project) relicensing:

- Effects of continued operation of the Projects on water quality (e.g., dissolved oxygen [DO] levels and water temperature)

In Section 6.2.2 of the Pre-Application Document (PAD), ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a Water Quality Study to monitor temperature and DO at the Project. FERC filed comments on the proposed Water Quality Study in a letter dated April 5, 2019. In a letter dated April 11, 2019, the Minnesota Pollution Control Agency (MPCA) supported the proposed Water Quality Study and proposed additional parameters to be analyzed.

2.0 Goals and Objectives

The Water Quality Study will collect information and establish recent baseline information on water quality in the vicinity of the Project to further expand on the extensive water quality data that has been conducted historically. The study will employ standard methodologies that are consistent with the scope and level of effort of water quality monitoring conducted at hydropower projects in the region. The information collected by this study will be used to determine the Project's potential effects on water quality and provide water quality data sufficient to determine compliance with applicable water quality standards (Minnesota Statute Chapter 7050) and designated uses.

3.0 Resource Management Goals

The State of Minnesota has established water quality standards (Minnesota Statute Chapter 7050) to protect water resources for uses such as fishing, swimming, and other recreation and to sustain aquatic life. These rules are administered by the MPCA, who is the lead 401 Water Quality Certification Agency. The Minnesota Department of Natural Resources (MDNR), Minnesota Board of Soil and Water Resources (BSWR), and local agencies also play a role in water quality protection (MPCA undated).

4.0 Public Interest

FERC and MPCA expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding water quality in the Project vicinity was presented in Section 5.3.7.1 of the PAD (MP 2018). The PAD included historical water quality data collected in the vicinity of the Project including upstream of the Project, downstream of the Project, and within Blandin Reservoir. The data collected ranges from 1990 – 2017 with the most recent data showing that DO concentrations downstream of Blandin Dam are typically above the minimum state criterion (MPCA 2018).

6.0 Project Nexus

The Project impounds water at Blandin Dam. Operation of the hydropower facility may affect water quality parameters such as temperature and DO in the Project's impoundment and immediate downstream area.

7.0 Methodology

7.1 Water Temperature and DO Monitoring

MP will to monitor DO and water temperature at the following general locations at the Project:

1. Blandin Reservoir (log boom corner and turbine); and
2. Tailrace area (near retaining wall and Highway 169 bridge).

Safety concerns related to monitoring device retrieval will also be taken into consideration when determining the specific sampling locations. A portable DO and temperature meter will be used to collect DO and temperature readings. Water sampling equipment will be cleaned and calibrated prior to sample collection. The DO and temperature readings will be collected and recorded at 1 meter intervals.

All water quality monitoring locations will be georeferenced using Global Positioning System (GPS). These GPS locations will be included in a Geographic Information Systems (GIS) database layer to support the documentation and reporting of collected data.

The water temperature and DO measurements will be collected on a randomly selected day twice a month from May 1, 2020 to September 30, 2020.

8.0 Schedule and Deliverables

Results of this study will be summarized in the final study report. MP anticipates that the Water Quality Study Report will include the following elements:

1. Project information and background
2. Study area
3. Methodology
4. Study results
5. Analysis and discussion
6. Agency correspondence and/or consultation
7. Literature cited

MP anticipates the monitoring associated with this study will be completed by the end of September 2020. Due to the length of this study, the final study report will not be provided in the Initial Study Report that will be distributed to stakeholders and filed with FERC in October 2020. Instead, the final report will be filed with the Draft License Application to be filed with the FERC in August 2021 in accordance with FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 150 hours. MP estimates that this study will cost approximately $18,000 to complete.

9.0 Discussion of Alternative Approaches

MP has generally incorporated the FERC's comments on water quality resources from the letter dated April 5, 2019. MP has provided reasoning in Section 3.0 of the Proposed Study Plan as to why the MPCA additional parameter requests were not adopted into this study. The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC's study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Minnesota Pollution Control Agency (MPCA). 2018. Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report. Published June 2018.

Minnesota Pollution Control Agency (MPCA). Undated. Clean Water Act Section 401 Water Quality Certifications. [Online] URL: https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications. Accessed: March 12, 2019.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

Appendix C. Grand Rapids Project Desktop Entrainment and Impingement Study

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Fish Entrainment and Impingement Study Plan

Grand Rapids Hydroelectric Project

(FERC No. 2362)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Grand Rapids Hydroelectric Project (Project) relicensing:

- Effects of continued operation of the Project on impingement, entrainment, and turbine-induced fish mortality.

In Section 6.2.3 of the Pre-Application Document (PAD) ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a desktop entrainment and impingement study at the Project. FERC provided comments on the Fish Entrainment and Impingement Study in their April 5, 2019, PAD comment letter, which have been addressed in this study plan. No other formal comments or study requests were received regarding fish entrainment and impingement.

2.0 Goals and Objectives

The goals and objectives of the Fish Entrainment and Impingement Study are to:

- Describe the physical characteristics of the powerhouse and intake structures including location, dimensions, turbine specifications, trashrack spacing, and field collection of intake velocities that could influence entrainment.
- Describe the local fish community and compile a target species list for entrainment analysis.
- Use intake velocities, trashrack spacing, target fish swim speeds, and other Project specifications to conduct a desktop impingement assessment.
- Conduct a desktop analysis that incorporates the impingement assessment, Project specifications, and hydrology to quantify turbine entrainment and mortality at the Project.

3.0 Resource Management Goals

Multiple agencies have resource management goals relevant to this study. The Minnesota Department of Natural Resources' (MDNR) mission statement is to conserve and manage Minnesota's aquatic resources and associated fish communities for their intrinsic values and long term ecological, commercial, and recreational benefits to the people of Minnesota (MDNR 2019). The waters in the

Grand Rapids Project and Project vicinity are designated by the Minnesota Pollution Control Agency (MPCA) as cool and warm water aquatic life and habitat and wetlands (MPCA 2018).

4.0 Public Interest

FERC expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding the fish community in the Project vicinity was summarized in Section 5.4.2 of the PAD. Studies conducted by Minnesota Department of Natural Resources (MDNR) in Blandin Reservoir from 1973-2012 indicated a dominance of yellow perch (*Perca flavescens*), pumpkinseed (*Lepomis gibbosus*), hybrid sunfish, bluegill (*Lepomis macrochirus*), black bullhead (*Ameiurus melas*), yellow bullhead (*A. natalis*), bowfin (*Amia calva*), shorthead redhorse sucker (*Moxostoma macrolepidotum*), white sucker (*Catostomus commersonii*), largemouth bass (*Microterus salmoides*), smallmouth bass (*Micropterus dolomieu*), rock bass (*Ambloplites rupestris*), northern pike (*Esox lucius*), and black crappie (*Pomoxis nigromaculatus*). Blandin Reservoir has been stocked with Walleye (*Sander vitreus*) and Muskellunge (*Esox masquinongy*) since 1971, by both MDNR and private citizens/sporting groups (MP 2018).

An impingement characterization study was performed in 2017 by MP on the traveling water screen of the cooling water intake structure located near Blandin Dam for compliance with Section 316 (b) of the Clean Water Act (CWA). Fish were collected on several dates from May 2016 to May 2017. The collection was dominated by bluegill and black crappie, followed by yellow perch and largemouth bass (MP 2018).

6.0 Project Nexus

Downstream fish passage through hydroelectric dam intakes and turbines may cause injury or mortality by impingement against trashracks or entrainment through a turbine as a result of Project operations. Entrainment injuries and mortalities can result from fish coming into contact with the turbine blades or other mechanical components and/or pressure changes and cavitation.

7.0 Methodology

A desktop evaluation of the potential for fish impingement, entrainment, and turbine mortality will be performed to achieve the objectives described in Section 2.0. This evaluation will make use of the

extensive amount of existing fish community information, hydrology data, and structural/operational characteristics of the Project to quantify turbine entrainment and mortality for select species. The only potential field component would be to collect intake velocities at the Project depending on the feasibility and safety considerations.

7.1 Task 1 – Consultation with Interested Stakeholders

MP will coordinate with interested stakeholders who express an interest in participating in this study at the Proposed Study Plan (PSP) meeting and through subsequent comments filed on the PSP or the Revised Study Plan (RSP).

7.2 Task 2 – Describe the Physical Characteristics and Water Chemistry Characteristics of the Project that may influence Fish-related Turbine Entrainment, Impingement, and Survival

Physical and operational data for the Project including reservoir surface area, volume, average depth, and retention time will be obtained. Maps and available drawings of the dam and powerhouse may be reviewed to gather information related to total head, intake depth and size, the number, type, orientation, trashrack clear spacing, and other relevant powerhouse/turbine specifications necessary to perform the study. Many of these physical and operational data are summarized in the PAD, although further review of Project drawings may be necessary.

Water quality profile data collected as part of the Water Quality Study will be used to describe reservoir water quality conditions and potential influence on fish entrainment.

7.3 Task 3 – Intake Velocity Data Collection

Velocity measurements and/or the calculated average approach velocity will be completed one foot in front of the existing trashrack structure. If feasible, measurements will be collected using an Acoustic Doppler Current Profiler (ADCP) or similar technology. In the event that approach velocity measurements are not possible due to river flow conditions or safety-related concerns, calculated approach velocities will be used. Calculation of approach velocities will be determined by dimensions/spacing of trash racks, pumping rate, intake width, and water depth.

7.4 Task 4 – Describe the Species Composition of the Existing Fish Community and Select a Subset of these Species for the Entrainment Assessment

Results of the existing fisheries information (MP 2018, MDNR 2018) will be used to describe the fish communities that may be susceptible to turbine entrainment. This is expected to include information

related to spatial and temporal characteristics, life histories, swimming speeds, and avoidance behavior of target fish species larval, juvenile, and adult life stages. A target species list will be compiled for the entrainment assessment that is expected to include species of management concern (fish stocked by MDNR), as well as the dominant species reported by MDNR in Blandin Reservoir from 1973-2012. The expected susceptibility of these species to entrainment based on varying life stage periodicities, abundance at the Project, and potential "cold stress" related entrainment will be included.

7.5 Task 5 – Assess the Potential for Trashrack Exclusion and/or Impingement of the Target Species

Information gathered as part of Tasks 1 through 3 will be used to assess the potential for trashrack exclusion and vulnerability to impingement/entrainment. This will incorporate the trashrack clear spacing, intake velocities, swimming speeds, and body scaling factors. Body scaling factors (documented body width to body length proportions) will be calculated from empirical data to determine minimum lengths of target species physically excluded from the trashrack spacing. Such exclusions will be factored into the individual entrainment and mortality estimates.

7.6 Task 6 – Determine Monthly Turbine Entrainment Rates from Existing Empirical Data and Utilize these Rates to Estimate Monthly Turbine Entrainment for the Target Species using Existing Hydrology and Project Operations

A literature review of turbine entrainment field studies conducted at other hydroelectric projects will be performed to compile entrainment rates for target species. The primary sources of turbine entrainment information may include, but does not have to be limited to, the comprehensive Turbine Entrainment and Survival Database Field Tests prepared by the Electric Power Research Institute (EPRI 1997). For comparing entrainment potential between studied facilities and the Project, the EPRI database includes test data from 43 hydroelectric sites that used full-flow tailrace netting techniques to estimate the number, species, and sizes of fish entrained. Other principal sources of entrainment data include Stone & Webster Environmental Services (1992) and FERC (1995). Monthly entrainment rates will be determined for each of the target species or surrogate/guild representatives available in the literature. Monthly entrainment estimates for each target species will be calculated using the entrainment rate, hydrological, and operational information. Monthly flow duration curves for a representative dry, average, and wet water year will be utilized, in addition to operational parameters, to provide the estimated average and potential range of entrainment. Target fish species abundance data may be incorporated into the entrainment estimates to account for local fish community makeup in relation to the entrainment rates determined from the literature.

7.7 Task 7 – Calculate Turbine Mortality for the Range of Target Species' Sizes Expected to Become Entrained and Apply this to the Monthly Entrainment Estimates

A literature review of turbine mortality field studies conducted at other hydroelectric projects will be performed to compile fish survival rates applicable to the Project. The primary sources of turbine survival information may include, but does not have to be limited to, the comprehensive Turbine Entrainment and Survival Database Field Tests prepared by EPRI (EPRI 1997).

In addition to the literature review, a blade strike analysis will be performed to calculate turbine mortality rates at the Project. It has been suggested that the majority of fish mortalities at low head dams (<100 ft) are caused by fish striking a blade or other component of the turbine unit. Estimates of survival for each target species based on the blade strike analysis and literature review findings will be developed, and these survival estimates will be applied to the entrainment estimates for overall Project assessments.

8.0 Schedule and Deliverables

Results of this study will be summarized in the final study report. MP anticipates that the Fish Entrainment and Impingement Study Report will include the following elements:

- Project information and background
- Study area
- Methodology
- Study results
- Analysis and discussion
- Agency correspondence and/or consultation
- Literature cited

MP anticipates that this study will be completed by July 2020. The study report will be prepared and provided to the applicable parties in conjunction with the Initial Study Report (ISR) that will be distributed to stakeholders and filed with FERC in accordance with FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 240 hours. MP estimates that this study will cost approximately $30,000 to complete.

9.0 Discussion of Alternative Approaches

Desktop entrainment and impingement studies are consistent with generally accepted practices in the scientific community. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Electric Power Research Institute (EPRI). 1997 Turbine entrainment and survival database – field tests. Prepared by Alden Research Laboratory, Inc., Holden, Massachusetts. EPRI Report No. TR-108630. October 1997.

Federal Energy Regulatory Commission (FERC). 1995. Preliminary assessment of fish entrainment at hydropower projects, a report on studies and protective measures, volumes 1 and 2 (Paper No. DPR-10). Office of Hydropower Licensing, FERC, Washington, DC.

Minnesota Department of Natural Resources (MDNR). 2018. Fisheries Lake Surveys: Blandin. Online: [URL] https://www.dnr.state.mn.us/lakefind/showreport.html?downum=31053300.

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Appendix D. Grand Rapids Project Recreation Resources Study

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Recreation Resources Study Plan

Grand Rapids Hydroelectric Project

(FERC No. 2362)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Grand Rapids Hydroelectric Project (Project) relicensing:

- Adequacy of existing recreational facilities and public access at the Projects to meet current and future recreational demand.

In Section 6.2.7 of the Pre-Application Document (PAD), ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a Recreation Resources Study to evaluate current recreational opportunities and potential improvements. FERC filed comments on the proposed Recreation Resources Study in a letter dated April 5, 2019. These comments included the identification of recreation sites and their ownership; conducting recreation use surveys, spot counts, and report preparation.

2.0 Goals and Objectives

The Recreation Resources Study will collect information regarding current recreation use levels and the condition of the existing Project recreation facilities. The goals and objectives of this study are to:

- Gather information on the condition of the MP-managed, FERC-approved recreation facility and identify any need for improvement; and
- Characterize current recreational use and future demand of the MP-managed FERC-approved recreation facility within the Project Boundary.

3.0 Resource Management Goals

The mission of the Minnesota Department of Natural Resources (MDNR) is to work with citizens to conserve and manage the State's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. The recreation facilities within the Project contribute to MDNR's goals by providing outdoor recreation opportunities to the public (MDNR 2019).

4.0 Public Interest

FERC has expressed interest in this study.

5.0 Background and Existing Information

Section 5.8.2 of the PAD describes existing information about recreation facilities and opportunities in the Project area. Article 407 of the current FERC license for the Project requires a Recreation Management Plan (RMP) addressing recreational use and needs at the Project. The RMP for the Project was approved by FERC in 1996, amended in 2002, and most recently updated in April 2018, following a public meeting in March 2018. The FERC approved the plan in May 31, 2018.

The Project supports a variety of recreation opportunities. MP manages a FERC-approved canoe self-portage for recreationists. The canoe self-portage trail take-out and signage are located approximately 1,000 feet upstream of the dam on the southwestern bank of Blandin Reservoir, on land owned by the City of Grand Rapids. MP currently assists the City of Grand Rapids in the maintenance of the take-out area of the FERC-approved canoe self-portage trail. The canoe self-portage extends approximately 0.5 miles along the City of Grand Rapids streets and sidewalks to the put-in site at the City of Grand Rapids' Steamboat Park, approximately 0.3 miles downstream of Blandin Dam.

There are several other recreation sites located in the Project area that are not maintained or operated by MP. These recreation sites are documented in Table 1.

Table 1: Recreation sites in the Grand Rapids Project area.

Recreation Area	Distance to Grand Rapids Dam	Amenities	Owner/Operator	Relationship to Project Boundary
Pokegama Dam and Recreation Area	3.0 miles upstream	A popular recreation attraction in the area; offers boat launch, dock, picnic area with grills, a playground, and 19 RV sites with a disposal station.	USACE	Partially within
Blandin Mississippi River Park and Izaak Walton Landing	2.0 miles upstream	Site of Blandin Reservoir (Lake Sylvan area) boat launch and popular fishing site	Blandin Paper Company	Partially within

Recreation Area	Distance to Grand Rapids Dam	Amenities	Owner/Operator	Relationship to Project Boundary
Forest History Center Trail System	1.4 miles upstream of the dam	There are more than 5 miles of trails at the Forest History Center that connect to the National Scenic Trail (section 5.8.4.4) that include summer and winter activities as hosted by the History Center (Minnesota Historical Society 2008).	State of Minnesota Historic Society	Adjacent to
Sylvan Park with Sylvan Landing	0.8 miles upstream	Contains a boat launch, linkage to several trails along the south shores of the lake, restrooms, benches and a picnic area with grills.	City of Grand Rapids	Partially within
Skogebo Park	0.6 miles upstream	Undeveloped green space along the lake shore.	City of Grand Rapids	Partially within
River Park	0.1 miles downstream	Contains a walking trail and scenic overlook.	City of Grand Rapids	Partially within
Riverfront Trail System	Along the downstream banks of the Mississippi River	Bituminous walking trail with a fishing pier that connects with River Park, a fishing pier, and the Angel of Hope memorial garden on the south shore of the Mississippi River. The city has plans to further develop the trail system.	City of Grand Rapids	Partially within and adjacent to
Steamboat Park	0.3 miles downstream	Contains a public boat launch to the Mississippi River and is the put-in site for portagers at Blandin Dam.	City of Grand Rapids	Partially within
Veterans Park	1.0 miles downstream	36-acre site with two picnic shelters, toilets, and picnic areas with grills, play area, and trails.	City of Grand Rapids	Partially within and adjacent to
Oakland Park	1.2 miles downstream	10.7-acre site with athletic fields, equipment, parking, and connections to trails.	City of Grand Rapids	Partially within and adjacent to

6.0 Project Nexus

The Project currently provides multiple public recreational opportunities. The results of this study, in conjunction with existing information, will be used to inform analysis in the license application regarding potential Project effects on public recreation and to update the existing Recreation Management Plan, if needed.

7.0 Methodology

7.1 Task 1 - Recreation Facility Inventory and Condition Assessment

MP will perform a field inventory to document the existing MP-managed, FERC-approved canoe self-portage trail at the Project. MP will record the following information for the canoe self-portage trail including:

- A description of the type and location of the existing recreation facility;
- The type of recreation provided;
- Length and footing materials of any trails;
- Existing facilities, signage, and sanitation;
- The type of vehicular access and parking (if any);
- Suitability of the facility to provide recreational opportunities and access for persons with disabilities (i.e., compliance with current Americans with Disabilities Act standards for accessible design); and
- Photographic documentation of the recreation facility and Global Positioning System (GPS) location.

Additionally, MP will conduct a site inventory and general condition assessment of the recreation facilities listed in Table 1 of Section 5.0. The assessment will consist of:

- Identification of whether or not the facility is located within the Project Boundary;
- Ownership and party responsible for operation and maintenance of each facility;
- Hours and seasons of operation;
- Type and number of amenities provided, including parking and signage; and
- General observations of site use, condition, and accessibility.

7.2 Task 2 – Recreational Use Observation

MP will conduct recreational observations at the MP-managed, FERC-approved canoe self-portage trail. These observations will be conducted over a two-hour interval (at random times throughout the recreation season). A designated observer will visit the area over the course of the traditional recreation season (Memorial Day through Labor Day). MP will conduct the observations and surveys using the following schedule:

Month	Survey and Reconnaissance
May	▪ Two weekend days (Memorial Day Weekend) ▪ Two randomly selected weekdays
June	▪ Two weekend days ▪ Two randomly selected weekdays
July	▪ Two weekend days (4th of July weekend) ▪ Two randomly selected weekdays
August	▪ Two weekend days ▪ Two randomly selected weekdays
September	▪ Two weekend days (Labor Day Weekend) ▪ Two randomly selected weekdays

The recreational use observations will represent a snapshot-in-time depicting specific user groups and their activities during randomly selected intervals. An observation form will be filled out by the designated observer during scheduled observation times. These observations will include the following information:

- Date and time;
- Observer;
- Weather conditions;
- Number of people observed;
- Observed activities; and
- Pertinent notes.

To estimate the use of the MP-managed, FERC-approved canoe self-portage trail, MP will utilize methods for deriving recreation user day calculations that were developed for use in FERC Form 80 reporting. MP will use the information collected from recreational use observations to determine the adequacy of current recreational opportunities and estimate future recreational demand.

7.3 Task 3 – Recreational Survey

MP will develop a survey to administer to the recreational users observed during the recreational use observations discussed in Section 7.2. The survey will allow respondents to provide survey responses related to recreation at the Project. The survey will be used to gain user opinions with regard to the existing Project recreation facility and opportunities. The survey will record the number of people in a party, their primary reason (recreational activity) for visiting the Project, their perception of level of use, and their opinions with regard to the amount and types of recreation opportunities offered at the FERC-approved recreation facility.

8.0 Schedule and Deliverables

MP intends to conduct the Recreation Resources Study from May 2020 through September 2020. Upon completion of recreational use observations and surveys, the data will be analyzed and the study report will be prepared and provided to applicable parties in conjunction with the Initial Study Report that will be distributed to stakeholders and filed with FERC in accordance with FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 170 hours. MP estimates that this study will cost approximately $20,000 to complete.

Results of the facility assessment and recreational use observations and surveys will be summarized in the final study report. MP anticipates that the Recreation Resources Study Report will include the following elements:

- Project information and background
- Study area
- Methodology
- Study results
- Analysis and discussion
- Any agency correspondence and/or consultation
- Literature cited

9.0 Discussion of Alternative Approaches

MP has generally incorporated FERC's comments on recreation resources from the letter dated April 5, 2019. The methodology proposed in this plan is appropriate for the size and scope of the Project. The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC's study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Minnesota Department of Natural Resources (MDNR). 2019. Conservation Agenda. [Online] URL: https://www.dnr.state.mn.us/conservationagenda/index.html. Accessed: May 23, 2019.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

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Appendix E. Grand Rapids Project Cultural Resources Study

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Cultural Resources Study Plan

Grand Rapids Hydroelectric Project

(FERC No. 2362)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Grand Rapids Hydroelectric Project (Project) relicensing:

- Effects of continued project operation on properties that are included in or eligible for inclusion in the National Register of Historic Places.

ALLETE, Inc., d/b/a Minnesota Power (MP) did not propose to conduct a Cultural Resources Study in the Pre-Application Document (PAD). FERC requested MP conduct a Cultural Resources Study by letter dated April 5, 2019. No other formal study requests meeting the Integrated Licensing Process (ILP) study criteria were received regarding cultural resources.

2.0 Goals and Objectives

The Cultural Resources Study will identify potential historic properties within the Project's Area of Potential Effects (APE) and assess the potential effects of continued Project operations and maintenance activities on historic and cultural resources, should any be present. The goals and objectives of this study are to:

- Consult with the Minnesota State Historic Preservation Office (SHPO) and potentially affected federally-recognized Indian Tribes to determine an appropriate APE for the Project;
- Conduct background research and an archival review;
- Conduct a Phase 1A Reconnaissance Survey (Reconnaissance Survey) of the Project's APE;
- Consult with federally-recognized Indian Tribes to develop and conduct an inventory of properties of traditional religious and cultural importance (often referred to as "traditional cultural properties") within the APE;
- Assess the condition of the area where any historic and archaeological sites are located for shoreline stability and evidence of erosion; and
- If determined necessary, update the Project's Cultural Resource Management Plan (CRMP) in consultation with the Minnesota SHPO and federally-recognized Indian Tribes to include appropriate measures for the management of historic properties within the Project's APE, including specific protection, mitigation and enhancement measures.

3.0 Resource Management Goals

The National Historic Preservation Act of 1966 provided for a network of historic preservation offices in every state to spearhead state preservation initiatives and help carry out the nation's historic preservation program. Minnesota's SHPO was created by state statute in 1969 to provide statewide leadership.

4.0 Public Interest

FERC expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding cultural resources in the Project vicinity was presented in Section 5.10 of the PAD (MP 2018). Phase I surveys were conducted in 1994 and included inspection of the entire shoreline. The surveys consisted of 104 shovel tests, two of which contained Native American artifacts. One of the sites was concluded to lack contextual integrity because of shoreline erosion and disturbance by modern construction, the other of which indicated extensive subsurface disturbances and not in its original place. Neither site met the criteria of eligibility for nomination to the National Register of Historic Places (NRHP).

A standing structures evaluation was also conducted. The scope of work for this evaluation included a contextual analysis and survey to evaluate the architectural and engineering significance, as well as overall integrity of the Project facilities. The evaluation found that the standing Project structures were ineligible for the NRHP as all the surveyed structures had been significantly compromised or were constructed outside the period of significance.

Article 405 of the current FERC License required the development of a CRMP in consultation with the Minnesota SHPO. The FERC-approved CRMP requires shoreline monitoring and reporting every five years and consultation with the Minnesota SHPO. Per the most recent report filed in 2016, results of the erosion monitoring concluded that no shoreline erosion has occurred or is currently anticipated to occur. There is no current evidence of erosion, slumping, or slope instability around the reservoir shoreline.

6.0 Project Nexus

At present, there is no evidence that archaeological or historic resources are currently being affected by the Project's operations. However, the Project has the potential to directly or indirectly affect historic properties listed or eligible for inclusion in the NRHP.

7.0 Methodology

7.1 Task 1 – APE Determination

Pursuant to the implementing regulations of Section 106 at 36 CFR § 800.4(a), MP will consult with the Minnesota SHPO and potentially affected Indian Tribes, to determine and document the APE for the Project as defined in 36 CFR § 800.16(d). MP tentatively proposes the following APE:

> *The APE for the Grand Rapids Hydroelectric Project includes all lands and waters within the FERC Project boundary and also lands and properties outside of the Project boundary where Project-related activities that are conducted in compliance with the FERC license may affect historic properties.*

7.2 Task 2 – Background Research and Archival Review

MP will conduct background research and an archival review to inform the specific research design and the historic and environmental contexts. MP will review relevant sources of information that may include, but are not necessarily limited to:

- Information on archaeological sites, historic architectural resources, and previous cultural resource studies on file with Minnesota SHPO;
- A review of Minnesota's NRHP listings in proximity to the Project;
- Historic maps and aerial photographs of the APE;
- Relevant documents related to Project construction;
- Relevant information available from local repositories;
- Information on the current and historical environment, including mapped soils, bedrock geology, physiography, topography, and hydrology in the vicinity of the APE;
- Relevant historical accounts of the Project area;

- Relevant management plans for the Project, including approved management plans; and
- Any additional relevant information made available by the Minnesota SHPO, Indian Tribes, or other stakeholders.

7.3 Task 3 – Reconnaissance Survey

A Reconnaissance Survey will be conducted within the Project's APE. The proposed methods for the Reconnaissance Survey take into account the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE (36 CFR 800.4(b)(1)). The Reconnaissance Survey will be conducted by a qualified cultural resources professional[1] retained by MP and will be in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Federal Register [FR] 44716, Sept. 1983) and the Minnesota SHPO's *Historic and Architectural Survey Manual and Archaeology Survey Manual* (Minnesota Historical Society 2017).

The Reconnaissance Survey will include a visual reconnaissance of the exposed portions of the reservoir shoreline areas to identify any previously recorded or unrecorded archaeological and/or historic architectural resources. If archaeological material is observed during the Reconnaissance Survey, a preliminary assessment of the archaeological site will consist of the delineation of site boundaries. The maximum length and width of each site will be measured and recorded and the site's location geo-located. Site dimensions and elevations will be recorded on standardized field forms along with sketch maps of site settings and notations regarding landform, site aspect, temporal affiliations (if possible) and density of observed materials, site condition, any evidence of Project-related effects, and the nature of site deposits. Site boundaries will be located on Project maps and USGS topographic maps. Based on the judgment of the archaeologist, visual reconnaissance may be augmented by limited subsurface testing (e.g., shovel test pits). The archaeologist will geo-locate, record, and collect any observed artifacts, features, or other pre-contact or historic period cultural material (as appropriate), and any new archaeological sites discovered will be documented on the Minnesota Archaeological Site Form. If any archaeological and/or historic architectural resources are discovered during the Reconnaissance Survey, the condition will be assessed on where the sites are located for shoreline stability and evidence of erosion and document such conditions in the final study report.

[1] For this study, a "qualified cultural resources professional" is defined as an individual who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44738-44739, Sept. 1983).

Treatment and disposition of any human remains that may be discovered will be managed in a manner consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) (P.L. 101-601; 25 U.S.C. 3001 *et seq*.)[2], and the Council's Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects (Advisory Council on Historic Preservation [ACHP] 2007). Any human remains, burial sites, or funerary objects that are discovered will at all times be treated with dignity and respect. In the event that any Native American graves and/or associated cultural items are inadvertently discovered, MP will immediately notify the Minnesota SHPO and potentially affected Indian Tribes.

As a component of the Reconnaissance Survey, the survey will identify properties of architectural significance within the APE and update existing information on architectural resources in the Minnesota SHPO's files. The Reconnaissance Survey will document properties of architectural significance using photographs, brief descriptions, condition, and location information. The survey will conduct limited research on the history of the buildings, sites, and features, and complete a survey form for each property. The location will be documented on Project maps and USGS topographic maps.

7.4 Task 4 – Cultural Resource Management Plan

MP will consult with the Minnesota SHPO and potentially affected Indian Tribes, and other parties, as appropriate, to update the existing CRMP, if necessary. The measures provided in the CRMP will assist MP in managing historic properties within the Project's APE throughout the term of the new license.

The CRMP will be prepared in accordance with the Guidelines for the Development of CRMPs for FERC Hydroelectric Projects, promulgated by FERC and the Advisory Council on Historic Places (ACHP) on May 20, 2002. The CRMP will address the following items (ACHP and FERC 2002):

- Identification of the APE for the Project and inclusion of a map or maps that clearly show the APE in relation to the existing and proposed Project boundary;
- Additional studies to assist in identifying or managing historic properties within the APE;
- Continued use and maintenance of any historic properties;

[2] Pursuant to 43 C.F.R. Part 10, NAGPRA applies to human remains, sacred objects, and items of cultural patrimony (described as "cultural items" in the statute) located on federal or tribal lands or in the possession and control of federal agencies or certain museums. Regardless of where cultural items are discovered, the principles described in NAGPRA's implementing regulations will serve as guidance for MP's actions should the remains or associated artifacts be identified as Native American and to the extent such principles and procedures are consistent with any other applicable requirements.

- Potential effects on historic properties resulting from the continued operation and maintenance of the Project;
- Protection and treatment of historic properties threatened by potential ground-disturbing activities;
- Protection and treatment of historic properties threatened by other direct or indirect Project-related activities, including routine Project maintenance and vandalism;
- The resolution of unavoidable adverse effects on historic properties;
- Treatment and disposition of any human remains that are discovered, taking into account any applicable state laws and the Council's Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects (ACHP 2007);
- Compliance with the Native American Graves Protection and Repatriation Act (25 U.S.C. §3001), for tribal or federal lands within the Project's APE;
- Provisions for unanticipated discoveries of previously unidentified cultural resources within the APE;
- A dispute resolution process;
- Categorical exclusions from further review of effects;
- Public interpretation of the historic and archaeological values of the Project, if any; and
- Coordination with consulting parties during implementation of the HPMP.

8.0 Schedule and Deliverables

Based on the results of Task 3, MP will prepare a report on the results of the Phase IA Reconnaissance Survey. The report will include: 1) a summary of information obtained through the background research and archival review, 2) maps and descriptions of reported archaeological and historic resources within the Project's APE, 3) an assessment of the APE's archaeological sensitivity and potential, 4) an assessment of significant architectural resources within the APE, and 5) recommendations regarding additional cultural resource studies and/or management measures for identified resources. MP will consult with Minnesota SHPO, Indian Tribes, and other interested parties (as appropriate) regarding the Reconnaissance Survey Report.

MP anticipates this study will be completed by October 2020. Due to the length of this study, the final study report will not be provided in the Initial Study Report (ISR) that will be distributed to stakeholders and filed with FERC in October 2020. Instead, the final report will be filed with the Draft License Application (DLA) to be filed with FERC in August 2021 in accordance with the FERC's ILP Plan and Schedule. The estimated level of effort for this study is approximately 320 hours. MP estimates that this study will cost approximately $40,000 to complete.

9.0 Discussion of Alternative Approaches

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Advisory Council on Historic Preservation (ACHP). 2007. Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects. Washington, D.C.

Advisory Council on Historic Preservation (ACHP) and the Federal Energy Regulatory Commission (FERC). 2002. Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects. Washington, D.C.

Minnesota Historical Society. 2017. Historic and Architectural Survey Manual. Heritage Preservation Department. Revised 6/2017.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

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Appendix F. Prairie River Project Water Quality Study

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Water Quality Study Plan

Prairie River Hydroelectric Project

(FERC No. 2361)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Prairie River Hydroelectric Project (Project) relicensing:

- Effects of continued operation of the Projects on water quality (e.g., dissolved oxygen [DO] levels and water temperature)

In Section 6.2.2 of the Pre-Application Document (PAD), ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a Water Quality Study to monitor temperature and DO at the Project. FERC filed comments on the proposed Water Quality Study in a letter dated April 5, 2019. In a letter dated April 11, 2019, the Minnesota Pollution Control Agency (MPCA) supported the proposed Water Quality Study and proposed additional parameters to be analyzed.

2.0 Goals and Objectives

The Water Quality Study will collect information and establish recent baseline information on water quality in the vicinity of the Project to further expand on the extensive water quality data that has been conducted historically. The study will employ standard methodologies that are consistent with the scope and level of effort of water quality monitoring conducted at hydropower projects in the region. The information collected by this study will be used to determine the Project's potential effects on water quality and provide water quality data sufficient to determine compliance with applicable water quality standards (Minnesota Statute Chapter 7050) and designated uses.

3.0 Resource Management Goals

The State of Minnesota has established water quality standards (Minnesota Statute Chapter 7050) to protect water resources for uses such as fishing, swimming, and other recreation and to sustain aquatic life. These rules are administered by the MPCA, who is the lead 401 Water Quality Certification Agency. The Minnesota Department of Natural Resources (MDNR), Minnesota Board of Soil and Water Resources (BSWR), and local agencies also play a role in water quality protection (MPCA undated).

4.0 Public Interest

FERC and MPCA expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding water quality in the Project vicinity was presented in Section 5.3.7.2 of the PAD (MP 2018). The PAD included historical water quality data collected in the vicinity of the Project including upstream of the Project, downstream of the Project, and within Prairie River Reservoir (Lower Prairie Lake and Prairie Lake). The data collected ranges from 2001 – 2016 with the most recent data showing that DO concentrations both upstream and downstream of Prairie River Dam are typically above the minimum state criterion (MPCA 2018).

6.0 Project Nexus

The Project impounds water at Prairie River Dam. Operation of the hydropower facility may affect water quality parameters such as temperature and DO in the Project's impoundment and immediate downstream area.

7.0 Methodology

7.1 Water Temperature and DO Monitoring

MP will monitor DO and water temperature at the following general locations at the Project:

1. Upstream of coarse trash rack;
2. Tailrace area; and
3. Bypass reach (upstream of the road to avoid influence).

Safety concerns related to monitoring device retrieval will also be taken into consideration when determining the specific sampling locations. A portable DO and temperature meter will be used to collect DO and temperature readings. Water sampling equipment will be cleaned and calibrated prior to sample collection. The DO and temperature readings will be collected and recorded at 1 meter intervals.

All water quality monitoring locations will be georeferenced using Global Positioning System (GPS). These GPS locations will be included in a Geographic Information Systems (GIS) database layer to support the documentation and reporting of collected data.

The water temperature and DO measurements will be collected on a randomly selected day twice a month from May 1, 2020 to September 30, 2020.

8.0 Schedule and Deliverables

Results of this study will be summarized in the final study report. MP anticipates that the Water Quality Study Report will include the following elements:

1. Project information and background
2. Study area
3. Methodology
4. Study results
5. Analysis and discussion
6. Agency correspondence and/or consultation
7. Literature cited

MP anticipates the monitoring associated with this study will be completed by the end of September 2020. Due to the length of this study, the final study report will not be provided in the Initial Study Report that will be distributed to stakeholders and filed with FERC in October 2020. Instead, the final report will be filed with the Draft License Application to be filed with FERC in August 2021 in accordance with FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 150 hours. MP estimates that this study will cost approximately $18,000 to complete.

9.0 Discussion of Alternative Approaches

MP has generally incorporated FERC's comments on water quality resources from the letter dated April 5, 2019. MP has provided reasoning in Section 3.0 of the Proposed Study Plan as to why the MPCA additional parameter requests were not adopted into this study. The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Minnesota Pollution Control Agency (MPCA). 2018. Mississippi River – Grand Rapids Watershed Monitoring and Assessment Report. Published June 2018.

Minnesota Pollution Control Agency (MPCA). Undated. Clean Water Act Section 401 Water Quality Certifications. [Online] URL: https://www.pca.state.mn.us/water/clean-water-act-section-401-water-quality-certifications. Accessed: March 12, 2019.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

Appendix G. Prairie River Project Desktop Entrainment and Impingement Study

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Fish Entrainment and Impingement Study Plan

Prairie River Hydroelectric Project

(FERC No. 2361)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Prairie River Hydroelectric Project (Project) relicensing:

- Effects of continued operation of the Project on impingement, entrainment, and turbine-induced fish mortality.

In Section 6.2.3 of the Pre-Application Document (PAD) ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a desktop entrainment and impingement study at the Project. FERC provided comments on the Fish Entrainment and Impingement Study in their April 5, 2019, PAD comment letter, which have been addressed in this study plan. No other formal comments or study requests were received regarding fish entrainment and impingement.

2.0 Goals and Objectives

The goals and objectives of the Fish Entrainment and Impingement Study are to:

- Describe the physical characteristics of the powerhouse and intake structures including location, dimensions, turbine specifications, trashrack spacing, and field collection of intake velocities that could influence entrainment.
- Describe the local fish community and compile a target species list for entrainment analysis.
- Use intake velocities, trashrack spacing, target fish swim speeds, and other Project specifications to conduct a desktop impingement assessment.
- Conduct a desktop analysis that incorporates the impingement assessment, Project specifications, and hydrology to quantify turbine entrainment and mortality at the Project.

3.0 Resource Management Goals

Multiple agencies have resource management goals relevant to this study. The Minnesota Department of Natural Resources' (MDNR) mission statement is to conserve and manage Minnesota's aquatic resources and associated fish communities for their intrinsic values and long term ecological, commercial, and recreational benefits to the people of Minnesota (MDNR 2019). The waters in the

Prairie River Project and Project vicinity are designated by the Minnesota Pollution Control Agency (MPCA) as cool and warm water aquatic life and habitat and wetlands (MPCA 2018).

4.0 Public Interest

FERC expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding the fish community in the Project vicinity was summarized in Section 5.4.2 of the PAD. Studies conducted by Minnesota Department of Natural Resources (MDNR) in Prairie Reservoir periodically from 1955-2012 indicated a dominance of bluegill (*Lepomis macrochirus*), black crappie (*Pomoxis nigromaculatus*), yellow perch (*Perca flavescens*), northern pike (*Esox lucius)*, white sucker (*Catostomus commersonii*), walleye (*Sander vitreus*), pumpkinseed (*Lepomis gibbosus*), shorthead redhorse (*Moxostoma macrolepidotum)*, brown bullhead (*Ameiurus nebulosus*), and rock bass (*Ambloplites rupestris)*. In the past, Prairie River Reservoir had been exclusively stocked with Walleye from 2008 through 2012 by the MDNR. Due to failure to achieve management goals set for Prairie River Reservoir, the walleye stocking program was recommended for discontinuation (MP 2018).

6.0 Project Nexus

Downstream fish passage through hydroelectric dam intakes and turbines may cause injury or mortality by impingement against trashracks or entrainment through a turbine as a result of Project operations. Entrainment injuries and mortalities can result from fish coming into contact with the turbine blades or other mechanical components and/or pressure changes and cavitation.

7.0 Methodology

A desktop evaluation of the potential for fish impingement, entrainment, and turbine mortality will be performed to achieve the objectives described in Section 2.0. This evaluation will make use of the extensive amount of existing fish community information, hydrology data, and structural/operational characteristics of the Project to quantify turbine entrainment and mortality for select species. The only potential field component would be to collect intake velocities at the Project depending on the feasibility and safety considerations.

7.1 Task 1 – Consultation with Interested Stakeholders

MP will coordinate with interested stakeholders who express an interest in participating in this study at the Proposed Study Plan meeting and through subsequent comments filed on the Proposed Study Plan (PSP) or the Revised Study Plan (RSP).

7.2 Task 2 – Describe the Physical Characteristics and Water Chemistry Characteristics of the Project that may influence Fish-related Turbine Entrainment, Impingement, and Survival

Physical and operational data for the Project including reservoir surface area, volume, average depth, and retention time will be obtained. Maps and available drawings of the dam and powerhouse may be reviewed to gather information related to total head, intake depth and size, the number, type, orientation, trashrack clear spacing, and other relevant powerhouse/turbine specifications necessary to perform the study. Many of these physical and operational data are summarized in the PAD, although further review of Project drawings may be necessary.

Water quality profile data collected as part of the Water Quality Study will be used to describe reservoir water quality conditions and potential influence on fish entrainment.

7.3 Task 3 – Intake Velocity Data Collection

Velocity measurements and/or the calculated average approach velocity will be completed one foot in front of the existing trashrack structure. If feasible, measurements will be collected using an Acoustic Doppler Current Profiler (ADCP) or similar technology. In the event that approach velocity measurements are not possible due to river flow conditions or safety-related concerns, calculated approach velocities will be used. Calculation of approach velocities will be determined by dimensions/spacing of trash racks, pumping rate, intake width, and water depth.

7.4 Task 4 – Describe the Species Composition of the Existing Fish Community and Select a Subset of these Species for the Entrainment Assessment

Results of the existing fisheries information (MP 2018, MDNR 2018) will be used to describe the fish communities that may be susceptible to turbine entrainment. This is expected to include information related to spatial and temporal characteristics, life histories, swimming speeds, and avoidance behavior of target fish species larval, juvenile, and adult life stages. A target species list will be compiled for the entrainment assessment that is expected to include species of management concern (fish stocked by MDNR), as well as the dominant species reported by MDNR in Prairie River Reservoir from 1973-2012. The expected susceptibility of these species to entrainment based on varying life

stage periodicities, abundance at the Project, and potential “cold stress” related entrainment will be included.

7.5 Task 5 – Assess the Potential for Trashrack Exclusion and/or Impingement of the Target Species

Information gathered as part of Tasks 1 through 3 will be used to assess the potential for trashrack exclusion and vulnerability to impingement/entrainment. This will incorporate the trashrack clear spacing, intake velocities, swimming speeds, and body scaling factors. Body scaling factors (documented body width to body length proportions) will be calculated from empirical data to determine minimum lengths of target species physically excluded from the trashrack spacing. Such exclusions will be factored into the individual entrainment and mortality estimates.

7.6 Task 6 – Determine Monthly Turbine Entrainment Rates from Existing Empirical Data and Utilize these Rates to Estimate Monthly Turbine Entrainment for the Target Species using Existing Hydrology and Project Operations

A literature review of turbine entrainment field studies conducted at other hydroelectric projects will be performed to compile entrainment rates for target species. The primary sources of turbine entrainment information may include, but does not have to be limited to, the comprehensive Turbine Entrainment and Survival Database Field Tests prepared by the Electric Power Research Institute (EPRI 1997). For comparing entrainment potential between studied facilities and the Project, the EPRI database includes test data from 43 hydroelectric sites that used full-flow tailrace netting techniques to estimate the number, species, and sizes of fish entrained. Other principal sources of entrainment data include Stone & Webster Environmental Services (1992) and FERC (1995). Monthly entrainment rates will be determined for each of the target species or surrogate/guild representatives available in the literature. Monthly entrainment estimates for each target species will be calculated using the entrainment rate, hydrological, and operational information. Monthly flow duration curves for a representative dry, average, and wet water year will be utilized, in addition to operational parameters, to provide the estimated average and potential range of entrainment. Target fish species abundance data may be incorporated into the entrainment estimates to account for local fish community makeup in relation to the entrainment rates determined from the literature.

7.7 Task 7 – Calculate Turbine Mortality for the Range of Target Species' Sizes Expected to Become Entrained and Apply this to the Monthly Entrainment Estimates

A literature review of turbine mortality field studies conducted at other hydroelectric projects will be performed to compile fish survival rates applicable to the Project. The primary sources of turbine survival information may include, but does not have to be limited to, the comprehensive Turbine Entrainment and Survival Database Field Tests prepared by EPRI (EPRI 1997).

In addition to the literature review, a blade strike analysis will be performed to calculate turbine mortality rates at the Project. It has been suggested that the majority of fish mortalities at low head dams (<100 ft) are caused by fish striking a blade or other component of the turbine unit. Estimates of survival for each target species based on the blade strike analysis and literature review findings will be developed, and these survival estimates will be applied to the entrainment estimates for overall Project assessments.

8.0 Schedule and Deliverables

Results of this study will be summarized in the final study report. MP anticipates that the Fish Entrainment and Impingement Study Report will include the following elements:

- Project information and background
- Study area
- Methodology
- Study results
- Analysis and discussion
- Agency correspondence and/or consultation
- Literature cited

MP anticipates that this study will be completed by July 2020. The study report will be prepared and provided to the applicable parties in conjunction with the Initial Study Report (ISR) that will be distributed to stakeholders and filed with FERC in accordance with the FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 240 hours. MP estimates that this study will cost approximately $30,000 to complete.

9.0 Discussion of Alternative Approaches

Desktop entrainment and impingement studies are consistent with generally accepted practices in the scientific community. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Electric Power Research Institute (EPRI). 1997 Turbine entrainment and survival database – field tests. Prepared by Alden Research Laboratory, Inc., Holden, Massachusetts. EPRI Report No. TR-108630. October 1997.

Federal Energy Regulatory Commission (FERC). 1995. Preliminary assessment of fish entrainment at hydropower projects, a report on studies and protective measures, volumes 1 and 2 (Paper No. DPR-10). Office of Hydropower Licensing, FERC, Washington, DC.

Minnesota Department of Natural Resources (MDNR). 2018. Fisheries Lake Surveys: Blandin. Online: [URL] https://www.dnr.state.mn.us/lakefind/showreport.html?downum=31053300.

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Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

Minnesota Pollution Control Agency (MPCA). 2018. Water Quality Standards. Online [URL]: https://www.pca.state.mn.us/water/water-quality-standards. Accessed on October 4, 2018.

Stone & Webster Environmental Services. 1992. Fish entrainment and turbine mortality review and guidelines. EPRI Report TR-101232. September 1992.

Appendix H. Prairie River Project Recreation Resources Study

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Recreation Resources Study Plan

Prairie River Hydroelectric Project

(FERC No. 2361)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Prairie River Hydroelectric Project (Project) relicensing:

- Adequacy of existing recreational facilities and public access at the Projects to meet current and future recreational demand.

In Section 6.2.7 of the Pre-Application Document (PAD), ALLETE, Inc., d/b/a Minnesota Power (MP) proposed to conduct a Recreation Resources Study to evaluate current recreational opportunities and potential improvements. FERC filed comments on the proposed Recreation Resources Study in a letter dated April 5, 2019. These comments included the identification of recreation sites and their ownership; conducting recreation use surveys, spot counts, and report preparation.

2.0 Goals and Objectives

The Recreation Resources Study will collect information regarding current recreation use levels and the condition of the existing Project recreation facilities. The goals and objectives of this study are to:

- Gather information on the condition of the MP-managed, FERC-approved recreation facilities and identify any need for improvement; and
- Characterize current recreational use and future demand of the MP-managed, FERC-approved recreation facilities within the Project Boundary.

3.0 Resource Management Goals

The mission of the Minnesota Department of Natural Resources (MDNR) is to work with citizens to conserve and manage the State's natural resources, to provide outdoor recreation opportunities, and to provide for commercial uses of natural resources in a way that creates a sustainable quality of life. The recreation facilities within the Project contribute to MDNR's goals by providing outdoor recreation opportunities to the public (MDNR 2019).

4.0 Public Interest

FERC has expressed interest in this study.

5.0 Background and Existing Information

Section 5.8.2 of the PAD describes existing information about recreation facilities and opportunities in the Project area. Pursuant to Article 411 of the current FERC license, MP provides a canoe self-portage trail at the Project, extending approximately 1,500 feet from the southern bank of Prairie River Reservoir to the Prairie River, 100 feet south of Prairie River Dam. Additionally, MP manages three shoreline fishing areas providing access to the reservoir and downstream of the Prairie River Dam. One area is located adjacent to the canoe self-portage take-out, west-northwest of the dam. The other two shoreline fishing areas are located on the east and west sides of the peninsula leading to the canoe self-portage put-in on the Prairie River. All of the fishing areas are accessible from the canoe self-portage trail and include signage to direct anglers to the fishing areas. The Public Access Plan defining each of these access areas was developed in consultation with the National Park Service (NPS), MDNR, and Arbo Township and was approved by FERC in August 1995.

There are several other recreation sites located in the Project area that are not maintained or operated by MP. These recreation sites are documented in Table 1.

Table 1: Recreation sites in the Prairie River Project area.

Recreation Area	Distance to Prairie River Dam	Amenities	Owner/Operator	Relationship to Project Boundary
Mallard Point Road Boat Launch	3.0 miles upstream	Contains 1 concrete boat launch and 6 vehicle / trailer parking spaces	Arbo Township	Partially within
Arbo Township Boat Launch	Adjacent to	Contains 1 concrete boat launch and 3 vehicle / trailer parking spaces.	Arbo Township	Partially within
Arbo Township Park	1.5 miles west	Contains two benches, pavilion, interpretive signage, and an old runner from the Prairie River Project donated by MP.	Arbo Township and Prairie Lake Associations	Outside
Gunn Park	1.5 miles upstream	Contains several baseball and softball fields, a fishing pier, playground, pavilion, and picnic area.	Itasca County	Partially within
Itasca Trail	0.2 miles downstream	Multi-use bituminous trail from the County Fairgrounds in Grand Rapids to Gunn Park.	Itasca County	Partially within and adjacent to

Recreation Area	Distance to Prairie River Dam	Amenities	Owner/Operator	Relationship to Project Boundary
Mesabi Trail	0.2 miles downstream	The Mesabi Trail is a 135-mile multi-use trail that passes south of the dam, including connecting to the portage site.	Itasca County	Outside
Prairie Lake Campground and RV Park, LLC.	3.3 miles upstream	Privately owned campground and RV park with 55 camping sites, swimming beach, playground, restroom with showers, lodge, boat launch and docks	Private	Partially within

Source: MP 2018

6.0 Project Nexus

The Project currently provides multiple public recreational opportunities. The results of this study, in conjunction with existing information, will be used to inform analysis in the license application regarding potential Project effects on public recreation and to update the existing Public Access Plan, if needed.

7.0 Methodology

7.1 Task 1 - Recreation Facility Inventory and Condition Assessment

MP will perform a field inventory to document the existing MP-managed, FERC-approved recreation facilities (canoe self-portage trail and shoreline fishing areas) at the Project. MP will record the following information for the facilities including:

- A description of the type and location of the existing recreation facility;
- The type of recreation provided;
- Length and footing materials of any trails;
- Existing facilities, signage, and sanitation;
- The type of vehicular access and parking (if any);
- Suitability of facilities to provide recreational opportunities and access for persons with disabilities (i.e., compliance with current Americans with Disabilities Act standards for accessible design); and

- Photographic documentation of recreation facilities and Global Positioning System (GPS) location.

Additionally, MP will conduct a site inventory and general condition assessment of the recreation facilities listed in Table 1 of Section 5.0 with the exception of the privately owned campground. The assessment will consist of:

- Identification of whether or not the facility is located within the Project Boundary;
- Ownership and party responsible for operation and maintenance of each facility;
- Hours and season of operation;
- Type and number of amenities provided, including parking and signage; and
- General observations of site use, condition and accessibility.

7.2 Task 2 – Recreational Use Observation

MP will conduct recreational observations at the MP-managed, FERC-approved recreation facilities; including three shoreline fishing areas and the canoe self-portage trail.

These observations will be conducted over a two-hour interval (at random times throughout the recreation season). A designated observer will visit the area over the course of the traditional recreation season (Memorial Day through Labor Day). MP will conduct the observations and surveys using the following schedule:

Month	Survey and Reconnaissance
May	▪ Two weekend days (Memorial Day Weekend) ▪ Two randomly selected weekdays
June	▪ Two weekend days ▪ Two randomly selected weekdays
July	▪ Two weekend days (4th of July weekend) ▪ Two randomly selected weekdays
August	▪ Two weekend days ▪ Two randomly selected weekdays
September	▪ Two weekend days (Labor Day Weekend) ▪ Two randomly selected weekdays

The recreational use observations will represent a snapshot-in-time depicting specific user groups and their activities during randomly selected intervals. An observation form will be filled out by the designated observer during scheduled observation times. These observations will include the following information:

- Date and time;
- Observer;
- Weather conditions;
- Number of people observed;
- Observed activities; and
- Pertinent notes.

To estimate the use of the MP-managed, FERC-approved facilities, MP will utilize methods for deriving recreation user day calculations that were developed for use in FERC Form 80 reporting. MP will use the information collected from recreational use observations to determine the adequacy of current recreational opportunities and estimate future recreational demand.

7.3 Task 3 - Recreational Survey

MP will develop a survey to administer to the recreational users observed during the recreational use observations discussed in Section 7.2. The survey will allow respondents to provide survey responses related to recreation at the Project. The survey will be used to gain user opinions with regard to the existing Project recreation facilities and opportunities. The survey will record the number of people in a party, their primary reason (recreational activity) for visiting the Project, their perception of level of use, and their opinions with regard to the amount and types of recreation opportunities offered at the FERC-approved recreation facility.

8.0 Schedule and Deliverables

MP intends to conduct the Recreation Resources Study from May 2020 through September 2020. Upon completion of recreational use observations and surveys, the data will be analyzed and the study report will be prepared and provided to applicable parties in conjunction with the Initial Study Report (ISR) that will be distributed to stakeholders and filed with FERC in accordance with FERC's Integrated Licensing Process (ILP) Plan and Schedule. The estimated level of effort for this study is approximately 170 hours. MP estimates that this study will cost approximately $20,000 to complete.

Results of the facility assessment and recreational use observations and surveys will be summarized in the final study report. MP anticipates that the Recreation Resources Study Report will include the following elements:

- Project information and background
- Study area
- Methodology
- Study results
- Analysis and discussion
- Any agency correspondence and/or consultation
- Literature cited

9.0 Discussion of Alternative Approaches

MP has generally incorporated FERC's comments on recreation resources from the letter dated April 5, 2019. The methodology proposed in this plan is appropriate for the size and scope of the Project. The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Minnesota Department of Natural Resources (MDNR). 2019. Conservation Agenda. [Online] URL: https://www.dnr.state.mn.us/conservationagenda/index.html. Accessed: May 23, 2019.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

Appendix I. Prairie River Project Cultural Resources Study

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Cultural Resources Study Plan

Prairie River Hydroelectric Project

(FERC No. 2361)

May 2019

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1.0 Study Requests

The Federal Energy Regulatory Commission's (FERC or Commission) February 7, 2019, Scoping Document 1 (SD1) identified the following environmental resource issue to be analyzed in the Environmental Assessment (EA) for the Prairie River Hydroelectric Project (Project) relicensing:

- Effects of continued project operation on properties that are included in or eligible for inclusion in the National Register of Historic Places.

ALLETE, Inc., d/b/a Minnesota Power (MP) did not propose to conduct a Cultural Resources Study in the Pre-Application Document (PAD). FERC requested MP conduct a Cultural Resources Study by letter dated April 5, 2019. No other formal study requests meeting the Integrated Licensing Process (ILP) study criteria were received regarding cultural resources.

2.0 Goals and Objectives

The Cultural Resources Study will identify potential historic properties within the Project's Area of Potential Effects (APE) and assess the potential effects of continued Project operations and maintenance activities on historic and cultural resources, should any be present. The goals and objectives of this study are to:

- Consult with the Minnesota State Historic Preservation Office (SHPO) and potentially affected federally-recognized Indian Tribes to determine an appropriate APE for the Project;
- Conduct background research and an archival review;
- Conduct a Phase 1A Reconnaissance Survey (Reconnaissance Survey) of the Project's APE;
- Consult with federally-recognized Indian Tribes to develop and conduct an inventory of properties of traditional religious and cultural importance (often referred to as "traditional cultural properties") within the APE;
- Assess the condition of the area where any historic and archaeological sites are located for shoreline stability and evidence of erosion; and
- If determined necessary, update the Project's Cultural Resource Management Plan (CRMP) in consultation with the Minnesota SHPO and federally-recognized Indian Tribes to include appropriate measures for the management of historic properties within the Project's APE, including specific protection, mitigation and enhancement measures.

3.0 Resource Management Goals

The National Historic Preservation Act of 1966 provided for a network of historic preservation offices in every state to spearhead state preservation initiatives and help carry out the nation's historic preservation program. Minnesota's SHPO was created by state statute in 1969 to provide statewide leadership.

4.0 Public Interest

FERC expressed interest in this study.

5.0 Background and Existing Information

Existing relevant and reasonably available information regarding cultural resources in the Project vicinity was presented in Section 5.10 of the PAD (MP 2018). A Phase I survey was completed in 1990 and identified archaeological sites. A Phase II evaluation was completed for 18 of these sites in 1992 and a single site was evaluated in 1993. Of the evaluated sites, six were determined to be significant and eligible, in addition to the hydropower facility itself, for the National Register of Historic Places (NRHP).

Article 410 of the current FERC License required the development of a CRMP in consultation with the Minnesota SHPO. The FERC-approved CRMP requires MP submit a report annually that summarizes cultural resource management activities conducted the prior year. Per the most recent report filed in 2018, nine sites on the annual monitoring list were visited in 2017 and assessed regarding status of shoreline stability and ground cover. Based on monitoring investigations, none of the nine sites were experiencing degrading impacts resulting from the operations and maintenance of the Project. Based on the recent monitoring observations showing the sites are not being impacted by the operation and maintenance of the Project, SHPO concurred in their September 2018 letter, with the recommendation to discontinue annual monitoring activities.

6.0 Project Nexus

At present, there is no evidence that archaeological or historic resources are currently being affected by the Project's operations. However, the Project has the potential to directly or indirectly affect historic properties listed or eligible for inclusion in the NRHP.

7.0 Methodology

7.1 Task 1 – APE Determination

Pursuant to the implementing regulations of Section 106 at 36 CFR § 800.4(a), MP will consult with the Minnesota SHPO and potentially affected Indian Tribes, to determine and document the APE for the Project as defined in 36 CFR § 800.16(d). MP tentatively proposes the following APE:

> *The APE for the Prairie River Hydroelectric Project includes all lands and waters within the FERC Project boundary and also lands and properties outside of the Project boundary where Project-related activities that are conducted in compliance with the FERC license may affect historic properties.*

7.2 Task 2 – Background Research and Archival Review

MP will conduct background research and an archival review to inform the specific research design and the historic and environmental contexts. MP will review relevant sources of information that may include, but are not necessarily limited to:

- Information on archaeological sites, historic architectural resources, and previous cultural resource studies on file with Minnesota SHPO;
- A review of Minnesota's NRHP listings in proximity to the Project;
- Historic maps and aerial photographs of the APE;
- Relevant documents related to Project construction;
- Relevant information available from local repositories;
- Information on the current and historical environment, including mapped soils, bedrock geology, physiography, topography, and hydrology in the vicinity of the APE;
- Relevant historical accounts of the Project area;
- Relevant management plans for the Project, including approved management plans; and
- Any additional relevant information made available by the Minnesota SHPO, Indian Tribes, or other stakeholders.

7.3 Task 3 – Reconnaissance Survey

A Reconnaissance Survey will be conducted within the Project's APE. The proposed methods for the Reconnaissance Survey take into account the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the APE (36 CFR 800.4(b)(1)). The Reconnaissance Survey will be conducted by a qualified cultural resources professional[1] retained by MP and will be in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Federal Register [FR] 44716, Sept. 1983) and the Minnesota SHPO's *Historic and Architectural Survey Manual and Archaeology Survey Manual* (Minnesota Historical Society 2017).

The Reconnaissance Survey will include a visual reconnaissance of the exposed portions of the reservoir shoreline areas to identify any previously recorded or unrecorded archaeological and/or historic architectural resources. If archaeological material is observed during the Reconnaissance Survey, a preliminary assessment of the archaeological site will consist of the delineation of site boundaries. The maximum length and width of each site will be measured and recorded and the site's location geo-located. Site dimensions and elevations will be recorded on standardized field forms along with sketch maps of site settings and notations regarding landform, site aspect, temporal affiliations (if possible) and density of observed materials, site condition, any evidence of Project-related effects, and the nature of site deposits. Site boundaries will be located on Project maps and USGS topographic maps. Based on the judgment of the archaeologist, visual reconnaissance may be augmented by limited subsurface testing (e.g., shovel test pits). The archeologist will geo-locate, record, and collect any observed artifacts, features, or other pre-contact or historic period cultural material (as appropriate), and any new archaeological sites discovered will be documented on the Minnesota Archaeological Site Form. If any archaeological and/or historic architectural resources are discovered during the Reconnaissance Survey, the condition will be assessed on where the sites are located for shoreline stability and evidence of erosion and document such conditions in the final study report.

Treatment and disposition of any human remains that may be discovered will be managed in a manner consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) (P.L. 101-601; 25 U.S.C. 3001 *et seq*.)[2], and the Council's Policy Statement Regarding Treatment of Burial Sites,

[1] For this study, a "qualified cultural resources professional" is defined as an individual who meets the Secretary of the Interior's Professional Qualification Standards (48 FR 44738-44739, Sept. 1983).

[2] Pursuant to 43 C.F.R. Part 10, NAGPRA applies to human remains, sacred objects, and items of cultural patrimony (described as "cultural items" in the statute) located on federal or tribal lands or in the possession and control of federal agencies or certain museums. Regardless of where cultural items are discovered, the principles described in NAGPRA's implementing regulations will serve as guidance for MP's actions should the remains or

Human Remains, and Funerary Objects (Advisory Council on Historic Preservation [ACHP] 2007). Any human remains, burial sites, or funerary objects that are discovered will at all times be treated with dignity and respect. In the event that any Native American graves and/or associated cultural items are inadvertently discovered, MP will immediately notify the Minnesota SHPO and potentially affected Indian Tribes.

As a component of the Reconnaissance Survey, the survey will identify properties of architectural significance within the APE and update existing information on architectural resources in the Minnesota SHPO's files. The Reconnaissance Survey will document properties of architectural significance using photographs, brief descriptions, condition, and location information. The survey will conduct limited research on the history of the buildings, sites, and features, and complete a survey form for each property. The location will be documented on Project maps and USGS topographic maps.

7.4 Task 4 – Cultural Resource Management Plan

MP will consult with the Minnesota SHPO and potentially affected Indian Tribes, and other parties, as appropriate, to update the existing CRMP, if necessary. The measures provided in the CRMP will assist MP in managing historic properties within the Project's APE throughout the term of the new license.

The CRMP will be prepared in accordance with the Guidelines for the Development CRMPs for FERC Hydroelectric Projects, promulgated by FERC and the Advisory Council on Historic Places (ACHP) on May 20, 2002. The CRMP will address the following items (ACHP and FERC 2002):

- Identification of the APE for the Project and inclusion of a map or maps that clearly show the APE in relation to the existing and proposed Project boundary;
- Additional studies to assist in identifying or managing historic properties within the APE;
- Continued use and maintenance of any historic properties;
- Potential effects on historic properties resulting from the continued operation and maintenance of the Project;
- Protection and treatment of historic properties threatened by potential ground-disturbing activities;

associated artifacts be identified as Native American and to the extent such principles and procedures are consistent with any other applicable requirements.

- Protection and treatment of historic properties threatened by other direct or indirect Project-related activities, including routine Project maintenance and vandalism;
- The resolution of unavoidable adverse effects on historic properties;
- Treatment and disposition of any human remains that are discovered, taking into account any applicable state laws and the Council's Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects (ACHP 2007);
- Compliance with the Native American Graves Protection and Repatriation Act (25 U.S.C. §3001), for tribal or federal lands within the Project's APE;
- Provisions for unanticipated discoveries of previously unidentified cultural resources within the APE;
- A dispute resolution process;
- Categorical exclusions from further review of effects;
- Public interpretation of the historic and archaeological values of the Project, if any; and
- Coordination with consulting parties during implementation of the HPMP.

8.0 Schedule and Deliverables

Based on the results of Task 3, MP will prepare a report on the results of the Phase IA Reconnaissance Survey. The report will include: 1) a summary of information obtained through the background research and archival review, 2) maps and descriptions of reported archaeological and historic resources within the Project's APE, 3) an assessment of the APE's archaeological sensitivity and potential, 4) an assessment of significant architectural resources within the APE, and 5) recommendations regarding additional cultural resource studies and/or management measures for identified resources. MP will consult with Minnesota SHPO, Indian Tribes, and other interested parties (as appropriate) regarding the Reconnaissance Survey Report.

MP anticipates this study will be completed by October 2020. Due to the length of this study, the final study report will not be provided in the Initial Study Report (ISR) that will be distributed to stakeholders and filed with FERC in October 2020. Instead, the final report will be filed with the Draft License Application (DLA) to be filed with FERC in August 2021 in accordance with FERC's ILP Plan and Schedule. The estimated level of effort for this study is approximately 320 hours. MP estimates that this study will cost approximately $40,000 to complete.

9.0 Discussion of Alternative Approaches

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods used by Federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are warranted.

10.0 References

Advisory Council on Historic Preservation (ACHP). 2007. Policy Statement Regarding Treatment of Burial Sites, Human Remains, and Funerary Objects. Washington, D.C.

Advisory Council on Historic Preservation (ACHP) and the Federal Energy Regulatory Commission (FERC). 2002. Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects. Washington, D.C.

Minnesota Historical Society. 2017. Historic and Architectural Survey Manual. Heritage Preservation Department. Revised 6/2017.

Minnesota Power (MP). 2018. Pre-Application Document, Volume I of II, Grand Rapids Hydroelectric Project (FERC Project No. 2362) Prairie River Hydroelectric Project (FERC Project No. 2361). Prepared by HDR Engineering, Inc. for Minnesota Power. December 13, 2018.

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Appendix J. Grand Rapids Bathymetric Surveys

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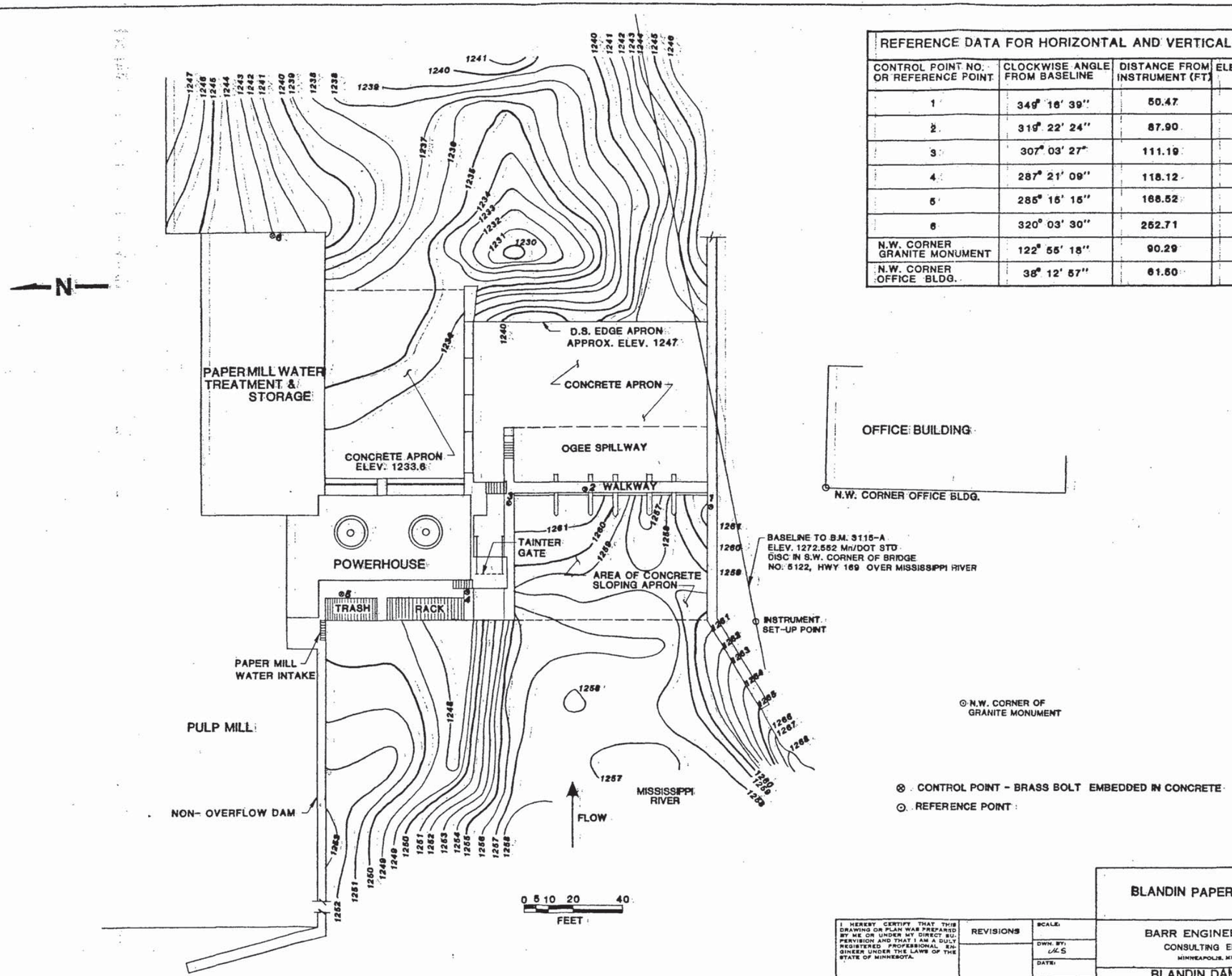
REFERENCE DATA FOR HORIZONTAL AND VERTICAL CONTROL			
CONTROL POINT NO. OR REFERENCE POINT	CLOCKWISE ANGLE FROM BASELINE	DISTANCE FROM INSTRUMENT (FT.)	ELEVATION (MSL)
1	349° 16' 39"	50.47	1269.66
2	319° 22' 24"	87.90	1269.29
3	307° 03' 27"	111.19	1269.26
4	287° 21' 09"	118.12	1269.64
5	285° 15' 15"	166.52	1269.62
6	320° 03' 30"	252.71	1269.50
N.W. CORNER GRANITE MONUMENT	122° 55' 18"	90.29	1273.56
N.W. CORNER OFFICE BLDG.	38° 12' 57"	61.50	—



I HEREBY CERTIFY THAT THIS DRAWING OR PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATE

REG. NO.

REVISIONS

SCALE:

DWN. BY: JLS

DATE:

DWG. NO.: E-3/SE-001 D

BLANDIN PAPER COMPANY

BARR ENGINEERING CO.
CONSULTING ENGINEERS
MINNEAPOLIS, MINNESOTA

BLANDIN DAM
HORIZONTIAL-VERTICAL CONTROL AND SOUNDINGS
1981

SHEET NO. 1 OF 1 SHEETS

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981										
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	—	—	—
0+10	1981										
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	—	—	—
0+25	1981										
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	—	—	—
0+50	1981										
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4 / 58.4	50.4	49.4	50.4
0+75	1981										
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
1+00	1981										
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
1+25	1981										
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
1+50	1981										
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
1+75	1981										
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
2+00	1981										
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	52.4	51.4
2+25	1981										
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981										
	1988	—	—	—	—	—	—	—	33.8	33.8	34.8
0-45	1981										
	1988	—	—	—	—	—	—	—	34.8	34.8	34.8
0-30	1981										
	1988	—	—	—	—	—	—	—	35.3	35.8	35.3
0-15	1981										
	1988	—	—	—	—	—	—	—	35.8	36.3	35.8
0+00	1981										
	1988	—	—	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
0+10	1981										
	1988	—	—	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+25	1981										
	1988	—	—	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
0+50	1981										
	1988	—	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	—
0+75	1981										
	1988	—	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	—
1+00	1981										
	1988	—	—	44.8	40.8	38.8	36.3	36.3	39.3	36.3	—
1+25	1981										
	1988	—	—	44.8	41.8	40.8	40.8	41.8	42.3	34.8	—

NOTES
1. ADD 1200' TO ALL SOUNDING ELEVATIONS
2. 1981 SURVEY BY BARR ENGINEERING CO. FOR SOUDINGS DATA. REFER TO DWG. NO. 1 of 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.

FIGURE VI-I

Date • By • App'd

WARZYN ENGINEERING INC.
Madison • Milwaukee
Minneapolis • Chicago
Detroit

Designed By:
Drawn By: SJR
Checked By: MDB
Approved By: GSB
Date:
Reference:
Scale:
Revisions

SOUNDINGS
BLANDIN DAM PROJECT
FERC NO. 2362
MISSISSIPPI RIVER

Printed
Sheet Number OF
Project Number 50246
WARZYN

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981										
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	—	—	—
	7-15-93	59.2	59.2	59.2	59.2	59.2	59.2	59.2	—	—	—
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	—	—	—
0+10	1981										
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	—	—	—
	7-15-93	58.2	57.2	58.2	58.2	58.2	59.2	58.2	—	—	—
	1998	58.7	58.2	58.2	54.2	58.7	54.2	61.7	—	—	—
0+25	1981										
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	—	—	—
	7-15-93	54.2	54.2	56.2	56.2	56.2	55.2	55.2	—	—	—
	1998	—	55.7	55.7	55.7	55.2	55.2	56.7	—	—	—
0+50	1981										
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4	50.4	49.4	50.4
	7-15-93	—	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	—
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
0+75	1981										
	1988	58.4	57.4	57.4	57.9	57.4	58.4	56.4	49.4	50.4	53.4
	7-15-93	—	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
1+00	1981										
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	7-15-93	—	56.2	56.2	56.2	56.2	57.2	56.2	48.2	48.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	53.0	58.0	53.4	49.7	51.9
1+25	1981										
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	7-15-93	—	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
1+50	1981										
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	7-15-93	—	53.2	54.2	55.2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.4	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
1+75	1981										
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
2+00	1981										
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	52.4	51.4
	1998	49.2	47.4	46.2	46.6	40.7	41.4	36.7	33.2	47.7	51.7
2+25	1981										
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981										
	1988	—	—	—	—	—	—	—	33.8	33.8	34.8
	1998	—	—	—	—	—	—	—	33.7	33.7	—
0-45	1981										
	1988	—	—	—	—	—	—	—	34.8	34.8	34.8
	1998	—	—	—	—	—	—	—	34.2	34.3	34.7
0-30	1981										
	1988	—	—	—	—	—	—	—	35.3	35.8	35.3
	1998	—	—	—	—	—	—	—	35.1	35.4	34.7
0-15	1981										
	1988	—	—	—	—	—	—	—	35.8	36.3	35.8
	1998	—	—	—	—	—	—	—	35.6	35.9	36.6
0+00	1981										
	1988	—	—	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	—	—	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
0+10	1981										
	1988	—	—	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	—	—	43.4	36.9	35.2	33.2	33.7	32.7	36.1	36.5

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+25	1981										
	1988	—	—	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	—	—	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
0+50	1981										
	1988	—	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	—
	1998	—	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	—
0+75	1981										
	1988	—	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	—
	1998	—	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	—
1+00	1981										
	1988	—	—	44.8	40.8	38.8	36.3	36.3	39.3	36.3	—
	1998	—	—	42.9	39.2	38.2	37.7	38.2	40.7	33.7	
1+25	1981										
	1988	—	—	44.8	41.8	40.8	40.8	41.8	42.3	34.8	—
	1998	—	—	—	44.4	43.2	42.4	42.1	42.7	34.5	—

NOTES

1. ADD 1200' TO ALL SOUNDING ELEVATIONS
2. 1981 SURVEY BY BARR ENGINEERING CO. FOR SOUDINGS DATA REFER TO DWG. NO. 1 of 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD-CLYDE.
5. 1998 SOUNDINGS BY WOODWARD-CLYDE AND EMS
6. CLOUDED AREAS DENOTE MORE SIGNIFICANT CHANGES IN THE RIVER BOTTOM ELEVATIONS

FIG. 6-2

DESIGNED
DRAWN SYH
CHECKED WJM
FILE PITCHED
PROJECT MANAGER
DATE 05-13-93

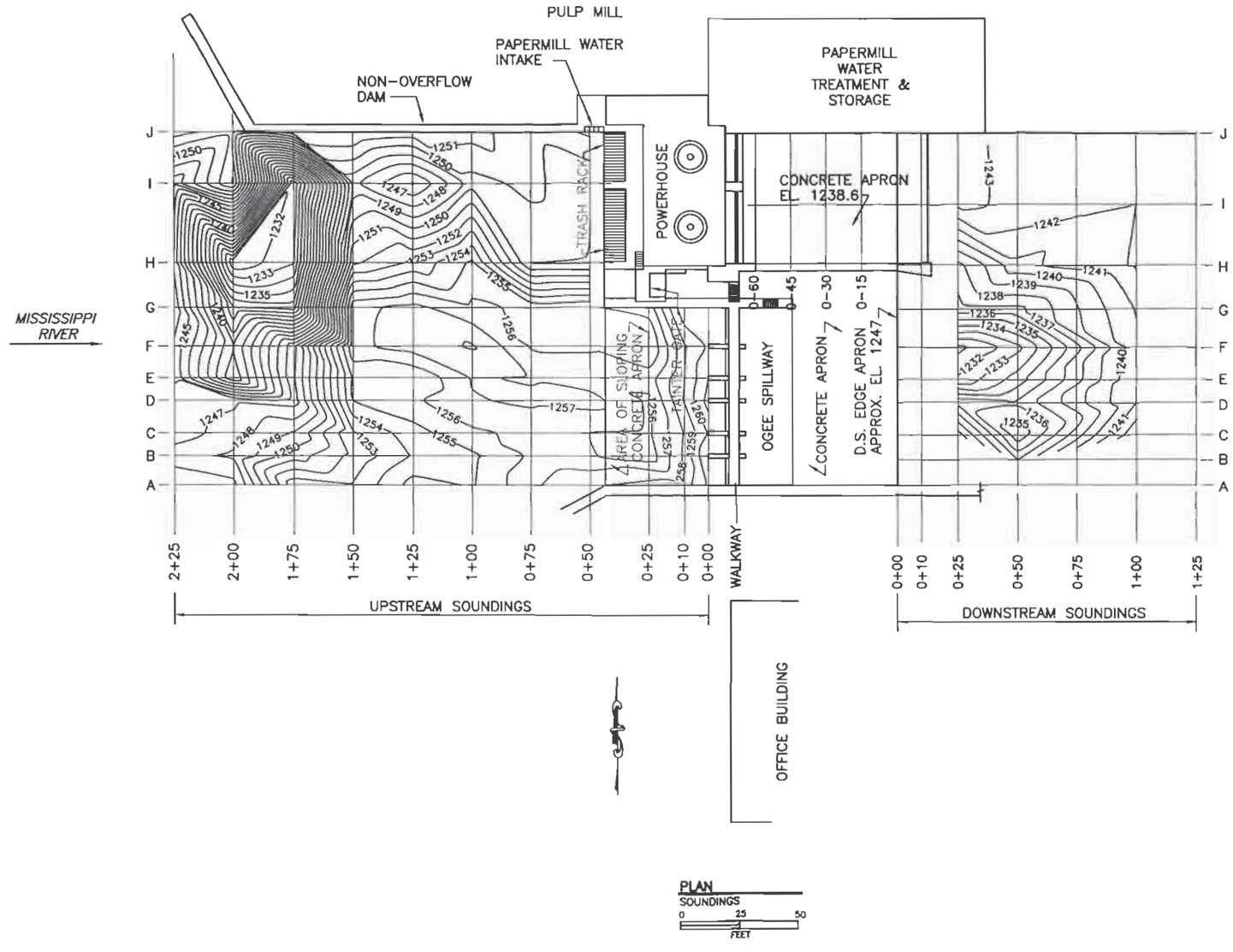
WARNING 0 250 500 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

Woodward-Clyde Consultants
Engineering & Sciences applied to the earth & its environment
Park Place West Building, Suite 690
7805 Bloomington Freeway
Minneapolis, Minnesota 55420

SOUNDINGS

BLANDIN DAM PROJECT
FERC NO. 2362
MISSISSIPPI RIVER

REVISION △
PROJECT 50523
DRAWING
SHEET 01

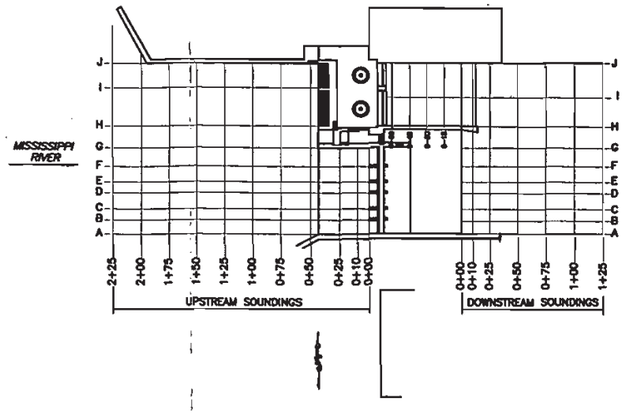


BLANDIN DAM
UPSTREAM AND DOWNSTREAM SOUNDINGS

DRN BY: SWH	DATE: OCT. 2004	SPAULDING CONSULTANTS, LLC	FIG. NO. 1
CHK'D BY: DAS	DATE: OCT. 2004		

STATION	DATE	UPSTREAM SOUNDINGS									
		A	B	C	D	E	F	G	H	I	J
0+00	1981										
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	–	–	–
	1993	59.2	59.2	59.2	59.2	59.2	59.2	59.2	–	–	–
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	–	–	–
	2004	60.2	61.1	60.1	61.4	61.0	60.2	60.4	–	–	–
0+10	1981										
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	–	–	–
	1993	58.2	57.2	58.2	58.2	58.2	59.2	58.2	–	–	–
	1998	58.7	58.2	58.2	59.2	58.7	59.2	61.7	–	–	–
	2004	58.5	58.2	58.1	59.1	59.0	58.9	60.9	–	–	–
0+25	1981										
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	–	–	–
	1993	54.2	54.2	56.2	56.2	56.2	55.2	55.2	–	–	–
	1998	–	55.7	55.7	55.7	55.2	55.2	56.7	–	–	–
	2004	–	55.4	55.8	55.8	56.5	55.0	56.4	–	–	–
0+50	1981										
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4 / 48.4	50.4	49.4	50.4
	1993	–	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	–
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
	2004	57.9	56.1	56.0	57.4	56.4	55.9	55.9	48.9	*49.1	51.2
0+75	1981										
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
	1993	–	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
	2004	56.8	56.2	56.3	57.2	56.9	55.9	55.8	49.0	*50.3	50.3
1+00	1981										
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	1993	–	56.2	56.2	56.2	56.2	57.2	56.2	48.2	58.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	58.0	58.0	53.4	49.7	51.9
	2004	54.9	54.8	55.8	56.9	57.1	58.1	56.2	55.2	49.6	51.4
1+25	1981										
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	1993	–	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
	2004	55.4	54.1	54.6	55.8	55.1	57.5	57.3	53.2	45.9	51.6
1+50	1981										
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	1993	–	53.2	54.2	55..2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.9	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
	2004	53.1	52.3	52.9	55.0	55.2	56.1	56.7	51.8	48.3	52.0
1+75	1981										
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7
	2004	53.7	50.5	49.1	46.5	46.9	46.7	36.5	32.9	32.1	51.9
2+00	1981										
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	51.4	51.4
	1998	49.2	47.7	46.2	45.6	40.7	41.4	36.7	33.2	47.7	51.7
	2004	46.7	48.2	47.5	46.8	39.1	40.0	37.1	31.2	52.1	51.3
2+25	1981										
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2
	2004	46.2	47.5	46.5	46.3	45.9	45.8	46.7	45.8	47.3	52.5

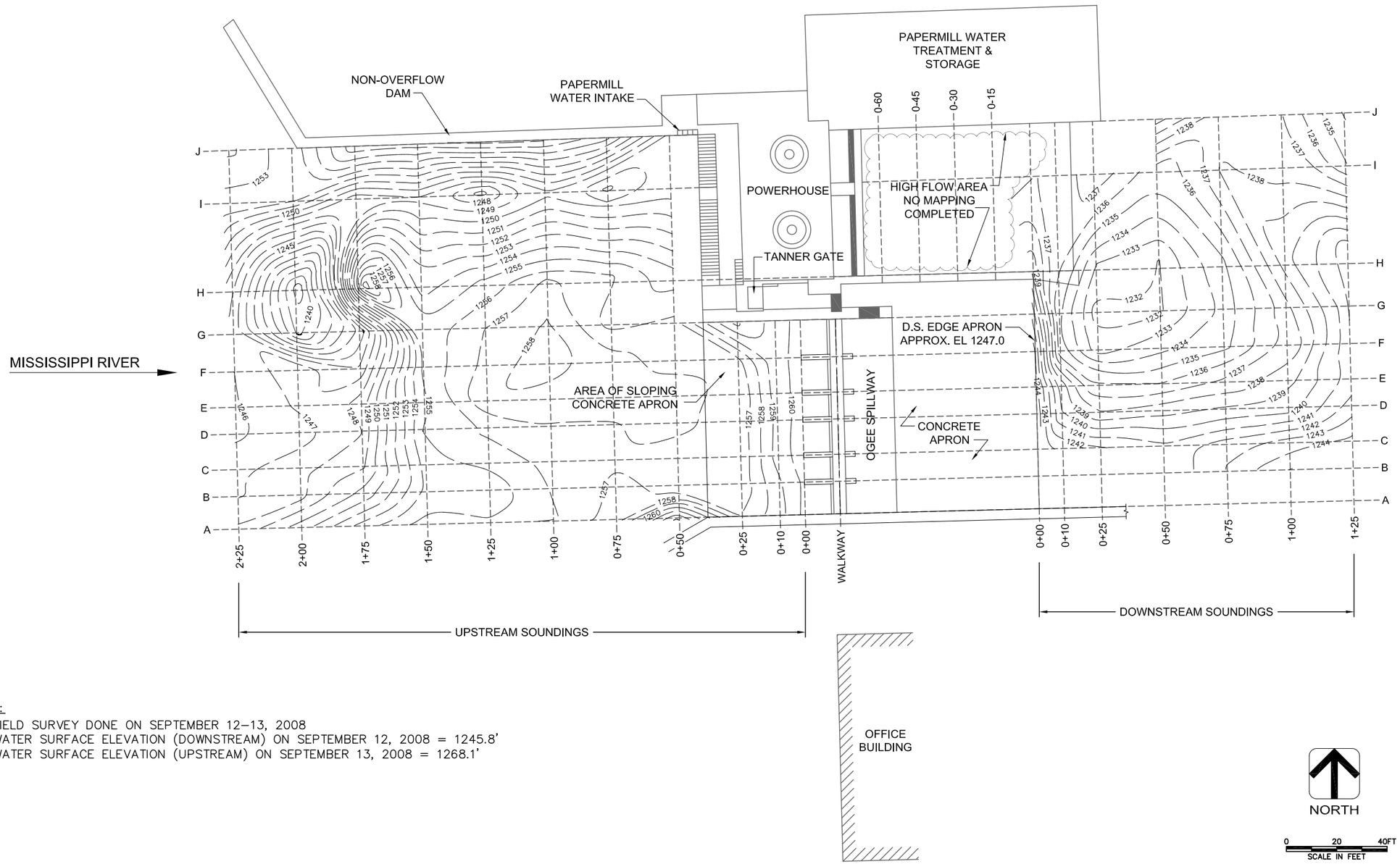
STATION	DATE	DOWNSTREAM SOUNDINGS									
		A	B	C	D	E	F	G	H	I	J
0-60	1981										
	1988	–	–	–	–	–	–	–	33.8	33.8	34.8
	1998	–	–	–	–	–	–	–	33.7	33.7	–
	2004	–	–	–	–	–	–	–	–	–	–
0-45	1981										
	1988	–	–	–	–	–	–	–	34.8	34.8	34.8
	1998	–	–	–	–	–	–	–	34.2	34.3	34.7
	2004	–	–	–	–	–	–	–	–	–	–
0-30	1981										
	1988	–	–	–	–	–	–	–	35.3	35.8	35.3
	1998	–	–	–	–	–	–	–	35.1	35.4	34.7
	2004	–	–	–	–	–	–	–	–	–	–
0-15	1981										
	1988	–	–	–	–	–	–	–	35.8	36.6	35.8
	1998	–	–	–	–	–	–	–	35.6	35.9	36.6
	2004	–	–	–	–	–	–	–	–	–	–
0+00	1981										
	1988	–	–	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	–	–	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
	2004	–	–	–	–	–	–	–	–	–	–
0+10	1981										
	1988	–	–	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	–	–	43.9	36.9	35.2	33.2	33.7	32.7	36.1	36.5
	2004	–	–	–	–	–	–	–	–	–	–
0+25	1981										
	1988	–	–	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	–	–	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
	2004	–	–	40.5	36.7	32.2	30.7	36.6	37.7	43.2	43.2
0+50	1981										
	1988	–	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	–
	1998	–	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	–
	2004	–	37.0	34.3	36.2	34.5	32.7	36.7	40.1	–	–
0+75	1981										
	1988	–	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	–
	1998	–	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	–
	2004	–	–	–	–	–	–	–	–	–	–
1+00	1981										
	1988	–	–	44.8	40.8	38.8	36.3	36.3	39.3	36.3	–
	1998	–	–	42.9	39.2	38.2	37.7	38.2	40.7	33.7	–
	2004	–	–	42.9	41.0	40.9	40.7	41.1	42.1	42.0	–
1+25	1981										
	1988	–	–	44.8	41.8	40.8	40.8	41.8	42.3	34.8	–
	1998	–	–	–	44.4	43.2	42.4	42.1	42.7	34.5	–
	2004	–	–	–	–	–	–	–	–	–	–



NOTES:
1. ADD 1200' TO ALL SOUNDING ELEVATIONS.
2. 1981 SURVEY BY BARR ENGINEERING CO. FOR SOUNDINGS DATA REFER TO DWG. NO. 1 of 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD–CLYDE.
5. 1998 SOUNDINGS BY WOODWARD–CLYDE AND EMS.
6. CLOUDED AREAS DENOTE MORE SIGNIFICANT CHANGES IN THE RIVER BOTTOM ELEVATIONS.
7. 2004 SOUNDINGS BY SPAULDING CONSULTANTS, LLC.

BLANDIN DAM
UPSTREAM AND DOWNSTREAM SOUNDINGS

DRN BY: SWH	DATE: OCT. 2004	SPAULDING CONSULTANTS, LLC	FIG. NO. 2
CHK'D BY: DAS	DATE: OCT. 2004		



NOTES:

- FIELD SURVEY DONE ON SEPTEMBER 12–13, 2008
- WATER SURFACE ELEVATION (DOWNSTREAM) ON SEPTEMBER 12, 2008 = 1245.8'
- WATER SURFACE ELEVATION (UPSTREAM) ON SEPTEMBER 13, 2008 = 1268.1'

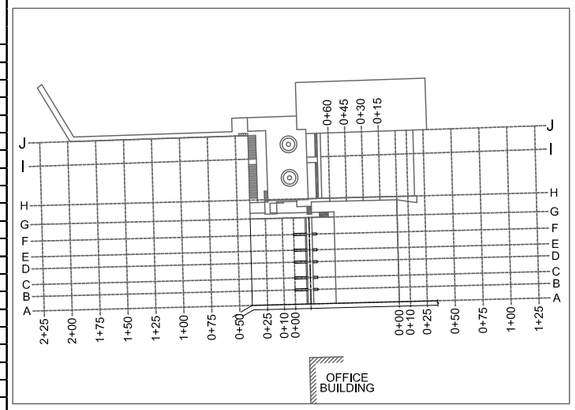
DR.BY CRF								MINNESOTA POWER BLANDIN DAM GRAND RAPIDS, MINNESOTA	AYRES ASSOCIATES Duluth, Minnesota	UPSTREAM AND DOWNSTREAM SOUNDINGS	DRAWING NO. 1
CHK.BY EAK	JOB NO. 81-0273.00										
DATE SEPT 2008	SCALE AS SHOWN	NO.	DATE	REVISION	NO.	DATE	REVISION				SHEET NO.

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981										
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	-	-	-
	1993	59.2	59.2	59.2	59.2	59.2	59.2	59.2	-	-	-
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	-	-	-
	2004	60.2	61.1	60.1	61.4	61.0	60.2	60.4	-	-	-
	2008	60.3	60.2	60.7	60.5	60.4	60.4	60.3			
0+10	1981										
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	-	-	-
	1993	58.2	57.2	58.2	58.2	58.2	59.2	58.2	-	-	-
	1998	58.7	58.2	58.2	59.2	58.7	59.2	61.7	-	-	-
	2004	58.5	58.2	58.1	59.1	59.0	58.9	60.9	-	-	-
	2008	58.6	58.8	59.4	59.5	59.6	59.7	59.6			
0+25	1981										
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	-	-	-
	1993	54.2	54.2	56.2	56.2	56.2	55.2	55.2	-	-	-
	1998	-	55.7	55.7	55.7	55.2	55.2	56.7	-	-	-
	2004	-	55.4	55.8	55.8	56.5	55.0	56.4	-	-	-
	2008	57.0	56.4	56.1	56.3	56.3	56.5	61.2			
0+50	1981										
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4/48.4	50.4	49.4	50.4
	1993	-	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	-
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
	2004	57.9	56.1	56.0	57.4	56.4	55.9	55.9	48.9	*49.1	51.2
	2008	63.3	56.7	56.5	57.3	57.6	56.7	56.3	54.6	49.4	49.7
0+75	1981										
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
	1993	-	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
	2004	56.8	56.2	56.3	57.2	56.9	55.9	55.8	49.0	*50.3	50.3
	2008	57.5	57.2	56.9	56.9	57.6	57.3	55.7	56.1	47.8	55.3
1+00	1981										
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	1993	-	56.2	56.2	56.2	56.2	57.2	56.2	48.2	58.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	58.0	58.0	53.4	49.7	51.9
	2004	54.9	54.8	55.8	56.9	57.1	58.1	56.2	55.2	49.6	51.4
	2008	55.9	56.1	56.4	56.9	57.5	58.8	58.2	57.3	49.7	57.0
1+25	1981										
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	1993	-	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
	2004	55.4	54.1	54.6	55.8	55.1	57.5	57.3	53.2	45.9	51.6
	2008	55.1	54.4	55.2	56.2	57.9	57.3	57.0	55.3	46.6	57.4
1+50	1981										
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	1993	-	53.2	54.2	55.2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.9	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
	2004	53.1	52.3	52.9	55.0	55.2	56.1	56.7	51.8	48.3	52.0
	2008	55.6	54.4	54.6	55.0	54.9	55.2	55.3	53.5	48.8	56.6
1+75	1981										
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7
	2004	53.7	50.5	49.1	46.5	46.9	46.7	36.5	32.9	32.1	51.9
	2008	53.4	50.3	48.9	47.9	48.4	46.1	44.2	59.5	48.5	56.6
2+00	1981										
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	51.4	51.4
	1998	49.2	47.7	46.2	45.6	40.7	41.4	36.7	33.2	47.7	51.7
	2004	46.7	48.2	47.5	46.8	39.1	40.0	37.1	31.2	52.1	51.3
	2008	50.5	47.7	47.7	46.4	47.2	47.8	39.7	38.4	52.2	52.3
2+25	1981										
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2
	2004	46.2	47.5	46.5	46.3	45.9	45.8	46.7	45.8	47.3	52.5
	2008	48.2	46.9	46.9	45.9	45.9	46.0	46.7	47.4	52.3	54.3

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981										
	1988	-	-	-	-	-	-	-	33.8	33.8	34.8
	1998	-	-	-	-	-	-	-	33.7	33.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008										
0-45	1981										
	1988	-	-	-	-	-	-	-	34.8	34.8	34.8
	1998	-	-	-	-	-	-	-	34.2	34.3	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008										
0-30	1981										
	1988	-	-	-	-	-	-	-	35.3	35.8	35.3
	1998	-	-	-	-	-	-	-	35.1	35.4	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008										
0-15	1981										
	1988	-	-	-	-	-	-	-	35.8	36.6	35.8
	1998	-	-	-	-	-	-	-	35.6	35.9	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008										
0+00	1981										
	1988	-	-	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	-	-	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008			43.3	44.4	44.3	44.4	42.8	39.6	37.1	
0+10	1981										
	1988	-	-	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	-	-	43.9	36.9	35.2	33.2	33.7	32.7	36.1	36.5
	2004	-	-	-	-	-	-	-	-	-	-
	2008			42.7	40.2	39.7	35.1	35.0	36.3	36.4	
0+25	1981										
	1988	-	-	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	-	-	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
	2004	-	-	40.5	36.7	32.2	30.7	36.6	37.7	43.2	43.2
	2008			42.1	38.1	36.3	32.5	31.3	32.9	37.6	
0+50	1981										
	1988	-	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	-
	1998	-	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	-
	2004	-	37.0	34.3	36.2	34.5	32.7	36.7	40.1	-	-
	2008		41.1	41.2	38.6	35.9	33.6	31.9	32.0	35.3	40.6
0+75	1981										
	1988	-	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	-
	1998	-	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008		43.0	42.6	39.3	37.1	34.8	34.2	34.9	38.1	37.3
1+00	1981										
	1988	-	-	44.8	40.8	38.8	36.3	36.3	39.3	36.3	-
	1998	-	-	42.9	39.2	38.2	37.7	38.2	40.7	33.7	-
	2004	-	-	42.9	41.0	40.9	40.7	41.1	42.1	42.0	-
	2008		45.0	43.5	39.6	39.0	37.1	37.6	39.8	37.3	37.1
1+25	1981										
	1988	-	-	44.8	41.8	40.8	40.8	41.8	42.3	34.8	-
	1998	-	-	-	44.4	43.2	42.4	42.1	42.7	34.5	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008			44.3	42.3	41.3	41.7	41.7	42.9	35.0	33.8

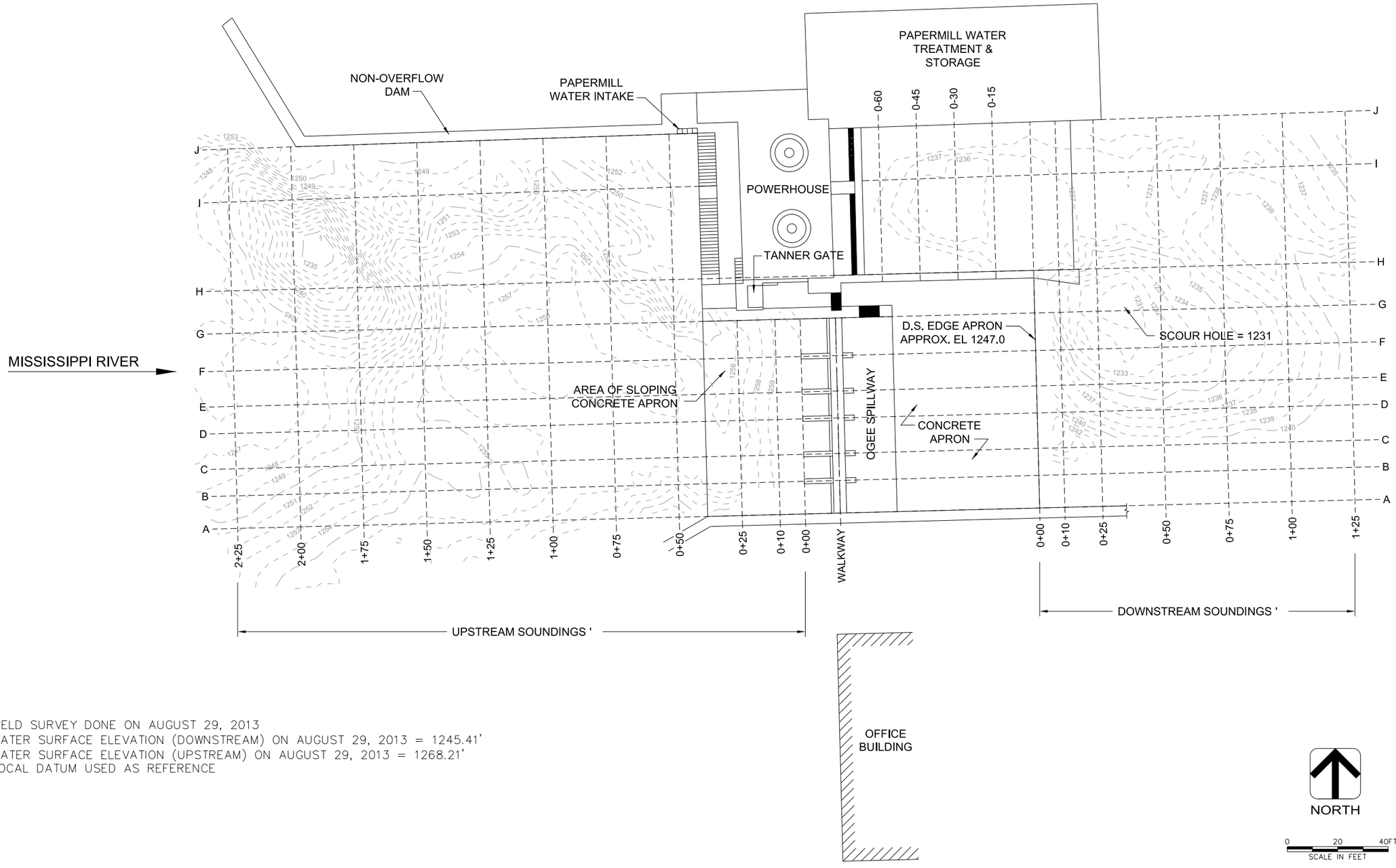


NOTES:

1. ADD 1200' TO ALL SOUNDING ELEVATIONS.
2. 1981 SURVEY BY BARR ENGINEERING CO. FOR SOUNDINGS DATA REFER TO DWG. NO. 1 OF 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD–CLYDE.
5. 1998 SOUNDINGS BY WOODWARD–CLYDE AND EMS.
6. CLOUDED AREAS DENOTE MORE SIGNIFICANT CHANGES IN THE RIVER BOTTOM ELEVATIONS.
7. 2004 SOUNDINGS BY SPAULDING CONSULTANTS, LLC.
8. 2008 SURVEY BY AYRES ASSOCIATES INC.

DR.BY CRF								MINNESOTA POWER BLANDIN DAM GRAND RAPIDS, MINNESOTA	AYRES ASSOCIATES Duluth, Minnesota	UPSTREAM AND DOWNSTREAM SOUNDINGS	DRAWING NO. 2
CHK.BY EAK	JOB NO. 81-0273.00										SHEET NO.
DATE SEPT 2008	SCALE AS SHOWN	NO.	DATE	REVISION	NO.	DATE	REVISION				

J:\PROJ\81\0273\SHT\81027Sht1-02.dwg, SHEET 2, 9/22/2008 7:01:24 AM, 1:1



NOTES:

- FIELD SURVEY DONE ON AUGUST 29, 2013
- WATER SURFACE ELEVATION (DOWNSTREAM) ON AUGUST 29, 2013 = 1245.41'
- WATER SURFACE ELEVATION (UPSTREAM) ON AUGUST 29, 2013 = 1268.21'
- LOCAL DATUM USED AS REFERENCE

DR.BY M ARNESON							
CHK.BY P HAUG	JOB NO. 26-0768.00						
DATE NOV 2013	SCALE AS SHOWN	NO.	DATE	REVISION	NO.	DATE	REVISION

MINNESOTA POWER
BLANDIN DAM
GRAND RAPIDS, MINNESOTA

AYRES ASSOCIATES
Eau Claire, Minnesota

UPSTREAM AND DOWNSTREAM SOUNDINGS

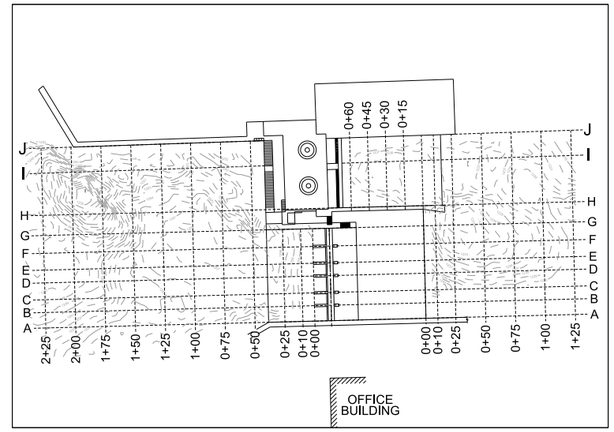
DRAWING NO. 1
SHEET NO.

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	-	-	-
	1993	59.2	59.2	59.2	59.2	59.2	59.2	59.2	-	-	-
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	-	-	-
	2004	60.2	61.1	60.1	61.4	61.0	60.2	60.4	-	-	-
	2008	60.3	60.2	60.7	60.5	60.4	60.4	60.3	-	-	-
	2013	-	-	-	-	-	-	57.8	-	-	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	-	-	-
	1993	58.2	57.2	58.2	58.2	58.2	59.2	58.2	-	-	-
	1998	58.7	58.2	58.2	59.2	58.7	59.2	61.7	-	-	-
	2004	58.5	58.2	58.1	59.1	59.0	58.9	60.9	-	-	-
	2008	58.6	58.8	59.4	59.5	59.6	59.7	59.6	-	-	-
	2013	-	59.1	59.4	59.5	59.2	59.0	59.3	-	-	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	-	-	-
	1993	54.2	54.2	56.2	56.2	56.2	55.2	55.2	-	-	-
	1998	-	55.7	55.7	55.7	55.2	55.2	56.7	-	-	-
	2004	-	55.4	55.8	55.8	56.5	55.0	56.4	-	-	-
	2008	57.0	56.4	56.1	56.3	56.3	56.5	61.2	-	-	-
	2013	-	57.0	56.9	56.6	56.6	56.1	57.1	-	-	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.9	57.4	57.4	57.4	56.4	-	50.4	49.4	50.4
	1993	-	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	-
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
	2004	57.9	56.1	56.0	57.4	56.4	55.9	55.9	48.9	-	51.2
	2008	63.3	56.7	56.5	57.3	57.6	56.7	56.3	54.6	49.4	49.7
	2013	59.8	58.4	56.5	56.8	57.1	56.7	52.0	48.3	50.0	-
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
	1993	-	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
	2004	56.8	56.2	56.3	57.2	56.9	55.9	55.8	49.0	-	50.3
	2008	57.5	57.2	56.9	56.9	57.6	57.3	55.7	56.1	47.8	55.3
	2013	59.4	56.7	56.8	56.7	57.0	57.0	56.4	54.1	50.3	-
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	1993	-	56.2	56.2	56.2	56.2	57.2	56.2	48.2	58.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	58.0	58.0	53.4	49.7	51.9
	2004	54.9	54.8	55.8	56.9	57.1	58.1	56.2	55.2	49.6	51.4
	2008	55.9	56.1	56.4	56.9	57.5	58.8	58.2	57.3	49.7	57.0
	2013	57.6	55.9	56.1	50.4	56.4	57.3	57.8	57.8	51.1	-
1+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	1993	-	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
	2004	55.4	54.1	54.6	55.8	55.1	57.5	57.3	53.2	45.9	51.6
	2008	55.1	54.4	55.2	56.2	57.9	57.3	57.0	55.3	46.6	57.4
	2013	56.0	55.2	54.9	55.8	56.5	57.0	56.7	55.9	47.9	-
1+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	1993	-	53.2	54.2	55.2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.9	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
	2004	53.1	52.3	52.9	55.0	55.2	56.1	56.7	51.8	48.3	52.0
	2008	55.6	54.4	54.6	55.0	54.9	55.2	55.3	53.5	48.8	56.6
	2013	56.3	55.5	54.8	54.8	55.0	54.8	52.0	51.7	47.9	-
1+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7
	2004	53.7	50.5	49.1	46.5	46.9	46.7	36.5	32.9	32.1	51.9
	2008	53.4	50.3	48.9	47.9	48.4	46.1	44.2	59.5	48.5	56.6
	2013	55.0	52.7	50.4	50.5	50.6	48.8	43.8	39.8	48.2	-
2+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	51.4	51.4
	1998	49.2	47.7	46.2	45.6	40.7	41.4	36.7	33.2	47.7	51.7
	2004	46.7	48.2	47.5	46.8	39.1	40.0	37.1	31.2	52.1	51.3
	2008	50.5	47.7	47.7	46.4	47.2	47.8	39.7	38.4	52.2	52.3
	2013	52.8	50.8	48.8	47.3	46.6	47.1	46.5	40.5	44.3	-
2+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2
	2004	46.2	47.5	46.5	46.3	45.9	45.8	46.7	45.8	47.3	52.5
	2008	48.2	46.9	46.9	45.9	45.9	46.0	46.7	47.4	52.3	54.3
	2013	50.8	48.7	47.6	46.5	45.9	46.3	45.8	46.9	45.1	50.1

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	33.8	33.8	34.8
	1998	-	-	-	-	-	-	-	33.7	33.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	-	-
0-45	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	34.8	34.8	34.8
	1998	-	-	-	-	-	-	-	34.2	34.3	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	36.0	-
0-30	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.3	35.8	35.3
	1998	-	-	-	-	-	-	-	35.1	35.4	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.6	-
0-15	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.8	36.6	35.8
	1998	-	-	-	-	-	-	-	35.6	35.9	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.9	-
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	-	-	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	43.3	44.4	44.3	44.4	42.8	39.6	37.1	-
	2013	-	44.4	-	-	-	-	-	-	36.6	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	-	-	43.9	36.9	35.2	33.2	33.7	32.7	36.1	36.5
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	42.7	40.2	39.7	35.1	35.0	36.3	36.4	-
	2013	-	42.7	43.0	39.7	37.9	36.3	34.1	-	37.0	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	-	-	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
	2004	-	-	40.5	36.7	32.2	30.7	36.6	37.7	43.2	43.2
	2008	-	-	42.1	38.1	36.3	32.5	31.3	32.9	37.6	-
	2013	-	43.9	-	37.4	34.9	32.1	30.8	33.7	37.3	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	-
	1998	-	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	-
	2004	-	37.0	34.3	36.2	34.5	32.7	36.7	40.1	-	-
	2008	-	41.1	41.2	38.6	35.9	33.6	31.9	32.0	35.3	40.6
	2013	-	42.1	-	36.1	33.8	32.1	32.3	34.0	36.8	-
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	-
	1998	-	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	43.0	42.6	39.3	37.1	34.8	34.2	34.9	38.1	37.3
	2013	-	44.0	-	37.1	35.2	34.6	35.4	37.7	37.2	-
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.8	40.8	38.8	36.3	36.3	39.3	36.3	-
	1998	-	-	42.9	39.2	38.2	37.7	38.2	40.7	33.7	-
	2004	-	-	42.9	41.0	40.9	40.7	41.1	42.1	42.0	-
	2008	-	45.0	43.5	39.6	39.0	37.1	37.6	39.8	37.3	37.1
	2013	-	-	-	38.9	37.8	37.3	38.2	39.2	36.4	-
1+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.8	41.8	40.8	40.8	41.8	42.3	34.8	-
	1998	-	-	-	44.4	43.2	42.4	42.1	42.7	34.5	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	44.3	42.3	41.3	41.7	41.7	42.9	35.0	33.8
	2013	-	-	-	-	-	40.4	40.9	41.8	34.3	-



NOTES:

1. ADD 1200' TO ALL SOUNDING ELEVATIONS.
2. 1981 SURVEY BY BARR ENGINEERING CO. FOR SOUNDINGS DATA REFER TO DWG. NO. 1 OF 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD–CLYDE.
5. 1998 SOUNDINGS BY WOODWARD–CLYDE AND EMS.
6. CLOUDED AREAS DENOTE MORE SIGNIFICANT CHANGES IN THE RIVER BOTTOM ELEVATIONS.
7. 2004 SOUNDINGS BY SPAULDING CONSULTANTS, LLC.
8. 2008 SURVEY BY AYRES ASSOCIATES INC.
9. 2013 SURVEY BY AYRES ASSOCIATES INC.

DR.BY M ARNESON									
CHK.BY P HAUG	JOB NO. 26-0768.00								
DATE NOV 2013	SCALE AS SHOWN	NO.	DATE	REVISION		NO.	DATE	REVISION	

MINNESOTA POWER
BLANDIN DAM
GRAND RAPIDS, MINNESOTA

AYRES ASSOCIATES
Duluth, Minnesota

UPSTREAM AND DOWNSTREAM SOUNDINGS

DRAWING NO. **2**
SHEET NO.

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AMI
Consulting Engineers P.A.

Grand Rapids Dam Bathymetric Survey

AMI Project #181221

AMI CONTACT:
Mat Burich
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Ph: (218) 749-3436 Ext. 31
Fax: (877)761-7058

MN POWER CONTACT:
David L. Aspie, PE, PG
daspie@mnpower.com
Ph: (218) 355-3557

Background

AMI Consulting Engineers P.A. (AMI) was contacted by MN Power to perform a bathymetric survey of the Upstream and Downstream areas around the Grand Rapids dam located on the Mississippi River in Grand Rapids, MN approximately 90 miles Northwest of Duluth, MN. A MN Power representative was onsite with the AMI survey technician throughout the duration of the survey as a point of contact with the dam operators and to coordinate with other contractors onsite.

Procedure

Two bathymetric surveys were conducted on September 5, 2018. AMI utilized an 18' 33rd Strike Group survey vessel with a Suzuki outboard motor during the bathymetric surveys. The surveys were conducted with a 200kHz Ceescope Single Beam transducer for depth readings and a Hemisphere GNSS for global positioning.

Reservoir Side of Dam (Upstream):

The survey vessel was launched at the Sylvan Bay boat landing. The buoys that spanned across the river to the East of the dam had to be disconnected to gain access to the survey site. The bathymetric survey equipment was calibrated onsite prior to conducting the survey by utilizing MN Power's water elevation gauge (NGVD 29 vertical datum) that was mounted on the walkway outside of the Blandin building on the North side of the reservoir.

Soundings were collected on track lines that ran parallel and perpendicular to the dam. Each track line was 10 lineal feet apart. Depths were recorded by taking hand soundings in areas that were inaccessible by boat due to the presence of buoys. The area of concern upstream of the dam was approximately 32,000 square feet. The sounding elevations that are outlined in the results are referenced to vertical datum NGVD29.

Tail Side of Dam (Downstream):

The survey vessel was launched at the Steamboat Park boat landing. The bathymetric survey equipment was calibrated onsite prior to conducting the survey by utilizing NGS control point 3115 A, located on the Southeast corner of the N. Pokegama Ave. bridge (NGVD 29 vertical datum).

Soundings were collected on track lines that ran parallel and perpendicular to the spillway channel. Each track line was 10 lineal feet apart. The area of concern was adjacent to the spillway and was approximately 23,000 square feet.

Results

Reservoir Side of Dam (Upstream):

The reservoir was surveyed where boat access was not hindered by existing buoys, shallow depths or submerged obstructions. The elevation of the water in the tail pond during the bathymetric survey was 1268.29 ft. The maximum depth that was recorded was 37.79 ft (elev. 1230.5 ft.). The sounding elevations were charted on a gridlines A through J at 10' to 35' intervals that begin at station 0+00 and end at station 2+25. The results of the survey can be seen in Drawing S3.0 and S3.1 in Appendix A.

Tail Side of Dam (Downstream):

The tail side of the dam was surveyed where boat access was not hindered by existing shallow depths or submerged obstructions. The elevation of the water downstream of the dam during the bathymetric survey was 1246.52 ft. The maximum depth that was recorded was 17.29 ft (elev. 1229.23 ft.). The sounding elevations were charted on a gridlines A through J at 10' to 35' intervals that begin at station 0–60 and end at station 1+25. The results of the survey can be seen in Drawing S3.0 and S3.1 in Appendix A.

If any questions arise regarding the results of the bathymetric survey, please feel free to contact AMI at your convenience.

Respectfully Submitted,

Mat Burich
Marine Engineer

APPENDIX A

AMI Drawings .....S3.0 – S3.1

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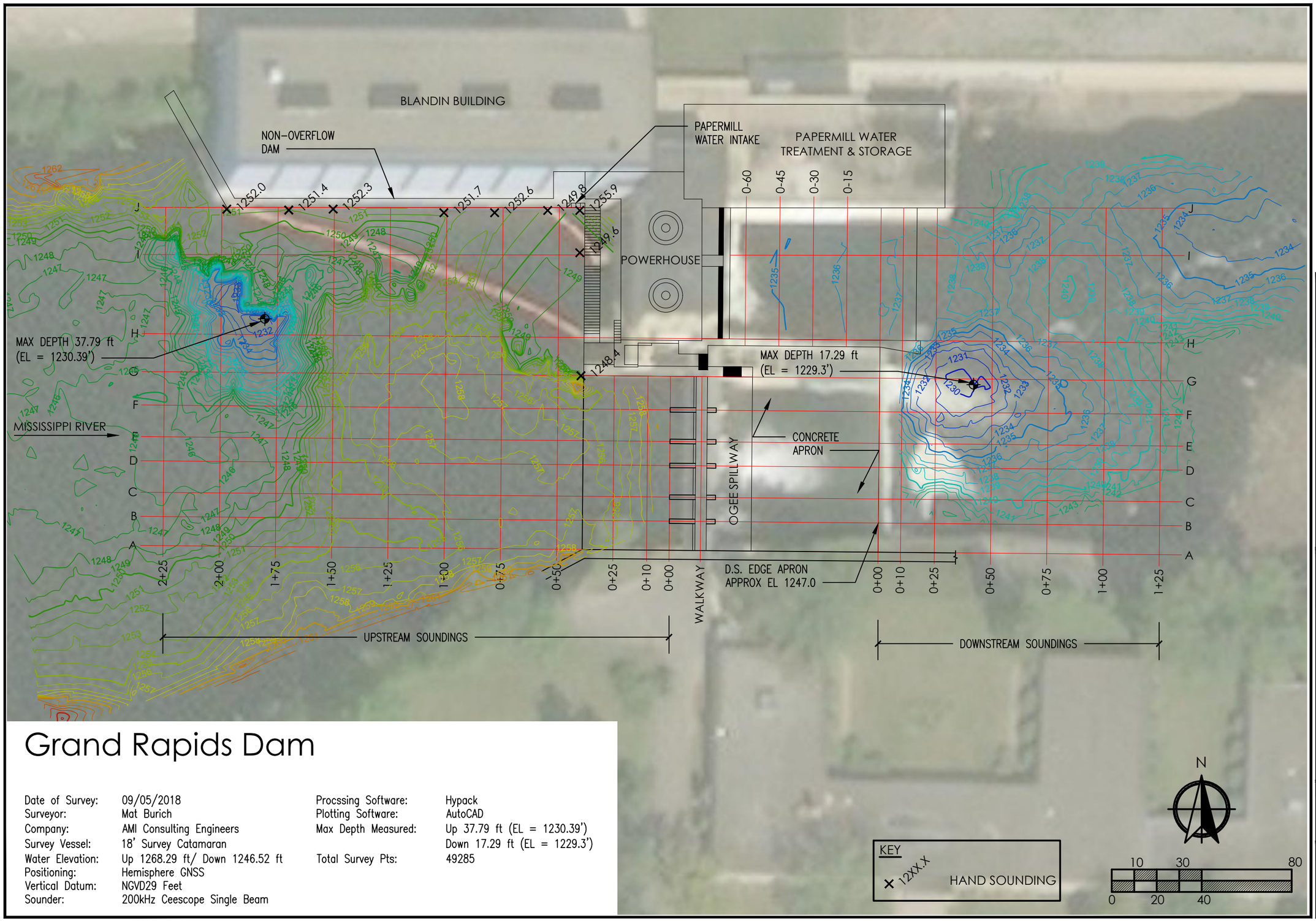

Grand Rapids Dam

Date of Survey:	09/05/2018	Procssing Software:	Hypack
Surveyor:	Mat Burich	Plotting Software:	AutoCAD
Company:	AMI Consulting Engineers	Max Depth Measured:	Up 37.79 ft (EL = 1230.39')
Survey Vessel:	18' Survey Catamaran		Down 17.29 ft (EL = 1229.3')
Water Elevation:	Up 1268.29 ft/ Down 1246.52 ft	Total Survey Pts:	49285
Positioning:	Hemisphere GNSS		
Vertical Datum:	NGVD29 Feet		
Sounder:	200kHz Ceescope Single Beam		

AMI
Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

DATE:	REV:	DESCRIPTION	BY:
9/28/18	0	NOT FOR CONSTRUCTION	MJB

Minnesota Power
2018 Dam Surveys
Grand Rapids, Minnesota

Grand Rapids Dam
Upstream & Downstream Survey

JOB No: 181221
DATE: 9/28/18
DRAWN BY: SAJ
DESIGNED BY: MJB

SHEET:
S3.0

Oct 03, 2018 - 5:11pm
Z:\2018\181221 MN Power Dam Surveys\Drawings\Grand Rapids Dam 2018.dwg

UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	-	-	-
	1993	59.2	59.2	59.2	59.2	59.2	59.2	59.2	-	-	-
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	-	-	-
	2004	60.2	61.1	60.1	61.4	61.0	60.2	60.4	-	-	-
	2008	60.3	60.2	60.7	60.5	60.4	60.4	60.3	-	-	-
	2013	-	-	-	-	-	-	57.8	-	-	-
	2018	-	-	-	-	-	-	-	-	-	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	-	-	-
	1993	58.2	57.2	58.2	58.2	58.2	59.2	58.2	-	-	-
	1998	58.7	58.2	58.2	59.2	58.7	59.2	61.7	-	-	-
	2004	58.5	58.2	58.1	59.1	59.0	58.9	60.9	-	-	-
	2008	58.6	58.8	59.4	59.5	59.6	59.7	59.6	-	-	-
	2013	-	59.1	59.4	59.5	59.2	59.0	59.3	-	-	-
	2018	-	58.0	58.3	58.4	58.3	58.5	-	-	-	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	-	-	-
	1993	54.2	54.2	56.2	56.2	56.2	55.2	55.2	-	-	-
	1998	-	55.7	55.7	55.7	55.2	55.2	56.7	-	-	-
	2004	-	55.4	55.8	55.8	56.5	55.0	56.4	-	-	-
	2008	57.0	56.4	56.1	56.3	56.3	56.5	61.2	-	-	-
	2013	-	57.0	56.9	56.6	56.6	56.1	57.1	-	-	-
	2018	-	55.8	56.0	55.7	55.5	55.3	-	-	-	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4/48.4	50.4	49.4	50.4
	1993	-	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	-
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
	2004	57.9	56.1	56.0	57.4	56.4	55.9	55.9	48.9	*49.1	51.2
	2008	63.3	56.7	56.5	57.3	57.6	56.7	56.3	54.6	49.4	49.7
	2013	59.8	58.4	56.5	56.8	57.1	56.7	52.0	48.3	50.0	-
	2018	57.9	56.5	56.6	57.2	57.3	56.4	53.1	-	49.1	-
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
	1993	-	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
	2004	56.8	56.2	56.3	57.2	56.9	55.9	55.8	49.0	*50.3	50.3
	2008	57.5	57.2	56.9	56.9	57.6	57.3	55.7	56.1	47.8	55.3
	2013	59.4	56.7	56.8	56.7	57.0	57.0	56.4	54.1	50.3	-
	2018	57.0	56.9	56.5	56.9	57.2	57.2	56.4	53.5	51.0	-
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	1993	-	56.2	56.2	56.2	56.2	57.2	56.2	48.2	58.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	58.0	58.0	53.4	49.7	51.9
	2004	54.9	54.8	55.8	56.9	57.1	58.1	56.2	55.2	49.6	51.4
	2008	55.9	56.1	56.4	56.9	57.5	58.8	58.2	57.3	49.7	57.0
	2013	57.6	55.9	56.1	50.4	56.4	57.3	57.8	57.8	51.1	-
	2018	55.3	55.7	56.1	56.8	57.6	58.3	58.2	55.8	52.3	-
1+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	1993	-	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
	2004	55.4	54.1	54.6	55.8	55.1	57.5	57.3	53.2	45.9	51.6
	2008	55.1	54.4	55.2	56.2	57.9	57.3	57.0	55.3	46.6	57.4
	2013	56.0	55.2	54.9	55.8	56.5	57.0	56.7	55.9	47.9	-
	2018	55.2	54.5	55.1	56.0	57.3	57.2	56.1	54.5	46.0	52.0
1+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	1993	-	53.2	54.2	55.2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.9	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
	2004	53.1	52.3	52.9	55.0	55.2	56.1	56.7	51.8	48.3	52.0
	2008	55.6	54.4	54.6	55.0	54.9	55.2	55.3	53.5	48.8	56.6
	2013	56.3	55.5	54.8	54.8	55.0	54.8	52.0	51.7	47.9	-
	2018	54.7	54.0	54.7	54.0	54.0	52.9	51.9	52.7	48.5	51.6
1+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7
	2004	53.7	50.5	49.1	46.5	46.9	46.7	36.5	32.9	32.1	51.9
	2008	53.4	50.3	48.9	47.9	48.4	46.1	44.2	59.5	48.5	56.6
	2013	55.0	52.7	50.4	50.5	50.6	48.8	43.8	39.8	48.2	51.6
	2018	52.3	49.8	48.5	47.2	47.5	41.8	36.6	32.8	47.5	51.2
2+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	51.4	51.4
	1998	49.2	47.7	46.2	45.6	40.7	41.4	36.7	33.2	47.7	51.7
	2004	46.7	48.2	47.5	46.8	39.1	40.0	37.1	31.2	52.1	51.3
	2008	50.5	47.7	47.7	46.4	47.2	47.8	39.7	38.4	52.2	52.3
	2013	52.8	50.8	48.8	47.3	46.6	47.1	46.5	40.5	44.3	-
	2018	49.0	47.0	46.1	46.1	46.8	45.2	40.1	35.5	51.0	51.8
2+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2
	2004	46.2	47.5	46.5	46.3	45.9	45.8	46.7	45.8	47.3	52.5
	2008	48.2	46.9	46.9	45.9	45.9	46.0	46.7	47.4	52.3	54.3
	2013	50.8	48.7	47.6	46.5	45.9	46.3	45.8	46.9	45.1	50.1
	2018	47.2	46.4	45.6	45.6	45.3	45.0	46.8	46.6	43.5	54.5

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	33.8	33.8	34.8
	1998	-	-	-	-	-	-	-	33.7	33.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	-	-
	2018	-	-	-	-	-	-	-	-	-	-
0-45	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	34.8	34.8	34.8
	1998	-	-	-	-	-	-	-	34.2	34.3	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	36.0	-
	2018	-	-	-	-	-	-	-	-	35.0	-
0-30	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.3	35.8	35.3
	1998	-	-	-	-	-	-	-	35.1	35.4	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.6	-
	2018	-	-	-	-	-	-	-	-	35.6	-
0-15	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.8	36.6	35.8
	1998	-	-	-	-	-	-	-	35.6	35.9	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.9	-
	2018	-	-	-	-	-	-	-	-	36.1	-
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	-	-	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	43.3	44.4	44.3	44.4	42.8	39.6	37.1	-
	2013	-	44.4	-	-	-	-	-	-	36.6	-
	2018	-	-	-	-	-	-	-	-	36.6	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	-	-	43.9	36.9	35.2	33.2	33.7	32.7	36.1	36.5
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	42.7	40.2	39.7	35.1	35.0	36.3	36.4	-
	2013	-	42.7	43.0	39.7	37.9	36.3	34.1	-	37.0	-
	2018	-	-	-	-	-	-	-	-	37.3	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	-	-	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
	2004	-	-	40.5	36.7	32.2	30.7	36.6	37.7	43.2	43.2
	2008	-	-	42.1	38.1	36.3	32.5	31.3	32.9	37.6	-
	2013	-	43.9	-	37.4	34.9	32.1	30.8	33.7	37.3	-
	2018	-	-	43.9	38.2	34.3	31.4	31.5	35.5	37.7	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	-
	1998	-	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	-
	2004	-	37.0	34.3	36.2	34.5	32.7	36.7	40.1	-	-
	2008		41.1	41.2	38.6	35.9	33.6	31.9	32.0	35.3	40.6
	2013	-	42.1	-	36.1	33.8	32.1	32.3	34.0	36.8	
	2018	-	-	40.3	37.1	34.5	32.0	30.1	33.1	36.7	40.8
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	-
	1998	-	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	43.0	42.6	39.3	37.1	34.8	34.2	34.9	38.1	37.3
	2013	-	44.0	-	37.1	35.2	34.6	35.4	37.7	37.2	-
	2018	-	-	42.3	37.5	36.0	34.5	34.2	37.2	38.4	36.4
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.8	40.8	38.8	36.3	36.3	39.3	36.3	-
	1998	-	-	42.9	39.2	38.2	37.7	38.2	40.7	33.7	-
	2004	-	-	42.9	41.0	40.9	40.7	41.1	42.1	42.0	-
	2008	-	45.0	43.5	39.6	39.0	37.1	37.6	39.8	37.3	37.1
	2013	-	-	-	38.9	37.8	37.3	38.2	39.2	36.4	-
	2018	-	-	43.8	39.4	37.5	36.9	37.1	38.9	38.1	36.7
1+25	1981	-	-	-	-	-	-	-	-32.8	-	-
	1988	-	-	44.8	41.8	40.8	40.8	41.8	42.3	34.8	-
	1998	-	-	-	44.4	43.2	42.4	42.1	42.7	34.5	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	44.3	42.3	41.3	41.7	41.7	42.9	35.0	33.8
	2013	-	-	-	-	-	40.4	40.9	41.8	34.3	-
	2018	-	-	-	41.6	41.3	40.4	41.3	42.4	35.7	35.2

NOTES:

1. ADD 1200' TO ALL SOUNDING ELEVATIONS
2. 1981 SURVEY BY BARR ENGINEERING. FOR SOUNDING DATA REFER TO DRAWING NO. 1 OF 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD-CLYDE.
5. 1998 SOUNDINGS BY WOODWARD-CLYDE AND EMS.
6. 2004 SOUNDINGS BY SPAULDING CONSULTANTS, LLC.
7. 2008 & 2013 SURVEYS BY AYERS ASSOCIATES INC.
8. 2018 SURVEY BY AMI CONSULTING ENGINEERS, PA.

AMI
Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

DATE:	REV:	DESCRIPTION	BY:
9/28/18	0	NOT FOR CONSTRUCTION	MJB

Minnesota Power
2018 Dam Surveys
Grand Rapids, Minnesota

Grand Rapids Dam
Upstream & Downstream Survey Data

JOB No: 181221
DATE: 9/28/18
DRAWN BY: SAJ
DESIGNED BY: MJB

SHEET: S3.1

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AMI
Consulting Engineers P.A.

Grand Rapids Dam Bathymetric Survey

AMI Project #181221

AMI CONTACT:
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Background

AMI Consulting Engineers P.A. (AMI) was contacted by MN Power to perform a bathymetric survey of the Upstream and Downstream areas around the Grand Rapids dam located on the Mississippi River in Grand Rapids, MN approximately 90 miles Northwest of Duluth, MN. A MN Power representative was onsite with the AMI survey technician throughout the duration of the survey as a point of contact with the dam operators and to coordinate with other contractors onsite.

Procedure

Two bathymetric surveys were conducted on September 5, 2018. AMI utilized an 18' 33rd Strike Group survey vessel with a Suzuki outboard motor during the bathymetric surveys. The surveys were conducted with a 200kHz Ceescope Single Beam transducer for depth readings and a Hemisphere GNSS for global positioning.

Reservoir Side of Dam (Upstream):

The survey vessel was launched at the Sylvan Bay boat landing. The buoys that spanned across the river to the East of the dam had to be disconnected to gain access to the survey site. The bathymetric survey equipment was calibrated onsite prior to conducting the survey by utilizing MN Power's water elevation gauge (NGVD 29 vertical datum) that was mounted on the walkway outside of the Blandin building on the North side of the reservoir.

Soundings were collected on track lines that ran parallel and perpendicular to the dam. Each track line was 10 lineal feet apart. Depths were recorded by taking hand soundings in areas that were inaccessible by boat due to the presence of buoys. The area of concern upstream of the dam was approximately 32,000 square feet. The sounding elevations that are outlined in the results are referenced to vertical datum NGVD29.

Tail Side of Dam (Downstream):

The survey vessel was launched at the Steamboat Park boat landing. The bathymetric survey equipment was calibrated onsite prior to conducting the survey by utilizing NGS control point 3115 A, located on the Southeast corner of the N. Pokegama Ave. bridge (NGVD 29 vertical datum).

Soundings were collected on track lines that ran parallel and perpendicular to the spillway channel. Each track line was 10 lineal feet apart. The area of concern was adjacent to the spillway and was approximately 23,000 square feet.

Results

Reservoir Side of Dam (Upstream):

The reservoir was surveyed where boat access was not hindered by existing buoys, shallow depths or submerged obstructions. The elevation of the water in the tail pond during the bathymetric survey was 1268.29 ft. The maximum depth that was recorded was 37.79 ft (elev. 1230.5 ft.). The sounding elevations were charted on a gridlines A through J at 10' to 35' intervals that begin at station 0+00 and end at station 2+25. The results of the survey can be seen in Drawing S3.0 and S3.1 in Appendix A.

Tail Side of Dam (Downstream):

The tail side of the dam was surveyed where boat access was not hindered by existing shallow depths or submerged obstructions. The elevation of the water downstream of the dam during the bathymetric survey was 1246.52 ft. The maximum depth that was recorded was 17.29 ft (elev. 1229.23 ft.). The sounding elevations were charted on a gridlines A through J at 10' to 35' intervals that begin at station 0–60 and end at station 1+25. The results of the survey can be seen in Drawing S3.0 and S3.1 in Appendix A.

If any questions arise regarding the results of the bathymetric survey, please feel free to contact AMI at your convenience.

Respectfully Submitted,

Mat Burich
Marine Engineer

APPENDIX A

AMI Drawings .....S3.0 – S3.1

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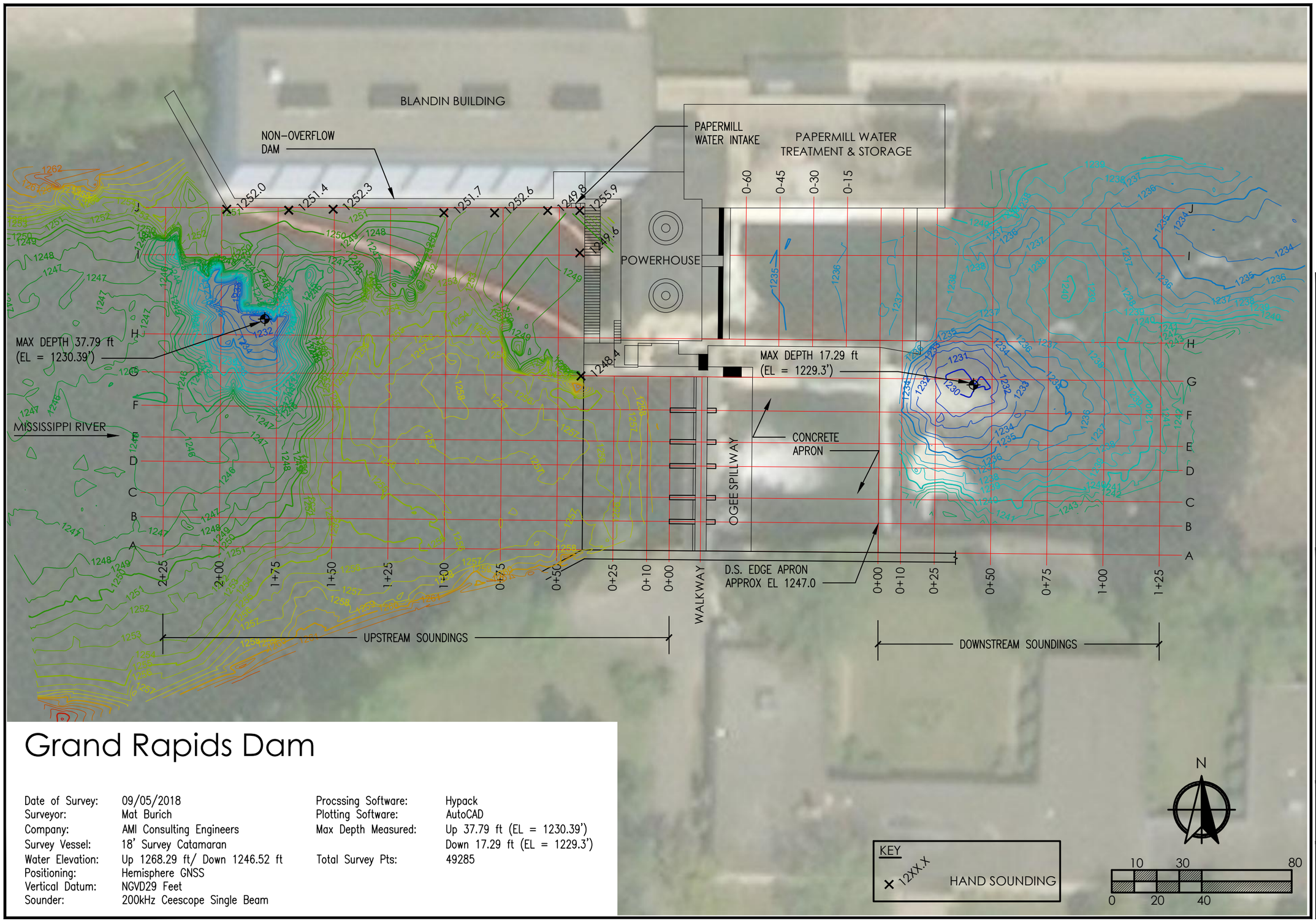

Grand Rapids Dam

Date of Survey:	09/05/2018	Procssing Software:	Hypack
Surveyor:	Mat Burich	Plotting Software:	AutoCAD
Company:	AMI Consulting Engineers	Max Depth Measured:	Up 37.79 ft (EL = 1230.39')
Survey Vessel:	18' Survey Catamaran		Down 17.29 ft (EL = 1229.3')
Water Elevation:	Up 1268.29 ft/ Down 1246.52 ft	Total Survey Pts:	49285
Positioning:	Hemisphere GNSS		
Vertical Datum:	NGVD29 Feet		
Sounder:	200kHz Ceescope Single Beam		

AMI
Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

DATE:	REV:	DESCRIPTION	BY:
9/28/18	0	NOT FOR CONSTRUCTION	MJB

Minnesota Power
2018 Dam Surveys
Grand Rapids, Minnesota

Grand Rapids Dam
Upstream & Downstream Survey

JOB No: 181221
DATE: 9/28/18
DRAWN BY: SAJ
DESIGNED BY: MJB

SHEET:
S3.0

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UPSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	59.9	59.9	60.4	60.4	60.4	60.4	60.4	-	-	-
	1993	59.2	59.2	59.2	59.2	59.2	59.2	59.2	-	-	-
	1998	60.4	60.2	60.4	61.6	60.4	60.3	60.5	-	-	-
	2004	60.2	61.1	60.1	61.4	61.0	60.2	60.4	-	-	-
	2008	60.3	60.2	60.7	60.5	60.4	60.4	60.3	-	-	-
	2013	-	-	-	-	-	-	57.8	-	-	-
	2018	-	-	-	-	-	-	-	-	-	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	58.4	58.4	58.4	60.4	59.4	59.4	-	-	-
	1993	58.2	57.2	58.2	58.2	58.2	59.2	58.2	-	-	-
	1998	58.7	58.2	58.2	59.2	58.7	59.2	61.7	-	-	-
	2004	58.5	58.2	58.1	59.1	59.0	58.9	60.9	-	-	-
	2008	58.6	58.8	59.4	59.5	59.6	59.7	59.6	-	-	-
	2013	-	59.1	59.4	59.5	59.2	59.0	59.3	-	-	-
	2018	-	58.0	58.3	58.4	58.3	58.5	-	-	-	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	57.4	56.9	56.4	56.4	56.4	56.4	-	-	-
	1993	54.2	54.2	56.2	56.2	56.2	55.2	55.2	-	-	-
	1998	-	55.7	55.7	55.7	55.2	55.2	56.7	-	-	-
	2004	-	55.4	55.8	55.8	56.5	55.0	56.4	-	-	-
	2008	57.0	56.4	56.1	56.3	56.3	56.5	61.2	-	-	-
	2013	-	57.0	56.9	56.6	56.6	56.1	57.1	-	-	-
	2018	-	55.8	56.0	55.7	55.5	55.3	-	-	-	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.9	57.4	57.4	57.4	56.4	56.4/48.4	50.4	49.4	50.4
	1993	-	56.2	56.2	56.2	56.2	55.2	53.2	47.2	48.2	-
	1998	58.0	56.2	56.2	57.2	57.2	56.7	56.2	49.2	49.2	50.5
	2004	57.9	56.1	56.0	57.4	56.4	55.9	55.9	48.9	*49.1	51.2
	2008	63.3	56.7	56.5	57.3	57.6	56.7	56.3	54.6	49.4	49.7
	2013	59.8	58.4	56.5	56.8	57.1	56.7	52.0	48.3	50.0	-
	2018	57.9	56.5	56.6	57.2	57.3	56.4	53.1	-	49.1	-
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	58.4	57.4	57.4	57.4	57.4	58.4	56.4	49.4	50.4	53.4
	1993	-	56.2	56.2	56.2	57.2	56.2	55.2	46.2	49.2	49.2
	1998	57.2	56.4	56.4	56.9	57.0	56.8	55.7	49.2	51.2	54.9
	2004	56.8	56.2	56.3	57.2	56.9	55.9	55.8	49.0	*50.3	50.3
	2008	57.5	57.2	56.9	56.9	57.6	57.3	55.7	56.1	47.8	55.3
	2013	59.4	56.7	56.8	56.7	57.0	57.0	56.4	54.1	50.3	-
	2018	57.0	56.9	56.5	56.9	57.2	57.2	56.4	53.5	51.0	-
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	57.4	57.4	56.4	57.4	57.4	58.4	58.4	55.4	48.4	51.4
	1993	-	56.2	56.2	56.2	56.2	57.2	56.2	48.2	58.2	51.2
	1998	55.0	53.9	55.2	56.5	57.4	58.0	58.0	53.4	49.7	51.9
	2004	54.9	54.8	55.8	56.9	57.1	58.1	56.2	55.2	49.6	51.4
	2008	55.9	56.1	56.4	56.9	57.5	58.8	58.2	57.3	49.7	57.0
	2013	57.6	55.9	56.1	50.4	56.4	57.3	57.8	57.8	51.1	-
	2018	55.3	55.7	56.1	56.8	57.6	58.3	58.2	55.8	52.3	-
1+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	57.4	57.4	58.4	57.4	55.4	51.4	52.4
	1993	-	56.2	55.2	56.2	56.2	57.2	57.2	52.2	48.2	51.2
	1998	55.7	54.2	54.6	55.6	55.2	57.2	57.2	55.4	45.7	51.7
	2004	55.4	54.1	54.6	55.8	55.1	57.5	57.3	53.2	45.9	51.6
	2008	55.1	54.4	55.2	56.2	57.9	57.3	57.0	55.3	46.6	57.4
	2013	56.0	55.2	54.9	55.8	56.5	57.0	56.7	55.9	47.9	-
	2018	55.2	54.5	55.1	56.0	57.3	57.2	56.1	54.5	46.0	52.0
1+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	56.4	55.4	55.4	55.4	57.4	56.4	56.4	54.4	49.4	51.9
	1993	-	53.2	54.2	55.2	56.2	56.2	55.2	54.2	47.2	52.2
	1998	52.9	52.4	53.6	53.6	54.7	54.3	50.2	51.7	46.7	51.7
	2004	53.1	52.3	52.9	55.0	55.2	56.1	56.7	51.8	48.3	52.0
	2008	55.6	54.4	54.6	55.0	54.9	55.2	55.3	53.5	48.8	56.6
	2013	56.3	55.5	54.8	54.8	55.0	54.8	52.0	51.7	47.9	-
	2018	54.7	54.0	54.7	54.0	54.0	52.9	51.9	52.7	48.5	51.6
1+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	55.4	54.4	49.4	48.4	53.4	47.4	53.4	52.4	49.4	56.4
	1998	53.2	50.9	48.9	46.2	48.1	43.0	37.4	32.7	47.7	51.7
	2004	53.7	50.5	49.1	46.5	46.9	46.7	36.5	32.9	32.1	51.9
	2008	53.4	50.3	48.9	47.9	48.4	46.1	44.2	59.5	48.5	56.6
	2013	55.0	52.7	50.4	50.5	50.6	48.8	43.8	39.8	48.2	51.6
	2018	52.3	49.8	48.5	47.2	47.5	41.8	36.6	32.8	47.5	51.2
2+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	53.4	50.4	47.4	46.4	48.4	45.4	38.4	30.4	51.4	51.4
	1998	49.2	47.7	46.2	45.6	40.7	41.4	36.7	33.2	47.7	51.7
	2004	46.7	48.2	47.5	46.8	39.1	40.0	37.1	31.2	52.1	51.3
	2008	50.5	47.7	47.7	46.4	47.2	47.8	39.7	38.4	52.2	52.3
	2013	52.8	50.8	48.8	47.3	46.6	47.1	46.5	40.5	44.3	-
	2018	49.0	47.0	46.1	46.1	46.8	45.2	40.1	35.5	51.0	51.8
2+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	50.4	48.4	46.4	46.4	47.4	46.4	47.4	32.4	48.4	53.4
	1998	51.7	47.4	46.4	45.7	45.4	45.2	45.0	45.7	42.3	54.2
	2004	46.2	47.5	46.5	46.3	45.9	45.8	46.7	45.8	47.3	52.5
	2008	48.2	46.9	46.9	45.9	45.9	46.0	46.7	47.4	52.3	54.3
	2013	50.8	48.7	47.6	46.5	45.9	46.3	45.8	46.9	45.1	50.1
	2018	47.2	46.4	45.6	45.6	45.3	45.0	46.8	46.6	43.5	54.5

DOWNSTREAM SOUNDINGS

STATION	DATE	A	B	C	D	E	F	G	H	I	J
0-60	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	33.8	33.8	34.8
	1998	-	-	-	-	-	-	-	33.7	33.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	-	-
	2018	-	-	-	-	-	-	-	-	-	-
0-45	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	34.8	34.8	34.8
	1998	-	-	-	-	-	-	-	34.2	34.3	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	36.0	-
	2018	-	-	-	-	-	-	-	-	35.0	-
0-30	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.3	35.8	35.3
	1998	-	-	-	-	-	-	-	35.1	35.4	34.7
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.6	-
	2018	-	-	-	-	-	-	-	-	35.6	-
0-15	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	-	-	-	-	-	35.8	36.6	35.8
	1998	-	-	-	-	-	-	-	35.6	35.9	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	-	-	-	-	-	-	-	-
	2013	-	-	-	-	-	-	-	-	35.9	-
	2018	-	-	-	-	-	-	-	-	36.1	-
0+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.3	40.8	40.8	40.3	36.8	37.3	36.3	36.8
	1998	-	-	38.6	38.3	37.0	40.7	36.5	36.4	36.1	36.6
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	43.3	44.4	44.3	44.4	42.8	39.6	37.1	-
	2013	-	44.4	-	-	-	-	-	-	36.6	-
	2018	-	-	-	-	-	-	-	-	36.6	-
0+10	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	42.8	40.8	38.8	35.8	34.8	37.3	36.8	37.3
	1998	-	-	43.9	36.9	35.2	33.2	33.7	32.7	36.1	36.5
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	42.7	40.2	39.7	35.1	35.0	36.3	36.4	-
	2013	-	42.7	43.0	39.7	37.9	36.3	34.1	-	37.0	-
	2018	-	-	-	-	-	-	-	-	37.3	-
0+25	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	43.8	37.8	36.3	32.8	30.8	36.3	37.8	39.3
	1998	-	-	44.0	35.5	33.4	32.4	29.3	31.7	37.1	37.3
	2004	-	-	40.5	36.7	32.2	30.7	36.6	37.7	43.2	43.2
	2008	-	-	42.1	38.1	36.3	32.5	31.3	32.9	37.6	-
	2013	-	43.9	-	37.4	34.9	32.1	30.8	33.7	37.3	-
	2018	-	-	43.9	38.2	34.3	31.4	31.5	35.5	37.7	-
0+50	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	41.3	39.8	36.8	35.8	31.3	31.3	32.8	35.8	-
	1998	-	42.0	42.2	36.7	34.2	32.7	31.7	32.7	34.7	-
	2004	-	37.0	34.3	36.2	34.5	32.7	36.7	40.1	-	-
	2008		41.1	41.2	38.6	35.9	33.6	31.9	32.0	35.3	40.6
	2013	-	42.1	-	36.1	33.8	32.1	32.3	34.0	36.8	
	2018	-	-	40.3	37.1	34.5	32.0	30.1	33.1	36.7	40.8
0+75	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	43.8	41.8	39.8	35.8	34.3	33.8	35.3	34.8	-
	1998	-	41.7	39.7	36.2	33.7	34.7	33.7	35.2	39.7	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	43.0	42.6	39.3	37.1	34.8	34.2	34.9	38.1	37.3
	2013	-	44.0	-	37.1	35.2	34.6	35.4	37.7	37.2	-
	2018	-	-	42.3	37.5	36.0	34.5	34.2	37.2	38.4	36.4
1+00	1981	-	-	-	-	-	-	-	-	-	-
	1988	-	-	44.8	40.8	38.8	36.3	36.3	39.3	36.3	-
	1998	-	-	42.9	39.2	38.2	37.7	38.2	40.7	33.7	-
	2004	-	-	42.9	41.0	40.9	40.7	41.1	42.1	42.0	-
	2008	-	45.0	43.5	39.6	39.0	37.1	37.6	39.8	37.3	37.1
	2013	-	-	-	38.9	37.8	37.3	38.2	39.2	36.4	-
	2018	-	-	43.8	39.4	37.5	36.9	37.1	38.9	38.1	36.7
1+25	1981	-	-	-	-	-	-	-	-32.8	-	-
	1988	-	-	44.8	41.8	40.8	40.8	41.8	42.3	34.8	-
	1998	-	-	-	44.4	43.2	42.4	42.1	42.7	34.5	-
	2004	-	-	-	-	-	-	-	-	-	-
	2008	-	-	44.3	42.3	41.3	41.7	41.7	42.9	35.0	33.8
	2013	-	-	-	-	-	40.4	40.9	41.8	34.3	-
	2018	-	-	-	41.6	41.3	40.4	41.3	42.4	35.7	35.2

NOTES:

1. ADD 1200' TO ALL SOUNDING ELEVATIONS
2. 1981 SURVEY BY BARR ENGINEERING. FOR SOUNDING DATA REFER TO DRAWING NO. 1 OF 1 1983 FERC PART 12 INSPECTION REPORT.
3. 1988 SURVEY BY WARZYN ENGINEERING INC.
4. 1993 SOUNDINGS BY WOODWARD-CLYDE.
5. 1998 SOUNDINGS BY WOODWARD-CLYDE AND EMS.
6. 2004 SOUNDINGS BY SPAULDING CONSULTANTS, LLC.
7. 2008 & 2013 SURVEYS BY AYERS ASSOCIATES INC.
8. 2018 SURVEY BY AMI CONSULTING ENGINEERS, PA.

AMI
Consulting Engineers P.A.
91 Main Street SUPERIOR, WI
715.718.2193 - amiengineers.com
TWIN CITIES - IRON RANGE

DATE:	REV:	DESCRIPTION	BY:
9/28/18	0	NOT FOR CONSTRUCTION	MJB

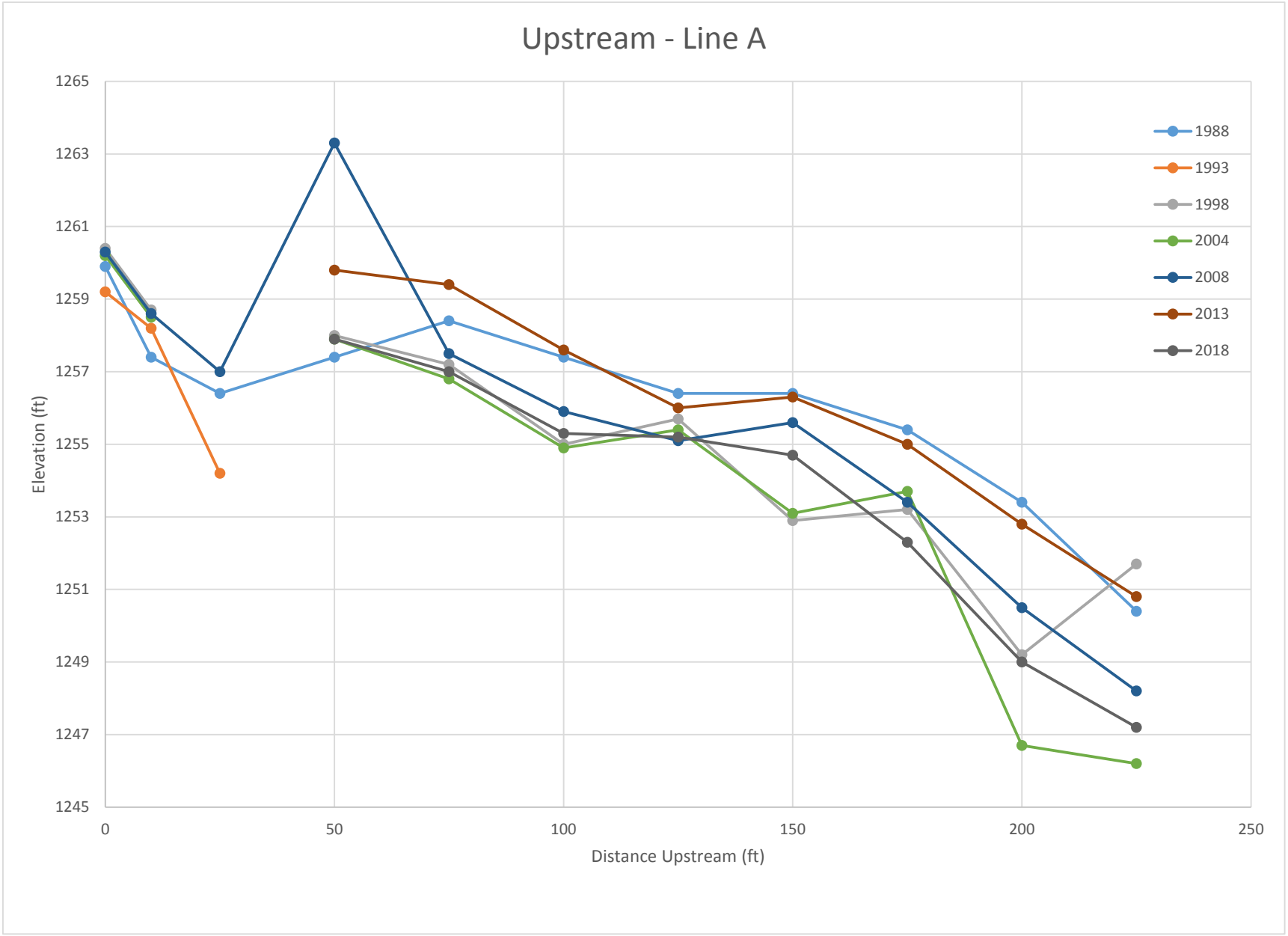
Minnesota Power
2018 Dam Surveys
Grand Rapids, Minnesota

Grand Rapids Dam
Upstream & Downstream Survey Data

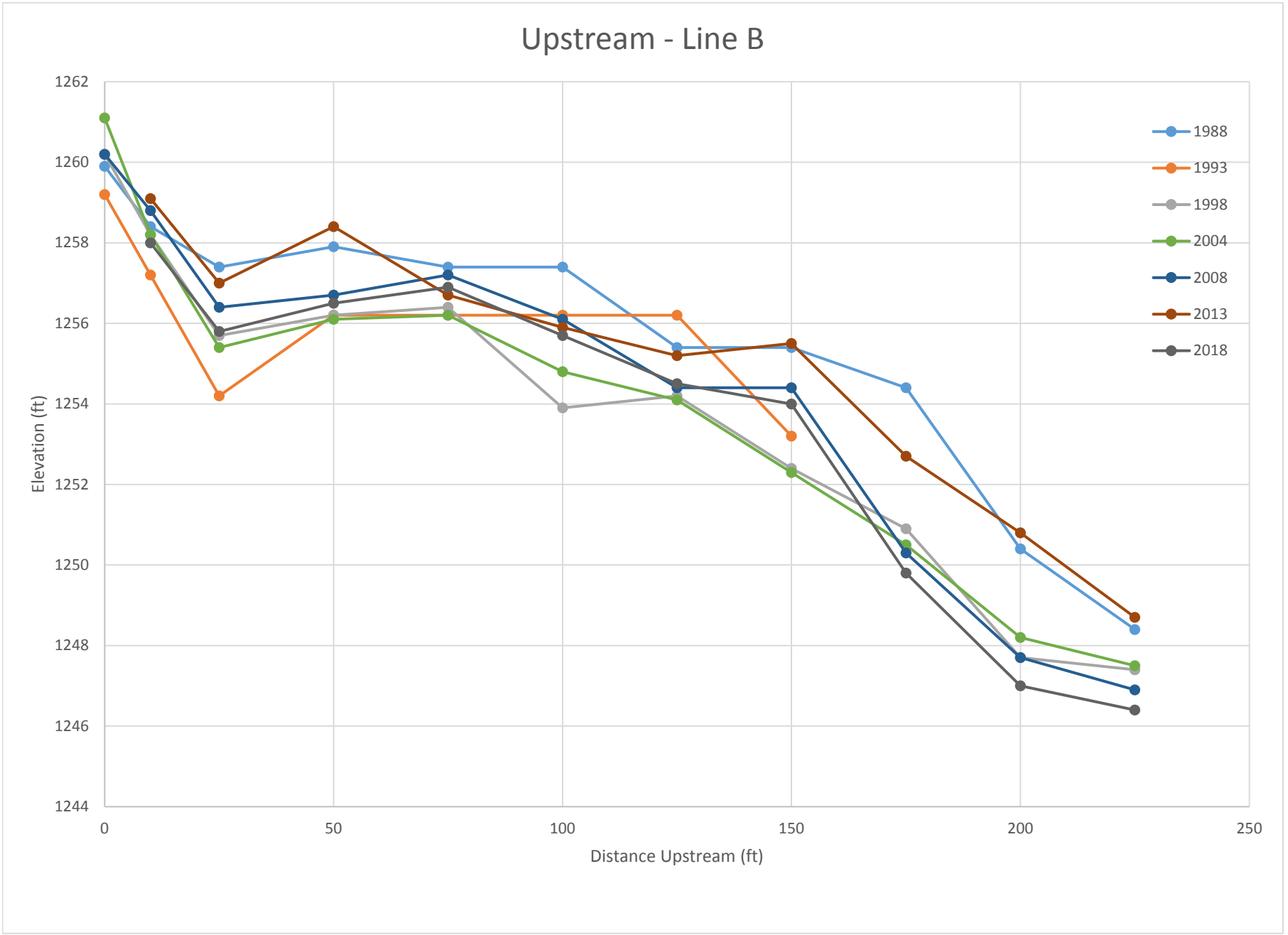
JOB No: 181221
DATE: 9/28/18
DRAWN BY: SAJ
DESIGNED BY: MJB

SHEET: S3.1

Oct 03, 2018 - 5:11pm
Z:\2018\181221 MN Power Dam Surveys\Drawings\Grand Rapids Dam 2018.dwg

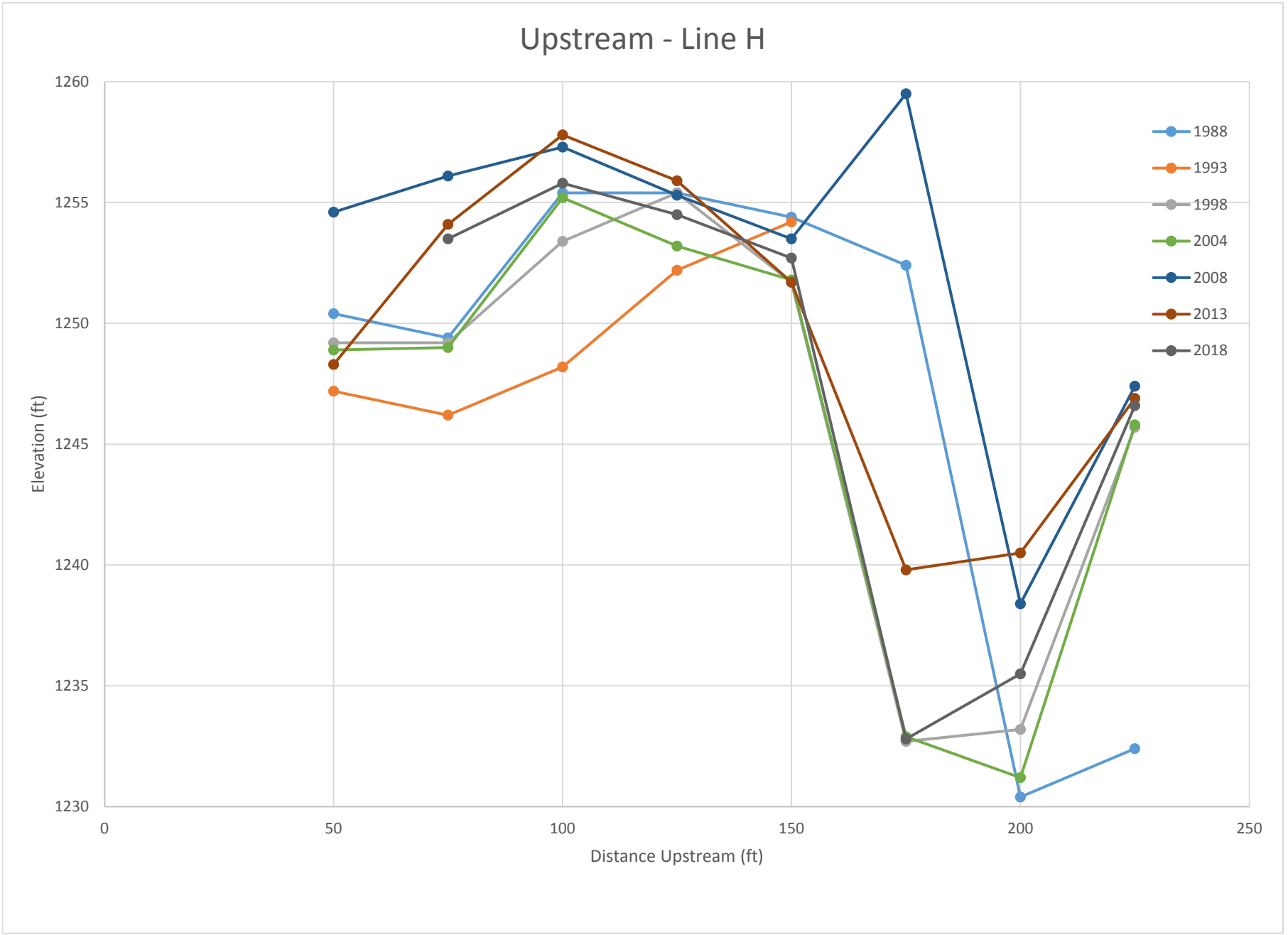


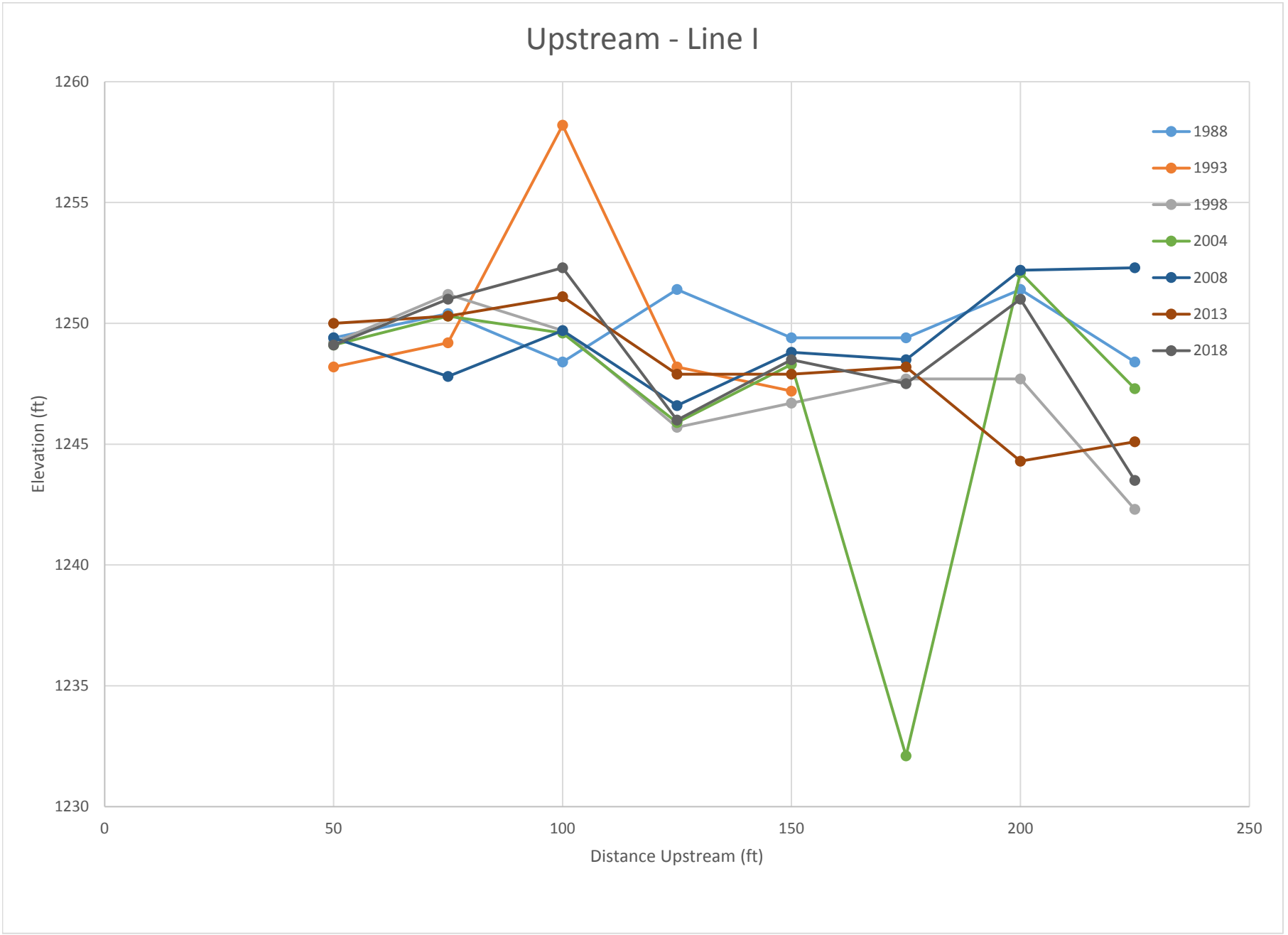
excerpt from Eleventh Part 12D Consultant Safety Inspection Report, Barr Engineering Co.,


Upstream - Line B
Elevation (ft)
1262
1260
1258
1256
1254
1252
1250
1248
1246
1244
0
50
100
150
200
250
Distance Upstream (ft)
1988
1993
1998
2004
2008
2013
2018


Upstream - Line D
Elevation (ft)
1264
1262
1260
1258
1256
1254
1252
1250
1248
1246
1244
0
50
100
150
200
250
Distance Upstream (ft)
1988
1993
1998
2004
2008
2013
2018


Upstream - Line F
1265
1260
1255
1250
1245
1240
1235
Elevation (ft)
0
50
100
150
200
250
Distance Upstream (ft)
1988
1993
1998
2004
2008
2013
2018


Upstream - Line H
1260
1255
1250
1245
1240
1235
1230
Elevation (ft)
0
50
100
150
200
250
Distance Upstream (ft)
1988
1993
1998
2004
2008
2013
2018


Upstream - Line I
1260
1255
1250
1245
1240
1235
1230
Elevation (ft)
0
50
100
150
200
250
Distance Upstream (ft)
1988
1993
1998
2004
2008
2013
2018

Appendix K. MP Aquatic Invasive Species Management Procedure

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1.0 Purpose/Policy

1.1 ALLETE is committed to being a responsible corporate citizen. Consistent with ALLETE's Environmental Ethics Statement, all Company watercraft shall meet regulatory requirements, limit the environmental impacts of our activities, protect the environment and demonstrate the conservation of water resources by preventing the spread of aquatic invasive species.

1.2 This procedure provides directions to comply with Minnesota Statute's chapter 84D and Minnesota Rule chapter 6216 to prevent the spread of aquatic invasive species.

2.0 Procedure

2.1 Prior to leaving and entering public roadways

2.1.1 Remove drain plug

2.1.2 Remove mud

2.1.3 Inspect the watercraft, motor, and trailer to ensure no weeds or aquatic invasive species are present

2.1.4 Inspect the watercraft to ensure no invasive species (ex. Zebra mussels) are attached to or inside of the watercraft, motor, or trailer. See Appendix A for invasive species references.

2.2 If you find invasive species on your watercraft

2.2.1 Remove the invasive species

2.2.2 Spray the watercraft with high pressure water

2.2.3 Rinse with hot water (120-140°F)

2.2.3.1 **HSC has a hot water pressure washer that is suitable for rinsing boats.**

2.2.4 If the boat or equipment has been in known infested waters for more than 24 consecutive hours, rinse with high pressure, hot water and/or dry for at least 7 days before entering another body of water.

2.3 When leaving a body of water

2.3.1 Remove drain plug

2.3.2 Remove mud

2.3.3 Inspect the watercraft, motor, and trailer for any invasive species (remove if found, see section 2.2)

2.3.4 Remove ALL weeds whether invasive or not from watercraft and trailer. Use a designated weed disposal area at the boat launch, if provided. Contact the Environmental and Land Management Department at x3200 for case specific guidance.

2.3.5 Drain all water from the motor, ballast tanks, live wells, and bait containers. Run motor for a few seconds out of the water to discharge water from cooling system.

2.3.6 If invasive species are adhered to your watercraft or equipment after the above process DO NOT enter another body of water until all contaminants are removed, and sections 2.2.1 through 2.2.4 are followed and there are no threats of contaminating other sources.

2.3.7 If you suspect a new infestation in a water body, report it immediately to the Environmental and Land Management Department at x3200.

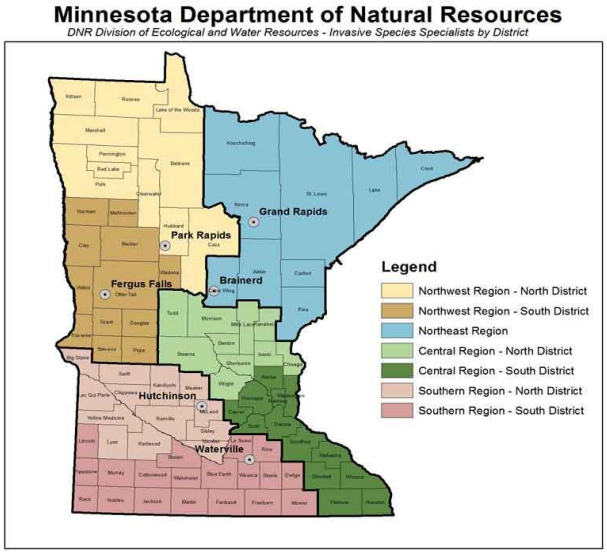
2.3.7.1 Note the exact location

2.3.7.2 Take a photo or keep a sample specimen

2.3.7.3 Call the Area Invasive Species Specialist in your region

Northeast Region

Grand Rapids	Richard Rezanka	218-328-8821
Brainerd	Tim Plude	218-203-4354



2.4 List of infested waters within Minnesota Power project boundaries

Cloquet River from Island Lake to the St. Louis River	St. Louis	spiny waterflea
Fish Lake Reservoir	St. Louis	spiny waterflea
Island Lake Reservoir	St. Louis	spiny waterflea
Grand Rapids Mississippi River	Itasca	Zebra Mussel
Pillager Hydro Crow Wing River	Morrison	Zebra Mussel and Faucet Snail
Sylvan Hydro Crow Wing and Gull River	Morrison and Cass	Zebra Mussel and Faucet Snail
Little Falls and Blanchard Mississippi River	Morrison	Zebra Mussel and Faucet Snail

3.0 Definitions

3.1 **Invasive species** refers to a nonnative species that causes or may cause economic or environmental harm or harm to human health

3.2 **Watercraft** refers to a boat or any other water-borne vehicle used or designed for navigation on water

4.0 References

4.1 http://files.dnr.state.mn.us/natural_resources/invasives/ais_business/public-awareness/print/protectmnwaters_generic.pdf

4.2 Minnesota Statute chapter 84D

4.3 Minnesota Rule chapter 6216

5.0 Hardware, Software, Data References, or Equipment Needed

5.1 Access to high pressure, hot water between 120-140°F

6.0 Document Review Schedule

6.1 This procedure will be scheduled for review annually. A Perillon task will be created to ensure the document is reviewed according to this schedule.

7.0 Location

7.1 ELM-EMS SharePoint

7.2 Hard copy located inside Minnesota Power truck/watercraft

Appendix L. MDNR IFIM Study Report

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STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

500 LAFAYETTE ROAD • ST. PAUL, MINNESOTA • 55155-40_____

DNR INFORMATION
(612) 296-6157

October 24, 1991

Mr. Robert Bohm
Environmental Engineer
Minnesota Power
30 West Superior Street
Duluth, MN 55802

Re: PRAIRIE RIVER HYDROPOWER PROJECT RELICENSING, FERC PROJECT NUMBER 2361, Recommendations for Flows in Natural Channel

Dear Mr. Bohm:

As we have discussed with you previously, we hereby provide flow recommendations for the bypassed channel of the Prairie River between the Prairie River Dam and the hydroelectric station. I apologize for the delay in completing our recommendations, due to some unforeseen complications.

A study utilizing instream flow incremental methodology (IFIM) was conducted at the Prairie River Dam by the MDNR Division of Waters. The objective of the study was to determine the flows necessary to prevent fish stranding in the bypass, and, secondarily, to address flow requirements for fish spawning. We analyzed data from the PHABSIM models to develop habitat versus discharge relationships for walleye spawners, juvenile small mouth and habitat guild representatives.

The guild representatives were:

long nose dace adult -- fast riffle
logperch adult -- riffle
shorthead redhorse adult -- raceway
sand shiner young -- shallow pool.

Guild representatives are routinely included in any IFIM analysis because of our interest in providing flows that protect the aquatic community, and guild representatives require a diversity of habitat types.

Based on the results of our analysis and the considerations discussed below, **our general flow recommendation for the natural channel is 75 cfs for April and May, and 50 cfs for June.**

DISCUSSION

Fish management concerns

We discussed our concerns regarding flow fluctuations during the walleye spawning period (April through May) in our consultation comment letter dated March 29, 1989. June flows are needed to ensure a stepped approach to decreasing flows in the bypass, to allow fingerling fish to leave the area, and to prevent stranding. Guild representatives were examined for obvious problems, but various factors led us to concentrate primarily on the requirements of spawning walleye. These factors included the length of the bypass (approximately 800 yards), the limited duration of the period when flows are needed (April - June), and the lack of obvious conflicts with guild species. Figure 1 shows the habitat/discharge relationship for all species/life stages modeled. Habitat peaked at flows of approximately 75 cfs for long nose dace adults and 200 cfs for sand shiner young. Walleye spawning habitat increases in the bypass as discharge increases above 400 cfs (Figure 1). This is probably because the entire bypass channel and its floodplain contain suitable spawning substrate. The channel has apparently narrowed because of the low flows it receives for most of the year, and because vegetation has encroached into the bypass. As flows increase, the water spills over its banks and around the trees, but the substrate is still acceptable for spawning. However, we do not want to encourage walleye spawning outside of the channel banks. Therefore, it was necessary to examine the current operation of the dam and spillway to determine current conditions in the bypass.

Availability of flows -- Hydro Plant Operation

A critical element related to water availability in the bypass is the operational limits of the turbines. The Prairie River hydro facility is a two turbine plant. The operational flow range for Unit 1 varies from 156 to 301 cfs, and for Unit 2 from 86 to 167 cfs. Based on the maximum flow through the units, the hydraulic capacity of the plant is 468 cfs (Draft Application Document).

To establish water availability, we summarized two periods of record: monthly flows for calendar years 1925 through 1987 (Table 1) and hourly flows for 1987 through June 1989 (Table 2). The long term monthly data was total flow; the hourly information provided for analysis of flow, use, "waste", and head and tailwater elevations. All hydrologic information was provided by Minnesota Power. The latter data set is small and represents a drought period for the Prairie River, but its use as a lower limit of available flows is sound.

Table 1 presents a summary of the long-term monthly flow data for the Prairie River at the dam. April through June are the high flow months for this river, with flows averaging 396 to 694 cfs. The 75 percent exceedence flows for April through June are 296, 400, and 239 cfs, respectively. Providing 75 cfs in April and May and 50 cfs in June for fish spawning in the bypass would leave 221, 325 and 189 cfs for turbine operation more than 75 percent of the time. Flows do not drop below our recommended flows for the bypass reach, as indicated by the 95 percent exceedence flows (ranging from 101 to 136 cfs), but are low enough at that point to shut down turbine operations if 75 and 50 cfs is provided through the bypass (lower limit of operation is 86 cfs).

Table 2 serves to illustrate the current use of water at this plant and the nature of flows provided in the bypass reach, during a dry period. For the years summarized and presumably any other year, MP uses as much water as it can. Water is 'wasted' over the spillway only when flows

exceed turbine hydraulic capacity. Normally, continuity of flows is not maintained; if flows are provided in April at 189 or 531 cfs and are reduced in May to 5 cfs (Table 2, 1988 and 1989), spawning fish will be attracted by the April flows and their eggs or offspring may be stranded in the channel in May. One of our primary intentions is to recommend a base flow for the bypass to avoid fluctuations in flow that may lead to stranding of fish or spawn.

Based on our analysis, our flow recommendation for the natural channel in April and May is 75 cfs and in June is 50 cfs. If flows drop below 150 cfs during April and May, we recommend that flows be provided to the bypass reach first and the remaining flows used for hydropower operation. Stated minimum flow capacity is 86 cfs for Unit 2; presumably, if flows fall below 80 cfs all water is wasted. We recommend that any wasted water be discharged through the bypass channel during the period April through June. Therefore, to ensure that flow fluctuations are kept to a minimum during this period, and to avoid the situation where flows in the bypass may bounce between no flow and 80+ cfs, we recommend that as flows drop, increased emphasis be placed on maintaining flows in the bypass channel. It is important to realize that this situation will not occur often -- less than 10 percent of the time during April and May (Table 1).

Fish Stranding and Passage

As noted above, a primary concern of the Area Fisheries Manager regarding this facility has been stranding of adult fish caused by drastic fluctuations in flows. To prevent this, we have examined the channel depths across each of the three transects established in the bypass, for a range of discharges. Figure 2 illustrates the discharges necessary to maintain depths of 0.25, 0.50, 0.75, 1.00 and 1.50 feet. A minimum of 0.50 feet has been reported as necessary for passage of stream trout, with 0.75 feet minimum for larger walleyes (Bob Strand, Regional Supervisor, personal communication). Stream width at 75 cfs is approximately 30 feet for water 0.50 feet deep and 20 feet for water 0.75 feet deep. At 75 cfs, approximately 70 percent of the channel is 0.50 feet deep, 42 percent of the channel is 0.75 feet deep and 15 percent of the channel is 1 foot deep (Figure 3). These percentages drop approximately 10 percent at a flow of 50 cfs. We conclude that 75 cfs is adequate for fish passage in the bypass.

However, there is a complicating factor involved in appraising depths for fish passage in the bypass. The stream has some secondary channels, as indicated by the profiles for transects 2 and 3 (Figures 4 and 5), which are connected only at higher flows. Transects 2 and 3 are riffles and are likely to be utilized by spawning walleye. Our recommendation will not provide enough base flow to allow fish entering the secondary channel under high flow conditions to exit if flows are dropped below 200 cfs. At 325 cfs, the discharge provides 0.50 feet of depth above the connecting ridge between the two channels (elevation 98.12, Figure 4).

Rather than requesting sufficient flows (325 cfs) to keep the secondary channels accessible for the entire spawning period, we believe it is more responsible to adopt ramping rates for decreasing flows above 325 cfs. Therefore, we recommend that as flows drop to 325 cfs, discharge in the diversion channel be maintained between 325 and 300 cfs for at least four hours. This should provide adult fish in secondary channels an opportunity to pass to the main channel and avoid becoming stranded. The implementation of this recommendation may require some further discussion between MP and MDNR to make it practical and effective.

It will especially be necessary to ramp flows in the bypassed channel at the end of June, when flows can be decreased to zero, to avoid stranding any fish that may have entered the channel. We recommend holding flows at 50 cfs, then dropping them to 25 cfs for at least 24 hours before total cessation of flows in the bypassed channel. Flow ramping could begin June 30. These

incremental flow changes should more closely resemble natural fluctuations in flow, and should minimize stranding and allow time for redistribution of aquatic life. The short length of the channel should not necessitate further stepping of flows.

Wetted Perimeter

Wetted perimeter is the distance from water's edge to water's edge across the bottom of the stream. When plotted as a function of discharge, it helps to confirm that our recommendations are at the minimum level necessary to protect the fishery (Figure 6). Although curves for all three transects and for the average of the three are presented in Figure 6, it is appropriate to examine the wetted perimeter curve for the riffle transects only, transects 1 and 2. The break point on the curve of wetted perimeter as a function of discharge describes where wetted perimeter decreases drastically relative to discharge, and typically determines the flow recommendation. For transects 1 and 2, the lower break point is between 50 and 100 cfs and the upper break point is above 175 cfs.

Reservoir Elevations

Because of the development concerns on Prairie Lake, we do not recommend that reservoir elevations be sacrificed to provide flows for the 800 yards of the bypass reach. This shouldn't be a problem, however; as noted above, flows during April through June for this river are high, and even during a drought are more than our flow recommendations. If discharge falls below the recommended flows during April through June (i.e., 75, 75, and 50 cfs), the reservoir elevation should be maintained and the outflow at the spillway should be held at a level equal to the inflow (i.e., run-of-river operation).

Thank you for the opportunity to provide these recommendations. If you have any questions, please feel free to call either me at (612) 296-4790 or Ian Chisholm at 296-0781.

Sincerely,

Ken Wald
Office of Planning

c: Dave Leuthe
Ian Chisholm
Steve Mueller
Dan Retka

Table 1. Monthly exceedence flows (cfs) for the Prairie River at Prairie River Dam for the period of record 1925 through 1987. Based on summary of average monthly flow statistics provided by Minnesota Power Company.

	25%	Mean	Median	75 %	90%	95%
Jan	122	100	100	73	46	35
Feb	124	101	97	74	61	45
Mar	168	141	124	92	73	66
Apr	767	579	508	296	234	126
May	799	694	593	400	190	136
Jun	522	396	362	239	112	101
Jul	286	245	215	114	77	54
Aug	206	214	125	64	28	10
Sep	220	158	106	63	27	10
Oct	306	204	145	66	26	11
Nov	247	185	166	112	66	14
Dec	167	133	125	96	81	37

Table 2. Monthly flow statistics (cfs) in the Prairie River at Prairie River Dam for April through June, 1987 to 1989. Breakdown based on summary of hourly flows provided by Minnesota Power Company. Exceedence value (e.g., 95%) represents the percent of time a flow is equalled or exceeded.

Year	Month	Flow			Use			Waste		
		50%	75%	95%	50%	75%	95%	50%	75%	95%
1987	Apr	252	206	206	252	206	206	0	0	0
	May	206	163	99	206	163	99	0	0	0
	Jun	164	163	80	164	163	80	0	0	0
1988	Apr	581	308	110	391	244	110	189	61	0
	May	301	123	118	296	118	118	5	5	0
	Jun	80	0	0	80	0	0	0	0	0
1989	Apr	952	845	324	418	414	324	531	424	0
	May	424	332	320	418	332	320	5	0	0
	Jun	525	333	332	419	333	332	106	0	0

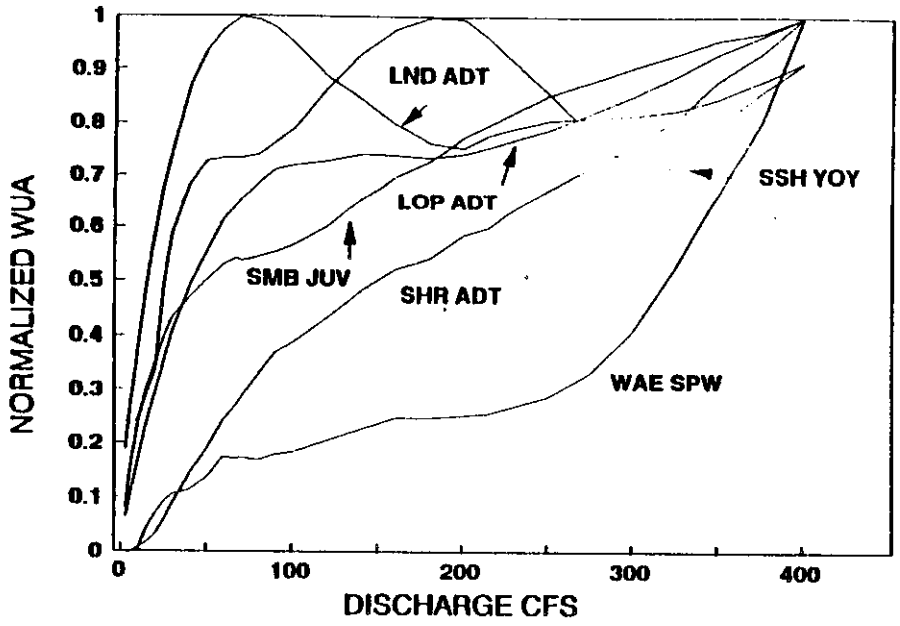

Figure 1. Habitat (normalized weighted useable area (WUA)) - discharge relationship for selected species and life stages in the Prairie River bypass reach.

PRAIRIE RIVER DIVERSION

WIDTH OF STREAM AT EACH DISCHARGE

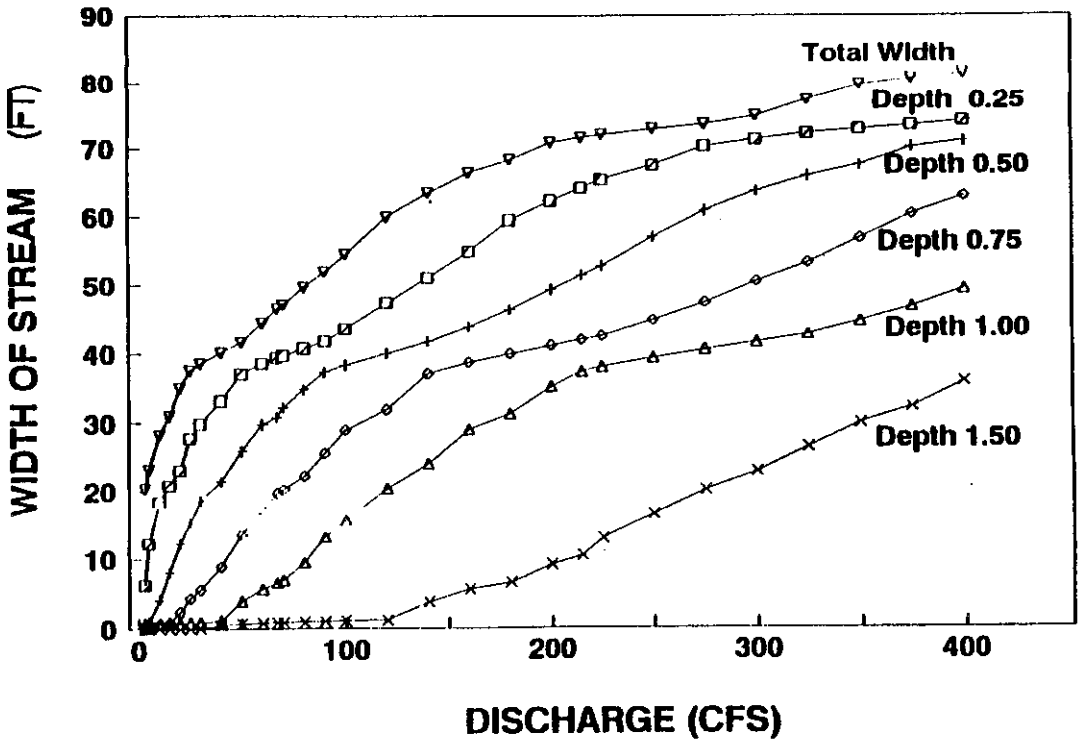

Figure 2. Plot of the width of the Prairie River bypass channel with a specified depth, over a range of discharges.

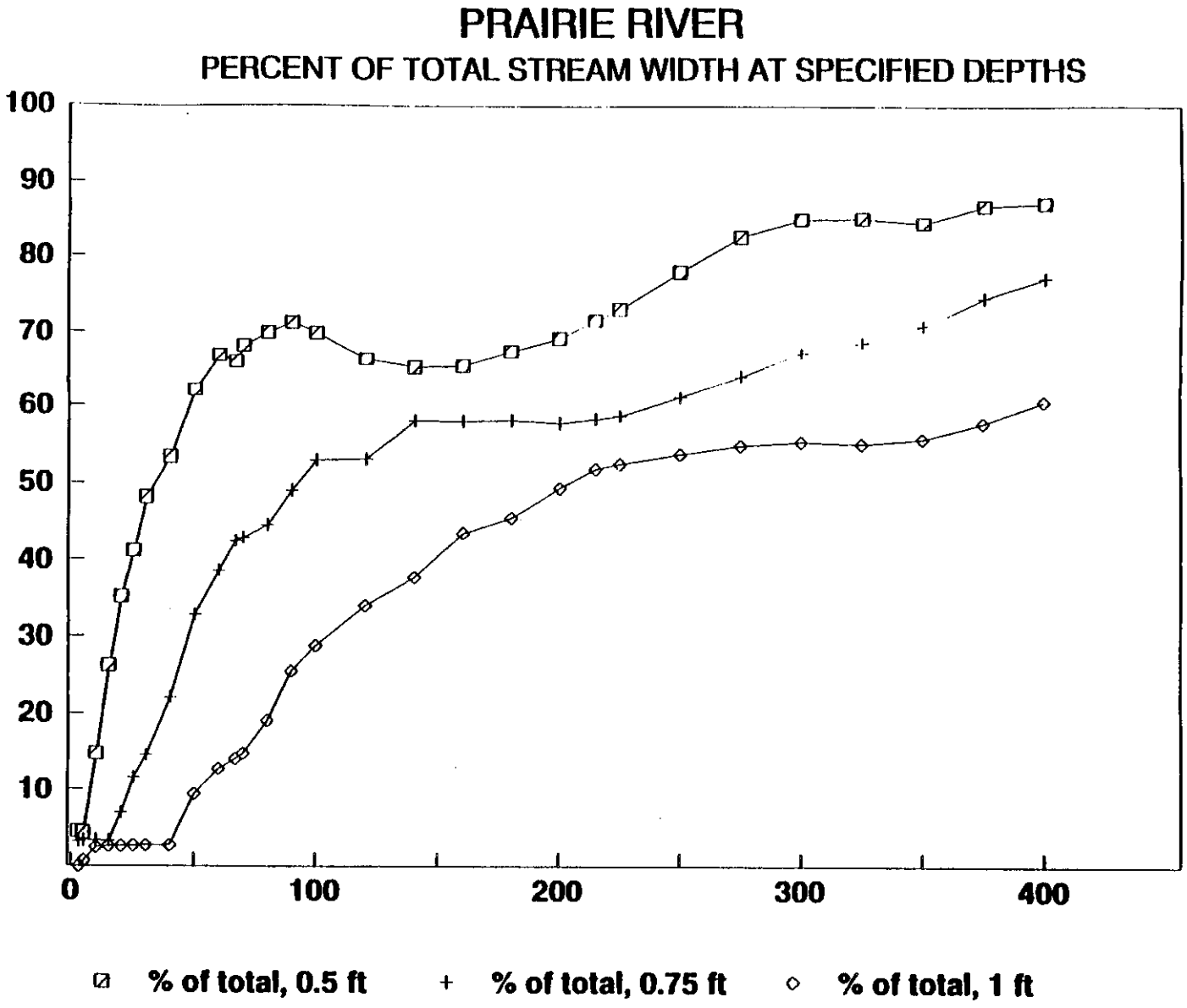

Figure 3. Percentage of the total stream width of the Prairie River bypass channel at specified depths.

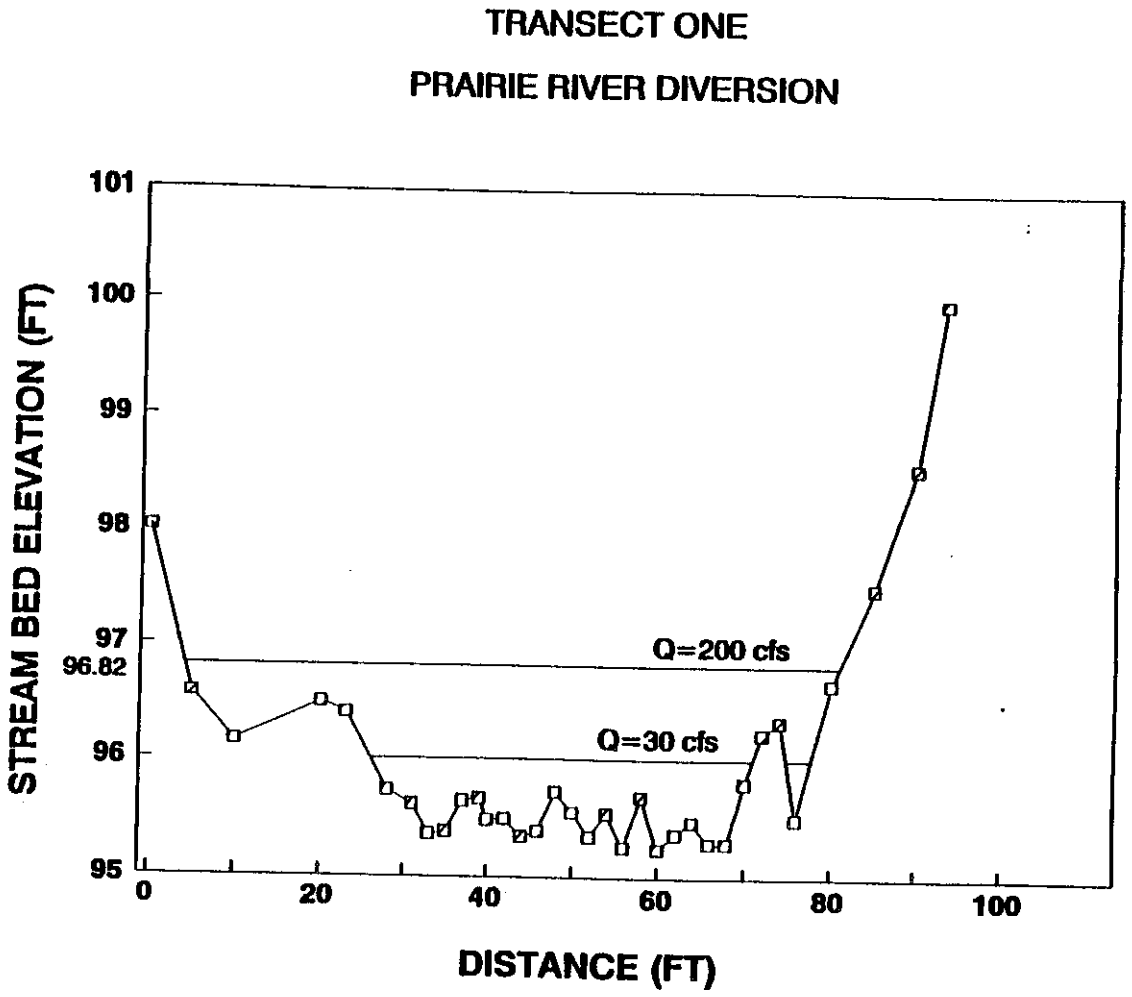

Figure 4. Cross-sectional profile of transect 1 in the Prairie River bypass reach, showing bed elevations for select discharges.

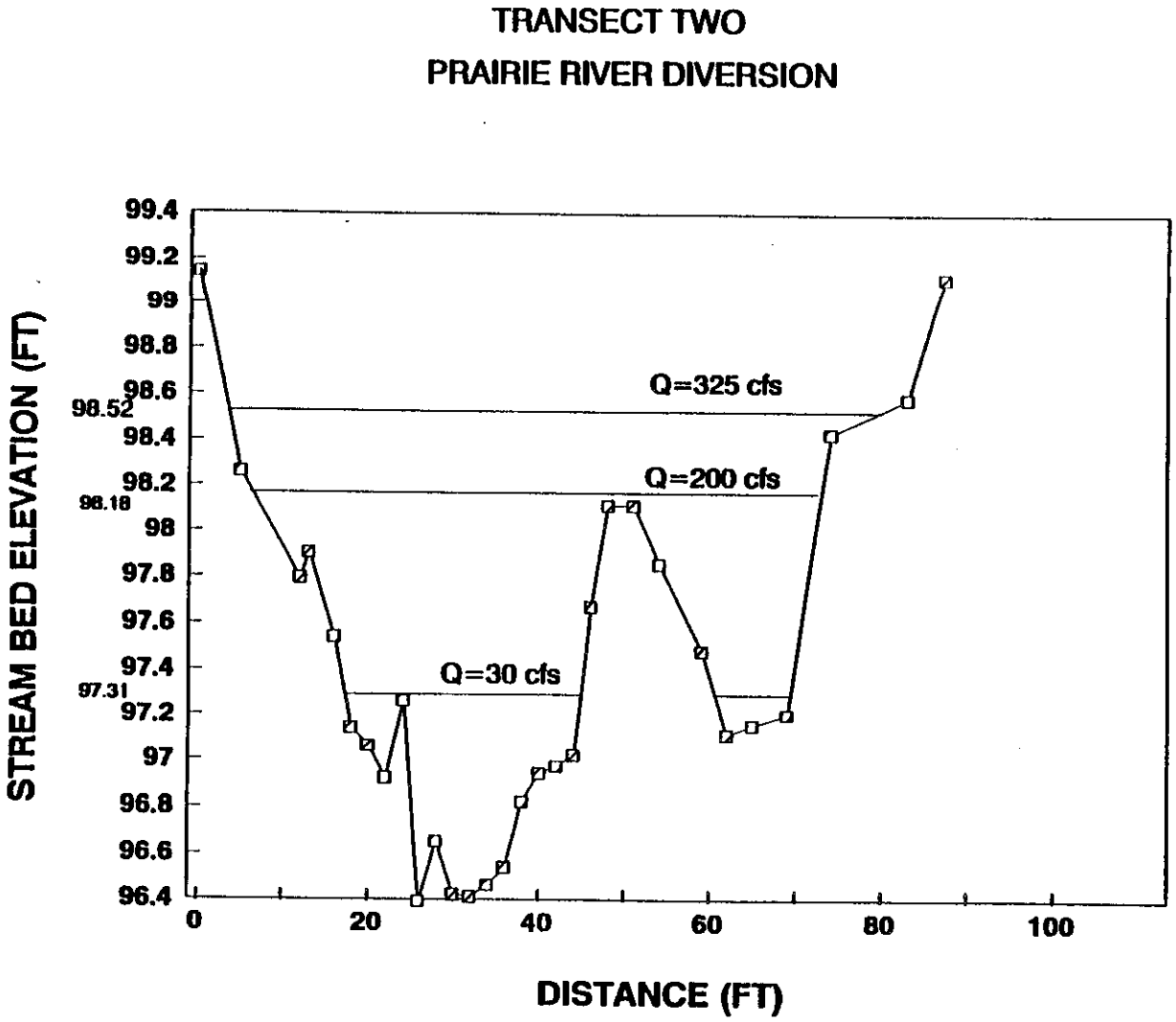

Figure 5. Cross-sectional profile of transect 2 in the Prairie River bypass reach, showing bed elevations for select discharges.

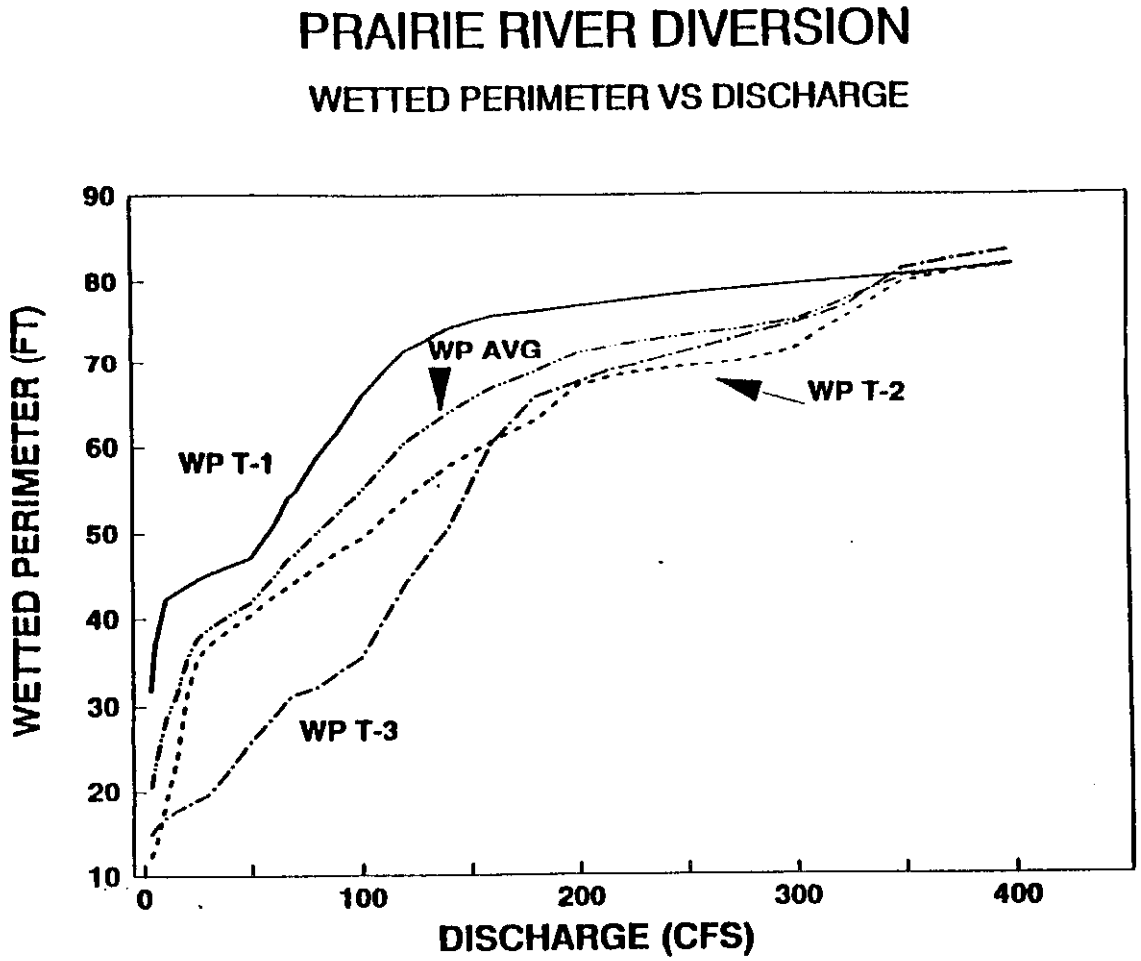

Figure 6. Wetted perimeter - discharge relationship for the 3 study transects in the Prairie River bypass reach. Transects 1 and 2 are riffle transects.

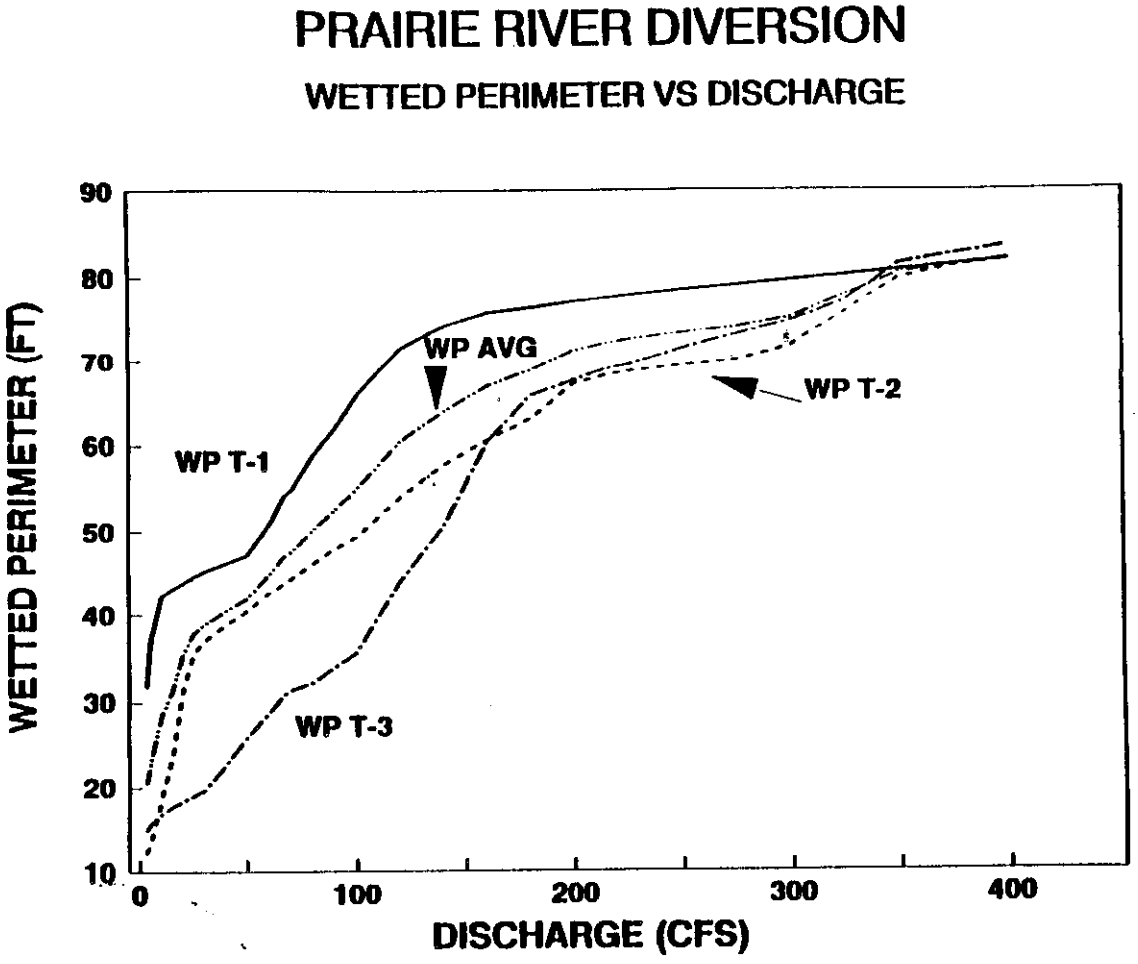

Figure 6. Wetted perimeter - discharge relationship for the 3 study transects in the Prairie River bypass reach. Transects 1 and 2 are riffle transects.

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Appendix M. 2018 Rapids Energy NPDES Permit Renewal

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ALLETE/Minnesota Power

2018 Rapids Energy Center NPDES Permit Renewal

316(b) Submittal

February 28, 2018

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Appendices

Appendix A. 2016-2017 Rapids Impingement Study Results

Appendix B. 2014 Alden Generation Station Assessment

Introduction

The purpose of this document is to provide the Minnesota Pollution Control Agency (MPCA) with §122.21(r) information for the Minnesota Power (MP) Rapids Energy Center (Rapids) per the requirements of the §316(b) Rule. Rapids is located in Grand Rapids, Minnesota. The facility uses a combination of coal, natural gas, and biomass to provide power, steam, and compressed air to the Blandin Paper Mill located adjacent to the facility. Rapids consists of two steam turbines with a combined generating capacity of 29MW. Rapids uses >2 million gallons per day (mgd) of cooling water and therefore meets §316(b) applicability requirements. This introduction consists of three sections that include a general overview of the §316(b) Rule (herein "the Rule"), a discussion of the compliance approach for Rapids, and an organizational summary of this document.

General §316(b) Rule Overview

The U.S. Environmental Protection Agency (EPA) issued new final §316(b) regulations that became effective on October 14, 2014 for existing facilities. These regulations require all facilities using a cooling water intake structure (CWIS) that withdraws >2 mgd to install best technology available (BTA) to reduce entrainment and impingement mortality. All facilities are required to submit the §122.21(r)(2) and (3) information and applicable provisions of (r)(4) through (8) impingement information which includes:

(r)(2) – Source Water Physical Data
(r)(3) – Cooling Water Intake Structure Data
(r)(4) – Source Water Baseline Biological Characterization Data
(r)(5) – Cooling Water System Data
(r)(6) – Method of Compliance with the Impingement Mortality Standard
(r)(7) – Entrainment Performance Studies
(r)(8) – Operational Status

All facilities using >125 mgd actual intake flow (AIF) are required to submit entrainment information that includes the §122.21(r)(9) - (12) information. However, Rapids design intake flow (DIF) is only 22 mgd and therefore entrainment information is not required.

For impingement BTA, the Rule allows facilities to select from seven compliance alternatives (CA1 – CA7) to reduce impingement mortality. The seven impingement mortality BTA alternatives are:

1. Closed-cycle Cooling Recirculating System (CA1)
2. 0.5 fps Through-Screen Design Velocity (CA2)
3. F.5 fps Through-Screen Actual Velocity (CA3)
4. Existing Offshore Velocity Cap (CA4)
5. Modified Traveling Screens (CA5)
6. System of Technologies as the BTA for Impingement Mortality (CA6)
7. Impingement Mortality Performance Standard (CA7)

However, the Rule includes a number of potential exemptions:

- an exemption for *de minimis* levels of impingement,
- a provision for less stringent standards for low-capacity utilization,
- an exemption for some or all of the §122.21(r) information for facilities that withdraw cooling water from manmade lakes and reservoirs and have stocked or managed fisheries, and
- an exemption from use of technologies at nuclear facilities that conflict with federal nuclear safety requirements.

The Rule provides broad discretionary authority to the MPCA to deny exemptions or impose additional requirements, especially if federally protected threatened or endangered species or their designated critical habitat are at risk.

Compliance Approach for Rapids

Given the relatively small size of the Rapids CWIS and amount of cooling water flow, MP's compliance approach for Rapids was to conduct a one-year impingement study to estimate annual impingement. As discussed in Section 6 of this document, results of the study confirmed that Rapids should qualify for the *de minimis* rate of impingement exemption.

The one-year impingement study at Rapids was performed from May 6, 2016 through May 3, 2017 and consisted of 24 hour sampling events twice per week in April and May and every other week the rest of the year. The study resulted in an annual impingement estimate of 499 fish per year. EPRI's national impingement database consisting of impingement study results for 165 different facilities found an average of 1,100 fish per year for the 5% of facilities with the lowest impingement rates. Rapids impingement rate was less than half that number. Further, no state or federally protected species were impinged and the Rapids intake is not located in an area of designated critical habitat for such species. The low level of impingement and lack of risk to federally protected species should qualify Rapids for the *de minimis* rate of impingement exemption at §125.94(c)(11) of the Rule, such that the existing CWIS should be determined BTA for impingement.

Report Organization

This report is organized into nine (9) sections as follows:

- Sections 2 through 8 provide the information for §122.21(r)(2) – (8) respectively.
- Section 9 provides key references used in the document.
- For Sections §122.21(r)(2) – (8), each section begins by providing the requirements for the information directly from the Rule in *blue font and italics*.
- Applicable information and associated data are located below each rule requirement.

Source Water Physical Data - §122.21(r)(2)

The Rule at §122.21(r)(2) requires that MP provide the following source waterbody physical data for Rapids:

(i) A narrative description and scaled drawings showing the physical configuration of all source water bodies used by your facility, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located;

Rapids is located on the north shore of the Blandin Paper Mill Reservoir on the Mississippi River. The Mississippi River flows in an easterly direction as it passes through the Grand Rapids Dam. According to the Minnesota Department of Natural Resources (MDNR) "the river above and below the Grand Rapids dam exhibits a warm water fishery".

The Blandin Reservoir/Mississippi River is described on the MDNR Lake Finder website as:

> *"Blandin Reservoir is a 449-acre impoundment on the Mississippi River, controlled by a dam at Blandin Paper Company in Grand Rapids, Minnesota. Blandin Reservoir has minimal storage capacity and functions more as a flow-through system, minimizing water level fluctuations. The lake is in ecological lake class 35, which represents moderate size lakes with a high percentage of littoral area and moderately clear and hard water. Other area lakes in this class include Little Cut Foot Sioux and Prairie Lakes."*

This reservoir stretches approximately 3.4 miles from the Pokegama Dam to the Grand Rapids Dam and is 449 acres.

The U.S. Army Corps of Engineers estimated water levels at Rapids using the tail water level at the Pokegama Dam from January 1, 2007 through December 31, 2017. Based on this data the high water level is El. 1267.0 ft., the average water level is El. 1268.3 ft. and the low water level is El. 1, 267.75 ft. Maximum depth of the pool is 44 feet.

The Blandin Paper Mill Reservoir is a fresh waterbody and therefore, salinities are negligible.

According to U.S. Army Corps of Engineers data, the river outflow from the Pokegama Dam from January 1, 2007 through December 31, 2017 was as follows:

Maximum: 4150.0 cfs
Average: 1151.5 cfs
Minimum: 200 cfs

Figure 1 provides detailed bathymetry for the Blandin Paper Mill Reservoir.

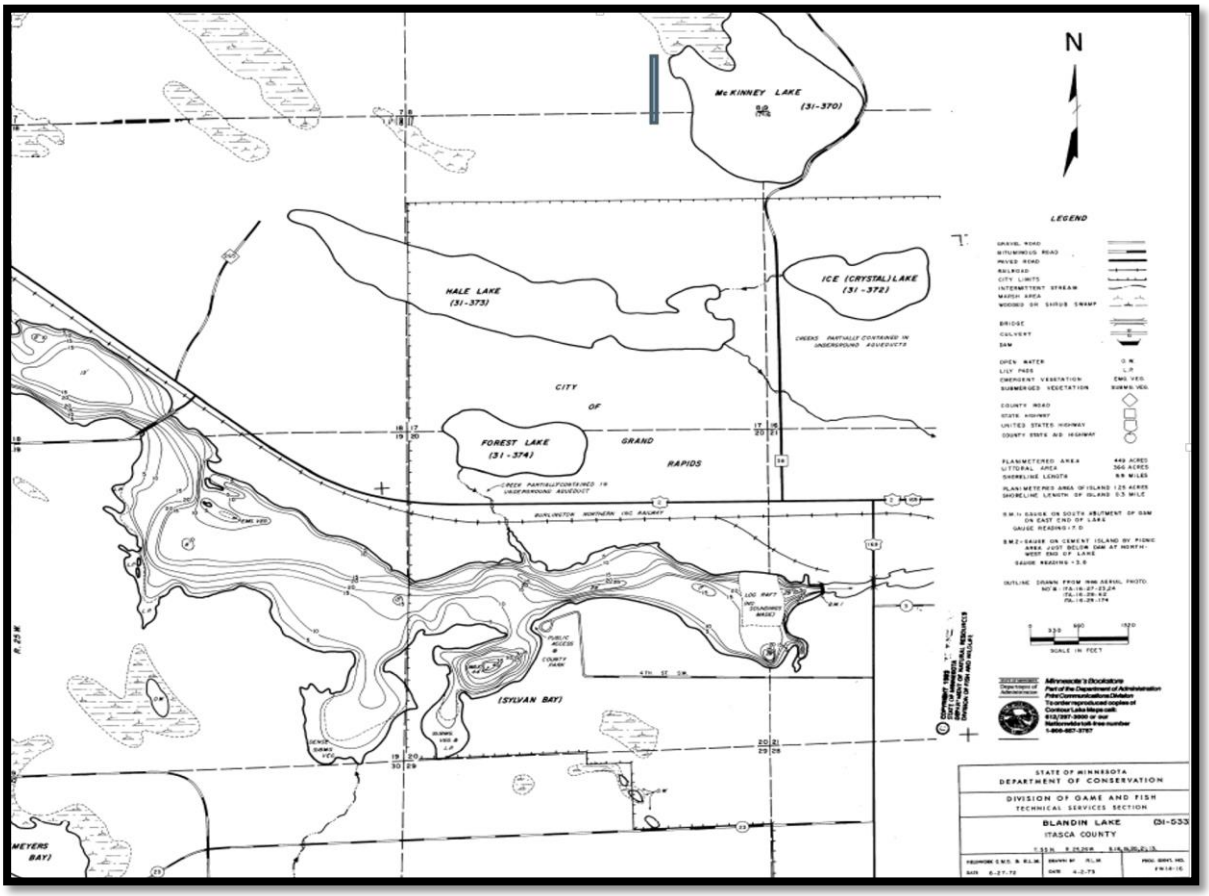


Figure 1: Lake Depth Map

Table 1 provides average monthly temperature data for water entering the Rapids CWIS from 2012 to 2016. Average monthly temperatures ranged from a high of 77.9°F in July of 2012 to a low of 38.5°F in January 2014.

Table 1: Average River Intake Temp

	2016	2015	2014	2013	2012	5 Year Avg
Jan	43.0	43.2	38.5	42.8	47.4	43.0
Feb	43.7	41.4	40.3	40.6	43.7	41.9
Mar	44.5	42.9	41.0	42.0	43.8	42.8
Apr	49.8	50.0	44.7	39.3	49.1	46.6
May	60.3	59.3	58.0	52.6	61.8	58.4
Jun	68.8	70.0	69.8	68.2	64.1	68.2
Jul	75.3	76.2	72.8	75.4	77.9	75.5
Aug	75.2	72.1	73.2	73.9	74.4	73.8
Sep	66.0	69.3	63.5	68.4	63.5	66.2
Oct	53.5	53.4	49.9	52.4	52.7	52.4
Nov	47.0	47.6	41.8	39.1	43.2	43.7
Dec	43.7	43.8	44.5	39.3	43.1	42.9

(ii) Identification and characterization of the source waterbody's hydrological and geomorphological features, as well as the methods you used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies;

No physical studies were conducted to determine Rapids CWIS area of influence within the waterbody. However, Alden estimated that the calculated length of the zone of influence for this intake is 10.5'. However, given the proximity of this structure to the Grand Rapids Dam, the calculated zone of influence is likely impacted by dam flow and realistically shorter than the 10.5' standard calculation.

(iii) Locational maps.

Location maps for Rapids are provided in **Figures 2, 3, and 4**.

Figure 2: Location Map of Rapids Energy Center

Figure 3: Site Configuration of Rapids Energy Center

Figure 4: Rapids Cooling Water Intake Location at the Grand Rapids Dam

Cooling Water Intake Structure Data - §122.21(r)(3)

The Rule at §122.21(r)(3) requires that MP provide the following cooling water intake information for Rapids:

(i) A narrative description of the configuration of each of your cooling water intake structures and where it is located in the water body and in the water column;

Rapids has a single seven foot wide water intake bay with one traveling screen located on the north shore of the reservoir adjacent to the Blandin Hydroelectric power house and provides cooling water to the facility. The facility employs a single traveling water screen that is 4.5' wide and equipped with 3/8 inch mesh. The traveling water screen has an invert at El. 1,260.5 ft., the same as the spillway. Circulating water pumps are located in the distribution piping downstream of the screen. The two circulating water pumps are each rated for 17.8 cfs (8,000 gpm) for a total DIF of 34.0 cfs or 22 mgd. Blandin Paper Mill has a separate circulating water pump with in the distribution pipe that diverts 3000-4000 gpm of water to the mill for paper manufacturing. Cooling water is discharged back to the Mississippi River downstream of the dam.

Water flows through the bottom of the intake structure gate. The gate position does not change unless the structure is closed for pipe maintenance work which has only been required once in the last 13 years.

The center of the intake is at El. 1255 ft., approximately 13' below the water (water current El. 1268 ft.). It is 6.5' below the water to the top of the gate and 19.5' to the bottom of the gate.

(ii) Latitude and longitude in degrees, minutes and seconds for each of your cooling water structures;

Latitude of Rapids CWIS: 47.23456°
Longitude of Rapids CWIS: -93.53744°

(iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable;

Non-contact cooling water pumps are operated continuously throughout the year with only minor exceptions for cleaning and equipment maintenance at the facility. The screen is rotated once per day and rinsed with a screen spray wash. Debris is sluiced from the screen, collected in a drain pan, and dewatered. The water is returned to the river and the debris is manually removed from the pan and disposed. Maintenance and cleaning activities account for 1 week per year or less. Average annual hours of circulating pump operation with consideration of down time is approximately 8,592 hours per year.

Table 2: Average Monthly Flow 2012 - 2016						
	2016	**2015**	**2014**	**2013**	**2012**	**5 Year Avg**
Jan	14.5	15.7	13.6	14.9	15.2	14.8
Feb	14.9	15.4	13.2	14.0	16.1	14.7
Mar	13.8	14.0	13.3	14.3	17.3	14.5
Apr	12.2	13.6	14.7	16.3	17.4	14.8
May	23.1	20.2	15.6	21.7	24.4	21.0
Jun	22.8	23.5	23.2	22.9	17.8	22.0
Jul	23.3	21.5	22.8	22.7	28.9	23.8
Aug	22.7	20.7	22.4	22.1	28.2	23.2
Sep	21.8	19.6	21.1	21.7	18.1	20.5
Oct	17.0	15.2	20.7	19.5	23.4	19.2
Nov	14.9	13.7	18.8	13.2	22.5	16.6
Dec	16.1	14.7	16.5	14.2	15.2	15.3

Velocities in the CWIS were calculated approaching the traveling water screens, and through the screen mesh. Through-screen velocities were calculated at 100% clean condition. The traveling water screen is equipped with a 0.375" square mesh with a 68% open area and an 86% open area for the screen frames. This results in a 58% net open area for the screens. The low water level (El. 1,267.75 ft.) and maximum non-contact cooling water flow (38.0 cfs including Blandin water use) were used for estimating the intake velocities. The calculated intake velocities for Rapids are provided in **Table 3**.

Table 3: Velocities at the Rapids CWIS			
	Velocity (ft/sec)		
Flow (cfs)	**Intake Entrance**	**Approach to Screens [1,2]**	**Through-screen[1,2,3]**
38.1	0.8	1.2	2.0

1. *Assumed invert at El. 1,260.5 ft (same as the spillway).*
2. *Based on 4.5 ft wide traveling water screen.*
3. *Through-mesh velocity assumes 100% clean screening area.*

The hydraulic zone of influence is defined as the area where the flow velocity is greater than 0.5ft/sec and is as follows:

The total flow equals area times the water velocity across that area or:

Flow = A x V = length (L) x depth x V

A depth of 7.25' (low water level) and V=0.5 ft/sec (at edge of the zone of influence), then flow = L x 7.25 x 0.5, L = flow/6.75 = length of zone of influence. L=38.0/3.875 = 10.5

(iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges; and

A flow distribution and water balance diagram for Rapids is provided in **Figure 5**.

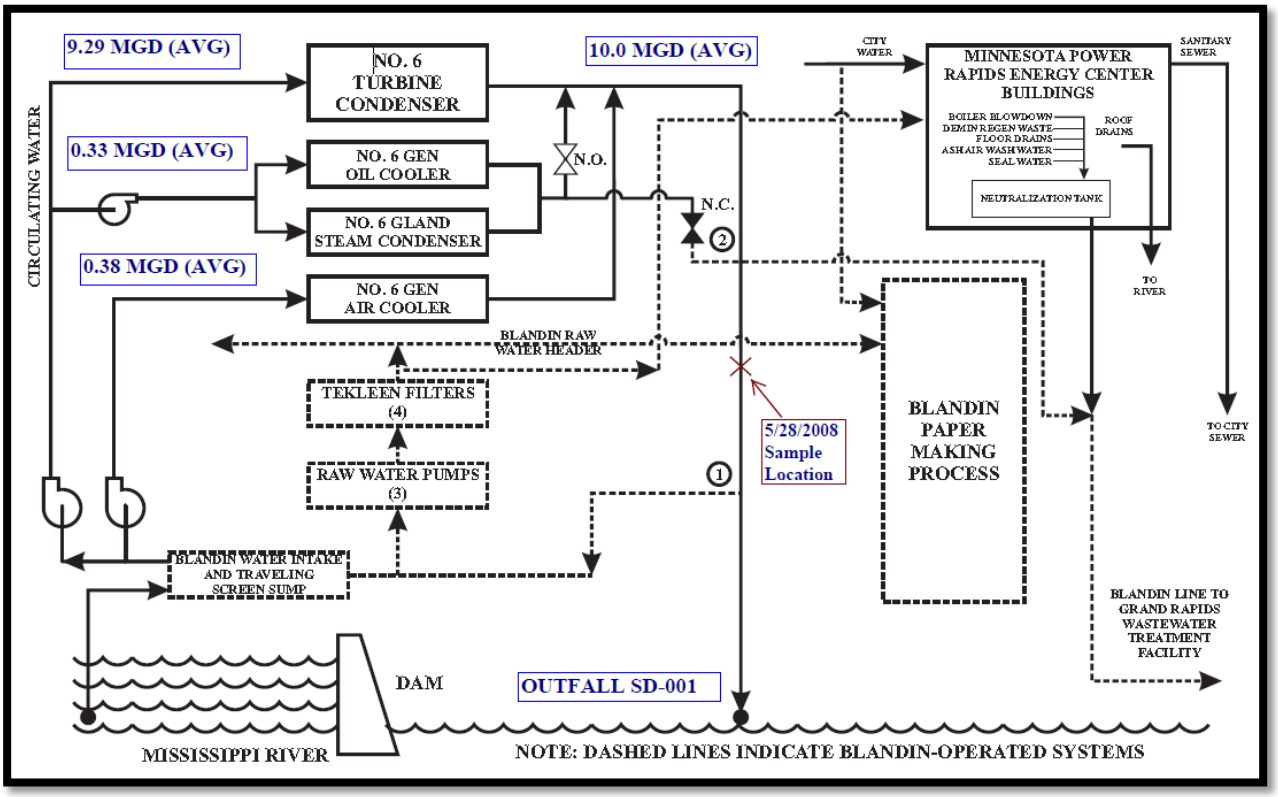


Figure 5: Water Flow Diagram

(v) Engineering drawings of the cooling water intake structure.

Figure 6 provides a side view drawing of Rapids CWIS and **Figure 7** is an engineering drawing.

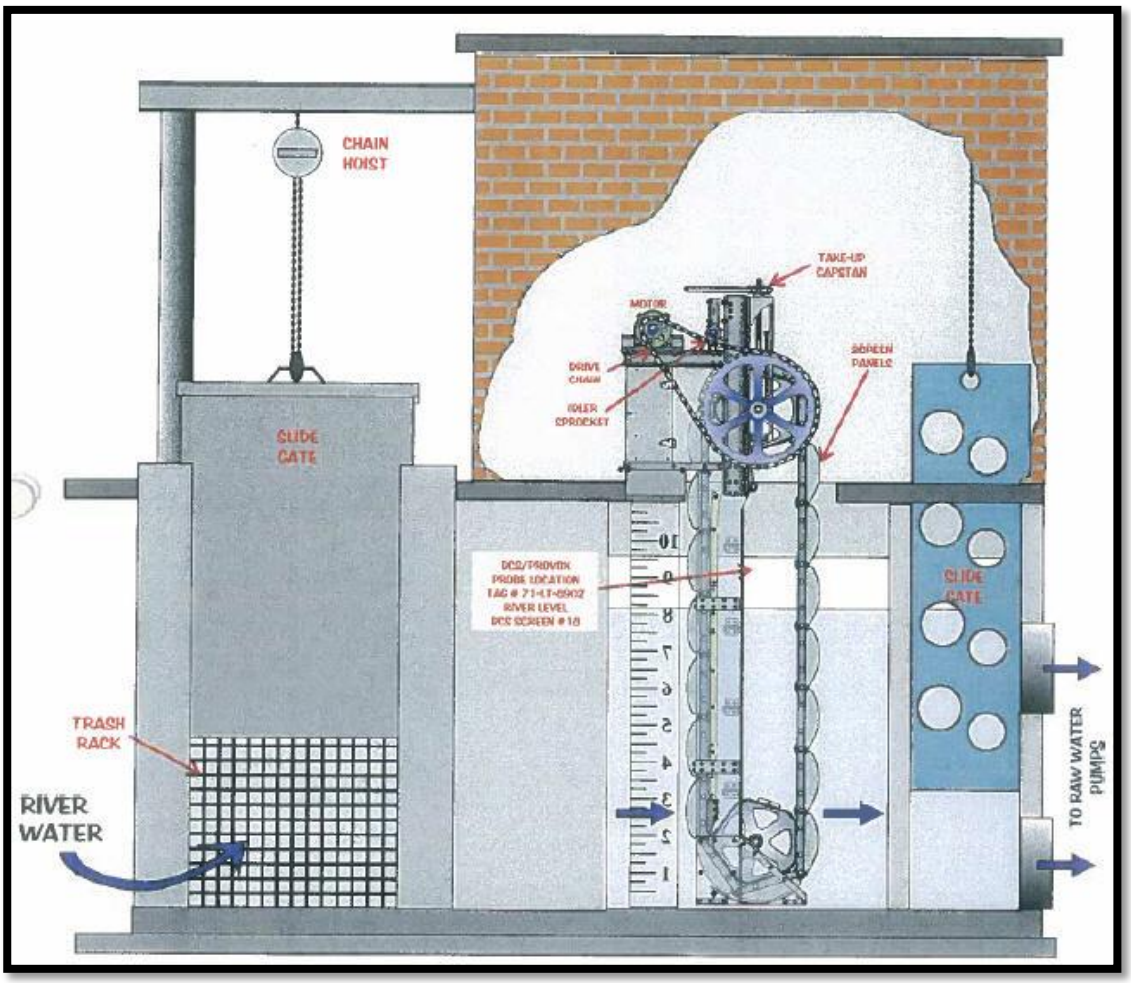


Figure 6: Cooling Water Intake Structure

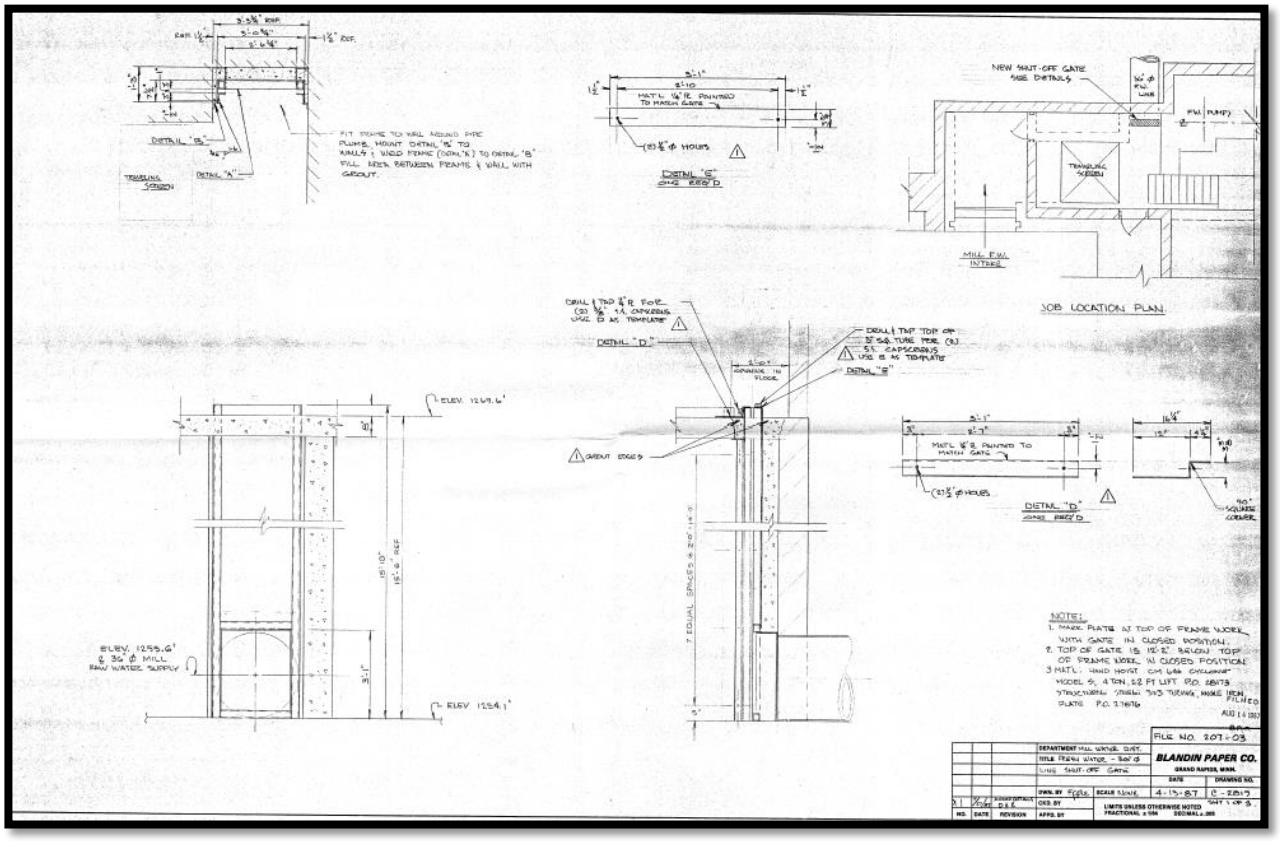


Figure 7: Cooling Water Intake Structure Engineered Drawings

Source Water Baseline Biological Characterization Data - §122.21(r)(4)

The Rule at §122.21(r)(4) requires MP to provide the source water biological baseline characterization data for the Blandin Paper Mill Reservoir. The introductory paragraph states *"§122.21(r)(4) Source water baseline biological characterization data. This information is required to characterize the biological community in the vicinity of the cooling water intake structure and to characterize the operation of the cooling water intake structures. The Director may also use this information in subsequent permit renewal proceedings to determine if your Design and Construction Technology Plan as required in §125.86(b)(4) of this chapter should be revised. This supporting information must include existing data (if they are available). However, you may supplement the data using newly conducted field studies if you choose to do so. The information you submit must include:"*

(i) A list of data required in paragraphs (r)(4)(ii) through (r)(4)(vi) that were not available with an explanation of efforts to identify sources of that data.

All of the necessary data to complete these sections were available.

(ii) A list of species (or relevant taxa) for all life stages and their relative abundance near the CWIS.

Table 4 provides a list of fish species found in the Blandin Paper Mill Reservoir in a 2012 Minnesota Department of Natural Resources fisheries study.

Table 4: Minnesota DNR – Fisheries Lake Survey

Blandin Reservoir
Survey Date: 08/06/2012
Link to Site: http://www.dnr.state.mn.us/lakefind/showreport.html?downum=31053300

Species	Gear	CPUE	Normal Range	Avg Weight	Normal Range	Count
black crappie	Standard gill nets	0.22	1.0-10.5	0.2	0.2-0.3	2
bluegill	Standard trap nets	1.88	4.0-28.1	0.16	0.1-0.3	15
bluegill	Standard gill nets	1	N/A	0.31	N/A	9
bowfin (dogfish)	Standard trap nets	0.25	0.3-1.2	6.69	3.3-5.5	2
bowfin (dogfish)	Standard gill nets	0.11	0.2-0.7	4.66	2.9-4.6	1
brown bullhead	Standard trap nets	0.12	0.5-4.3	1.37	0.5-0.9	1
hybrid sunfish	Standard gill nets	0.11	N/A	0.34	N/A	1
largemouth bass	Standard trap nets	0.12	0.2-0.6	0.46	0.2-1.0	1
largemouth bass	Standard electrofishing	21.33	N/A	1.42	N/A	32
largemouth bass	Standard gill nets	0.22	0.3-0.9	0.19	0.6-1.5	2
northern pike	Standard trap nets	0.12	N/A	7.65	N/A	1
northern pike	Standard gill nets	1.78	3.6-11.0	1.41	1.3-2.3	16
pumpkinseed	Standard trap nets	2.25	1.5-6.8	0.07	0.1-0.3	18
pumpkinseed	Standard gill nets	3.56	N/A	0.19	N/A	32
rock bass	Standard trap nets	0.12	0.3-1.0	0.03	0.3-0.6	1
rock bass	Standard gill nets	1.22	0.2-1.4	0.24	0.3-0.6	11
shorthead redhorse	Standard gill nets	0.78	0.2-2.2	2.49	1.5-1.9	7
smallmouth bass	Standard gill nets	1	0.5	1.77	1.1	9
smallmouth bass	Standard electrofishing	1.33	N/A	1.52	N/A	2
walleye	Standard trap nets	0.12	0.3-1.1	2.28	1.2-3.4	1
walleye	Standard gill nets	1.11	1.0-3.2	0.61	1.0-2.1	10
white sucker	Standard trap nets	0.12	0.2-1.4	3.75	1.6-3.0	1
white sucker	Standard gill nets	0.11	0.7-3.5	3.97	1.5-2.4	1
yellow bullhead	Standard trap nets	0.75	1.4-5.0	1	0.4-0.8	6
yellow bullhead	Standard gill nets	0.33	0.6-7.0	1.06	0.3-0.7	3
yellow perch	Standard trap nets	0.38	0.5-3.3	0.07	0.1-0.2	3
yellow perch	Standard gill nets	3.56	3.8-22.8	0.14	0.1-0.2	32

(iii) Identification of species and life stage that would be most susceptible to impingement and entrainment. Species evaluated must include the forage base as well as those important in terms of significance to commercial and recreational fisheries.

The best indicator of species susceptible to impingement are the species impinged during the 2016-2017 Rapids impingement study. Rapids Energy Center was not required to conduct a formal impingement study under Phase II of the 316(b) Rule because facility flow is <50 mgd. An internal impingement characterization study was conducted by Minnesota Power

from May 2016 to May 2017 to assess impingement rates and identify potential species of concern. A summary of results from the impingement study is included in **Table 5** and additional information included in Appendix A. Also, an Environmental Impact Assessment completed for the MDNR as part of the Grand Rapids Dam project in 2006 was referenced to help identify species of concern. The species identified in the environmental impact assessment included Bowfin, Walleye, Largemouth Bass, Common Sucker, Muskellunge, Northern Pike, Pumpkinseed, Spottail Shiner, and Yellow Bullhead.

The annual impingement rate at Rapids is estimated to be 499 finfish.

The species impinged included: Bluegill (*Lepomis macrochirus*), Black Crappie (*Pomoxis nigromaculatus*), Yellow Perch (*Perca flavescens*) and Largemouth Bass (*Micropterus salmoides*). Crappie identified during the 2016-2017 impingement study were recorded on field sheets as "Crappie" with no further species identification. MDNR fish surveys going back to 1973 do not document the presence of White Crappie with in the Blandin Reservoir so therefore all "Crappie" identified in the impingement survey are assumed to be Black Crappie.

Table 5: 2016-2017 Rapids Fish Impingement Summary

Date	Number of Fish Found	Fish Species
5/20/2016	7	3 Bluegill, 4 Perch
6/1/2016	3	1 Bluegill, 2 Perch
8/11/2016	13	13 Bluegill
8/12/2016	10	10 Bluegill
8/26/2016	1	1 Bluegill
10/3/2016	50	19 Bluegill, 31 Black Crappie
10/21/2016	3	2 Black Crappie, 1 Largemouth Bass
11/22/2016	1	1 Black Crappie
11/23/2016	1	1 Black Crappie
11/30/2016	1	1 Bluegill
5/1/2017	3	3 Black Crappie

Due to Rapids AIF being well below 125 mgd, no entrainment characterization study was required. However, EPRI developed a national impingement and entrainment database and results were published in a report titled National and Regional Summary of Impingement and Entrainment of Fish and Shellfish Based on an Industry Survey of Clean Water Act §316(b) Characterization Studies (EPRI 2011). **Figure 8** illustrates data for Midwestern Reservoirs. The dominant species entrained included unidentified fish eggs, Yellow perch, *Lepomis spp*. (sunfish including bluegill), Alewife, and Brook Silverside.

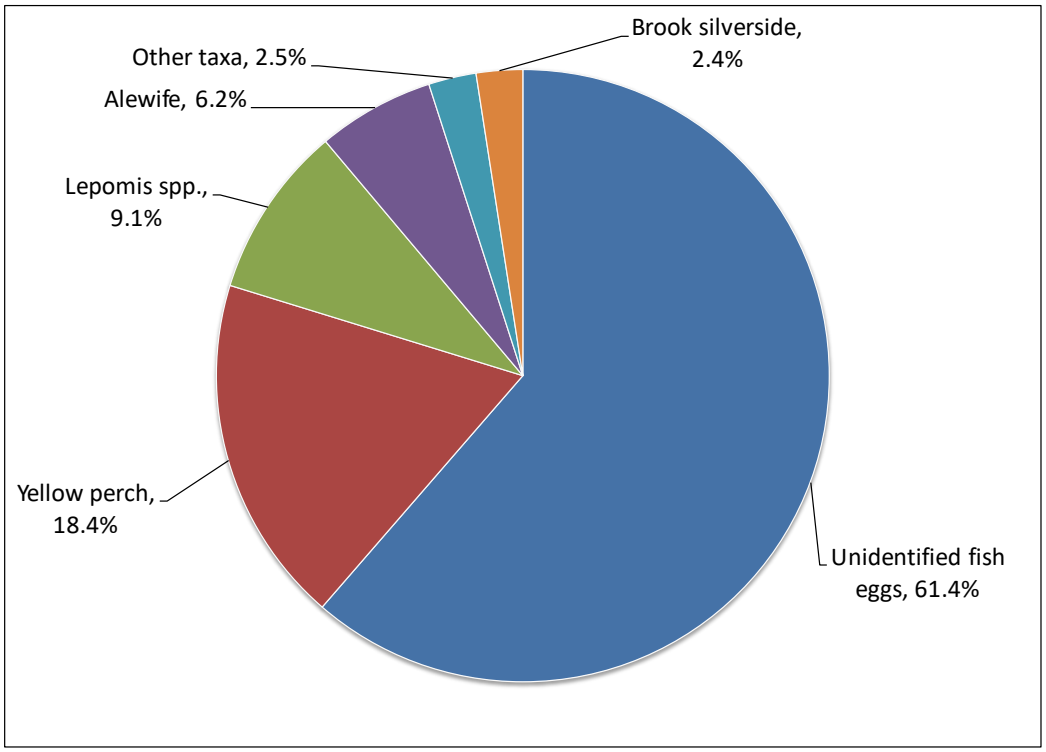


Figure 8: Distribution of Common Species Entrained at the one Midwestern Reservoir Facility in the EPRI 316(b) Database

(iv) Identification and evaluation of the primary period of reproduction, larval recruitment, and period of peak abundance of relevant taxa.

Based on the 2016-2017 impingement study results, the relevant taxa for Rapids are considered to be Bluegill, Black Crappie, and Yellow Perch (only a single Largemouth Bass was collected). Below is the required information for the relevant species for Rapids gathered from DNR (http://www.dnr.state.mn.us/fish/index.html) and University of Minnesota websites (http://academics.cehd.umn.edu/hatch/default.htm).

Bluegill:

The spawning season for the bluegill starts in late May and goes into early August, (peak spawning is in June) at water temperatures of 19-27° C (67-80° F). Males arrive first at spawning sites and start to scoop out round depressions in areas of gravel and coarse sand. Bluegills usually form a community of 40-50 these nests in one area. The males are very protective and chase everything away from the nests, especially other male bluegill. Some will even attack snorkelers and divers if they come to the edge of the nest. When a female bluegill approaches, the male starts circling the nest while making grunting noises. The motion and sound appear to attract the female. If the female goes into the nest, both male and female circle around it and finally come to rest in the middle. With the male upright and the female at any angle, the pair touch bellies, quiver and spawn. These actions are repeated at irregular intervals several times. Once the spawning is done, the male then chases the

female out of the nest and goes back to protecting the nest. Other females may spawn later in the same nest, and the same female will spawn in other nests. Sometimes a smaller male hides in the nearby weeds. Just as the spawning act begins, he darts into the nest between the resident male and female and releases sperm. Then he hightails it back to the weeds. These little guys are called "sneakers" and it's easy to tell why. The size of the female has a large effect on how many eggs she will produce. The number can range from 1,000 in stunted fish to nearly 70,000 in a large, healthy fish. A single nest typically will have 10,000-100,000 eggs (they are really embryos) in it usually from several different females. The male continues to fan the embryos and protect the nest. When the larvae hatch they spend a few days "wriggling" in the nest before they swim up into the water column. At that point, they are on their own.

*

Black Crappie:

Black crappies spawn in May and June in Minnesota, when the water temperature goes above 15° C (59° F). Males sweep out circular nests (about 25-30 cm across) usually in areas of fine gravel, sand, or even mud. They usually choose a spot next to a submerged plant in water 0.3-2 m (1-6 ft) deep. Black crappies normally are 3 years old when they first spawn, but some mature at 2 years old. Females produce enormous numbers of eggs-- 3,000 to 188,000, depending on their size. Each male and female will spawn with several partners, and the male will guard the nest in colonies until the eggs are hatched and the larvae are eating on their own. Eggs (embryos actually) hatch in about a week or so, but the embryos stay in the nest for several more days while developing a functional mouth and fin rays. They then swim up into the water column and begin feeding. They mature early and are prolific; a large female may produce well over 100,000 eggs. Crappie are prone to stunting. Because a strong year-class often dominates in a lake, crappie often appear to be all of the same size. When these fish of a strong year-class grow large, the lake can gain a reputation as a crappie hot spot and then fade into mediocrity as a younger year class takes over.

*

Yellow Perch:

Yellow perch spawn fairly early, soon after ice-out in April and early May. Water temperature only needs to reach 7° C (45° F) to induce spawning. They build no nest, and there is no parenting of the eggs or young. Males reach sexual maturity at 2-3 years old and females at 3-4 years old. These adult perch move to shallow, weedy areas of lakes or into slower protected areas of a stream. At night females are escorted by two or more males as they move among the weeds. Females drape their eggs in an accordion-like strand over the vegetation. The males fertilize the eggs as they are released. A single female may lay 10,000-200,000 eggs, depending on her size and health. The eggs (embryos actually) hatch in about 2 weeks and shortly afterwards migrate to the open water of the lake or drift downstream to pools or backwaters. They stay in the open water until they are about 25 mm (1 in) long and then migrate into weedy areas near shore.

(v) Data representative of the seasonal and daily activities (e.g., feeding and water column migration) of biological organisms near the cooling water intake structure.

Below is the required information for the relevant species for Rapids gathered from DNR and University of Minnesota websites (links provided above).

Bluegill:

The growth of the bluegill in the first 3 years is fast; but once they reach maturity the rate slows down considerably. They can easily grow to a range of 90-130 mm (3.5- 5.1 in) in 3 years and up to 200 mm (8 in) in 7-9 years. In the best possible conditions in Minnesota, they may reach to 250-300 mm (10-12 in). The common weight of this fish is usually less than 0.2 kg (0.5 lbs), but occasionally it may reach 1 kg (2.2 lbs). The hook and line record for Minnesota is 1.37 kg (2 lb 13 oz). Many bluegills reach the age of 5 to 8 years and in extreme cases may reach 11 years old. In some lakes, bluegills become too numerous and a stunted population results. These fish often do not live beyond 4 years and rarely exceed 90 mm (3.5 in) in length. The young bluegill's diet is commonly rotifers and a variety of waterfleas. The adult bluegill's diet is mostly aquatic insect larvae (such as mayflies, caddisflies, and dragonflies), but also includes crayfish, leeches, snails, and sometimes small fish. Of course, the angler's bit of night crawler or waxworm is also on the menu. Bluegills are often taken on popping bugs and dry flies because they sometimes feed on insects "hatching" at the water's surface. (These insects are not hatches from eggs. They are breaking out of their last larval skin and becoming flying adults).

*

Black Crappie:

Black crappies occur in all major drainages of Minnesota. They are most abundant in the central portion of the state and least abundant in the deep, rocky lakes of the Arrowhead region (northeastern Minnesota). Black crappies inhabit moderate to large streams, large river backwaters, and small to medium sized lakes. They prefer clear, calm, warm water with lots of vegetation. The black crappie prefers deeper, cooler, clearer water than the white crappie does. Black crappies are carnivores (animal eaters). As larvae, they consume mostly copepods and waterfleas, but they begin to include tiny insect larvae when they get to be about 25 mm (1 in) long. As they grow they add more and larger insect larvae, amphipods, and finally small fishes. Full-grown black crappies continue to consume insect larvae, but minnows, small bluegill, and small yellow perch become their major prey. Adults can continue to feed on plankton but usually eat a lot of small fish as well. Crappie may compete with walleye to some degree because their habits are similar. Both species travel open water in schools, feeding on similar foods at night, dawn and dusk. Black crappie can often reach 250-300 mm (10-12 in) and about 0.5-0.9 kg (1-2 lbs). The Minnesota record weighed 2.27 kg (5 lbs). It was caught in the Vermillion River in 1970. Black crappies can live for 7-9 years, but most of those caught by anglers are 3-4 years old.

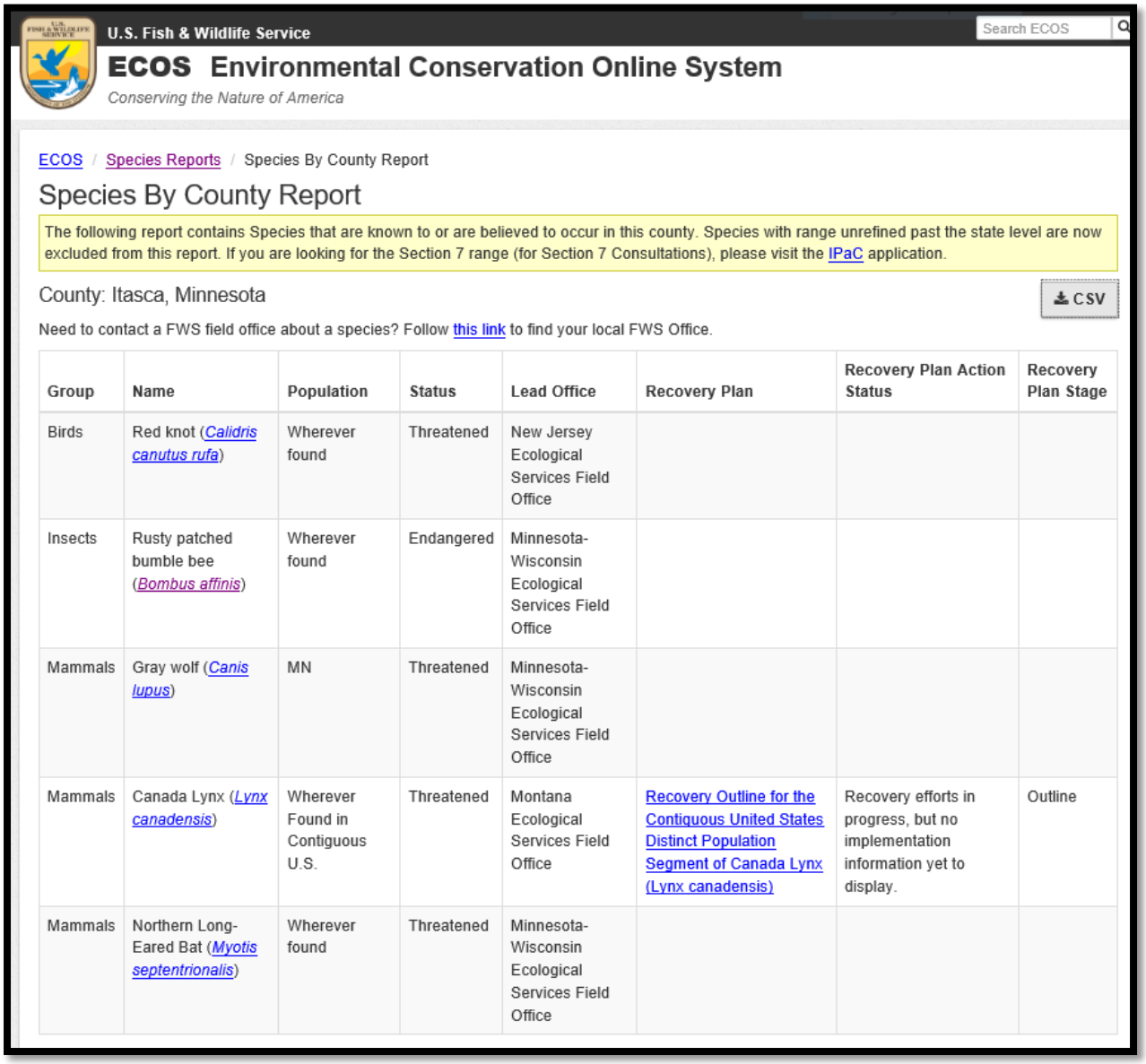
*

Yellow Perch:

Yellow perch occur in all major drainages of Minnesota. They live in both lakes and streams, including Lake Superior and the trout streams of the North Shore. Yellow perch are more abundant in lakes and backwaters of large rivers than they are in swift-flowing streams. But they also occur in the pools and runs of many of our small streams. The young are most abundant in areas of aquatic vegetation. Female yellow perch grow faster and reach an overall bigger size than males do. Some females get to almost 375 mm (15 in) and weigh over 0.5 kg (1 lb). But it is more common to find both sexes at lengths of 200-290 mm (8-11 in) and average weights of 170-300 g (6-10 oz). The state record for this fish is 1.5 kg (3 lb 4 oz). Yellow perch typically live for 7-9 years. The oldest known age is 13. Females live longer on average than males do. Larval yellow perch commonly eat copepods, waterfleas, and other small crustaceans. Juveniles quickly begin to include bigger items such as aquatic insect larvae and larval fish. By the end of their first growing season, perch are including small fish, crayfish, leeches, and snails in their diet. Adults continue to eat all of these items, but include more fish as they get larger.

(vi**)** *Identification of all Federally-listed threatened and endangered species and/or designated critical habitat that are or may be present in the action area*[1].

The U.S. Fish and Wildlife Service Environmental Conservation Online System (ECOS) was reviewed for critical habitat and federally listed threatened & endangered species. There are no threatened and endangered species in the reservoir or any nexus with the facility operation. Results from the USFWS website are shown in **Figure 9**.



U.S. Fish & Wildlife Service

Search ECOS

ECOS Environmental Conservation Online System

Conserving the Nature of America

ECOS / Species Reports / Species By County Report

Species By County Report

The following report contains Species that are known to or are believed to occur in this county. Species with range unrefined past the state level are now excluded from this report. If you are looking for the Section 7 range (for Section 7 Consultations), please visit the IPaC application.

County: Itasca, Minnesota

CSV

Need to contact a FWS field office about a species? Follow this link to find your local FWS Office.

Group	Name	Population	Status	Lead Office	Recovery Plan	Recovery Plan Action Status	Recovery Plan Stage
Birds	Red knot (*Calidris canutus rufa*)	Wherever found	Threatened	New Jersey Ecological Services Field Office			
Insects	Rusty patched bumble bee (*Bombus affinis*)	Wherever found	Endangered	Minnesota-Wisconsin Ecological Services Field Office			
Mammals	Gray wolf (*Canis lupus*)	MN	Threatened	Minnesota-Wisconsin Ecological Services Field Office			
Mammals	Canada Lynx (*Lynx canadensis*)	Wherever Found in Contiguous U.S.	Threatened	Montana Ecological Services Field Office	Recovery Outline for the Contiguous United States Distinct Population Segment of Canada Lynx (Lynx canadensis)	Recovery efforts in progress, but no implementation information yet to display.	Outline
Mammals	Northern Long-Eared Bat (*Myotis septentrionalis*)	Wherever found	Threatened	Minnesota-Wisconsin Ecological Services Field Office			

Figure 9: USFWS ECOS Results

A Minnesota Geographic Information System (GIS) National Heritage Information (NHIS) search was also conducted of all threatened and endangered (T & E) species located within a 1 mile radius of the Rapids CWIS. The NHIS database system is updated on a regular basis and this search was conducted in January 2018. There are two species located in the river downstream from the Rapids CWIS and no threatened or endangered species located within 1 mile upstream.

- *Ligumia recta* (Black Sandshell)
- *Lasmigona compressa* (Creek Heelsplitter)

Figure 10: NHIS Database Search Results

(vii) Documentation of any public participation or consultation with Federal or State agencies undertaken in development of the plan.

MP has not engaged in consultations with Federal fish and wildlife agencies or public agencies relative to the Rule for Rapids. However, a Fisheries Research Permit was secured from the Minnesota DNR for 2016 and 2017 in order to collect and preserve fish collected from the intake during the impingement study.

(viii) If the information requested in paragraph (r)(4)(i) of this section is supplemented with data collected using field studies, supporting documentation for the Source Water Baseline Biological Characterization must include a description of all methods and quality assurance procedures for sampling and data analysis, including a description of the study area; taxonomic identification of sampled and evaluated biological assemblages (including all life stages of fish and shellfish); and sampling and data analysis methods. The sampling and/or data analysis methods you use must be appropriate for a quantitative survey and based on consideration of methods used in other biological studies performed within the same source water body. The study area should include, at a minimum, the area of influence of the cooling water intake structure.

No source waterbody biological supplemental studies were conducted in the Blandin Paper Mill Reservoir. A one year impingement study was conducted in 2016-2017 but that study was conducted at the Rapids CWIS.

(ix) This part clarifies that the Source Water Baseline Characterization Data for owners/operators of existing facilities or new units at existing facilities is the information in paragraphs (r)(4)(i) through (xii) of this section.

This provision simply contains a statement of clarification and does not call for any specific information. This report does provide the information required under §122.21(r)(4)(i-xii).

(x) Identification of protective measures and stabilization activities that have been implemented and a description of how these measures and activities affected the baseline water condition near the intake.

Rapids does not employ protective or stabilization activities.

(xi) A list of fragile species, as defined at 40 CFR 125.92(m).

EPA defines a fragile species of fish or shellfish at §125.92(m) as either one of 14 listed species or as those that have an impingement survival rate of less than 30 percent. No listed fragile species were collected during the 2016-2017 impingement study.

(xii) Owners/operators of existing facilities that have incidental take exemptions or authorization for its cooling water intake structure(s) from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service to provide any information submitted to obtain those exemptions or authorizations to satisfy the permit application information requirement of paragraph 40 CFR 125.95(f) if included in the application.

MP has no incidental take exemptions or authorization for the Rapids CWIS from either the U.S Fish and Wildlife Service or the National Marine Fisheries Service.

Cooling Water System Data - §122.21(r)(5)

The Rule at §122.21(r)(5) requires MP to provide the following cooling water system data for Rapids:

(i) A narrative description of the operation of the cooling water system and its relationship to cooling water intake structures; the proportion of the design intake flow that is used in the system; the number of days of the year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable; the proportion of design intake flow for contact cooling, non-contact cooling, and process uses; a distribution of water reuse to include cooling water reused as process water, process water reused for cooling, and the use of gray water for cooling; a description of reductions in total water withdrawals including cooling water intake flow reductions already achieved through minimized process water withdrawals; a description of any cooling water that is used in a manufacturing process either before or after it is used for cooling, including other recycled process water flows; the proportion of the source waterbody withdrawn (on a monthly basis);

Rapids employs a once-through cooling system with all cooling water withdrawn through the CWIS. The system is further discussed in the "Cooling Water Intake Structure Data" section of this document.

The proportion of intake flow used for non-contact cooling and process uses is as follows:

- Blandin process uses = 35%
- Rapids non-contact cooling = 65%
- Contact cooling = 0%

The proportion of source waterbody withdrawn is as follows:

- Average Outflow at Pokegama Dam = 1151.5 cfs
- Maximum Outflow at Pokegama Dam = 4150 cfs
- Minimum Outflow at Pokegama Dam = 200 cfs
- Rapids/Blandin Use = 38 cfs
- Proportion of Source Waterbody Withdrawn = 3.3%

(ii) Design and engineering calculations prepared by a qualified professional and supporting data to support the description required by paragraph (r)(5)(i) of this section; and

Supporting documentation is located under in the "Cooling Water Intake Structure Data" section of this document.

(iii) Description of existing impingement and entrainment technologies or operational measures and a summary of their performance, including but not limited to reductions in impingement mortality and entrainment due to intake location and reductions in total water withdrawals and usage.

Rapids employs a single standard through-flow traveling water screen that does not have fish protection features so it is not designed or operated to reduce impingement.

Chosen Method of Compliance with Impingement Mortality Standard - §122.21(r)(6)

The Rule at §122.21(r)(6) requires MP to discuss the chosen method of compliance with the impingement mortality standard for Rapids. Facilities must either select one of the seven alternatives at §125.95(c)(1) through (7), unless the facility qualifies for an exemption for low levels of impingement or less stringent standards. The owner/operator must identify the chosen compliance method for the entire facility; alternatively, the applicant must identify the chosen compliance method for each cooling water intake structure at its facility. For impingement mortality reduction BTA for the Rapids CWIS, Rapids should qualify for an exemption based on having a "*de minimis* rate of impingement" as discussed §125.94(c)(11) of the Rule.

The Rule at §125.94(c)(11) states "*In limited circumstances, rates of impingement may be so low at a facility that additional impingement controls may not be justified. The Director, based on review of site-specific data submitted under 40 CFR 122.21(r), may conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted. For threatened or endangered species, all unauthorized take is prohibited by the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.). Notice of a determination that no additional impingement controls are warranted must be included in the draft or proposed permit and the Director's response to all comments on this determination must be included in the record for the final permit.*"

Under 40 CFR 125.94 (11) Rapids qualifies for *de minimis* rate of impingement. The 2016-2017 impingement study resulted in the collection of only 93 fish, over half of those fish being collected on a single day, October 3, 2016. On this same date the facility worked with the Sherriff's Department and Army Corps of Engineers to minimize river discharge through the adjacent dam to support a search and rescue effort on the river. Flows at the Grand Rapids Dam were reduced from 1500 cfs to 1050 cfs. It is possible the isolated increase in fish collected from the intake screen was related to the reduction in flow through the dam. Based on the study results an annual estimate of impingement was made by extrapolating the data on dates when fish were collected at the same rate as the 24 hour sample to the next sampling date and then summing the results over the entire one year impingement study. Since flows remained relatively constant between collection dates no adjustment was made

for the minor changes in flow. Full results along with the daily flow data are provided in Appendix A. Using this method it is estimated that annual impingement is 499 finfish per year. EPRI maintains an impingement database which contains estimated annual impingement levels for 165 facilities (EPRI 2011). The annual impingement number for the lowest 5% of facilities of all the facilities in the database was less than 1,100 fish/year. With estimated annual impingement for Rapids at 499 fish/year, Rapids annual impingement was less than half that number. Further, at 499 impinged fish/year it means the rate of impingement is <1.4 fish per day which is likely less than one fishermen would catch in a day.

In addition, the threatened and endangered species review did not identify any species or habitat adversely impacted by the existing CWIS.

For the above stated reasons, a Notice of Determination (NOD) of no additional impingement controls is warranted for Rapids Energy Center.

Entrainment Performance Studies - §122.21(r)(7)

The Rule at §122.21(r)(7) requires MP to discuss entrainment performance studies for Rapids, if applicable. The §122.21(r)(7) information (i.e., Entrainment Performance Studies) is not considered "applicable" for Rapids, since the entrainment information is not required as the AIF is <125 mgd (design intake flow is 22 mgd) and it is not listed as required for the impingement mortality BTA determination in the Rule (see Table VIII-2 of the Rule preamble on page 48362 of the Rule). However, MP is providing this information.

Specifically, the Rule requires: "*The owner or operator of an existing facility must submit any previously conducted studies or studies obtained from other facilities addressing technology efficacy, through-facility entrainment survival, and other entrainment studies. Any such submittals must include a description of each study, together with underlying data, and a summary of any conclusions or results. Any studies conducted at other locations must include an explanation as to why the data from other locations are relevant and representative of conditions at your facility. In the case of studies more than 10 years old, the applicant must explain why the data are still relevant and representative of conditions at the facility and explain how the data should be interpreted using the definition of entrainment at 40 CFR 125.92(h).*"

MP has never conducted entrainment performance studies at Rapids.

Operational Status - §122.21(r)(8)

The Rule at §122.21(r)(8) requires that MP discuss Rapids' operational status.

(i) For power production or steam generation, descriptions of individual unit operating status including age of each unit, capacity utilization rate (or equivalent) for the previous 5 years, including any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors, including identification of any operating unit with a capacity utilization rate of less than 8 percent averaged over a 24-month block contiguous period, and any major upgrades completed within the last 15 years, including but not limited to boiler replacement, condenser replacement, turbine replacement, or changes to fuel type;

Required capacity utilization data for the past five years is provided in **Tables 6** and **7** for Turbine 6 and Turbine 7 respectively as well as other required information.

Table 6: Turbine 6 Capacity Utilization Rates

	2012	2013	2014	2015	2016	5 Yr Avg
Jan	39.6%	35.9%	50.2%	38.1%	40.6%	40.9%
Feb	32.1%	29.7%	42.9%	34.4%	38.1%	35.4%
Mar	47.8%	33.4%	44.1%	25.9%	38.4%	37.9%
Apr	40.2%	40.6%	45.3%	35.5%	32.0%	38.7%
May	50.5%	42.5%	30.1%	34.4%	41.1%	39.7%
Jun	23.8%	34.8%	46.1%	41.0%	41.2%	37.4%
Jul	46.4%	43.6%	52.4%	35.5%	40.2%	43.6%
Aug	40.5%	47.3%	47.4%	39.4%	42.6%	43.4%
Sep	34.0%	45.6%	40.9%	37.6%	38.5%	39.3%
Oct	42.4%	44.6%	38.2%	37.6%	32.2%	39.0%
Nov	38.9%	26.6%	38.9%	37.5%	40.5%	36.5%
Dec	34.3%	42.3%	38.2%	39.0%	40.8%	38.9%
Annual	39.2%	38.9%	42.9%	36.3%	38.8%	39.2%

Age of Unit: 49 years (1969)

Major upgrades in the last 15 years: Condenser tube replacement (2010)

Table 7: Turbine 7 Capacity Utilization Rates						
	2012	2013	2014	2015	2016	5 Yr Avg
Jan	60.4%	65.9%	59.2%	66.1%	64.9%	63.3%
Feb	48.9%	52.2%	45.9%	71.0%	68.5%	57.3%
Mar	42.2%	54.8%	56.8%	44.3%	49.9%	49.6%
Apr	31.4%	50.6%	49.0%	63.5%	46.3%	48.2%
May	32.4%	49.7%	35.8%	44.1%	48.4%	42.1%
Jun	41.1%	50.2%	43.5%	48.8%	52.4%	47.2%
Jul	44.0%	43.6%	39.3%	51.7%	49.6%	45.6%
Aug	44.5%	18.1%	31.8%	53.3%	47.9%	39.1%
Sep	17.4%	38.7%	51.9%	46.8%	53.9%	41.7%
Oct	49.1%	29.9%	46.7%	46.8%	29.4%	40.4%
Nov	62.4%	19.9%	52.9%	63.1%	63.1%	52.3%
Dec	65.5%	35.7%	60.1%	65.1%	53.2%	55.9%
Annual	44.9%	42.4%	47.8%	55.4%	52.3%	48.6%

Age of Unit: 40 years (1978)

Major upgrades in the last 15 years: None

(ii) Descriptions of completed, approved, or scheduled upgrades and Nuclear Regulatory Commission relicensing status of each unit at nuclear facilities;

Rapids has no nuclear units and therefore §122.21(r)(8)(ii) is not applicable to this facility.

(iii) For process units at your facility that use cooling water other than for power production or steam generation, if you intend to use reductions in flow or changes in operations to meet the requirements of 40 CFR 125.94(c), descriptions of individual production processes and product lines, operating status including age of each line, seasonal operation, including any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors, any major upgrades completed within the last 15 years, and plans or schedules for decommissioning or replacement of process units or production processes and product lines;

The Turbine 6 condenser tubes were replaced in 2010. There were no other structural upgrades to the Rapids CWIS in the last 15 years. No major structural upgrades are planned

for the next five years, however water use may be reduced due to decommissioning of one of the paper machines in early 2018 at Blandin Paper Mill.

(iv) For all manufacturing facilities, descriptions of current and future production schedules; and

Rapids is a steam electric generating facility and does not use water for manufacturing purposes. However, Blandin Paper Mill continuously utilizes 3000–4000 gpm of Rapids cooling water discharge in the paper manufacturing process. In addition, between the months of October and April 5000–6000 gpm of heated wastewater discharge is recycled by redirecting it back to the intake to prevent freezing.

(v) Descriptions of plans or schedules for any new units planned within the next 5 years."

There are no plans for new units at Rapids in the next five years.

References

Electric Power Research Institute, 2011. National and Regional Summary of Impingement and Entrainment of Fish and Shellfish Based on an Industry Survey of §316(b) Characterization Studies, Technical Report 1019861.

United States Environmental Protection Agency (USEPA). 2014. National Pollutant Discharge Elimination System - Final Regulations To Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities; Final Rule. Federal Register 79 (15 August 2014). 48300-48439.

Appendix A

Rapids 2016-2017 Fish Impingement Data

Date *Yellow = Samples Collected*	Blandin Intake Water Flow (GPM)	Rapids Turbine 6 Water Flow (GPM)	REC + Blandin (Total GPM)	Total Flow (Cubic Feet/Sec)	Fish Species	Number of Fish Collected
6-May-16	4,200	12,257	16,457	36.7		0
7-May-16	3,921	12,356	16,276	36.3		0
8-May-16	3,990	12,398	16,389	36.5		0
9-May-16	3,944	12,442	16,386	36.5		0
10-May-16	3,747	12,476	16,224	36.1		0
11-May-16	3,833	12,469	16,302	36.3		0
12-May-16	3,828	12,429	16,257	36.2		0
13-May-16	3,891	12,423	16,315	36.3		0
14-May-16	3,915	12,400	16,315	36.3		0
15-May-16	3,837	12,399	16,237	36.2		0
16-May-16	3,801	12,379	16,180	36.0		0
17-May-16	3,844	12,351	16,196	36.1		0
18-May-16	3,865	12,329	16,194	36.1		0
19-May-16	3,764	12,313	16,077	35.8		0
20-May-16	3,833	12,295	16,128	35.9	Bluegill	3
					Perch	4
21-May-16	4,076	12,281	16,357	36.4		7
22-May-16	3,847	12,262	16,109	35.9		7
23-May-16	3,758	12,224	15,981	35.6		7
24-May-16	4,042	12,202	16,244	36.2		7
25-May-16	4,006	12,179	16,185	36.1		0

26-May-16	4,171	12,163	16,334	36.4		0
27-May-16	4,268	12,153	16,422	36.6		0
28-May-16	4,210	12,106	16,316	36.4		0
29-May-16	4,131	12,100	16,231	36.2		0
30-May-16	4,179	12,111	16,290	36.3		0
31-May-16	3,969	12,089	16,058	35.8		0
1-Jun-16	3,871	12,043	15,914	35.5	Bluegill	1
					Perch	2
2-Jun-16	3,965	12,032	15,997	35.6		3
3-Jun-16	4,017	12,021	16,039	35.7		0
4-Jun-16	4,018	11,995	16,013	35.7		0
5-Jun-16	3,913	12,001	15,915	35.5		0
6-Jun-16	3,896	11,990	15,886	35.4		0
7-Jun-16	3,906	11,956	15,862	35.3		0
8-Jun-16	3,923	11,948	15,871	35.4		0
9-Jun-16	3,922	11,934	15,857	35.3		0
10-Jun-16	4,014	11,915	15,930	35.5		0
11-Jun-16	4,052	11,868	15,920	35.5		0
12-Jun-16	4,008	11,844	15,852	35.3		0
13-Jun-16	3,957	11,831	15,788	35.2		0
14-Jun-16	3,969	11,801	15,770	35.1		0
15-Jun-16	4,110	11,759	15,869	35.4		0
16-Jun-16	4,333	11,732	16,065	35.8		0
17-Jun-16	4,100	11,656	15,756	35.1		0

18-Jun-16	4,026	11,796	15,822	35.3		0
19-Jun-16	4,344	11,789	16,133	35.9		0
20-Jun-16	4,087	11,721	15,808	35.2		0
21-Jun-16	4,001	11,681	15,682	34.9		0
22-Jun-16	4,270	11,614	15,884	35.4		0
23-Jun-16	4,320	11,495	15,815	35.2		0
24-Jun-16	4,292	8,890	13,182	29.4		0
25-Jun-16	4,567	11,714	16,281	36.3		0
26-Jun-16	4,291	11,699	15,990	35.6		0
27-Jun-16	4,111	11,670	15,780	35.2		0
28-Jun-16	4,270	11,713	15,983	35.6		0
29-Jun-16	4,275	11,691	15,966	35.6		0
30-Jun-16	4,172	11,665	15,837	35.3		0
1-Jul-16	4,117	11,658	15,775	35.1		0
2-Jul-16	4,122	11,674	15,797	35.2		0
3-Jul-16	4,229	11,695	15,925	35.5		0
4-Jul-16	4,289	11,759	16,047	35.8		0
5-Jul-16	4,592	11,698	16,290	36.3		0
6-Jul-16	4,563	11,669	16,233	36.2		0
7-Jul-16	4,520	11,736	16,257	36.2		0
8-Jul-16	4,418	11,715	16,133	35.9		0
9-Jul-16	4,352	11,700	16,052	35.8		0
10-Jul-16	4,441	11,711	16,152	36.0		0
11-Jul-16						0

	4,408	11,708	16,116	35.9		
12-Jul-16	4,574	11,701	16,275	36.3		0
13-Jul-16	4,779	11,681	16,460	36.7		0
14-Jul-16	4,238	11,638	15,876	35.4		0
15-Jul-16	4,350	11,612	15,962	35.6		0
16-Jul-16	4,289	11,619	15,909	35.4		0
17-Jul-16	4,348	11,610	15,958	35.6		0
18-Jul-16	4,258	11,540	15,797	35.2		0
19-Jul-16	4,558	11,525	16,083	35.8		0
20-Jul-16	4,738	11,549	16,288	36.3		0
21-Jul-16	5,033	11,524	16,557	36.9		0
22-Jul-16	5,067	11,479	16,545	36.9		0
23-Jul-16	4,961	11,471	16,432	36.6		0
24-Jul-16	4,958	11,454	16,411	36.6		0
25-Jul-16	4,882	11,445	16,328	36.4		0
26-Jul-16	4,841	11,454	16,295	36.3		0
27-Jul-16	4,736	11,359	16,095	35.9		0
28-Jul-16	4,687	11,395	16,082	35.8		0
29-Jul-16	4,755	11,541	16,296	36.3		0
30-Jul-16	4,801	11,514	16,315	36.4		0
31-Jul-16	4,800	11,498	16,298	36.3		0
1-Aug-16	5,003	11,479	16,482	36.7		0
2-Aug-16	4,954	11,434	16,388	36.5		0
3-Aug-16	4,738	11,423	16,161	36.0		0

4-Aug-16	4,888	11,408	16,296	36.3		0
5-Aug-16	4,755	11,361	16,116	35.9		0
6-Aug-16	4,602	11,360	15,962	35.6		0
7-Aug-16	4,751	11,351	16,102	35.9		0
8-Aug-16	4,632	11,344	15,976	35.6		0
9-Aug-16	4,841	11,357	16,197	36.1		0
10-Aug-16	4,329	11,331	15,660	34.9		0
11-Aug-16	4,381	11,330	15,710	35.0	Bluegill	13
12-Aug-16	4,319	11,327	15,646	34.9	Bluegill	10
13-Aug-16	4,426	11,306	15,733	35.1		23
14-Aug-16	4,626	11,296	15,922	35.5		23
15-Aug-16	4,431	11,285	15,716	35.0		23
16-Aug-16	4,460	11,262	15,722	35.0		23
17-Aug-16	4,313	11,252	15,565	34.7		23
18-Aug-16	4,271	11,230	15,500	34.5		23
19-Aug-16	4,553	11,205	15,758	35.1		23
20-Aug-16	4,507	11,185	15,692	35.0		23
21-Aug-16	4,294	11,164	15,458	34.4		23
22-Aug-16	4,468	11,162	15,630	34.8		23
23-Aug-16	4,668	11,163	15,831	35.3		23
24-Aug-16	4,561	11,136	15,697	35.0		23
25-Aug-16	4,336	11,116	15,452	34.4		23
26-Aug-16	4,329	11,116	15,445	34.4	Bluegill	1
27-Aug-16						1

	4,200	11,086	15,286	34.1		
28-Aug-16	4,379	11,087	15,466	34.5		0
29-Aug-16	4,356	11,086	15,442	34.4		0
30-Aug-16	4,578	11,076	15,654	34.9		0
31-Aug-16	4,724	11,040	15,764	35.1		0
1-Sep-16	4,426	11,037	15,463	34.5		0
2-Sep-16	4,432	11,032	15,464	34.5		0
3-Sep-16	4,334	11,053	15,387	34.3		0
4-Sep-16	4,232	11,067	15,299	34.1		0
5-Sep-16	4,442	11,067	15,509	34.6		0
6-Sep-16	4,363	11,024	15,387	34.3		0
7-Sep-16	4,225	10,999	15,224	33.9		0
8-Sep-16	4,406	11,001	15,407	34.3		0
9-Sep-16	4,263	11,009	15,271	34.0		0
10-Sep-16	4,383	11,006	15,390	34.3		0
11-Sep-16	4,290	11,026	15,317	34.1		0
12-Sep-16	4,161	11,017	15,178	33.8		0
13-Sep-16	3,847	11,009	14,856	33.1		0
14-Sep-16	3,908	11,044	14,952	33.3		0
15-Sep-16	4,015	11,067	15,082	33.6		0
16-Sep-16	4,011	11,112	15,122	33.7		0
17-Sep-16	4,028	11,097	15,125	33.7		0
18-Sep-16	4,049	11,093	15,142	33.7		0
19-Sep-16	4,124	11,074	15,198	33.9		0

20-Sep-16	3,994	10,965	14,959	33.3		0
21-Sep-16	3,900	11,018	14,918	33.2		0
22-Sep-16	3,899	11,084	14,983	33.4		0
23-Sep-16	3,834	11,096	14,930	33.3		0
24-Sep-16	3,871	11,107	14,978	33.4		0
25-Sep-16	4,054	11,119	15,173	33.8		0
26-Sep-16	4,310	11,093	15,403	34.3		0
27-Sep-16	3,707	11,074	14,781	32.9		0
28-Sep-16	4,034	11,092	15,126	33.7		0
29-Sep-16	3,972	11,097	15,069	33.6		0
30-Sep-16	4,041	11,066	15,107	33.7		0
1-Oct-16	4,138	11,146	15,284	34.1		0
2-Oct-16	4,070	11,179	15,250	34.0		0
3-Oct-16	3,916	11,191	15,107	33.7	Bluegill	14
					Crappie	36
4-Oct-16	3,830	11,201	15,031	33.5		50
5-Oct-16	3,756	11,196	14,951	33.3		0
6-Oct-16	3,761	11,158	14,919	33.2		0
7-Oct-16	3,815	11,142	14,956	33.3		0
8-Oct-16	4,000	11,141	15,142	33.7		0
9-Oct-16	4,030	11,151	15,181	33.8		0
10-Oct-16	4,122	11,196	15,319	34.1		0
11-Oct-16	4,141	5,328	9,469	21.1		0
12-Oct-16	4,139	-	4,139	9.2		0

13-Oct-16	3,520	3,170	6,690	14.9		0
14-Oct-16	3,628	5,980	9,608	21.4		0
15-Oct-16	3,588	9,574	13,162	29.3		0
16-Oct-16	3,596	9,496	13,092	29.2		0
17-Oct-16	3,697	9,455	13,151	29.3		0
18-Oct-16	3,758	9,395	13,154	29.3		0
19-Oct-16	3,831	8,575	12,407	27.6		0
20-Oct-16	3,800	6,053	9,853	22.0		0
21-Oct-16	3,843	5,945	9,788	21.8	Crappie	2
					Largemouth Bass	1
22-Oct-16	3,775	5,896	9,672	21.5		3
23-Oct-16	3,746	5,897	9,642	21.5	Crappie	1
24-Oct-16	4,067	6,031	10,098	22.5		1
25-Oct-16	3,714	6,021	9,735	21.7		1
26-Oct-16	3,847	6,341	10,188	22.7		1
27-Oct-16	3,816	6,680	10,496	23.4		1
28-Oct-16	3,841	6,804	10,645	23.7		1
29-Oct-16	3,789	6,449	10,238	22.8		1
30-Oct-16	3,928	6,077	10,006	22.3		1
31-Oct-16	3,990	6,102	10,093	22.5		1
1-Nov-16	3,736	6,678	10,414	23.2		1
2-Nov-16	3,811	6,442	10,253	22.8		1
3-Nov-16	3,703	6,018	9,721	21.7		1
4-Nov-16						1

	3,649	5,963	9,613	21.4		
5-Nov-16	3,663	5,920	9,583	21.4		1
6-Nov-16	3,724	6,208	9,931	22.1		1
7-Nov-16	3,626	5,869	9,495	21.2		0
8-Nov-16	3,722	5,933	9,655	21.5		0
9-Nov-16	3,694	7,021	10,716	23.9		0
10-Nov-16	3,753	5,957	9,711	21.6		0
11-Nov-16	3,690	5,909	9,599	21.4		0
12-Nov-16	3,625	5,923	9,548	21.3		0
13-Nov-16	3,806	5,959	9,764	21.8		0
14-Nov-16	3,630	5,927	9,557	21.3		0
15-Nov-16	3,637	5,918	9,554	21.3		0
16-Nov-16	3,634	5,917	9,551	21.3		0
17-Nov-16	3,639	7,625	11,263	25.1		0
18-Nov-16	3,720	8,463	12,183	27.1		0
19-Nov-16	3,788	7,906	11,693	26.1		0
20-Nov-16	3,819	7,843	11,663	26.0		0
21-Nov-16	3,610	7,357	10,967	24.4		0
22-Nov-16	3,716	7,036	10,752	24.0	Crappie	1
23-Nov-16	3,688	7,778	11,466	25.5	Crappie	1
24-Nov-16	3,805	7,691	11,496	25.6		1
25-Nov-16	3,634	7,471	11,106	24.7		1
26-Nov-16	3,701	7,317	11,018	24.5		1
27-Nov-16	3,613	7,049	10,662	23.8		1

28-Nov-16	3,606	6,840	10,446	23.3		1
29-Nov-16	3,674	6,512	10,186	22.7		1
30-Nov-16	3,597	5,953	9,549	21.3	Bluegill	1
1-Dec-16	3,666	6,241	9,906	22.1		1
2-Dec-16	3,743	6,942	10,685	23.8		0
3-Dec-16	3,736	7,377	11,114	24.8		0
4-Dec-16	3,691	7,794	11,485	25.6		0
5-Dec-16	3,796	7,895	11,691	26.0		0
6-Dec-16	3,931	7,855	11,786	26.3		0
7-Dec-16	4,250	7,957	12,207	27.2		0
8-Dec-16	4,031	7,874	11,906	26.5		0
9-Dec-16	3,960	7,824	11,784	26.3		0
10-Dec-16	3,699	7,809	11,508	25.6		0
11-Dec-16	3,700	7,810	11,510	25.6		0
12-Dec-16	3,642	7,806	11,449	25.5		0
13-Dec-16	3,788	7,745	11,533	25.7		0
14-Dec-16	3,664	7,709	11,373	25.3		0
15-Dec-16	3,670	7,663	11,332	25.2		0
16-Dec-16	3,682	7,673	11,355	25.3		0
17-Dec-16	3,922	7,426	11,349	25.3		0
18-Dec-16	3,636	7,862	11,498	25.6		0
19-Dec-16	3,611	7,687	11,298	25.2		0
20-Dec-16	3,684	7,791	11,475	25.6		0
21-Dec-16						0

	3,327	7,781	11,107	24.7		
22-Dec-16	1,678	7,756	9,435	21.0		0
23-Dec-16	2,448	7,738	10,186	22.7		0
24-Dec-16	2,455	7,740	10,194	22.7		0
25-Dec-16	2,504	7,741	10,245	22.8		0
26-Dec-16	2,844	7,700	10,544	23.5		0
27-Dec-16	4,281	7,662	11,943	26.6		0
28-Dec-16	3,965	7,654	11,619	25.9		0
29-Dec-16	3,657	7,655	11,312	25.2		0
30-Dec-16	3,614	7,655	11,269	25.1		0
31-Dec-16	3,653	7,663	11,316	25.2		0
1-Jan-17	3,654	7,660	11,314	25.2		0
2-Jan-17	3,688	7,665	11,353	25.3		0
3-Jan-17	3,681	7,664	11,345	25.3		0
4-Jan-17	3,876	7,646	11,521	25.7		0
5-Jan-17	3,690	7,647	11,337	25.3		0
6-Jan-17	3,655	7,650	11,305	25.2		0
7-Jan-17	3,645	7,656	11,301	25.2		0
8-Jan-17	3,919	7,663	11,582	25.8		0
9-Jan-17	3,751	7,661	11,413	25.4		0
10-Jan-17	3,682	7,663	11,346	25.3		0
11-Jan-17	3,931	7,664	11,595	25.8		0
12-Jan-17	3,858	7,675	11,533	25.7		0
13-Jan-17	3,634	7,672	11,306	25.2		0

14-Jan-17	3,644	7,676	11,320	25.2		0
15-Jan-17	3,590	7,680	11,270	25.1		0
16-Jan-17	3,684	7,685	11,369	25.3		0
17-Jan-17	3,908	7,679	11,588	25.8		0
18-Jan-17	3,700	8,424	12,125	27.0		0
19-Jan-17	3,760	7,694	11,454	25.5		0
20-Jan-17	3,768	7,697	11,464	25.5		0
21-Jan-17	3,793	7,697	11,490	25.6		0
22-Jan-17	4,024	7,696	11,720	26.1		0
23-Jan-17	3,803	7,704	11,506	25.6		0
24-Jan-17	3,868	7,704	11,572	25.8		0
25-Jan-17	3,900	7,706	11,606	25.9		0
26-Jan-17	3,774	7,713	11,487	25.6		0
27-Jan-17	3,680	7,713	11,394	25.4		0
28-Jan-17	3,981	7,702	11,683	26.0		0
29-Jan-17	3,744	7,690	11,434	25.5		0
30-Jan-17	3,690	7,680	11,370	25.3		0
31-Jan-17	3,976	7,701	11,677	26.0		0
1-Feb-17	3,820	7,701	11,521	25.7		0
2-Feb-17	3,903	7,687	11,590	25.8		0
3-Feb-17	3,716	7,678	11,394	25.4		0
4-Feb-17	3,874	7,683	11,557	25.7		0
5-Feb-17	3,750	7,679	11,429	25.5		0
6-Feb-17						0

	3,825	8,089	11,914	26.5		
7-Feb-17	3,790	7,696	11,486	25.6		0
8-Feb-17	4,202	7,747	11,949	26.6		0
9-Feb-17	4,018	7,704	11,722	26.1		0
10-Feb-17	3,929	7,695	11,624	25.9		0
11-Feb-17	3,819	7,684	11,503	25.6		0
12-Feb-17	3,878	7,669	11,548	25.7		0
13-Feb-17	3,873	7,666	11,540	25.7		0
14-Feb-17	3,772	7,661	11,433	25.5		0
15-Feb-17	4,032	7,663	11,695	26.1		0
16-Feb-17	3,898	7,654	11,552	25.7		0
17-Feb-17	3,678	7,654	11,331	25.2		0
18-Feb-17	3,748	7,662	11,410	25.4		0
19-Feb-17	3,731	7,655	11,386	25.4		0
20-Feb-17	3,764	7,708	11,472	25.6		0
21-Feb-17	3,797	7,655	11,452	25.5		0
22-Feb-17	3,793	7,649	11,442	25.5		0
23-Feb-17	3,740	7,643	11,383	25.4		0
24-Feb-17	3,853	7,632	11,485	25.6		0
25-Feb-17	3,745	7,628	11,373	25.3		0
26-Feb-17	3,775	7,618	11,392	25.4		0
27-Feb-17	3,768	7,617	11,385	25.4		0
28-Feb-17	3,865	7,599	11,463	25.5		0
1-Mar-17	3,744	7,589	11,332	25.2		0

2-Mar-17	3,736	7,588	11,324	25.2		0
3-Mar-17	3,725	7,584	11,309	25.2		0
4-Mar-17	3,751	7,584	11,334	25.3		0
5-Mar-17	3,716	7,584	11,299	25.2		0
6-Mar-17	3,646	7,784	11,430	25.5		0
7-Mar-17	3,778	7,568	11,347	25.3		0
8-Mar-17	3,777	7,583	11,360	25.3		0
9-Mar-17	3,671	7,570	11,242	25.0		0
10-Mar-17	3,680	7,558	11,238	25.0		0
11-Mar-17	3,729	7,544	11,273	25.1		0
12-Mar-17	3,789	7,558	11,348	25.3		0
13-Mar-17	3,683	7,552	11,235	25.0		0
14-Mar-17	3,747	7,536	11,284	25.1		0
15-Mar-17	3,814	7,506	11,320	25.2		0
16-Mar-17	3,780	7,516	11,296	25.2		0
17-Mar-17	3,738	7,515	11,252	25.1		0
18-Mar-17	3,773	7,516	11,289	25.2		0
19-Mar-17	4,084	7,512	11,596	25.8		0
20-Mar-17	3,966	7,505	11,471	25.6		0
21-Mar-17	4,193	7,491	11,684	26.0		0
22-Mar-17	3,758	7,487	11,245	25.1		0
23-Mar-17	3,736	7,473	11,209	25.0		0
24-Mar-17	3,888	7,466	11,354	25.3		0
25-Mar-17						0

	3,769	7,464	11,233	25.0		
26-Mar-17	3,753	7,440	11,193	24.9		0
27-Mar-17	3,926	7,548	11,474	25.6		0
28-Mar-17	3,854	7,520	11,374	25.3		0
29-Mar-17	3,919	7,512	11,431	25.5		0
30-Mar-17	4,148	7,881	12,029	26.8		0
31-Mar-17	3,462	7,624	11,086	24.7		0
1-Apr-17	3,332	8,054	11,386	25.4		0
2-Apr-17	3,309	8,110	11,419	25.4		0
3-Apr-17	3,370	8,354	11,724	26.1		0
4-Apr-17	3,281	8,107	11,388	25.4		0
5-Apr-17	3,733	7,606	11,339	25.3		0
6-Apr-17	4,110	7,605	11,715	26.1		0
7-Apr-17	4,156	7,661	11,817	26.3		0
8-Apr-17	4,013	7,987	11,999	26.7		0
9-Apr-17	4,091	7,925	12,016	26.8		0
10-Apr-17	3,833	7,845	11,677	26.0		0
11-Apr-17	3,866	7,779	11,645	25.9		0
12-Apr-17	3,782	7,726	11,507	25.6		0
13-Apr-17	3,821	7,696	11,517	25.7		0
14-Apr-17	3,808	7,679	11,487	25.6		0
15-Apr-17	3,838	7,794	11,632	25.9		0
16-Apr-17	3,849	8,157	12,006	26.7		0
17-Apr-17	3,852	8,205	12,057	26.9		0

18-Apr-17	3,846	8,166	12,012	26.8		0
19-Apr-17	3,860	8,154	12,014	26.8		0
20-Apr-17	3,822	8,146	11,969	26.7		0
21-Apr-17	3,802	8,139	11,941	26.6		0
22-Apr-17	3,925	8,174	12,099	27.0		0
23-Apr-17	3,789	8,142	11,930	26.6		0
24-Apr-17	3,868	8,202	12,071	26.9		0
25-Apr-17	3,753	8,426	12,180	27.1		0
26-Apr-17	3,885	8,440	12,325	27.5		0
27-Apr-17	3,894	8,514	12,408	27.6		0
28-Apr-17	3,815	8,613	12,428	27.7		0
29-Apr-17	3,814	8,547	12,360	27.5		0
30-Apr-17	3,925	8,433	12,358	27.5		0
1-May-17	3,873	8,459	12,332	27.5	Crappie	3
2-May-17	3,843	8,444	12,287	27.4		0
3-May-17	3,886	8,447	12,333	27.5		0
4-May-17	4,036	8,449	12,485	27.8		0
5-May-17	4,133	8,445	12,578	28.0		0
6-May-17	4,145	8,436	12,581	28.0		0
7-May-17	4,109	8,422	12,531	27.9		0
8-May-17	4,054	8,419	12,473	27.8		0
9-May-17	3,323	8,445	11,768	26.2		0
10-May-17	3,234	8,455	11,689	26.0		0
11-May-17						0

	3,026	4,748	7,774	17.3		
12-May-17	2,272	-	2,272	5.1		0
13-May-17	1,666	-	1,666	3.7		0
14-May-17	1,515	-	1,515	3.4		0
15-May-17	1,467	-	1,467	3.3		0
16-May-17	1,639	-	1,639	3.7		0
					Total	499

Appendix B

(Not Provided)