Application for a New License for a Major Water Power Project Greater than 5 Megawatts

Cornell Hydroelectric Project

FERC Project No. 2639

Prepared for

Prepared by

Mead & Hunt

meadhunt.com

Volume 1 of 4
Initial Statement and
Exhibits A, B, C, D, E, and H

Volume 1 of 4
Initial Statement and Exhibits A, B, C, D, E, and H

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Before the
Federal Energy Regulatory Commission
Application for a New License
For a Major Water Power Project
Greater than 5 Megawatts

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1. *Xcel Energy Services, Inc. on behalf of Northern States Power Company - Wisconsin, a Wisconsin Corporation, applies to the Federal Energy Regulatory Commission (FERC) for a new license for the existing Cornell Hydroelectric Project (FERC Project No. 2639), as described in the attached exhibits.*

2. *The location of the project is:*

State or territory:	Wisconsin
County:	Chippewa
Township or nearby town:	City of Cornell, Town of Birch Creek, Town of Lake Holcombe, and Town of Estella, all in Wisconsin.
Stream:	Lower Chippewa River – River Mile 103
Other:	Located in northwest Chippewa County, approximately 40 miles by road northeast of the city of Eau Claire, Wisconsin and approximately 115 miles east by road of the city of St. Paul, Minnesota.

A project location map and project area map are included as Appendix A-1 and A-2, respectively.

3. *The exact name and business address of the applicant are:*

Northern States Power Company – Wisconsin (NSPW) d/b/a Xcel Energy
1414 W. Hamilton Avenue
PO Box 8
Eau Claire, WI 54702

The exact name and business address of each person authorized to act as agent for the applicant in this application are:

Mr. James Zyduck
Director, Hydro Plants
Xcel Energy
1414 W. Hamilton Avenue, PO Box 8
Eau Claire, WI 54702

Mr. Matthew Miller
Hydro License Compliance Consultant
Xcel Energy
1414 W. Hamilton Avenue, PO Box 8
Eau Claire, WI 54702

4. *Applicant is a domestic corporation and is not claiming preference under Section 7(a) of the Federal Power Act. See 16 U.S.C. 796.*

5. *a. The statutory or regulatory requirements of the state(s) in which the project would be located and that affect the project as proposed, with respect to bed and banks and to the appropriation, diversion, and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting, and distributing power and in any other business necessary to accomplish the purposes of the license under the Federal Power Act, and*

In accordance with Section 401 of the Federal Water Pollution Control Act, 22 U.S.C. S1341, the applicant must obtain water quality certification, or a waiver thereof, from the State of Wisconsin. In Wisconsin, the Certification Program is administered by the Wisconsin Department of Natural Resources (WDNR).

This is an existing project that is owned and operated by NSPW. Applicant is a corporation duly organized and existing under the laws of the State of Wisconsin and is duly authorized by it Articles of Incorporation to engage in the business of generating, transmitting, and distributing power.

Chapter 31 Wisconsin Statutes Regulation of Dams and Bridges Affecting Navigable Waters.

Applicant must comply with the provisions of the Coastal Zone Management Act (CZMA) of 1972.

b. The steps the applicant has taken or plans to take to comply with each of the laws cited above are outlined below:

Applicant will apply to the WDNR for the Section 401 water quality certificate pursuant to Section 401 of the Clean Water Act for continued operation of the Project.

NSPW has complied with all state laws necessary for its corporate existence, for engaging in the business of a public electric utility, and for ownership operation and maintenance of the Cornell Hydroelectric Project.

Electric utilities are governed by various statutes and regulated by the Public Service Commission of Wisconsin.

The Wisconsin Coastal Resources Management Program (WCMP) is responsible for implementing the State of Wisconsin's coastal zone management program. The State of Wisconsin Coastal Zone Management Program is limited to only the 15 counties that have frontage on Lake Superior and Lake Michigan. Chippewa County, the county containing the Cornell Project, is not located within this coastal zone. The Licensee requested a formal written determination of consistency with the WCMP on March 2, 2021.

Northern States Power Company owns or has all the rights to all lands necessary for the operation of the hydroelectric project.

6. *Name and address of the owner of any existing project facilities:*

Northern States Power Company – Wisconsin, d/b/a Xcel Energy
1414 W. Hamilton Avenue, PO Box 8
Eau Claire, WI 54702

The dam associated with the Project is not federally owned or operated.

7. *Information provided below complies with Section 4.32 of 18 CFR 5.18. Each application must:*

a. For a preliminary permit or a license, identify every person, citizen, association of citizens, domestic corporation, municipality, or state that has or intends to obtain and will maintain any proprietary right necessary to construct, operate, or maintain the project;

NSPW is the sole entity that intends to maintain any proprietary right necessary to construct, operate, or maintain the Project.

b. For a license, identify (providing names and mailing addresses):

i. Every county in which any part of the project and any federal facilities that would be used by the project would be located:

Ms. Jaclyn Sadler, County Clerk
Chippewa County
711 N. Bridge Street
Chippewa Falls, WI 54729

No federal facilities are used by the project.

ii. Every city, town, Indian Tribe, or similar local political subdivision in which any part of the project is located and any federal facility that is used by the project is located:

Mr. Dave DeJongh, Clerk/Treasurer
City of Cornell
222 Main Street
PO Box 796
Cornell, WI 54372

Ms. Tracey Larson, Town Clerk
Town of Lake Holcombe
25001 273rd Street
Holcombe, WI 54745

Ms. Elizabeth Hillebrand, Town Clerk
Town of Estella
22886 State Highway 27
Cornell, WI 54732

Ms. Robin Stender, Town Clerk
Town of Birch Creek
26344 240th Street
Holcombe, WI 54745

Ms. Linda Laird, Town Clerk
Town of Cleveland
20165 County Hwy Z
Cornell, WI 54732

No federal facilities are used by the Project.

iii. *Every city, town, Indian Tribe, or similar local political subdivision that has a population of 5,000 or more people and is located within 15 miles of the project dam:*

None

c. *Every irrigation district, drainage district, or similar special purpose political subdivision:*

i. *In which any part of the project is located and any federal facility used by the project is located:*

Northwest Regional Planning Commission
1400 S. River Street
Spooner, WI 54801

No federal facilities are used by the Project.

ii. *That owns, operates, maintains, or uses any project facility or any federal facility used by the project:*

None

d. *Every other political subdivision in the general area of the project that there is reason to believe would be likely to be interested in or affected by the notification:*

All Indian tribes that may be affected by the project:

Mr. Nathan Allison, Tribal Historic Preservation Officer
Stockbridge-Munsee Community Band of Lake Mohican Indians
86 Spring Street
Williamstown, MA 01267

Mr. Gary Bahr, Vice Chairperson
Sac and fox Nation of Missouri in Kansas and Nebraska
305 N. Main Street
Reserve, KS 66434

Mr. Brian Bissontte, Tribal Historic Preservation Officer
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of Wisconsin
13394 West Trepania Road
Hayward, WI 54843

Mr. Jonathon Buffalo, NAGRAPRA Representative
Sac and Fox of the Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339-9629

Ms. Paula Carrick, Tribal Historic Preservation Officer
Bay Mills Indian Community of WI
12140 Lake Shore Drive
Brimley, MI 49715-9319

Mr. Marvin Defoe, Tribal Historic Preservation Officer
Red Cliff Band of Lake Superior Chippewa Indians of Wisconsin
88385 Pike Road, Hwy. 13
Bayfield, WI 54814

Mr. Robert Deschampe, Chairperson
Grand Portage Band of Chippewa Indians
PO Box 428
Grand Portage, MN 55604

Mr. David Grignon, Tribal Historic Preservation Officer
Menominee Indian Tribe of Wisconsin
PO Box 910
Keshena, WI 54135

Ms. Jill Hoppe, Tribal Historic Preservation Officer
Fond du Lac Band of Lake Superior Chippewa
1720 Big Lake Road
Cloquet, MN 55720

Mr. Ryan Howell, Tribal Historic Preservation Officer
Prairie Island Indian Community
5636 Sturgeon Lake Road
Welch, MN 55089

Iowa Tribe of Oklahoma
Cultural Preservation Office
RR 1, Box 721
Perkins, OK 74059

Mr. Michael LaRonge, Tribal Historic Preservation Officer
Forest County Potawatomi Community of Wisconsin
PO Box 340
Crandon, WI 54520

Ms. Edith Leoso, THPO
Bad River Band of Lake Superior Tribe of Chippewa Indians
PO Box 39
Odanah, WI 54861

Ms. Sandra Massey, NAGRA Representative
Sac and Fox Nation of Oklahoma
920883 S. Highway 99, Building A
Stroud, OK 74079

Ms. Wanda McFaggen, Tribal Historic Preservation Officer
St. Croix Band Chippewa Indians of Wisconsin
24663 Angeline Avenue
Webster, WI 54893-9246

Ms. Daisy McGeshick, Tribal Historic Preservation Officer
Lac Vieux Desert Band of Lake Superior Chippewa Indians
Ketegitigaaning Ojibwe Nation
PO Box 249
Watersmeet, MI 49969

Mr. Earl Meshigaud, Cultural Director
Hannahville Potawatomi Indian Community
M-14911 Hannahville B1 Road
Wilson, MI 49896

Mr. Clinton Parish, Chairman
Bay Mills Indian Community of Michigan
12410 W. Lakeshore Drive
Brimley, MI 49715-9319

Mr. Cecil E Pavlat Sr., Cultural Repatriation Specialist
Sault Ste. Marie Tribe of Chippewa Indians
523 Ashmun Street
Sault Ste. Marie, MI 49783

Mr. William Quackenbush, Tribal Historic Preservation Officer
Ho-Chunk Nation
Executive Offices
PO Box 667
Black River Falls, WI 54615

Mr. Warren C. Swartz, Jr., President
Keweenaw Bay Indian Community
107 Beartown Road
Baraga, MI 49908

Mr. Adam Van Zile, Tribal Historic Preservation Officer
Sokoagon Chippewa Community, Mole Lake Band
3051 Sand Lake Road
Crandon, WI 54520

Mr. Warren Wahweotten Jr., Tribal Historic Preservation Officer
Prairie Band Potawatomi Nation
162Q Road
Mayetta, KS 66509

Mr. Noah White, Tribal Historic Preservation Officer
Prairie Island Indian Community
5636 Sturgeon Lake Road
Welch, MN 55089

Ms. Sherry White, Tribal Historic Preservation Officer
Stockbridge – Munsee Community of Wisconsin
N8476 Mo-He-Con-Nuck Road
Bowler, WI 54416

Ms. Corina Williams Tribal Historic Preservation Officer
Oneida Nation of Wisconsin
PO Box 365
Oneida, WI 54155-0365

James Williams, Jr., President
Lac Vieux Desert Band of Lake Superior Chippewa Indians
PO Box 249
Watersmet, MI 49969

Ms. Melinda Young, Tribal Historic Preservation Officer
Lac du Flambeau Band of Lake Superior Chippewa Indians of Wisconsin
PO Box 67
Lac du Flambeau, WI 54538

8. *As to any facts alleged in the application or other materials filed, be subscribed and verified under oath in the form set forth in paragraph (2)#)(ii) of Section 9.32 by the person filing, an officer thereof, or other person having knowledge of the matters set forth.*

This application is executed in the:

State of Wisconsin

County of Eau Claire

By James Zyduck

Being duly sworn, deposes and says the contents of this application are true to the best of his knowledge. The undersigned applicant this 4th day of June, 2021.

James Zyduck
Director of Regional Generation
Northern States Power Company-Wisconsin

Subscribed and sworn before me, a Notary Public, of the State of Wisconsin this 4th day of June, 2021.

Notary Public

SEAL
C. VAN GORDEN-DUEX
NOTARY PUBLIC, STATE OF WISCONSIN

Cornell Hydroelectric Project
FERC Project No. 2639

Exhibit A
Description of Project

Draft License Application

Prepared for

Prepared by

Mead & Hunt

meadhunt.com

June 2021

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TABLES

LIST OF ABBREVIATIONS

cfs	cubic feet per second
Cornell Project	Cornell Hydroelectric Project
d/b/a	doing business as
FERC	Federal Energy Regulatory Commission
kW	Kilowatts
kV	Kilovolts
kVA	Kilovolt Amperes
Licensee	Northern States Power Company-Wisconsin d/b/a Xcel Energy
MOD	Motor-Operated Disconnect
NGVD	National Geodetic Vertical Datum 1929
NSPW	Northern States Power Company-Wisconsin d/b/a Xcel Energy
rpm	revolutions per minute
WDNR	Wisconsin Department of Natural Resources

1. Description of Structures

The Cornell Hydroelectric Project (Cornell Project) is located on the Chippewa River at approximately River Mile 103 in northwest Chippewa County, Wisconsin. **Appendix A-1**[1] of this application includes a map showing the general location of the Cornell Project. **Appendix A-2** presents an aerial photograph showing the Cornell Project structures, which include the Cornell Dam, powerhouse, appurtenant facilities, reservoir, and surrounding land to an approximate elevation 1,002.0 feet National Geodetic Vertical Datum 1929[2] (NGVD) in most areas. From left to right looking downstream, the principal project works consist of a non-overflow bulkhead section with intake, a powerhouse section with integral intake, a left gated spillway section, a non-overflow concrete section, a right gated spillway section, an overflow spillway section with flashboards, and a right earthen embankment section[3]. In addition, a generator leads to a step-up transformer in an adjacent outdoor substation. The point of interconnection with the grid is the motor-operated disconnect (MOD) contained within the adjacent outdoor substation.

1.1 Non-Overflow Bulkhead Section with Intake

The 42-foot wide concrete non-overflow section is located on the east bank of the Chippewa River. The face is composed of a retaining wall founded on bedrock with a two-foot wide parapet. The parapet is approximately 78 feet long and adjoins to the powerhouse section at an angle of about 50 degrees from parallel. The parapet has a top elevation of 1,010.0 feet. A water intake passage for Unit 4 and the paper mill intake, which is not associated with the Cornell Project, are housed within the concrete bulkhead. Both intakes are protected by a vertical bar trashrack with a clear spacing of 2.375 inches. The intake for Unit 4 is 9.83 feet wide and can be closed by lowering a steel head gate with a stationary electric winch (Kleinschmidt Associates, 2016). The paper mill intake can be closed by manually operating a slide gate.

1.2 Powerhouse Section

The powerhouse section is located between the non-overflow bulkhead section and the left gated spillway section. It includes the powerhouse and integral gate house, which is approximately 131 feet long at its upstream face and extends approximately 151.5 feet downstream. The powerhouse section, including the gate house, is approximately 82 feet high when measured from the bottom of the tailrace at 937 feet to the top of the powerhouse. The powerhouse is constructed of reinforced concrete (NSPW, 2020b).

The powerhouse contains three horizontal shaft, tube-type hydraulic turbines and one vertical hydraulic turbine. Each horizontal turbine is connected to its own 10,000-kilowatt (kW) generator and the vertical turbine is connected to a 750-kW generator, for a total combined authorized capacity of 30,750 kW.

The integral gate house is positioned in front of the powerhouse on the upstream side and contains three 24-foot wide by 24-foot high steel tainter gates that open and close each time Units 1, 2, and 3 start and stop generation. A vertical bar trashrack protects these three intakes from debris. The three primary intake bays have total widths between 42 and 45 feet; however, concrete piers and vertical support beams for the trashrack reduce the open intake width of each bay to approximately 35 feet. The trashrack is approximately 25 feet high by 130 feet long and is divided into three sections, one for each unit. The vertical bar clear spacing is 5.375 inches (Kleinschmidt Associates, 2016).

[1] All Appendices are located in *Volume 3 of 4, Appendices*
[2] All elevations in this document are given in National Geodetic Vertical Datum 1929.
[3] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document filed with the FERC April 30, 2020 (NSPW, 2020a).

1.3 Spillway Sections

The spillway section is divided into three sections: left gated spillway, right gated spillway, and overflow spillway. The combined width of the three sections is 586 feet. **Table 1.3-1** below shows the water discharge capacities of the Cornell Project spillway sections and powerhouse.

Table 1.3-1: Cornell Project Discharge Capacities

Structure	Discharge (cfs)*		
	Pool elevation at 1,002.0 ft	**100-Year Flood (El. 1,004.7 ft)**	**Top of Earth Dike (El. 1,010.0 ft)**
Left Gated Spillway (Gates A & B)	18,000	22,000	30,000
Right Gated Spillway (Gates 1-12)	56,400	73,600	77,000
Overflow Spillway (Flashboards)	0	11,200	35,000
Powerhouse Discharge capacity is 0 when total discharge exceeds 60,000 cfs	12,000; 0 when discharge exceeds 60,000 cfs	0	0
Total	74,400	106,800	142,000

Source: Ayres Associates, 2007; * cubic feet per second (cfs)

1.3.1 Left Gated Spillway Section

The left gated spillway section is approximately 85[4] feet long by 58 feet high with a top of pier elevation of 1,008 feet. It is a gravity spillway located between the powerhouse section and the non-overflow section. It extends approximately 85 feet downstream and has a spillway crest elevation of 982.2 feet. The section contains two 37-foot wide by 23.3-foot high steel tainter gates (Gates A and B) with a top elevation of approximately 1,005.5 feet. These gates were installed during the reconstruction of the powerhouse between 1974 and 1976. Each gate is operated with its own electric hoist. These gates are typically operated remotely from the Licensee's Wissota Generation Control Center, located at the Wissota Hydroelectric Project. The gates can also be operated manually at the site and are heated to allow operation during the winter months.

1.3.2 Right Gated Spillway Section

The right gated spillway section is approximately 292 feet long by 58 feet high with a top of pier elevation of 1,004.2 feet. It is a gravity spillway located between the left gated spillway section and the overflow spillway section. It extends approximately 54 feet downstream and has a spillway crest elevation of 986.2 feet. The section contains twelve 20-foot long by 16-foot high[5] steel tainter gates with a top elevation of 1,002.2 feet. The gates are operated by two motor-operated hoists that travel on steel rails mounted on the spillway piers and steel deck. Air is bubbled in front of all the tainter gates during the winter to reduce ice pressures.

1.3.3 Overflow Spillway Section

The overflow concrete spillway section is located between the right gated spillway section and right earthen embankment section. This section is approximately 210 feet long by 28 feet high with a crest elevation of 998.2 feet. It consists of four bays that are each 51 feet wide. It extends downstream

[4] The length was incorrectly listed as 84 feet in the Pre-Application Document.
[5] The height was incorrectly listed as 16.75 feet in the Pre-Application Document.

approximately 23 feet. The overflow spillway section is topped with 48-inch high flashboards with a top elevation of approximately 1,002.2 feet. The flashboards are constructed of treated plywood supported by vertical pins and were last replaced in 2017. Air is bubbled in front of the overflow spillway section during the winter to reduce ice pressures.

1.4 Non-Overflow Concrete Section

A 10-foot long non-overflow concrete dam section is located between the left gated spillway section and right gated spillway section. This section has an elevation of 1,004.2 feet and was originally used as a log sluice and fishway after construction. The log sluice and fishway was filled with concrete between 1974 and 1976 when the powerhouse was reconstructed and the left gated spillway was installed.

1.5 Earthen Embankment

The earthen embankment is approximately 91 feet long and extends from the concrete overflow spillway to the right abutment. The embankment is approximately 9.8 feet high from the top of the downstream concrete wingwall and has an 8-foot top width with 3:1 upstream side slope and 1.5:1 downstream side slope. The embankment top is approximately elevation 1,010.0 feet while the concrete core top has an elevation of 1,009.2 feet. The downstream slope is partially protected by grouted riprap, and concrete chips have been placed over the riprap in recent years for added protection. In addition, a concrete wingwall extends from the overflow spillway section along the downstream side of the embankment.

2. Description of Reservoir

The reservoir impounded by the Cornell Dam has a maximum depth of 55.7 feet (WDNR, 2018). The water surface area is approximately 897 acres and the storage capacity is 7,005 acre-feet at reservoir elevation of 1,000.6 feet (Hartnett, 2015). The reservoir area is approximately 985 acres and has a gross storage capacity of approximately 8,000 acre-feet at the maximum reservoir elevation of 1,002.0 feet. The storage capacity decreases to approximately 6,500 acre-feet at the minimum reservoir elevation of 1,000.0 feet, which results in 1,500 acre-feet of usable storage capacity.

3. Description of Generating Units

3.1 Unit 1, 2, and 3

The powerhouse contains three horizontal shaft, tube-type, hydraulic turbines with fixed blade propeller runners and fixed vanes. The turbines do not have the usual wicket gates and standard governor controls. Each turbine is rated at 13,900 horsepower when operating at a speed of 100 revolutions per minute (rpm). Under a net head of 36 feet. Turbine operation is possible over a range of net heads from 25 to 39 feet. Each turbine is controlled by a hydraulically operated steel tainter gate. There are three identical horizontal shaft, forced-air cooled, enclosed, alternating current, synchronous generators with static excitation. Each generator is rated at 11,111 kilovolt-amperes (kVA); 0.9 power factor; 10,000 kW; 7.2 kilovolt (kV); 100 rpm; and three-phase 891 amperes per phase at 60˚C rise. Each static excitation unit is 170 kW. Each generator is connected to the 7.2 kV substation bus through an air circuit breaker (NSPW, 1984). Minimum flow per unit is 3,750 cfs at a 70% gate opening. While it is possible to operate the units at a lower gate setting, they are not because cavitation issues become a concern at lower gate settings. Maximum capacity with all three units operating is 11,250 cfs (NSPW, 2020b).

3.2 Unit 4 - Minimum Flow Unit

The powerhouse contains one vertical hydraulic turbine with a propeller-type runner operating at a speed of 450 rpm and at 36 feet of head. This turbine is used to release the 400 cfs minimum flow through the wicket gates with motor-operated limit torque operation. One vertical shaft, air-cooled, alternating current, synchronous with brushless rotating main shaft driven exciter, forced oil lubrication, 7.2 kV, 800 kVA, 750 kW generator runs at 450 rpm (NSPW, 1984). When the primary generating units (Units 1-3) are online, Unit 4 is run at a reduced load to limit turbine wear. When the primary units are shut down due to low flow, Unit 4 is operated at its maximum hydraulic capacity of 400 cfs (NSPW, 2020b).

4. Transmission Equipment

The Cornell Project includes 160-foot-long generator leads that connect to a 7.2 to 115 kV step-up transformer and MOD within the adjacent outdoor substation at the plant. Auxiliary station power is provided by a transformer bank connected to the plant bus. The generated electrical power is conveyed to the electrical grid within the adjacent outdoor substation; the MOD serves as the point of interconnect. A diagram of principal electrical circuits associated with the Cornell Project is included in **Appendix A-3.**

5. Appurtenant Equipment

The Cornell Project is remotely operated from the Licensee's Wissota Generation Control Center, which is staffed continuously. Accessory electrical equipment, such as relay devices and sensors, switchgear, switchboards, panels, control equipment, and associated wiring required for the safe, self-protected, remote operation of the turbine-generator units (with manual override) is included as a part of the licensed Cornell Project. Additional equipment includes, but is not limited to, bearing lubrication systems, gate hoist equipment, hoisting equipment for maintenance and repair of the turbine generators, protective devices, and metering devices. This equipment, as well as miscellaneous office equipment and tools, are also included in the licensed Cornell Project. The plant has the necessary plumbing, heating and ventilating system, electrical lighting, and station service power as appropriate for safe function.

6. United States Land within the Cornell Project Boundary

There are no federal lands located within the boundary of the Cornell Project.

7. List of References

- Ayres Associates. 2007. Discharge Capacity Investigation, Holcombe Hydroelectric Project and Cornell Hydroelectric Project. May 2007.
- Hartnett, Sean. 2015. Cornell Flowage-Chippewa River Bathymetric Map. August 2015 River Survey.
- Kleinschmidt Associates. 2016. Chippewa River Fish Protection Study. Final Report. Prepared for Xcel Energy. November 2016.
- Northern States Power Company-Wisconsin (NSPW). 1984. Revised Exhibit A. October 23, 1984.
- Northern States Power Company-Wisconsin (NSPW). 2020a. Standard Technical Information Document. April 30, 2020.
- Northern States Power Company-Wisconsin (NSPW). 2020b. Matt Miller Personal Communication, May 19, 2020.
- Wisconsin Department of Natural Resources (WDNR) Website. 2018. https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2181400. Accessed October 25, 2018.

Cornell Hydroelectric Project
FERC Project No. 2639

Exhibit B
Project Operation and Resource Utilization

Draft License Application

Prepared for

Prepared by

Mead & Hunt

meadhunt.com

June 2021

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TABLES

LIST OF ABBREVIATIONS

cfs	cubic feet per second
Cornell Project	Cornell Hydroelectric Project
d/b/a	doing business as
FERC	Federal Energy Regulatory Commission
Licensee	Northern States Power Company-Wisconsin
NSPW	Northern States Power Company-Wisconsin d/b/a Xcel Energy
Settlement Agreement	Lower Chippewa River Settlement Agreement
USGS	United States Geological Survey

1. Project Operation

The Cornell Hydroelectric Project (Cornell Project) is owned and operated by Northern States Power Company – Wisconsin d/b/a Xcel Energy (NSPW, Licensee). The Cornell Project is operated in a limited peaking mode[1]. NSPW is not proposing any substantial modifications to operations at this time.

1.1 Chippewa River Basin Flow Management

The Cornell Hydroelectric Project is located on the Chippewa River and is one of six hydroelectric projects NSPW operates in a 58-mile stretch of the lower Chippewa River. The project names and associated Federal Energy Regulatory Commission (FERC) license numbers include the following in upstream to downstream order: Holcombe (P-1982), Cornell (P-2639), Jim Falls (P-2491), Wissota (P-2567), Chippewa Falls (P-2440), and Dells (P-2670). Five of the six projects are owned by NSPW; the Dells Project is jointly owned with the city of Eau Claire. The Cornell Project is operated in tandem with the Holcombe Project, which is 5.5 miles upstream (NSPW, 2001).

The Lower Chippewa River Settlement Agreement (Settlement Agreement) was approved in 2001 to allow NSPW to continue facility peaking operations in conjunction with modifying operations to create a more natural, stable water level and flow regime. The Settlement Agreement limited reservoir fluctuations, increased minimum flows, provided recreational flows at some project locations, and re-regulated the incoming peaking flows at the Dells Project.

The Settlement Agreement limits the Cornell Project reservoir fluctuation to 0.5 feet between elevations 1,001.5 and 1,002.0 feet National Geodetic Vertical Datum 1929[2] annually from April 1 to June 7 to enhance fish spawning. Each year from June 8 to Labor Day, the reservoir elevation is maintained between 1,001.0 and 1,002.0 feet during the hours of noon to 8:00 p.m. At all other times, the reservoir elevation is maintained between 1,000.0 and 1,002.0 feet. The Settlement Agreement also increased the Cornell Project minimum flow releases from 236 to 400 cubic feet per second (cfs) (NSPW, 2001). On February 12, 2003, the FERC approved an amendment to the Cornell Project license to implement the reservoir elevations and flows required under the Settlement Agreement (FERC, 2003).

1.2 Operation of the Cornell Project

The Cornell Project is operated as a limited peaking plant and is monitored remotely from the Licensee's Wissota Generation Control Center where personnel are present 24 hours per day, 365 days per year. Operators at the Generation Control Center can remotely operate the two tainter gates (Gates A and B) on the left gated spillway adjacent to the powerhouse and monitor the headwater and tailwater elevations.

A one-person workforce is assigned to the Cornell Project site for local operation whenever the remote system is out of service, as well as for general housekeeping, minor maintenance duties, and operation of the right gated spillway (Gates 1-12, not operated remotely). An operator is on site during normal daytime working hours. On weekends and times outside of normal working hours, additional operators can be called to the site if assistance is needed. The average response time is 30 minutes. In addition, if an alarm sounds and cannot be cleared by the Generation Control Center, the operator is contacted.

[1] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document filed with the FERC on April 30, 2020 (NSPW, 2020a).

[2] All elevations in this document are given in National Geodetic Vertical Datum 1929.

1.2.1 Reservoir Normal Operations

The maximum reservoir elevation at the Cornell Project is 1,002.0 feet. The reservoir is required to maintain elevations between 1,001.5 and 1,002.0 feet annually between April 1 and June 7. From June 7 to Labor Day between the hours of noon and 8:00 p.m., the reservoir elevations must remain between 1,001.0 and 1,002.0 feet. At all other times, the reservoir elevation must be maintained and operated between the elevations of 1,000.0 and 1,002.0 feet. A minimum flow of 400 cfs is required to be released at all times to protect aquatic habitat and fish spawning areas downstream (NSPW, 2001).

In the event of an electrical failure, an emergency generator provides alternating current power to the spillway tainter gates, gate heaters, deicing blower, and emergency power panel. If the emergency generator were to fail, the uninterruptible power supply system would power the plant's control system for one hour beyond the onset of an outage. If power is unavailable, a gas-powered generator is available to power the two left gated spillway tainter gates. This generator is tested monthly. Hand cranks are available for manual operation of the two mobile gate hoists located on the right gated spillway. However, manual operation of the mobile gate hoists limits the time frame to open Gates 1-12.

1.2.2 Reservoir High Flow Operations

The maximum hydraulic capacity at the Cornell Project is 11,650 cfs. Gates A and B on the left gated spillway are operated when flows exceed 11,650 cfs. These two tainter gates are used to maintain normal pool elevations for as long as possible without exceeding an opening height of six feet in order to minimize downstream tailwater elevations near the powerhouse. Tainter Gates 1-12 on the right gated spillway and the flashboard spillway are used to pass flows exceeding the capacity of Gates A and B. A siren sounds and strobe light is activated whenever any gates are opened. Gates 11 and 12 are generally the last gates to be opened. Opening Gates 11 and 12 results in backflow downstream of the flashboard spillway causing pools to develop and potentially stranding fish. These gates are generally only used during larger flood events and operators complete a review for stranded fish once Gates 11 and 12 are closed.

1.2.3 Reservoir Low Flow Operations

The minimum flow unit, which is designated as Unit 4, is located in the powerhouse. This unit is operated continuously during low inflows and maintains a river flow of 400 cfs. Unit 4 underwent a turbine runner replacement following the Settlement Agreement to allow it to efficiently generate at the minimum flow release of 400 cfs, which is the minimum hydraulic capacity for the Cornell Project.

1.3 Plant Factor

The following equation is used to determine the average annual plant factor:

Average Annual Plant Factor = (Average Annual Output) ÷ (Nameplate Capacity × 8,750 hours/year)

The Cornell Project has a gross average annual energy production (output) of approximately 113,839 megawatt-hours per year and an annual plant factor of approximately 0.423 based on its current FERC authorized capacity of 30.75 megawatts.

2. Generating Characteristics and Flow Data

2.1 Average Annual Generation

Annual generation for the existing Cornell Plant, which has a generating capacity of 30.75 megawatts, averaged approximately 113,839 megawatt-hours for the 5-year period ending in 2020.

2.2 River Flow Characteristics

Flow in the Chippewa River in the reach of the Cornell Plant is recorded by one U.S. Geological Survey (USGS) surface water gaging station, Gaging Station No. 05365500, which is located on the right bank of the Chippewa River at Chippewa Falls, Wisconsin. The gage experienced a break in data collection that resulted in discontinuous records from September 1983 to October 1986. Therefore data prior to October 1986 was not utilized. All data provided in this section is based on USGS Gaging Station No. 05365500 for a period of record from October 1986 to December 2020[3]. The drainage area at the Chippewa Falls gage is 5,650 square miles adjusted for the drainage area of 4,780 square miles at the Cornell Dam.

2.2.1 Mean Monthly Flow

The mean monthly flow at the Cornell Dam is shown below in **Table 2.2.1-1**.

Table 2.2.1-1: Mean Monthly Flows

Month	Mean Monthly Flow (cfs)
January	2,365
February	2,441
March	5,115
April	9,933
May	6,968
June	5,464
July	3,376
August	2,987
September	3,584
October	4,298
November	3,823
December	2,868

Source: USGS Gaging Station No. 05365500

[3] Flow data from April 1, 2020 through December 31, 2020 is provisional.

2.2.2 Flow Duration Curves

Flow duration data shows the percentage of time a given flow is equaled or exceeded. Monthly flow-duration curves and the annual exceedance table are based on data collected for the period of record from October 1986 to December 2020 and are included in **Appendix B-4[4].**

2.2.3 Discharge Variation

The Cornell Dam discharge variations are shown below in **Table 2.2.3-1**. Discharge variations are based on data collected for the period of record from October 1986 to December 2020.

Table 2.2.3-1: Variation in Discharge

Flow Statistic	Flow Statistic Value (cfs)	Date(s)
Annual mean	4,435	1986-2020
Highest annual mean	7,504	2019
Lowest annual mean	2,011	2009
Highest daily mean	51,184	April 13, 2002
Lowest daily mean	198	Feb. 16, 1990
10-percent exceedance	8,799	--
50-percent exceedance	2,919	--
90-percent exceedance	1,184	--

Source: USGS Gaging Station No. 05365500

Table 2.2.3-2 below shows the Chippewa River peak discharge for flood events at the Cornell Dam, as identified in the Cornell Hydroelectric Project (P-2639) Supporting Technical Information Document filed with FERC on April 30, 2020 (NSPW, 2020a).

Table 2.2.3-2: Flood Discharge

Flood Type	Peak Discharge (cfs)
Flood of Record (September 1, 1941)	102,000
100-year Flood	105,000
Zero Freeboard Spillway Capacity	142,000
Inflow Design Flood	54,660
Probable Maximum Flood	238,000

[4] All Appendices are located in *Volume 3 of 4, Appendices*

2.3 Dependable Capacity

Dependable capacity refers to the power the Cornell Project is guaranteed to produce during future hours of peak demand under adverse flow conditions. The hydraulic capacity for the Cornell Project is 11,650 cfs and the installed capacity is 30.75 megawatts. The dependable capacity has been assumed to be the capacity provided at the minimum average annual flow of 3,573 cfs experienced in the period of record (October 1986 to December 2020), which was 30.7 percent of the Project's maximum hydraulic capacity. Based on this data, the Cornell Project would have a dependable capacity of 9.4 megawatts.

2.4 Area Capacity Curves

Appendix B-5 presents area capacity and storage capacity curves for the Cornell Project. The reservoir encompasses 985 acres with a gross storage capacity of 8,000 acre-feet at the maximum elevation of 1,002.0 feet. At the minimum elevation of 1,000.0 feet, the reservoir encompasses 865 acres with a storage capacity of 6,500 acre-feet. The usable storage capacity at the Cornell Project is 1,500 acre-feet (Hartnett 2015, as interpolated by Mead & Hunt).

2.5 Plant Estimated Hydraulic Capacity

The maximum hydraulic capacity is 11,650 cfs and the minimum hydraulic capacity is 400 cfs.

2.6 Tailwater Rating Curve

The Cornell Project discharges into the Chippewa River immediately downstream of the powerhouse. Under normal operating conditions, the tailrace elevation varies in direct response to the operation of the Cornell Project. The tailwater rating curve is included as **Appendix B-6**.

2.7 Plant Capability Versus Head

Water surface elevations on the lower Chippewa River are determined by the Settlement Agreement and applicable FERC license. Normal, minimum, and maximum headwater elevations for the Cornell Dam are provided below in **Table 2.7-1**.

Table 2.7-1: Headwater Elevations

Reservoir Elevation	Elevation (feet)
Normal	1,001.6
Maximum	1,002.0
Minimum	1,000.0

The amount of head available for power generation is dependent on tailwater elevation which varies with flow. Plant capability based on maximum generator output at various head elevations for Cornell Project are presented as **Appendix B-7**.

3. Utilization of Public Power

The power generated by the Cornell Project is delivered to NSPW's system for sale to customers. NSPW is a public utility that produces, purchases, transmits, and distributes power to retail customers. An estimated 34,000 households can be served by the power generated by the Cornell Project (NSPW, 2020b).

4. Proposed Future Development

NSPW is not proposing any future development at this time.

5. List of References

- Federal Energy Regulatory Commission (FERC). 2003. Order Amending License (Article 13) and Modifying Minimum Flows and Reservoir Elevations. Issued February 12, 2003.
- Northern States Power Company – Wisconsin (NSPW). 2001. Lower Chippewa River Settlement Agreement. January 17, 2001.
- Northern States Power Company – Wisconsin (NSPW). 2020a. Standard Technical Information Document. April 30, 2020.
- Northern States Power Company – Wisconsin (NSPW). 2020b. Matthew Miller, Personal Communication. May 19, 2020.

Cornell Hydroelectric Project
FERC Project No. 2639

Exhibit C
Construction History

Draft License Application

Prepared for

Prepared by

Mead & Hunt

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LIST OF ABBREVIATIONS

Cornell Project	Cornell Hydroelectric Project
d/b/a	doing business as
FERC	Federal Energy Regulatory Commission
NGVD	National Geodetic Vertical Datum 1929

1. Construction Activity History

The Cornell Hydroelectric Project (FERC No. 2639) (Cornell Project) was originally constructed to furnish water, mechanical power, and in-plant electricity for a paper mill operation. In 1911, Brunet Falls Manufacturing Company began preliminary clearing of the flowage areas, dam site, and paper products manufacturing plant. In 1913, the dam, powerhouse, and adjacent paper products plant were placed into operation. In 1914, Cornell Wood Products Company acquired all of Brunet Falls Manufacturing Company property. Northern States Power Company – Wisconsin d/b/a Xcel Energy (NSPW) obtained ownership of the flowage lands and associated land rights, dam, powerhouse, turbines, and hydroelectric generating equipment from Cornell Wood Products Company in 1929 (NSPW, 1972). Major construction and/or development events of the Cornell Project are described in the following paragraphs[1].

1916

Cornell Wood Products Company constructed the downstream spillway/powerhouse tailrace division wall (NSPW, 1972).

1930-1931

The powerhouse intake and tailrace piers, upstream portions of piers 1-7, aprons of spillway bays 1-5, and downstream right abutment retaining wall were restored. Weep holes were installed in the right retaining wall during this time.

1942

The right earthen embankment core wall was raised to an elevation of 1,009.2 feet National Geodetic Vertical Datum 1929 (NGVD); the earthen embankment was raised to 1,009.7 feet NGVD. The right abutment concrete was raised three feet. The upstream angled portion of this wall was partially raised, but no changes were made to the downstream wingwall. Additional riprap was placed on the right earthen embankment.

1952-1962

Downstream spillway piers and apron surfaces were repaired with gunite and spillway gates were painted.

1963-1965

Cavities and scoured areas of concrete on the downstream side of the spillway bays 1-7 were repaired.

1969-1970

A portion of the division wall separating the spillway from the powerhouse was rehabilitated.

1974-1976

The powerhouse was reconstructed and two new spillway tainter gates (Gates A and B) were installed. The right abutment was rebuilt upstream and raised on the downstream end.

[1] Construction history is from the April 2020 Supporting Technical Information Document for the Cornell Hydroelectric Project, FERC Project No. 2639 unless otherwise noted.

1981

Crack repairs were made on all piers separating the right gated spillway section gates (Gates 1–12).

1984

The tainter gate and flashboard spillways were rehabilitated.

1987

Downstream areas of the right abutment, overflow/flashboard spillway, and tainter gate spillway were repaired.

1992

Upstream ends of the piers downstream to the previous repairs were replaced. Upstream side of the spillway received a concrete overlay. Post-tension anchors were installed in the flashboard spillway.

2008

Right gated spillway gates (Gates 1-12) and associated hoists were modified. The work included demolition and removal of six existing gates; fabrication, assembly, and installation of six new gates; repair of four existing gates; coating of the new gates and gate repairs; demolition and removal of two hoists; fabrication, assembly, and installation of two new hoists; and modification of the hoist bridge to support the two new hoists.

2019

Riprap along the downstream left bank of the plant access road was replaced in 2019 as flooding in previous years caused the bank to slough in several locations. The bank was regraded and armored with new riprap. A new rubber roof was also installed on the intake section of the powerhouse.

2. Construction Schedule

NSPW is not proposing any construction modifications to the Cornell Project facilities at this time.

3. List of References

- Northern States Power (NSPW). 1972. Application for License for Cornell Hydro Chippewa River Cornell, Chippewa County, Wisconsin. December 8, 1972.
- Northern States Power Company – Wisconsin (NSPW). 2020. Standard Technical Information Document. April 30, 2020.

Cornell Hydroelectric Project
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Exhibit D
Project Cost and Financing

Draft License Application

Prepared for

Prepared by

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LIST OF ABBREVIATIONS

Applicant	Northern States Power Company-Wisconsin d/b/a Xcel Energy
Cornell Project	Cornell Hydroelectric Project
d/b/a	doing business as
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
MWh	megawatt hour
NSPW	Northern States Power Company-Wisconsin d/b/a Xcel Energy

1. Original Cost for Initial License

Not applicable; this application is not for an initial license.

2. Amount Payable for Section 14 Takeover

The Cornell Hydroelectric Project (Cornell Project) is owned and operated by Northern States Power Company – Wisconsin d/b/a Xcel Energy (NSPW, Applicant). The estimated net book value of the Cornell Project was calculated at $2,567,848 as of December 31, 2020 (NSPW, 2021a). The Applicant has not identified any severance damages that would result if the Cornell Project were taken over.

3. Estimated Cost for Proposed New Development

NSPW is not proposing any capacity related developments or any expansion of any land or water rights as a consequence of this application.

4. Annual Cost of Total Project as Proposed

4.1 Cost of Capital

4.1.1 Existing Project Valuation

As of December 31, 2020, the net book value for the Cornell Project was calculated at $2,567,848 and the gross book value was calculated at $22,369,116 (NSPW, 2021a). This figure includes land and land rights, structures and improvements, waterway improvements, generating equipment, accessories, and miscellaneous equipment.

4.1.2 Cost of Capital

NSPW's estimated short-term cost of capital is 3.35% and long-term cost of capital is 4.58%. Based on a gross book value of $22,369,116, the cost of capital associated with Cornell Project ownership is estimated at $1,024,506.

4.2 State, Local, and Federal Taxes

Property taxes at the Cornell Project were $123,200 per year from 2016 through 2020 (NSPW, 2021b).

4.3 Depreciation or Amortization

For calendar year 2020, the total allocated depreciation for the Cornell Project was estimated at $19,801,268 (NSPW, 2021a).

4.4 Operation and Maintenance Expenses

Average operation and maintenance expenses for the Cornell Project are provided in **Table 4.4-1**. The average cost of operation and maintenance was $465,828 per year over the period of 2016 to 2020 (NSPW, 2021c).

Table 4.4-1: Cornell Project Operation and Maintenance Expenses (2016-2020) (NSPW, 2021c)

Cost	2016	2017	2018	2019	2020	2016-2020 Mean
Total O&M Costs	$398,948	$462,846	$418,542	$510,712	$538,091	$465,828
Employee Expenses	$1,105*	$1,282*	$814	$1,997	$1,254	$1,290
Labor	$143,869*	$166,912*	$138,646	$210,707	$179,802	$167,987
Materials & Commodities	$41,335*	$47,955*	$29,654	$77,140	$45,236	$48,264
Miscellaneous	$182,271*	211.465*	$200,299	$178,307	$291,793	$212,827
Outside Services	$30,368*	$35,232*	$49,129	$42,560	$20,007	$34,459

*calculated using 2018 to 2020 mean percentage for each expense category

4.5 Capital for Proposed Environmental Measures

NSPW is still in the process of evaluating the need for environmental measures. Capital for proposed environmental measures will be provided in the Final License Application (FLA).

5. Estimated Value of Project Power

The annual value of project power is estimated based on the cost of obtaining equivalent power from an alternative source. The average cost of replacement power for both on-peak and off-peak use is $24.29 per megawatt hour (MWh). Assuming an annual energy demand of 113,839 MWh, the value of project power is $2,765,149 (NSPW, 2021d).

6. Financing and Annual Revenues Available to Meet Costs

NSPW has ample annual revenues and financing options to meet its cost of operation for the term of a new license.

7. Costs to Develop the License Application

The cost for NSPW to relicense under the Traditional Licensing Process through the filing of the FLA will be provided in the FLA.

8. Estimated Value of On-Peak Power and Off-Peak Power

The Cornell Project is an NSPW asset and is under the oversight of the Public Service Commission of Wisconsin. As shown in **Table 8-1**, the estimated average annual value of on-peak generation and off-peak generation is $1,935,038 and $1,153,334, respectively. The average value of both on-peak and off-peak use is $27.13 per MWh (NSPW, 2021e). Values of on-peak and off-peak generation are based on average historical data from 2016-2020. Values can vary depending upon market conditions, and therefore should only be used as an approximation of the value of power.

Table 8-1: Cornell Project Estimated Average Gross Revenue from On-Peak and Off-Peak Generation (2016-2020)

Description	Energy (MWh)	Nominal Market Price ($/MWh)	Average Gross Annual Revenue
Average Annual On-Peak Generation	62,120	$31.15	$1,935,038
Average Annual Off-Peak Generation	51,719	22.30	$1,153,334
Average Combined On-Peak and Off-Peak Generation	113,819	$27.13	$3,088,372

9. Estimated Change in Project Generation and Value of Project Power Due to Changes in Project Operations

NSPW is not proposing any changes that will affect power generation at the Cornell Project. The average annual amount and value of project power for the term of the new license is projected to remain the same unless modified project operations are required upon expiration of the Lower Chippewa River Settlement Agreement. If modified project operations are required, the average annual amount and value of project should be analyzed at the time of expiration.

10. List of References

- Northern States Power Company (NSPW). 2021a. Courtney Young, Email with Table. January 25, 2021.
- Northern States Power Company (NSPW). 2021b. Matthew Miller, Email with property tax information. February 9, 2021.
- Northern States Power Company (NSPW). 2021c. Sean Lacy, Email with O&M cost breakdown table, January 29, 2021.
- Northern States Power Company (NSPW). 2021d. Mary Morrison, Email with Resource Planning Information. February 16, 2021.
- Northern States Power Company (NSPW). 2021e. Matt Schmidt, Email with on-peak and off-peak energy usage and revenue. January 29, 2021.

Cornell Hydroelectric Project
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Exhibit E
Environmental Report

Draft License Application

Prepared for

Prepared by

Mead & Hunt

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[1] All Appendices are located in *Volume 3 of 4, Appendices*

LIST OF ABBREVIATIONS AND TERMS

§ ..... Section
°F ..... degrees Fahrenheit
ADA ..... Americans with Disabilities Act
AFF ..... American FactFinder
AHI ..... Architectural and Historic Inventory
Applicant ..... Northern States Power Company – Wisconsin d/b/a Xcel Energy
APE ..... Area of Potential Effect
ATIS ..... Aquatic and Terrestrial Invasive Species
Barrier free ..... ADA accessible
BITA ..... Broad Incidental Take Authorization
CFR ..... Code of Federal Regulations
cfs ..... cubic feet per second
CZMA ..... Coastal Zone Management Act
Commission ..... Federal Energy Regulatory Commission
CORP ..... Comprehensive Outdoor Recreation Plan
CWA ..... Clean Water Act
Dam ..... Cornell Dam
Dba ..... doing business as
d/b/a ..... Draft License Application
DO ..... Dissolved oxygen
DSC ..... Demographic Services Center
EA ..... EA Engineering Science and Technology, Inc
EFH ..... Essential Fish Habitat
ESA ..... Endangered Species Act
FEMA ..... Federal Emergency Management Agency
FERC ..... Federal Energy Regulatory Commission
FLA ..... Final License Application
fps ..... feet per second
GLEC ..... Great Lakes Environmental Center
GPS ..... Global Positioning System
HPR ..... High Potential Range
HPMP ..... Historic Properties Management Plan
HRMP ..... Historic Resources Management Plan
IATA ..... Ice Age Trail Alliance
IPaC ..... Information for Planning and Consultation
JAM ..... Joint Agency Meeting
KBB ..... Karner blue butterfly
Kleinschmidt ..... Kleinschmidt Group
kW ..... Kilowatts
LCRSA ..... Lower Chippewa River Settlement Agreement
Licensee ..... Northern States Power Company-Wisconsin d/b/a Xcel Energy
m ..... meter
µg/l ..... micrograms per liter
mg/l ..... milligrams per liter
ml ..... milliliter
n.d. ..... no date

NGVD ..... National Geodetic Vertical Datum 1929
NHI ..... Natural Heritage Inventory
NLEB ..... northern long-eared bat
NOI ..... Notice of Intent
NPS ..... National Park Service
NCVD ..... National Geodetic Vertical Datum 1929
NHPA ..... National Historic Preservation Act
NOAA ..... National Oceanic and Atmospheric Administration
NRCS ..... Natural Resource Conservation Service
NRHP ..... National Register of Historic Places
NR 40 ..... Chapter NR 40 of Wisconsin Administrative Code
NR 102 ..... Chapter NR 102 of Wisconsin Administrative Code
NSPW ..... Northern States Power Company-Wisconsin d/b/a Xcel Energy
PAD ..... Pre-Application Document Project
PCP ..... Poly-chlorinated biphenyl
Programmatic Agreement ..... see definition in Section 7.2
Project ..... Cornell Hydroelectric Project
RAW ..... River Alliance of Wisconsin
REA ..... Ready for Environmental Assessment
Register ..... National Register of Historic Places
rpm ..... revolutions per minute
SCORP ..... Statewide Outdoor Comprehensive Recreation Plan
Settlement Agreement ..... Lower Chippewa River Settlement Agreement
SHPO ..... State Historic Preservation Officer
SOP ..... standard operating procedures
SWIMS ..... Surface Water Information Management System
TCP ..... Traditional Cultural Property
THPO ..... Tribal Historic Preservation Officer
TLP ..... Traditional Licensing Process
TP ..... Total phosphorus
TRC ..... TRC Inc.
USC ..... United States Code
USFWS ..... United States Fish and Wildlife Service
USGS ..... United States Geologic Survey
WCMP ..... Wisconsin Coastal Management Program
WDA ..... Wisconsin Department of Administration
WDNR ..... Wisconsin Department of Natural Resources
WHPD ..... Wisconsin Historic Preservation Database
WHS ..... Wisconsin Historic Society
WQC ..... Water Quality Certification
WWA ..... Wisconsin Wetlands Association
Xcel Energy ..... Xcel Energy Services, Inc.

1. Introduction

Northern States Power Company-Wisconsin, d/b/a Xcel Energy (NSPW, Licensee or Applicant), is applying to the Federal Energy Regulatory Commission (FERC or Commission) for a new operating license for the Cornell Hydroelectric Project (FERC No. 2639). The purpose of this Exhibit E is to provide a description of the environmental setting in the vicinity of the Cornell Hydroelectric Project (Project). The Licensee prepared this Exhibit to conform to the Commission's regulations under 18 CFR § 4.38 and § 4.61, as required under the Traditional Licensing Process (TLP). Licensee's request to use the TLP was approved by the FERC on February 5, 2019.

2. Project Description

A brief description of the Project is provided below for a basis for subsequent discussions. A detailed Project description is provided in Exhibit A of the Draft License Application (DLA).

2.1 Project Facilities

The Project is located on the Chippewa River at approximately River Mile 103 in northwest Chippewa County, Wisconsin. The Project operates as a limited peaking facility to non-consumptively use water from the Chippewa River for hydroelectric generation. Project works include a non-overflow concrete bulkhead with intake; a powerhouse with an integral intake, four turbines, and four generator units; two gated spillways; a concrete non-overflow dam section; an overflow spillway with flashboards; an earthen embankment; a step-up transformer; and a transmission line. A continuous minimum flow of 400 cubic feet per second (cfs) or inflow, whichever is less, is provided downstream of the Cornell Dam (Dam). The Project has a combined total rated capacity of 30,750 kilowatts (kW).

The Licensee is not proposing any changes to Project facilities or operations.

2.2 Project Lands and Waters and Federal Lands

The FERC Project boundary is depicted on drawings included in Exhibit G of this application. No federal lands are within the boundary.

3. Pre-Filing Consultation Process

The FERC issued the Licensee an original license for 50 years on December 26, 1973, effective December 1, 1973, and expiring on November 30, 2023. On November 29, 2018, the Licensee filed a Notice of Intent (NOI) to relicense the Project, a Pre-Application Document (PAD), and a request to use the TLP. After due consideration and the opportunity for public comment, the FERC granted the Licensee's request to use the TLP on February 5, 2019. Each stage of consultation is further discussed in the following sections.

3.1 First-Stage Consultation

The Licensee distributed the NOI, PAD, and request to use the TLP to the various stakeholders on November 29, 2018. The Licensee also published a public notice of the NOI, PAD, and request to use the TLP on November 29, 2018 in the Cornell Courier Sentinel, a weekly newspaper of general circulation in the Project area. Comments on the request to use the TLP were due to the FERC within 30 days of the PAD filing, which was on or before December 30, 2018. FERC acted upon the Licensee's TLP request on February 5, 2019. In accordance with the deadlines set by the FERC, the Licensee held the Joint Agency Meeting (JAM) and site visit on March 19, 2019. A public notice of the JAM and site visit was published in the Cornell Courier Sentinel on February 21, 2019. The FERC was also notified of this meeting on February 15, 2019. The JAM and site visit were attended by a total of nine individuals from resource agencies and interested public.

Comments and study requests were received after the JAM from the following entities: City of Cornell, National Park Service (NPS), River Alliance of Wisconsin (RAW), and Wisconsin Department of Natural Resources (WDNR). Comments and study requests are discussed within each respective resource section and are summarized and included in *Volume 4, Documentation of Consultation*.

3.2 Second-Stage Consultation

3.2.1 Study Plans

Based upon the study requests submitted during the first-stage of consultation, the Licensee developed plans to perform the following:

- Aquatic and Terrestrial Invasive Species (ATIS) Study Plan
- Evaluation of Cornell Project for Eligibility for National Register of Historic Places (NRHP)
- Fish Impingement and Entrainment Study Plan
- Mussel Study Plan
- Phase I Archaeological Survey and Shoreline Monitoring
- Recreation Use Study Plan
- Water Quality Study Plan

The Licensee provided draft study plans to the agency/individual requesting the studies for comment prior to implementing the study plans. The full listing of stakeholder comments on the study plans and the Licensee's responses are included in *Volume 4, Documentation of Consultation*.

3.2.1.1 Aquatic and Terrestrial Invasive Species Study Plan

The Aquatic and Terrestrial Invasive Species Study Plan was distributed to the RAW and WDNR for comment on January 2, 2020. The WDNR did not respond with comments and a subsequent telephone conversation with Cheryl Laatsch (WDNR) indicated no comments would be provided. The RAW provided comments on January 16, 2020, which were incorporated into the final study plan.

3.2.1.2 Evaluation for National Register of Historic Eligibility

The Licensee conducted an evaluation of the Cornell Project for eligibility for the NRHP in conjunction with a Phase I Archaeological Survey of the Project shoreline. Since the procedures to conduct the studies are set forth in the existing Programmatic Agreement, no specific study plan was developed for consultation. Once completed, study reports were sent to the Wisconsin State Historic Preservation Office (SHPO) for comment as discussed in Section 3.2.2.

3.2.1.3 Fish Impingement and Entrainment Study Plan

The Fish Impingement and Entrainment Study Plan was sent to the WDNR for comment on March 31, 2020. The WDNR responded with comments on April 24, 2020, requesting the study be revised to evaluate the amount of time turbines are operated at peak efficiency since entrainment mortality is higher when turbines are operated below peak efficiency. The Licensee responded stating the Project turbines are operated at peak efficiency to prevent turbine damage due to cavitation. Therefore, no revisions to the study plan were made.

3.2.1.4 Mussel Study Plan

The Mussel Study Plan was developed in consultation with WDNR mussel specialist Lisie Kitchel and distributed to the RAW and WDNR for comment on April 2, 2020. No comments were received from the WDNR. The RAW provided comments on April 14, 2020 requesting the Licensee conduct additional mussel sampling within the littoral zone. Since Project operations are set by the 2001 Lower Chippewa River Settlement Agreement (Settlement Agreement or LCRSA), and no changes to Project operations are being proposed, no new impacts would occur to mussels within the littoral zone. Therefore, additional sampling within the littoral zone would not provide information necessary for relicensing and thus was not incorporated into the plan.

3.2.1.5 Phase I Archaeological Survey of Project Shorelines

The Licensee conducted a Phase I Archaeological Survey of the Project shorelines, in conjunction with the evaluation of the Cornell Project for eligibility for inclusion in the NRHP. Since the procedures to conduct the studies are set forth in the existing Programmatic Agreement, no specific study plan was developed for consultation. Once completed, study reports were sent to the SHPO for comment as discussed further in Section 3.2.2.

3.2.1.6 Recreation Use Study Plan

The Recreation Use Study Plan was distributed to the City of Cornell, NPS, RAW, and WDNR for comment on February 2, 2020. The City of Cornell did not provide any comments on the plan. The WDNR responded on March 10, 2020 indicating they did not have any comments. The RAW responded on March 17, 2020 indicating they did not have any comments. The NPS provided several comments on March 27, 2020. The study plan was revised to incorporate several NPS comments,

including adding a review of signage needs and another condition category to the recreation site assessment. The study plan was also revised to reflect comments received from the NPS regarding the survey use schedule.

3.2.1.7 Water Quality Study Plan

The Water Quality Study Plan was distributed to the WDNR for comment on April 4, 2020. The WDNR responded on April 24, 2020 providing the standard operating procedures (SOP) for grab sampling of nutrients. The Licensee incorporated the SOP for grab sampling of nutrients into the study plan.

3.2.2 Study Reports

The resource studies were performed in 2019 and 2020 per the updated study plans. A full listing of stakeholder comments on the study reports and the Licensee's responses can be found in *Volume 4, Documentation of Consultation*.

3.2.2.1 Aquatic and Terrestrial Invasive Species Study Report

The ATIS Study Report was distributed to the RAW and WDNR for comment on December 31, 2020. The RAW responded on January 14, 2021 indicating they had no comments. The WDNR responded on January 25, 2021 with several comments, which were incorporated into the study report. The WDNR provided additional comments on March 4, 2021 including an aquatic species identified in a submitted photo which may be wild rice. Botanists from EA Engineering Science and Technology, Inc. (EA), who completed the study, reviewed photographs, notes, and literature and determined "…the photographs do not provide enough diagnostic information to produce a definitive identification. While some characteristics may indicate Zizania, others, including what appear to be multiple florets in a spikelet, would be indicative of the original identification of Glyceria. We do not feel that the separate male and female spikelets characteristic of Zizania are clear in the photograph. Therefore, the proper recourse is to maintain the Glyceria identification as concluded by the study team." Therefore, wild rice was not identified as being present in the study report. A more thorough discussion of the ATIS study report is included in Section 6.

3.2.2.2 Evaluation for National Register of Historic Eligibility

The Evaluation for National Register of Historic Eligibility was distributed to the SHPO for concurrence on February 6, 2020 and the Forest County Potawatomi Tribal Historic Preservation Officer (THPO) for concurrence on February 22, 2020. On March 12, 2020, the SHPO responded, concurring that the facilities are eligible for the National Register. No specific comments on the NRHP eligibility were provided by the Forest County Potawatomi THPO. A more thorough discussion of agency comments and Licensee responses are included in Section 7.

3.2.2.3 Fish Impingement and Entrainment Study Report

The Fish Impingement and Entrainment Study Report was distributed to the RAW, WDNR, and United States Fish and Wildlife Service (USFWS) for comment on October 22, 2020. The WDNR provided comments on November 23, 2020. The USFWS provided comments on November 23, 2020 stating their concurrence with WDNR comments. The RAW provided comments on November 25,

2020. The WDNR provided additional comments on December 4, 2020. A more thorough discussion of agency comments and Licensee responses are included in Section 6.

3.2.2.4 Mussel Study Report

The Mussel Study Report was distributed to the RAW and WDNR on January 18, 2021. The RAW responded on February 11, 2021 indicating they had no comments. The WDNR did not respond with comments.

3.2.2.5 Phase I Archaeological Survey of Project Shorelines

The Phase I Archaeological Survey and Shoreline Monitoring Report was distributed to the SHPO for concurrence on February 6, 2020 and the Forest County Potawatomi THPO on February 25, 2020. The Forest County Potawatomi THPO and SHPO responded via email on March 23 and July 28, 2020, respectively. Both agencies concurred with the Phase I Survey Report results, including the proposed five-year monitoring schedule.

3.2.2.6 Recreation Use Study Report

The Recreation Use Study Report was distributed to the City of Cornell, NPS, RAW, and WDNR on February 19, 2020. The RAW and the NPS responded with several comments on February 24and March 21, 2021, respectively. Several citizens provided general recreation facility improvement requests. The City of Cornell requested a meeting with the Licensee rather than providing comments. A more thorough discussion of agency comments and Licensee's responses is included in Section 8.

3.2.2.7 Water Quality Study Report

The Water Quality Study Report was sent to the RAW and WDNR for comment on November 2, 2020. RAW responded on November 18, 2020 indicating they did not have comments on the report and agreed with the conclusions stating the Project has been operated within water quality standards. The WDNR responded on December 11, 2020 indicating they did not have any comments.

3.2.3 Draft License Application

This DLA is being submitted for review to the consulting parties included in the distribution list included in the cover letter. All written comments are due to FERC within 90 days of this filing.

3.3 Third-Stage Consultation

The Final License Application (FLA) will address comments received on the DLA and an electronic version will be sent via certified mail on a disc or drive to the distribution list. The FLA will also be posted on the relicensing website at: http://hydrorelicensing.com/cornell/. Documentation of delivery of the FLA will be included in *Volume 4, Documentation of Consultation* of the FLA.

3.4 Consistency with Statutory and Regulatory Requirements

3.4.1 Section 401 of the Clean Water Act

Under Section 401 of the Clean Water Act (CWA) (33 USC § 1341), any federal license or permit to conduct any activity that may result in discharge into navigable waters requires a certification from the

state in which the discharge originates that it will comply with the applicable provisions of the CWA, unless the certification is waived. Therefore, a Section 401 Water Quality Certification (WQC) or waiver is required prior to the FERC's issuance of a new license for the Project. The WDNR is the state agency designated to carry out the certification requirements prescribed in Section 401 of the CWA. Pursuant to 18 CFR § 5.23(b), the Licensee will request a Section 401 WQC from the WDNR within 60 days of the FERC issuance of the Notice of Application Ready for Environmental Analysis (REA).

3.4.2 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed endangered or threatened species, or result in the destruction or adverse modification of the species' critical habitat.

The Licensee was granted designation as the FERC non-federal representative for ESA consultation on February 5, 2019. The Licensee consulted with the USFWS and concluded that two federally listed species may occur in the Project vicinity. These species include the Karner blue butterfly (*Lycaeides melissa samuelis*) and the northern long-eared bat (*Myotis septentrionalis*). The Licensee's analysis of Project impacts on threatened and endangered species is presented in Section 6.

3.4.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) requires federal agencies to consult with the National Oceanic and Atmospheric Administration (NOAA) Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH). EFH is only applicable to federally managed commercial fish species which live at least one component of their lifecycle in marine waters. All fish in the Chippewa River are freshwater species and are not managed commercially; therefore, there is no designated EFH in the Project vicinity.

3.4.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) (Public Law 89-665) requires every federal agency to consider how each of its undertakings could affect historic properties. Historic properties are any prehistoric or historic districts, sites, building structures, Traditional Cultural Property (TCP), and objects significant in American history architecture, engineering, and culture which are eligible for inclusion in the NRHP. The Cornell Dam is eligible for listing in the NRHP. The Licensee is filing a Historic Properties Management Plan (HPMP) as part of this DLA as described in Section 7.3.2.

3.4.5 Coastal Zone Management Act

Under Section 307 (c)(3)(a) of the Coastal Zone Management Act (CZMA), FERC cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The Wisconsin Coastal Management Program (WCMP) is responsible for implementing Wisconsin's coastal management program, which includes 15 counties with frontage on Lake Superior or Lake

Michigan. The Project is not located within and does not affect the designated coastal zone for Wisconsin; therefore, the Project is not subject to coastal zone management review and a consistency certification is not needed for the Commission's relicensing of the Project. The Licensee requested a formal written determination of consistency with the WCMP on March 2, 2021. No response from the WCMP has been received as of the filing of this document.

3.4.6 Wild and Scenic River and Wilderness Act

Section 7(a) of the Wild and Scenic Rivers Act (Public Law 90-542) requires federal agencies to make a determination as to whether the operation of a project under a new license would unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated area. The Chippewa River is not a designated Wild and Scenic River by the NPS or WDNR (NPS, n.d.; WDNR, n.d.a).

The Wilderness Act (Public Law 88-577) was enacted to establish a National Wilderness Preservation System. There are no nationally designated wilderness areas within the Project vicinity.

3.4.7 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC § 668-668c) was enacted to protect eagles from human-induced alterations and human interactions. The act prohibits the take; possession; sale; purchase; barter; offer to sell, purchase, or barter; transport; export; or import of any bald or golden eagle whether alive or dead, including any eagle, part, nest, or egg. A take is defined as pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, collecting, molesting, or disturbing eagles (USFWS, 2020).

There is a recorded occurrence of a bald eagle (*Haliaeetyus leucocephalus*) nest within the Project boundary. The Licensee's analysis of Project impacts on the protected eagle is presented in Section 6.

4. General Location and Project Locale

4.1 Location

The Project is located on the Chippewa River at approximately River Mile 103 in northwest Chippewa County, Wisconsin (Fisher, 1972). The Cornell Dam impounds the Chippewa River creating the Cornell Reservoir. The Dam and principal Project works are located within the City of Cornell. From left to right when looking downstream, the principal Project works include a non-overflow bulkhead section with intake, a powerhouse section with integral intake, a left gated spillway section, a non-overflow concrete section, a right gated spillway section, an overflow spillway section with flashboards installed, and an earthen embankment with a concrete core wall.

The Project also includes a substation, electric transmission equipment, appurtenant facilities, and reservoir. Also included in the project is the surrounding land to an approximate elevation of 1,002.0[2] feet National Geodetic Vertical Datum 1929[3] (NGVD) in most areas. The facilities and property within the Project boundary are located within the City of Cornell and the Towns of Birch Creek, Cleveland, Estella, and Lake Holcombe, all in Chippewa County. The Project is one of six hydroelectric projects owned and operated by the Licensee along a 58-mile stretch of the Chippewa River and they include, in order from upstream to downstream, Holcombe (P-1982), Cornell (P-2639), Jim Falls (P-2491), Wissota (P-2567), Chippewa Falls (P-2440), and Dells (P-2670). All six projects are owned and operated by NSPW.

The Project location map is included in **Appendix A-1**. The Project and surrounding area are shown on an orthophotograph included in **Appendix E-8**. The proposed Project boundary is further described in Section 9.3 and in Exhibit G of this application.

4.2 Climate

The Project lies within the continental climate region and is characterized by very cold winters and warm summers. Weather records indicate an annual temperature range typical of this climate type. January has an average low temperature of 3 degrees Fahrenheit (°F) and is the coldest month. July has an average high temperature of 82°F and is the warmest month. Weather changes typically occur every few days (USCD, 2020).

The regional climate in the Cornell area is moderately moist with an average annual rainfall of approximately 31.6 inches. Most precipitation typically falls during the month of August, with an average of 4.6 inches. A large portion of precipitation falls during the growing season from late May through early September. The Cornell area has an average annual winter snowfall of 43 inches. The winter month of January experiences the largest snowfall with an average of 10 inches (USCD, 2020).

[2] The Project boundary elevation of 1,002.0 feet NGVD is being proposed in this application.
[3] All elevations in this document are referenced to the National Geodetic Vertical Datum 1929, unless stated otherwise.

4.3 Topography, Geology, and Soils

4.3.1 Topography

The Project is located on the southwest edge of the North Central Forest Ecological Landscape, which is characterized by end and ground moraines with occasional pitted outwash, exposed bedrock, and depressions forming poorly drained lowlands (WDNR, 2015). The surrounding topography can vary up to 100 feet in elevation, with the highest land surface at about 1,100 feet descending to the maximum reservoir elevation of 1,002 feet (USGS, 2018a; USGS, 2018b). The Chippewa River Valley carved into the surrounding landscape and now descends below the reservoir surface to an approximate elevation of 945 feet at the Dam (Hartnett, 2015). The topography in the Project and surrounding area is shown in **Appendix E-9**. A bathymetric map of the reservoir is shown in **Appendix E-10**.

4.3.2 Geology

The Project is in the Northern Highland geographic province of Wisconsin, just north of the border with the Central Plain geographic province. The Northern Highlands covers the majority of north-central Wisconsin; however, it does not border Lake Superior. This province is known as the lost mountains of Wisconsin and includes remnants of mountains which are ranked among the oldest in the world. These ancient mountains eroded to form a peneplain that later subsided below sea level, at which point sandstone and limestone were deposited. The area was uplifted one last time above sea level where it remains today. The sandstone and limestone extensively eroded which exposed remnants of the ancient mountains once again (Martin, 1965).

Bedrock in the Chippewa River Valley primarily includes exposed Pre-Cambrian granite, diorite, and gneiss, as well as Cambrian sandstone and limestone that survived erosion processes. Areas adjacent to the Chippewa River Valley are composed of Cambrian sandstone, dolomite, and shale and are considered part of the adjoining Central Plain geographic province (Martin, 1965).

4.3.3 Soils

There are 56 soil types identified in the Project vicinity. These soils are grouped into seven major soil associations and each have distinctive soil patterns, relief, and drainage factors. A custom soil resource report from the Natural Resource Conservation Service (NRCS) is provided for the Project vicinity in **Appendix E-11**.

Amery, Santiago, and Spencer soils are the most prevalent soil series found in the Project vicinity and are listed in **Table 4.3.3-1**. The most identified soil classifications are Amery sandy loam, Santiago silt loam, and Spencer silt loam, in respective order of abundance. The most common soil classifications are Amery sandy loam with 12-25% slopes, Santiago silt loam with 6-12% slopes, Amery sandy loam with 6-12% slopes, and Spencer silt loams with 2-6% slopes, which compose approximately 12%, 10.8%, 7%, and 6.5% of the soils in the Project vicinity, respectively (NRCS, n.d.).

Table 4.3.3-1 Prevalent Soil Characteristics in the Project Vicinity

Soil Series	Drainage Classification	Formation	Water Transmittal Capacity	Runoff Class
Amery	Well-drained	Moraine backslopes or shoulders	Very low to moderately low	High
Santiago	Well-drained	Summit of ground moraines	Moderately high to high	High
Spencer	Moderately well-drained	Summit of ground moraines	Moderately low to high	High

4.3.4 Impoundment Shoreline Conditions

The impoundment shoreline is primarily undeveloped, stable, and forested. There are a few residences with larger landholdings that maintain open lawn areas close to the shoreline and retain a buffer of natural vegetation. Brunet Island and the east shoreline of the central reservoir is part of Brunet Island State Park. These public recreation lands are maintained by the State of Wisconsin. Shoreline development is associated with the Cornell Dam, Mule-Hide paper mill, and the City of Cornell's Mill Yard Park.

In 2019, the Licensee conducted an archaeological survey of the entire Cornell flowage shoreline. The survey was conducted by boat to inspect the shoreline for archaeological sites and bank exposures (erosion). No areas of erosion were noted along the flowage shoreline (TRC, 2019).

4.4 Vegetative Cover

Two major land uses in Chippewa County comprised approximately 80% of the land base in 2007. Agricultural lands accounted for 52.4% of the land base and forest lands accounted for 28% (County, 2010a). The largest concentration of agricultural land occurs in the southern and western portions of the County. The largest concentrations of forest and woodland occurs in the northern portion of the County, where the Project is located. Most of the forest within the Project boundary is classified as northern mesic forest (MH, 2018; WDNR, 2020a).

There are approximately 134,827 acres of wetlands in Chippewa County, which accounts for 20% of the total acreage in the County. Major wetland areas are in the northern and eastern portions of the County where 15-45% of the land surface is covered by wetlands (WWA, n.d.). These wetlands support various sedges, grasses, and water-tolerant trees and shrubs including American elm, tamarack, white cedar, willow, tag alder, and dogwood. Emergent wetlands include species including cattails, wild rice, sedges, grasses, and rushes (MH, 2018).

A portion of the east shoreline near the Cornell Dam is in an urban atmosphere. The area near the Dam and powerhouse is industrial in nature and relatively devoid of vegetation due to the industrial setting and exposed bedrock of the river channel. The remaining Project lands include forested and wetland areas adjacent to the reservoir. A full description of the botanical resources in the Project vicinity is included in Section 6.1.8.

4.5 Land Development

Major land uses within the Project vicinity include residential, agriculture, commercial, manufacturing, forest, wetland, shrubland, parks, developed recreation, and undeveloped recreation open space. A map depicting the major land uses in the Project vicinity is included in **Appendix E-12**.

Major land use in the City of Cornell consists of 35.7% undeveloped, 29.6% residential, 10% agriculture, 7.5% conservancy, 6.6% parks and recreation, 4.9% industrial, 3.5% institutional, and 2.1% commercial (City, 2009). Major land use in Chippewa County consists of 52.6% Agricultural, 28% forest, 12.5% undeveloped, 4.8% residential, 1.2% manufacturing and commercial, and 0.8% other (County, 2010a).

4.6 Population Size and Density

The 2010 census indicated the population of Chippewa County was 62,415, which was an increase of 13.1% over the 2000 census figure of 55,195. The southern portion of the county is more urbanized with over one third of the County's population located within the cities of Chippewa Falls and Lake Hallie. Chippewa County has an average population density of 61.9 persons per square mile with a housing unit density of 27 housing units per square mile. (AFF, 2010).

The 2010 census indicated the population of the City of Cornell was 1,467, which was one person higher than the 2000 census figure of 1,466. The City of Cornell has an average population density of 382.3 persons per square mile with a housing unit density of 174.6 units per square mile (AFF, 2010).

Table 4.6-1 depicts the City of Cornell's population change from 1960 to 2010. Beginning in 1960, the population consistently decreased before stabilizing in 2010. The population decreased 12.9% during this timeframe (AFF, 2010; City, 2009).

Table 4.6-1 City of Cornell Historic Population

Year	1960	1970	1980	1990	2000	2010
Population	1,685	1,616	1,583	1,541	1,466	1,467
% Change	-13.3%	-4.1%	-2.0%	-2.7%	-4.9%	0.1%

Table 4.6-2 presents population projections from the Demographic Services Center (DSC) of the State of Wisconsin Department of Administration (WDA) for the City of Cornell and Chippewa County through 2040. The City or Cornell is projected to have a population decrease of 0.3% during the 2010 to 2040 timeframe (DSC, 2013a). Chippewa County is projected to have a population increase of 13.1% during the same timeframe (DSC, 2013b).

Table 4.6-2 City of Cornell and Chippewa County Population Projections

Municipality	2000 (Census)	2010 (Census)	2020 (DSC)	2030 (DSC)	2035 (DSC)	2040 (DSC)
City of Cornell Population	1,466	1,467	1,486*	1,480*	1,459*	1,429*
Chippewa County Population	55,195	62,415	66,155	69,400	70,275	70,600

*Calculated assuming no changes of population in group quarters

4.7 Tribal Resources

There are 11 federally recognized Tribes in Wisconsin. Tribes include the Menominee, Oneida, Stockbridge-Munsee, Ho-Chunk (Winnebago), Potawatomi, and six Ojibwe (Chippewa). Native American Reservations (Tribal lands) have been established by the federal government for each of these Tribes. There are no Tribal lands within the Project.

4.7.1 Menominee

The Menominee people are believed to have occupied Wisconsin for more than 5,000 years. As Europeans arrived, the Menominee lost most of their lands, but maintained a significant presence in the state. Menominee County was created from part of Shawano County in 1959 in anticipation of the termination of the Menominee Indian Reservation in 1961. Reservation status was restored in 1973. Today, most of the land within Menominee County is designated as Tribal trust lands. The Tribe also holds a small amount of land within the Town of Red Springs in Shawano County (Loew, 2001).

4.7.2 Oneida

The Oneida people were part of the New York Iroquois League prior to the Revolutionary War. In 1822, the Oneida purchased land in a territory that would later become Wisconsin. By the 1900s, much of these lands were taken away, but 1,270 acres were repurchased in 1937 (Loew, 2001).

4.7.3 Stockbridge-Munsee

The Stockbridge-Munsee are a blend of Mohican Tribes from Massachusetts and Delaware who moved west, settling near Lake Winnebago. In 1856, the Community obtained its present treaty lands from neighboring Menominee Native Americans. Tribal fee lands are owned by the Tribe and remain subject to non-tribal regulations. As such, lands held in fee title are subject to County zoning and subdivision regulation. Trust land, which is designated by the U.S. Bureau of Indian Affairs, are lands on which non-tribal regulations generally do not apply. The Stockbridge-Munsee Community population was estimated at 1,527 in 2000, which represents a nearly 163% increase from 1990 (Loew, 2001).

4.7.4 Ho-Chunk

The Ho-Chunk (Winnebago) people, who were driven from Wisconsin to the west, have gradually returned to reclaim their ancestral lands. No treaty lands had been reserved, so present Ho-Chunk lands are Tribal lands that have been repurchased. Today, 4,700 members of the Wisconsin Ho-Chunk hold title to 2,000 acres of land in Wisconsin (Loew, 2001).

4.7.5 Potawatomi

The Potawatomi arrived in Wisconsin in the mid-17th century from Canada and the western United States. In the early 1800s, the government took away Potawatomi land rights. In 1913, the Forest County Potawatomi bought back approximately 12,000 acres in northern Wisconsin (Loew, 2001).

4.7.6 Ojibwe

The Ojibwe (Chippewa) people originally from the Great Lakes had moved east near the Atlantic Ocean. Over 1,000 years ago, the Tribe returned to the Great Lakes Region, settling amidst fertile wild rice beds. Their final resting stop was Madeline Island in Wisconsin. The Ojibwe had a close relationship with the French, but the effort to convert the Ojibwe people to Christianity divided their belief systems into various bands of Ojibwe who established themselves in other locations.

As the pursuit of furs for trade progressed inland, conflicts with other Tribes, including the Dakotas, culminated with a Treaty assembled by the U.S. Government in 1825. The Treaty forced the Ojibwe to cede their territory to the U.S. under negotiations in 1837 and 1842. The Ojibwe ceded territories are shown in **Appendix E-13**. The Cornell Project is located within the territory ceded in 1837 (Loew, 2001).

Certain areas have cultural significance within the ceded territory; however, these areas are not publicly documented or recorded within the Wisconsin Historic Preservation Database (WHPD). If these areas are expected to be impacted by Project operation, this information will need to be provided through consultation with the individual Tribe representatives who consider the lands contained within the Project home territories.

The Licensee is not proposing changes to the current operations for the Cornell Project. As such, continued operation of the Project is not expected to adversely impact Tribal resources in the area.

4.8 Floodplains

The Chippewa River water surface profile drops about 110 feet in the 23 miles between the Cornell Dam tailrace and the Wissota Dam tailrace, or approximately 4.8 feet per mile (USGS, 2018a; USGS, 2018b).

The Chippewa River is subject to periodic flooding. These floodplain areas are defined in terms of a floodway and a flood fringe. The floodway is the river channel and adjacent areas where water continues to flow downstream and moves under flood conditions. The flood fringe is the portion of the floodplain outside the floodway where water will collect and not move during a flood.

A flood occurs when water flows outside river channel banks and activates the floodplain. A floodplain typically includes land area covered by water during a 100-year flood event, which is a flood defined as having a 1% recurrence interval over the period of record or has a chance of occurring once every 100 years over time. The Federal Emergency Management Agency (FEMA) floodplain mapping for the area is included in **Appendix E-14**.

Most of the Chippewa River floodplain near the Project consists of wooded shorelines and wooded lowland areas adjacent to the Chippewa River and Fisher Creek. The developed areas within the City of

Cornell are located outside the floodplain. Areas of the Chippewa River floodplain downstream of the Cornell Project are generally rural in nature.

The United States Geologic Survey (USGS) maintains a gage on the Chippewa River at Chippewa Falls (USGS Gage No. 05365500) that records river discharges in cfs. The gage location has a drainage area of 5,650 square miles versus the drainage area of 4,780 square miles at the Cornell Dam. The USGS gage data, adjusted for the drainage area at the Cornell Dam, was analyzed from October 1986 to December 31, 2020[4]. Based on the data, the average calendar year flow at the project is 4,435 cfs. The minimum annual calendar year flow was 2,011 cfs in 2009. The maximum annual calendar year flow was 7,504 cfs in 2019. The water discharge records are presented in **Appendix B-4**. **Table 4.8-1** presents flow statistics at the Cornell Dam (NSPW, 2008).

Table 4.8-1 Cornell Dam Flow Statistics

Flow Statistic	Value (cfs)	Date(s)
Annual Mean	4,435	1986-2020
Highest Annual Mean	7,504	2019
Lowest Annual Mean	2,011	2009
Highest Daily Mean	51,184	April 13, 2002
Lowest Daily Mean	198	February 16, 1990
10-percent Exceedance	8,254	-
50-percent Exceedance	3,090	-
90-percent Exceedance	1,307	-
100-year flood flow	105,000	-
Flood-of-Record	102,000	September 1, 1941

[4] Flow data from April 1, 2020 through December 31, 2020 is provisional.

5. Report on Water Use and Quality

5.1 Uses of Project Waters

5.1.1 Existing Uses of Project Waters

Since European settlement of the area in the late 1700's, the Chippewa River has provided important resources for the development of industry, business, agriculture, and communities. The primary present-day uses of the Chippewa River are industrial water supply, hydroelectric power production, recreation, and fish and wildlife habitat.

The Cornell powerhouse operates with 36 feet of head at a normal surface water elevation of 1,002.0 feet and has an estimated maximum hydraulic capacity of 11,650 cfs. It contains three generators (Units 1, 2, and 3) with a nameplate capacity of 10,000-kW each. The generators are connected to a horizontal shaft, tube-type hydraulic turbine with fixed blade propeller runners and fixed vanes operating at a speed of 100 revolutions per minute (rpm). Turbine operation is possible over a range of 25 to 39 feet net head. The powerhouse also includes one minimum flow generator (Unit 4) with a vertical hydraulic turbine with a propeller-type runner operating at a speed of 450 rpm with a nameplate capacity of 750 kW. Unit 4 is used to release a constant stream flow of 400 cfs to meet minimum flow requirements under the existing FERC license. The total nameplate capacity of all four units is 30,750 kW.

The reservoir encompasses 985 acres with a gross storage capacity of 8,000 acre-feet at the maximum pool elevation of 1,002.0 feet. At the minimum elevation of 1,000.0 feet, the reservoir encompasses 865 acres with a gross storage capacity of 6,500 acre-feet. The Project is operated between elevations 1,000.0 feet and 1,002.0 feet and has a useable storage capacity of 1,500 acre-feet (Hartnett, 2015[5]).

5.1.2 Proposed Uses of Project Waters

The current Project operation was negotiated between the Licensee and the WDNR, USFWS, NPS and several non-governmental organizations as part of the 2001 Lower Chippewa River Settlement Agreement. Article 13 of the current Project license was subsequently amended in 2003 to include the pertinent terms and conditions of the LCRSA. Therefore, the Licensee is required to operate the Project according to the established terms until LCRSA expires in 2033.

The Licensee proposes to evaluate the operational impacts of the Cornell Project, concurrent with the relicensing process for the remaining Lower Chippewa River hydroelectric projects, starting no later than 2028. This proposal will ensure that current information is being used to make comprehensive operational decisions for all six Lower Chippewa River hydroelectric projects. The resulting information from the comprehensive study can then be used to assess the need to modify the Project operation, if necessary, concurrent with any operational changes required under the new licenses for the other projects.

No changes are proposed to the Project operation and therefore no changes to available water quantity are anticipated for downstream uses.

[5] As interpolated by Mead & Hunt.

5.2 Existing Water Quality

Wisconsin established water quality standards under Chapter NR 102 of the Wisconsin Administrative Code (NR 102) to protect, maintain, and enhance surface waters for a variety of designated uses. The standards set limits for each designated use described below for which water quality cannot be artificially lowered unless a variance has been provided. NR 102 standards are consistent with CWA § 303(c). A copy of NR 102 is included in **Appendix E-15**.

5.2.1 River Water Quality Standards

Under NR 102.03, the portion of the Chippewa River flowing through the Project is defined as a surface water and no variances are provided. The river is categorized as a warm water sport fish community for fish and other aquatic life and for general recreational, public health and welfare, and wildlife uses.

5.2.1.1 Fish and Aquatic Life Standards

Criteria requirements:

- pH shall be between 6.0 and 9.0
- Surface water dissolved oxygen (DO) shall never be lowered below 5 milligrams per liter (mg/l)
- Total phosphorus less than 100 micrograms per liter (µg/l)

5.2.1.2 Temperature Standards

Waters within the Project boundary are subject to two different temperature standards. The waters within the Project boundary classified as the Cornell Flowage are subject to the "Northern Inland Lake/Impoundment" temperature standards. The remaining waters within the Project boundary are subject to "Warm Water-Large" temperature standards. **Table 5.2.1.2-1** shows the maximum temperatures allowed each month for the specific water classifications.

Table 5.2.1.2-1 Maximum Temperatures for Specified Water Classifications

Month	Maximum Acute Temperatures (ºF)	
	Warm, Large Waters	Northern Inland Lakes or Impoundments
January	76	76
February	76	76
March	76	76
April	79	78
May	82	81
June	85	85
July	86	86
August	86	86
September	84	84
October	80	80
November	77	78
December	76	76

Source: NR 102, see **Appendix E-15**.

5.2.1.3 Recreational Use Standards

A recreation use classification requires the geometric mean of bacterial counts of E. coli (*Escherichia coli*) to be below 126 counts per 100 milliliters (ml), based on a rolling 90-day rolling period during the recreation season. Under the WDNR Beach Advisory Program, a beach advisory is issued when the bacterial counts reach the action value of 235 per 100 ml and a beach closure is issued when the bacterial counts reach 1,000 per 100 ml.

5.2.1.4 Public Health and Welfare Standards

NR 102.14 established taste and odor criteria standards for public health and welfare, which are outlined by specific substance and will not be repeated here.

5.2.1.5 Fish Consumption Standards

NR 105.07 establishes wildlife use standards, which are outlined based upon specific substance concentrations and will not be repeated here.

5.2.2 Reservoir Water Quality Standards

Based upon 2020 monitoring results, and under NR 102.06, the Project reservoir is classified as a non-stratified lake or reservoir. Therefore, it is subject to the Northern Inland Lakes/Impoundments temperature criterion shown in **Table 5.2.1.2-1**, above. It is also subject to the Non-stratified Lake/Reservoir total phosphorus criterion of 40 ug/l. The remaining water quality criterion for fish and aquatic life, recreational use, public health and welfare, and fish consumption described in Section 5.2.1 apply to both rivers and reservoirs.

5.2.3 Historic Water Quality

Prior to implementation of effective control measures, the concentration of industrial and other post-settlement activities along the Chippewa River resulted in significant water quality degradation. Factors contributing to major pollution problems included soil erosion, increased sediment and nutrient loading, higher water temperatures, industrialization, and the destruction of wetlands. Low DO levels severely limited the number and diversity of aquatic organisms, restricting aquatic life to a few organisms adapted to live in degraded waters.

Controls placed on industrial and municipal point source discharges in the 1970's led to dramatic improvements in DO and the fishery. Initiatives to control nonpoint sources of contamination are currently underway to further improve the quality of the aquatic resources of the Chippewa River. Excessive nutrient enrichment, sedimentation, industrial discharge, and nonpoint source pollution continue to affect the integrity of the aquatic ecosystem. Although biological oxygen demand and suspended solids in industrial and municipal wastewater have been reduced, the river still contains substances that degrade water quality. River sediments contain persistent chemicals, such as polychlorinated biphenyls (PCB).

The WDNR conducted historic water quality monitoring at several locations within the Project vicinity. Monitoring Station 93016 is located within the Project reservoir near the Highway 64 bridge. Data available from the monitoring completed in 1989 showed all samples met water quality standards. Monitoring Station 93051 is located in the tailrace of the Holcombe Dam which is also the upper most extent of the Cornell Flowage. Extensive monitoring was conducted between 1997 and 2001 and the data

showed only one DO reading (4.8) was recorded below the standard of 5.0, and one pH reading of 9.29, slightly over the standard of 6.0-9.0. Monitoring Station 93179 is located at the Brunet Island State Park swimming beach. The levels of fecal coliform bacteria were monitored from 2013 to 2019. In 2013, one sample exceeded the beach action value of 235 and one other exceeded the beach closure value of 1,000. In 2015, two samples exceeded the beach action value of 235. Between 2016 and 2019, all samples were below the beach action value of 235. Monitoring data from each station is included in **Appendix E-16**.

5.2.4 Current Water Quality

The Licensee conducted a water quality monitoring study in 2020 to characterize current water quality conditions and determine compliance with Wisconsin water quality standards. The study monitored temperature, DO, pH, Secchi depth, total phosphorous, and chlorophyll a from three monitoring stations. Station 1 is located within a riverine area in the upper end of the Project reservoir. Station 2 is in the flowage deep hole upstream of the Cornell Dam. Station 3 is in the tailrace area downstream of the Dam. None of the field measurements for temperature, DO, or pH exceeded the state water quality criterion. Measurements of total phosphorus were above the Wisconsin standard for the sampling events in June and July and slightly under the Wisconsin standard for sampling events in August. High total phosphorus levels have been noted in other surveys regionally. The high degree of similarity between the results upstream and downstream of the Dam suggests Project operation has little effect, if any, on water quality within the Chippewa River. The results of the data collection are shown in **Table 5.2.4-1** and the corresponding report is included in **Appendix E-17**.

Table 5.2.4-1 2020 Water Quality Monitoring Study Results

Date (2020)	Station Number	Depth (m)	Temp. (°F)	DO (mg/l)	pH	Secchi Depth (m)	TP (µg/l)	Chlorophyll a (µg/l)
7/20	1	Surface	75.7	7.41	6.9	1.0	65.6	3.69
7/20	1	1.0	75.7	7.4	6.94	-	-	-
7/20	1	2.0	75.7	7.4	6.91	-	-	-
7/20	1	3.0	75.7	7.41	6.78	-	-	-
7/20	2	Surface	75.7	7.65	7.11	0.9	71.7	5.52
7/20	2	1.0	75.7	7.64	7.0	-	-	-
7/20	2	2.0	75.7	7.63	7.0	-	-	-
7/20	2	3.0	75.7	7.65	6.91	-	-	-
7/20	2	4.0	75.7	7.63	6.89	-	-	-
7/20	2	5.0	75.7	7.61	6.93	-	-	-
7/20	2	6.0	75.7	7.60	7.02	-	-	-
7/20	2	7.0	75.7	7.58	6.83	-	-	-
7/20	2	8.0	75.7	7.59	6.83	-	-	-
7/20	2	9.0	75.7	7.61	6.79	-	-	-
7/20	2	10.0	75.7	7.55	6.68	-	-	-
7/20	2	11.0	75.7	7.55	6.66	-	-	-
7/20	2	12.0	75.7	7.54	6.64	-	-	-
7/20	2	13.0	75.7	7.54	6.6	-	-	-
7/20	2	14.0	75.7	7.54	6.6	-	-	-

Date (2020)	Station Number	Depth (m)	Temp. (°F)	DO (mg/l)	pH	Secchi Depth (m)	TP (µg/l)	Chlorophyll a (µg/l)
7/20	2	15.0	75.7	7.50	6.55	-	-	-
7/20	2	16.0	75.7	7.51	6.53	-	-	-
7/20	3	Surface	75.9	8.17	7.24	1.1	73.5	5.52
7/20	3	1.0	75.9	8.15	7.21	-	-	-
7/20	3	2.0	75.9	8.13	7.21	-	-	-
7/20	3	3.0	75.9	8.10	7.15	-	-	-
7/20	3	4.0	75.9	8.09	6.95	-	-	-
8/17	1	Surface	74.1	7.09	7.27	0.9	45.7	4.48
8/17	1	1.0	74.1	7.11	6.79	-	-	-
8/17	1	2.0	74.1	7.07	6.59	-	-	-
8/17	1	3.0	74.1	7.05	6.7	-	-	-
8/17	2	Surface	73.8	6.94	7.18	0.9	47.0	4.19
8/17	2	1.0	73.8	6.94	7.09	-	-	-
8/17	2	2.0	73.8	6.9	7.01	-	-	-
8/17	2	3.0	73.8	6.88	6.95	-	-	-
8/17	2	4.0	73.6	6.87	6.94	-	-	-
8/17	2	5.0	73.6	6.88	7.01	-	-	-
8/17	2	6.0	73.6	6.87	6.78	-	-	-
8/17	2	7.0	73.6	6.87	6.65	-	-	-
8/17	2	8.0	73.6	6.87	6.54	-	-	-
8/17	2	9.0	73.6	6.86	6.5	-	-	-
8/17	2	10.0	73.6	6.85	6.93	-	-	-
8/17	2	11.0	73.6	6.84	6.99	-	-	-
8/17	2	12.0	73.6	6.84	7.03	-	-	-
8/17	2	13.0	73.6	6.83	7.05	-	-	-
8/17	2	14.0	73.4	6.81	6.85	-	-	-
8/17	2	15.0	73.4	6.81	6.74	-	-	-
8/17	2	16.0	73.4	6.79	6.69	-	-	-
8/17	3	Surface	73.8	7.02	7.27	0.9	60.1	4.69
8/17	3	1.0	73.8	7.01	7.16	-	-	-
8/17	3	2.0	73.8	7.01	7.17	-	-	-
8/17	3	3.0	73.8	7.0	7.12	-	-	-
8/17	3	4.0	73.8	7.0	7.13	-	-	-
8/17	3	5.0	73.8	7.0	7.08	-	-	-
8/17	3	6.0	73.8	6.99	7.05	-	-	-
8/17	3	7.0	73.8	6.97	7.06	-	-	-
8/17	3	8.0	73.8	6.99	7.04	-	-	-
9/21	1	Surface	60.4	10.08	7.34	1.1	36.2	6.88
9/21	1	1.0	60.4	10.07	7.29	-	-	-
9/21	1	2.0	60.4	10.05	7.21	-	-	-
9/21	1	3.0	60.4	10.03	7.17	-	-	-
9/21	2	Surface	61.0	9.82	7.65	1.1	38.8	6.12

Date (2020)	Station Number	Depth (m)	Temp. (°F)	DO (mg/l)	pH	Secchi Depth (m)	TP (µg/l)	Chlorophyll a (µg/l)
9/21	2	1.0	60.8	9.77	7.58	-	-	-
9/21	2	2.0	60.8	9.77	7.57	-	-	-
9/21	2	3.0	61.0	9.78	7.56	-	-	-
9/21	2	4.0	61.0	9.78	7.56	-	-	-
9/21	2	5.0	61.2	9.79	7.55	-	-	-
9/21	2	6.0	61.0	9.77	7.56	-	-	-
9/21	2	7.0	61.0	9.76	7.56	-	-	-
9/21	2	8.0	61.0	9.77	7.57	-	-	-
9/21	2	9.0	61.0	9.78	7.55	-	-	-
9/21	2	10.0	61.0	9.77	7.55	-	-	-
9/21	2	11.0	61.0	9.76	7.55	-	-	-
9/21	2	12.0	60.8	9.73	7.54	-	-	-
9/21	2	13.0	60.8	9.72	7.54	-	-	-
9/21	2	14.0	60.8	9.71	7.54	-	-	-
9/21	2	15.0	60.8	9.69	7.53	-	-	-
9/21	3	Surface	61.0	9.85	7.56	1.0	36.7	5.84
9/21	3	1.0	61.0	9.85	7.56	-	-	-
9/21	3	2.0	61.2	9.84	7.56	-	-	-
9/21	3	3.0	61.0	9.84	7.56	-	-	-
9/21	3	4.0	61.0	9.84	7.56	-	-	-
9/21	3	5.0	61.0	9.83	7.55	-	-	-
9/21	3	6.0	61.2	9.82	7.56	-	-	-
9/21	3	7.0	61.2	9.83	7.56	-	-	-
9/21	3	8.0	61.0	9.85	7.55	-	-	-

5.2.5 Future Water Quality Monitoring

The Licensee is not proposing any new facilities or changes to the current Project operation. As such, continued Project operation is not expected to adversely impact water quality in the area.

5.3 Project Operation (Minimum Flow and Reservoir Fluctuation)

Under the terms of the Settlement Agreement, the Project is operated in a limited peaking mode with a minimum flow release of 400 cfs to protect aquatic habitat and fish spawning areas of the Chippewa River downstream of the Cornell Dam[6]. The Settlement Agreement also established requirements regarding allowable reservoir fluctuations. From April 1 to June 7 of each year, the reservoir elevation is required to be maintained and operated between 1,001.5 and 1,002.0 feet to enhance fish spawning. From June 8 through Labor Day of each year during the hours of 12:00 pm to 8:00 pm, the reservoir is required to be maintained and operated between elevations 1,001.0 and 1,002.0 feet to minimize fluctuations during peak recreational use. At all other times, the reservoir elevation is maintained between 1,000.0 and 1,002.0 feet.

[6] A detailed description of the operation and river flow is included in Exhibit B of this application.

Since the current minimum flow and reservoir fluctuation requirements were agreed upon as part of the Settlement Agreement, the Licensee is required to operate the Project according to the established terms until 2033. The Licensee is proposing to evaluate the operational impacts of the Project, including minimum flows and reservoir fluctuations, concurrent with the relicensing process for the remaining five Lower Chippewa River hydroelectric projects starting no later than 2028. This proposal will ensure that current information is being used to make comprehensive operational decisions for all six projects. The resulting information from the comprehensive study will then be used to assess the need to modify the Project operation, if necessary, concurrent with any operational changes that may be required in the new licenses for the remaining projects.

5.4 Operational Deviations

Notifying the FERC, USFWS, and WDNR of planned deviations will protect water quality by providing for an informal consultation process to allow the Licensee to implement USFWS and/or WDNR recommended measures during the deviation to reduce potential impacts on natural resources.

A notification process for unplanned deviations after they occur will allow the FERC, USFWS, and WDNR to respond to any stakeholder questions about the deviations in an informed manner. The process will also allow the Licensee to keep track of any deviation occurrences. If deviations result in unanticipated adverse impacts upon the resource, the Licensee can reduce further unanticipated impacts by addressing the cause of the deviations.

The Licensee recommends the following deviation requirements be incorporated into any issued license:

Planned Deviations
Project operation may be temporarily modified for short periods, of up to 3 weeks, after mutual agreement among the Licensee, U.S. Fish and Wildlife Service, and Wisconsin Department of Natural Resources (collectively, resource agencies). After concurrence from the agencies, the Licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) reasons for the deviation and how project operations were modified, (2) duration and magnitude of the deviation, (3) any observed or reported environmental effects, and (4) documentation of consultation with the agencies. For planned deviations exceeding 3 weeks, the Licensee must file an application for a temporary amendment of required operations and receive Commission approval prior to implementation.

Unplanned Deviations
Operations may be temporarily modified if required by operating emergencies beyond the control of the Licensee (i.e., unplanned deviations). For any unplanned deviation that lasts longer than 3 hours ***or*** *results in visible environmental effects such as a fish kill, turbidity plume, bank erosion, or downstream flooding, the Licensee must file a report with the Secretary of the Commission as soon as possible, but no later than 14 days after each such incident. The report must include: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response, (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource agencies, (6) documentation of any observed or reported environmental effects, and (7) a description of measures implemented to prevent similar deviations in the future.*

For unplanned deviations lasting 3 hours or less that do not result in visible environmental effects, the Licensee must file an annual report, by March 1, describing each incident that occurred during the prior January 1 through December 31 time period. The report must include for each 3 hours or less deviation: (1) cause of the deviation, (2) duration and magnitude of the deviation, (3) any pertinent operational and/or monitoring data, (4) a timeline of the incident and the Licensee's response to each deviation, (5) any comments or correspondence received from the resource agencies, or confirmation that no comments were received from the resource agencies, and (6) a description of measures implemented to prevent similar deviations in the future.

The Licensee will develop an operations monitoring plan to document how it will comply with the operational requirements of the license, including reservoir elevation and minimum flow requirements. The plan will include the locations of headwater and tailwater monitoring gages, frequency of monitoring, procedures for maintaining and calibrating monitoring equipment, standard operating procedures to be implemented outside of normal operating conditions such as scheduled or emergency facility shutdowns or maintenance activities, and a schedule for installing and operating the monitoring equipment.

5.5 Water Quality Impacts During Project Operation

Water quality monitoring programs conducted in and near the Project area are described in Section 5.2. Monitoring program results are included in **Appendix E-16** and **Appendix E-17**.

The Licensee will implement erosion and siltation controls for ground-disturbing activities within the Project boundary to mitigate impacts on water quality.

The Licensee has not identified any proposed operational changes. Therefore, the Project is not expected to adversely impact water quality.

5.6 Water Quality Certification

The Licensee will request a water quality certification from the WDNR, pursuant to Section 401 of the Clean Water Act, no later than 60 days following the FERC issuance of the Notice of Application REA.

6. Report on Fishery, Terrestrial, and Endangered Resources

6.1 Existing Resources

6.1.1 Aquatic Habitat Resources

The Project consists of a dam, powerhouse, earthen embankment and 985-acre impoundment at the maximum operating elevation of 1,002.0 feet (Hartnett, 2015[7]). Approximately 18% of the total reservoir area is less than three feet deep (Hartnett, 2015). This depth provides a significant amount of littoral habitat with both submergent and emergent vegetation surrounding the islands and upstream of the confluence of the Chippewa River and Fisher River. The Dam includes two gated spillways and an overflow spillway with flashboards. A minimum flow of 400 cfs is released into the tailwater at all times to protect downstream aquatic habitat and fish spawning.

As part of the Aquatic and Terrestrial Invasive Species study, the Licensee conducted a point-intercept aquatic vegetation survey of the Cornell Flowage. Two surveys were completed, one in late June and one in mid-August, to account for both early season and late season species. The WDNR provided a point intercept plan with 737 sampling grid points. Per the guidelines set forth in the *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: Sampling Design, Field and Laboratory Procedures, Data Entry and Analysis, and Applications*, grid points to be sampled included those located in water depths of less than 15 feet or to the maximum depth of rooted vegetation if less than 15 feet.

The survey was conducted from a boat using a global positioning system (GPS) with submeter accuracy to navigate to grid point locations. A modified iron garden rake was thrown into the water at each grid point, pulled across the bottom, and brought to the surface to assess the extent and composition of aquatic species. The density for each rake sample was recorded on field datasheets based on the WDNR scale from 1 to 3, where 1 represents a few plants on the rake and 3 represents total coverage of the rake such that none of the rake tines are visible. Additionally, sediment composition at each grid point was described.

During the June survey, a total of 657 of the 737 grid points were sampled. The grid points not sampled included 65 points deeper than 15 feet and 15 points noted as inaccessible. Submerged aquatic vegetation was present at 115 of the 657 grid points sampled (17.5%) with 19 species observed. The three most predominant species identified, in order of abundance, were wild celery (*Vallinsneria americana),* coontail (*Ceratophyllum demersum)*, and American waterweed (*Elodea canadensis)* (EA, 2021).

The August survey was limited to grid points with a water depth of less than 8.5 feet. This sampling protocol modification was made based on the June survey findings, where vegetation was observed at only one of 291 grid points where the water depth was greater than 8.5 feet. As a result, August sampling was attempted at 368 of the 737 grid points. Sampling was not attempted at the 15 sites deemed inaccessible in the June survey and seven additional sites were inaccessible in August due to increased vegetative cover. Therefore, sample collection was attempted at 361 grid points. Submerged aquatic vegetation was identified at 114 of the 361 grid points sampled (31.6%) with 20 species observed. The three most predominant species identified in August surveys, in order of abundance, were wild celery, coontail, and American waterweed (EA, 2021).

[7] As interpolated by Mead & Hunt.

Table 6.1.1-1 lists all submerged aquatic plant species identified during the June and August surveys. The ATIS Study Report, including all maps and datasheets, is included in **Appendix E-18**.

Table 6.1.1-1 Species of Aquatic Vegetation Observed during ATIS Surveys

Common Name	Scientific Name
American waterweed	*Elodea canadensis*
Bigleaf pondweed	*Potamogeton amplifolius*
Coontail	*Ceratophyllum demersum*
Curly-leaf pondweed	*Potamogeton crispus*
Eurasian watermilfoil	*Myriophyllum spicatum*
Fernleaf pondweed	*Potamogeton robbinsii*
Filamentous algae	*Spirogyra spp.*
Flatstem pondweed	*Potamogeton zosteriformis*
Grassleaf pondweed	*Potamogeton gramineus*
Largeleaf pondweed	*Potamogeton amplifolious*
Leafy pondweed	*Potamogeton foliosus*
Longleaf pondweed	*Potamogeton nodosus*
Milfoil species	*Myriophyllum spp.*
Muskgrass	*Chara vulgaris*
Naiad species	*Najas sp.*
Pondweed species	*Potamogeton spp.*
Ribbonleaf pondweed	*Potamogeton epihydrus*
Slender pondweed	*Potamogeton pusillus*
Variable pondweed	*Potamogeton gramineus*
Water stargrass	*Heteranthera dubia*
Water starwort	*Callitriche stagnalis*
White water crowfoot	*Ranunculus aquatilis*
White water lily	*Nymphaea odorata*
Wild celery	*Vallinsneria americana*
White water lily	*Nuphar variegata*

6.1.2 Fish

6.1.2.1 Summary of Historic Sampling Efforts

Between 2005 and 2017, the WDNR conducted five fish surveys on Cornell Flowage whereby 30 fish species were identified. All fish species collected in the WDNR surveys are shown in **Table 6.1.2.1-1**. The combined catch was dominated numerically by bluegill (*Lepomis macrochirus*) at 49.4%, walleye (*Sander vitreus*) at 16.4%, yellow perch (*Perca flavescens*) at 11.8%, black crappie (*Pomoxis nigromaculatus*) at 6.4%, and smallmouth bass (*Micropterus dolomieu*) at 6.3%. Data from the fish surveys are included in **Appendix E-19**.

Table 6.1.2.1-1 WDNR Cornell Flowage Survey - Fish Species

Fish Species	Scientific Name
Black bullhead	*Ictalurus melas*
Black crappie	*Pomoxis nigromaculatus*
Blackside darter	*Percina maculata*
Bluegill	*Lepomis macrochirus*
Brook silverside	*Labidesthes sicculus*
Channel catfish	*Ictalurus punctatus*
Common carp	*Cyprinus carpio*
Emerald shiner	*Notropis atherinoides*
Flathead catfish	*Pylodictis olivaris*
Golden redhorse	*Moxostoma erythrurum*
Golden shiner	*Notemigonus crysoleucas*
Highfin carpsucker	*Carpiodes velifer*
Johnny darter	*Etheostoma nigrum*
Lake sturgeon	*Acipenser fulvescens*
Largemouth bass	*Micropterus salmoides*
Logperch	*Percina caprodes*
Mimic shiner	*Notropis volucellus*
Muskellunge	*Esox masquinongy*
Northern pike	*Esox lucius*
Pumpkin seed	*Lepomis gibbosus*
Quill back	*Carpiodes cyprinus*
Rock bass	*Ambloplites rupestris*
Shorthead redhorse	*Moxostoma macrolepidotum*
Silver redhorse	*Moxostoma anisurum*
Smallmouth bass	*Micropterus dolomieu*
Trout-perch	*Percopsis omiscomaycus*
Walleye	*Sander vitreus*
White sucker	*Catostomus commersonni*
Yellow bullhead	*Ameiurus natalis*
Yellow perch	*Perca flavescens*

6.1.2.2 Historic Fish Entrainment and Mortality Information

A complete fish entrainment and mortality study has not been completed for the Project. However, a study titled *Wissota Entrainment Study* was completed between April 1998 and April 1999 at the Wissota Hydroelectric Project, which is located approximately 23 miles downstream of the Cornell Project at River Mile 80. As part of the entrainment study, sampling was conducted during varying periods each month. Approximately 80% of the total river flow was passed through the collection nets during the sampling periods from April through December. Nearly all flow was passed through the collection nets during the sampling periods in January and February. Approximately 125,000 fish

were collected during the study. The study showed the average adjusted mortality for all size groups of centrachids combined was 7.7%. The overall average adjusted mortality for all size groups of cylindrical shaped fish combined was 2.8% (GLEC, 2000). The Wissota Entrainment Study Report is included in **Appendix E-20**.

In 2016, the Chippewa River Fish Protection Study was conducted to evaluate various fish protection methods at all six hydro projects on the Lower Chippewa River. The study was conducted in consultation with the LCRSA Implementation Team which includes representatives from the NPS, RAW, USFWS, and WDNR. Excerpts from the study are discussed below.

The Cornell Project features a main trashrack structure with a clear spacing of 5.38 inches and an approach velocity of 5.41 feet per second (fps) for Unit 1, Unit 2, and Unit 3. The turbines for these units each contain one horizontal fixed-blade axial flow runner that operates at a speed of 100 rpm. Unit 4 has a separate trashrack structure with a clear spacing of 2.375 inches and an average approach velocity of 1.8 fps. The turbine for this unit has one vertical, propeller-type runner that operates at a speed of 450 rpm and a head of 36 feet (Kleinschmidt, 2016).

The study predicted turbine passage survival for seven common species including black crappie, bluegill, lake sturgeon, muskellunge (*Esox masquinongy*), smallmouth bass (*Micropterus dolomieu)*, walleye, and yellow perch. The average turbine passage survival of small resident fish species for Units 1, 2, and 3 is estimated at 97.3% and Unit 4 is 91.7% (Kleinschmidt, 2016).

The study also evaluated the through-rack velocities (i.e., velocity of the water as it accelerates through the trashrack bars) of the turbines if trashracks with a clear spacing of 1.0 inch were installed. Installing narrowly spaced trashracks would increase the through-rack velocities. Narrower bar rack spacing would result in more rapid blinding of the racks due to debris clogging, which in turn would increase through-rack velocities. An increase in velocities can cause head losses that reduce power generation, which may result in unit(s) being shut down to prevent damage or to facilitate cleaning (Kleinschmidt, 2016). The Chippewa River Fish Protection Study Report is included in **Appendix E-21**.

6.1.2.3 Current Fish Entrainment and Mortality Information

At the request of the WDNR and RAW, the Licensee conducted the Cornell Fish Entrainment Survival Study in 2020 to determine the probability of entrainment mortality of lake sturgeon, muskellunge, redhorse suckers (*Moxostoma spp*.) and walleye, for lengths of larger fish[8] that can pass through the existing 5.38-inch trashracks on Units 1, 2, and 3. The desktop study also evaluated the size of fish which would be excluded from entrainment as well as determined approach velocities if 2.5-inch clear spacing trashracks were installed.

A turbine blade strike survival analysis was completed using the STRYKE model, which tracks the fate of individual simulated fish as they transition through a hydroelectric facility. The analysis was based on the USFWS's Turbine Blade Strike Analysis desktop model. The model was used to quantitatively estimate the probability of turbine blade strike survival through Units 1, 2, and 3 for

[8] Larger fish is defined as fish lengths that were not evaluated as part of the 2016 study.

each target species. The STRYKE model was run 10 times for each iteration to allow for turbine passage survival average estimates. The fish sample size (number of fish) was set at 100 for each iteration for a total sample size of 1,000. The model did not use swim speeds as an entrainment filter to remove fish that could swim away from the intakes.

Table 6.1.2.3-1 outlines the calculated mean turbine passage survival for rack spacings of 5.38 inches (existing) and 2.5 inches for the selected fish species. The STRYKE model concluded that the mean survival rate decreased as length increased for all fish species. All modeled fish lengths can become entrained with 5.38-inch spacing; however, larger fish of each species could be excluded (100% turbine survival) if trashrack spacing was reduced to 2.5 inches (Kleinschmidt, 2020).

Table 6.1.2.3-1 Mean Turbine Blade Strike Survival for Target Fish Species

Fish Species	Fish Length (inches)	Mean Turbine Survival Percentage	
		Existing Trashrack 5.38”	Alternative Trashrack 2.5”
Muskellunge	10-25	83%	83%
	26-35	50%	50%
	36-45	42%	100% (excluded)
	>45	24%	100% (excluded)
Lake Sturgeon	11-20	73%	73%
	21-30	53%	53%
	31- 40	48%	100% (excluded)
	> 40	10%	100% (excluded)
Walleye	0-10	78%	78%
	11-20	73%	73%
	>20	56%	100% (excluded)
Redhorse	0-10	81%	81%
	11-20	68%	68%
	>20	37%	100% (excluded)

The study also evaluated how intake approach velocities and through-rack velocities would be impacted if trashracks with 2.5 inch spacing were installed. Under this scenario, the current approach velocity would remain the same at 5.41 fps and through-rack velocities would increase slightly from 6.04 to 6.8 fps. Burst swim speeds for all adult size classes for all four target fish species, and prolonged swim speeds of all target fish species, except walleye, are higher than intake velocities, which limits entrainment to those fish that willingly move downstream. Larger adult fish are not expected to freely enter the intakes and as such are not expected to make up a large percentage of the total population (Kleinschmidt, 2020). The Cornell Fish Entrainment Survival Report is included in **Appendix E-22**.

Of the four species analyzed in Kleinschmidt’s 2020 desktop study, Lake Sturgeon showed the lowest survivability. Therefore, NSPW began to focus on mitigating adverse impacts to Lake Sturgeon

populations in the Cornell Reservoir. The WDNR indicated in their comments[9] on the report that downstream movement of fish is common on the Chippewa River and 15% of tagged Lake Sturgeon move downstream after being tagged. They recommended either a field entrainment study be conducted to quantify the number of fish entrained or mitigation measures be implemented. In their comments on the study report, the USFWS concurred with WDNR. The RAW stated in their comments that migration movement causes fish to freely enter the intakes and recommended the installation of trashracks with 2-inch clear spacing as a mitigation measure.

NSPW found it difficult to find adequate Lake Sturgeon population data for Cornell Reservoir. Data from the fish surveys included in **Appendix E-19** indicate one Lake Sturgeon was captured during electrofishing efforts for walleye in 2009.

In Wisconsin's Lake Sturgeon Management Plan dated October 2000, the section of the Chippewa River where the Project is located was not listed as a restoration area for Lake Sturgeon (WDNR 2000). A review of the October 2000 Sturgeon Management Plan in 2017 indicated intermittent post spawn surveys of juvenile and adult Lake Sturgeon occurred on Cornell Reservoir downstream of Lake Holcombe Dam (WDNR, 2017). An updated plan was released in October of 2019 and again mentioned intermittent gillnet surveys for Lake Sturgeon in Cornell Reservoir. The updated plan also included the Cornell Reservoir in the Lower Chippewa River management area and indicated the Lake Sturgeon population in this stretch is healthy and sustained entirely by natural production. It yields the highest harvest of any Wisconsin waters open to hook and line angling for Lake Sturgeon but does not identify any specific river reaches or Reservoirs (WDNR 2019b). Through the 2020 email consultation with WDNR, NSPW learned that the May 9, 2017[10] post spawn gillnet survey captured four Lake Sturgeon ranging from 39.1 to 57.2 inches. Due to the nature of the survey, catch rates were not anticipated to be high because fish were not concentrated near the shoreline at the time.

With the paucity of Lake Sturgeon population data available for the Cornell Reservoir, NSPW retained an independent expert to review the Kleinschmidt report and make recommendations regarding entrainment mortality at the Project. The independent expert reviewed the Kleinschmidt report and attempted to re-create the results using the USFWS's Turbine Blade Strike Analysis desktop model. To date, the independent expert has been unable to duplicate the results. Further discussion is necessary to develop a better understanding of the potential adverse effects of the operation of the Project on fish entrainment mortality.

NSPW believes it may have to revise the Kleinschmidt report, however, we maintain our position that a field entrainment study, as proposed by the WDNR to quantify the number of fish entrained, is unnecessary and cost-prohibitive to this effort.

6.1.3 Freshwater Mussels

6.1.3.1 Historic Mussel Information

While no mussel survey data was identified during preparation of the PAD, the WDNR indicated that two mussel species have been historically reported in the Cornell Project vicinity during relicensing

[9] See Cheryl Laatsch-WDNR email dated December 4, 2020 located on page 1,130 of *Volume 4, Documentation of Consultation*.

study consultation. The historic species include the salamander mussel (*Simpsonaias ambigua*) and purple wartyback mussel (*Cyclonalas tuberculate*).

6.1.3.2 Current Mussel Information

A mussel survey was completed in 2020 on two river reaches in the Project vicinity to obtain information on the Project's potential impact to mussel species. Reach 1 was located approximately 3.5 miles upstream of the Cornell Dam within a riverine section of the reservoir. Reach 2 was located outside the Project boundary approximately 1.2 miles downstream of the Cornell Dam and outside the downstream zone of influence. Each reach was selected based upon suitable mussel habitat as determined by field staff. Several transects in each reach were surveyed. Surveying along each transect was completed in 10-meter segments, with surveying extending 0.5 meters on each side of the transect. Divers visually searched and probed the substrate and turned over rocks to detect small or burrowed mussels. A rapid visual search was used to determine if mussels were present. If present, additional time was spent searching. All live mussels were identified to species, counted, and sexed by a malacologist. Mussels were kept submersed in ambient river water, kept cool and moist during processing, and released upon completion of the survey. The survey was conducted on September 24 and 25, 2020.

The survey identified a total of 179 live mussels representing12 different species. The only state listed species identified was the purple wartyback. The most abundant species in Reach 1 were the spike (*Elliptio dilatata*) and Fatmucket (*Lampsilis siliquoidea*), whereas the most abundant in Reach 2 were the black sandshell (*Ligumia recta*) and plain pocketbook (*Lampsilis cardium*). A summary of the mussel species identified during the study is shown below in **Table 6.1.3.2-1**, with state listed species indicated with an asterisk. The complete mussel study report is included in **Appendix E-23**.

Table 6.1.3.2-1 Mussels Identified in 2020 Survey

Mussel Species Name		Reach 1		Reach 2	
Common	**Scientific**	**Total Number**	**% Relative Abundance**	**Total Number**	**% Relative Abundance**
Black Sandshell	*Ligumia recta*	11	9.1	18	31
Fatmucket	*Lampsilis siliquoidea*	24	19.8	4	6.9
Fluted-shell	*Lasmigona costata*	0	0	1	1.7
Giant floater	*Pyganodon grandis*	1	0.8	0	0
Hickorynut	*Obovaria olivaria*	0	0	4	6.9
Mucket	*Actinonaias ligamentina*	2	1.7	0	0
Paper pondshell	*Utterbackia imbecillis*	0	0	1	1.7
Plain pocketbook	*Lampsilis cardium*	14	11.6	14	24.1
Pimpleback	*Quadrula pustulosa*	21	17.4	7	12.1
Purple wartyback*****	*Cyclonaias terculata*	0	0	4	6.9
Spike	*Elliptia dilatata*	47	38.8	3	5.2
Wabash pigtoe	*Fusconaia flava*	1	0.8	2	3.4

6.1.4 Benthic Community

A study of the benthic community of Lake Wissota, located approximately 23 miles downstream of the Cornell Project, was completed in 2010. While no specific benthic community survey of the Cornell Project has been conducted, the species located within Cornell Flowage are likely similar to those located in Lake Wissota.

The 2010 Lake Wissota study collected a total of 91 taxa. **Table 6.1.4-1** includes the taxa for those species identified in Lake Wissota which represented more than 1% of the total invertebrate population (Swanson, 2010).

Table 6.1.4-1 Lake Wissota Benthic Invertebrate Taxa (more than 1% total)

Benthic Invertebrate	Phylum/Family/Class/Order	Scientific Name
Annelida (segmented worms)	Oligochaeta Sub-class	-
Cnidaria	Hydridae Family	*Hydra sp.*
Crustacea (sowbugs, water fleas, copepods)	Amphipoda Order	*Crangonyx sp.*
		Hyalella azteca
	Isopoda Order	*Asellus racovitzae*
	Copepoda Sub-class	-
	Cladocera Order	-
	Decopoda Order	*Orconectes rusticus*
Ephemeroptera (mayflies)	Caenidae Family	*Caenis sp.*
Mollusca (clams and snails)	Spharidae Family	-
	Hydropbiidae Family	-
	Planorbidae Family	*Helisoma sp.*
Nematoda (roundworms)	Nematoda Phylum	-
Diptera (true flies)	Ceratopogonidae Family	*Bezzia sp. complex*
	Chaoboridae Family	*Chaoborus bicinctus*
Platyhelminthes (flatworms)	Dugesiidae Family	*Dugesia sp.*
Tricoptera (caddisflies)	Leptoceridae Family	*Nectopsyche candida*
		Oecetis sp.
	Polyentopidae Family	*Phylocentropus pacidus*

6.1.5 Aquatic Invasive Species

In Wisconsin, the invasive species rule makes it illegal to possess, transport, transfer, or introduce certain invasive species into the state without a permit (WDNR, n.d.b). The exact rules are outlined in Chapter NR 40 of the Wisconsin Administrative Code (NR 40). The requirements of NR 40 are often used as a guide at hydroelectric projects in Wisconsin to determine which species should be considered invasive.

NR 40.03 classifies invasive species into two categories: prohibited and restricted. Prohibited species are defined as invasive species not currently found in Wisconsin, but if introduced are likely to survive, spread, and potentially cause negative environmental and economic impacts. Restricted species are invasive species already established in Wisconsin and have caused or are believed to cause negative environmental and economic impacts.

NR 40 further categorizes invasive species by group, which include plants, algae and cyanobacteria, aquatic invertebrates (except crayfish), fish and crayfish, terrestrial and aquatic vertebrates (except fish), terrestrial invertebrates and plant disease-causing microorganisms, and fungus.

6.1.5.1 Historic Aquatic Invasive Information

According to the WDNR Find-A-Lake website, the Cornell Flowage contains four aquatic invasive species; three aquatic plants, and one crayfish. The presence of curly-leaf pondweed (*Potamogeton crispus*), purple loosestrife (*Lythrum salicaria*), and rusty crayfish (*Orconectes rusticus*) were verified in 2007. The presence of Eurasian watermilfoil (*Myriophylum spicatum*) was verified in 2009 (WDNR, n.d.c). All four of the species are listed as restricted under NR 40.

Pursuant to the Exotics Control Plan of the Settlement Agreement, the Licensee annually monitors for the presence and abundance of purple loosestrife on Cornell Flowage. Formal monitoring began in 2003. Based on 2020 monitoring, 27 purple loosestrife colonies were classified as present, and none were classified as abundant. The overall number of colonies and the amount of shoreline affected increased from 2019 (GLEC, 2019; GLEC, 2020). The complete purple loosestrife monitoring report is included in **Appendix E-24**. The results of the purple loosestrife surveys conducted from 2018 to 2020 are summarized in **Table 6.1.5.1-1** (GLEC, 2019; GLEC, 2020).

Table 6.1.5.1-1 Summary of Purple Loosestrife Surveys 2018 to 2020

Year	Number of Purple Loosestrife Locations		Feet of Shoreline Affected	
	Present	Abundant	Present	Abundant
2018	20	0	72	0
2019	13	0	23	0
2020	27	0	63	0

On September 8, 2015, according to the Surface Water Information Management System (SWIMS) provided by the WDNR, six hours were expended towing for water fleas on Cornell Flowage. The consolidated sample was analyzed for both the spiny water flea and the fishhook water flea. No invasive species were identified during the survey. The SWIMS data is included in **Appendix E-25.**

6.1.5.2 Current Aquatic Invasive Species Information

The Licensee conducted an ATIS study in 2020. The study area encompassed the upstream and downstream inundated portions of the Chippewa River contained within the proposed Project boundary and the upland areas owned in fee by the Licensee within the boundary. Aquatic species were identified via a point-intercept submerged aquatic vegetation survey as described in Section 6.1.1. Each sample was inspected for the presence of invasive species as included in NR 40. Two aquatic invasive species were positively identified during the survey and include Eurasian watermilfoil and curly-leaf pondweed (*Potamogeton crispus*). The ATIS Study Report is included in **Appendix E-18** and features a map of the locations of aquatic invasive species.

In addition to rake sampling, one water sample was collected from the Project reservoir and one from the Project tailwater during the July and August survey period. Water samples were provided to the

WDNR invasive species coordinator for analysis for the presence of the spiny water flea, fishhook water flea, and zebra mussel (*Dreissena polymorpha*). No spiny water fleas, fishhook water fleas, or zebra mussels were identified in the analyzed water samples.

6.1.6 Terrestrial Habitat

There are 16 ecological landscapes within Wisconsin. Ecological landscapes are classified by a combination of physical factors including climate, geology, topography, soils, water, and vegetation. The Cornell Project is located within the North Central Forest Ecological Landscape. The North Central Forest Ecological Landscape typically has rolling topography with loamy soils, extensive forests, forested watersheds, numerous wetlands, lakes, and headwater streams. Within this ecological landscape, forestry and recreation are the major land uses (WDNR, 2015). A map showing the ecological landscapes of Wisconsin is included in **Appendix E-26**.

The terrestrial habitat along the shoreline of the Project was characterized in 2020 during the ATIS study, which showed most of the Project shoreline as forested. Forested habitats within the Project vicinity included northern hardwood forests, conifer dominated forests, and mixed northern hardwood/conifer forests. A map showing the terrestrial habitat within the Project boundary and along the reservoir shoreline is included in the ATIS Study Report (Figure 6) found in **Appendix E-18**. A more thorough listing of botanical species found in terrestrial areas is included in Section 6.1.8.

6.1.7 Wildlife

Wildlife found in the Project vicinity includes various mammals, reptiles, amphibians, and birds typical of the North Central Forest Ecological Landscape. Much of the Project shoreline is located within Brunet Island State Park. The 1986 Brunet Island State Park Master Plan includes lists of wildlife species that have been observed or are likely to be encountered based on the location of and vegetation types within the State Park. The same wildlife species are likely to be found throughout the Project vicinity. The Brunet Island State Park Master Plan is included in **Appendix E-27**.

6.1.7.1 Mammal Species

Mammal species likely to be found in Brunet Island State Park and the general Project vicinity are shown in **Table 6.1.7.1-1** (WDNR, 1986). Note: the black bear, bobcat, fisher, and northern long-eared bat are not identified in the Brunet Island State Park Master Plan but are likely to be found within the Project vicinity. These four species are marked with an asterisk in the table.

Table 6.1.7.1-1 Mammal Species in Project Vicinity

Mammal Species	Scientific Name
American beaver	*Castor canadensis*
Black bear*	*Ursus americanus*
Bobcat*	*Lynx rufus*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus mainiculatus*
Eastern chipmunk	*Tamias striatus*
Fisher*	*Pekania pennanti*

Mammal Species	Scientific Name
Gray squirrel	*Sciurus carolinensis*
Gray wolf	*Canis lupus*
Masked shrew	*Sorex cinerus*
Mink	*Mustela vison*
Muskrat	*Ondaontra zibethicus*
Northern flying squirrel	*Glaucomys sabrinus*
Northern long-eared bat*	*Myotis septentrionalis*
Northern short-tailed shrew	*Blarina brevidauda*
Porcupine	*Erethizon dorsatum*
Pygmy shrew	*Sorex minutus*
Raccoon	*Procyon lotor*
Red squirrel	*Tamiasciurus hudsonicus*
River otter	*Lontra canadensis*
Short-tailed weasel (ermine)	*Mustela ermina*
Snowshoe hare	*Lepus americanus*
Striped skunk	*Mephitis*
Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*
White-footed mouse	*Peromyscus leucopus*
White-tailed deer	*Odocoileus virginianus*
Woodchuck	*Marmota monax*

6.1.7.2 Amphibian and Reptile Species

Amphibian and reptile species likely to be found within the Brunet Island State Park and the general Project vicinity are included in **Table 6.1.7.2-1** (WDNR, 1986).

Table 6.1.7.2-1 Reptile and Amphibian Species in Project Vicinity

Reptile and Amphibian Species	Scientific Name
American bullfrog	*Lithobates catesbeianus*
American toad	*Anaxyrus americanus*
Blanding's turtle	*Emydoidea blandingii*
Boreal chorus frog	*Pseudacris maculata*
Common garter snake	*Thamnophis sirtalis*
Eastern hognose snake	*Heterodon platirhinos*
Eastern newt	*Notophthalmus viridescens*
Five-lined skink	*Plestiodon fasciatus*
Fox snake	*Elaphe vulpina*
Gray treefrog	*Hyla versicolor*
Green frog	*Lithobates clamitans*
Mudpuppy	*Necturus maculosus*

Reptile and Amphibian Species	Scientific Name
Northern leopard frog	*Lithobates pipiens*
Northern ring-necked snake	*Diadophis punctatus edwardsii*
Northern water snake	*Nerodia sipedon*
Painted turtle	*Chrysemys picta*
Pickerel frog	*Lithobates palustris*
Pine snake	*Pituophis melanoleucus*
Red-backed salamander	*Plethodon cinereus*
Red-bellied snake	*Storeria occipitomaculata*
Snapping turtle	*Chelydra serpentina*
Softshell turtle	*Pelodiscus sinensis*
Spring peeper	*Pseudacris crucifer*
Wood Frog	*Lithobates sylvatica*

6.1.7.3 Bird Species

The Cornell Lab of Ornithology maintains a website called eBird which includes updated checklists of birds present in certain areas. The Licensee searched the site for bird lists identified in Chippewa County, Wisconsin. The eBird site includes a checklist of species likely to be found at the Brunet Island State Park which is included in **Table 6.1.7.3-1** (eBird, 2020). The species identified at the Brunet Island State Park are also likely to be found throughout the Project vicinity.

Table 6.1.7.3-1 Bird Species in the Project Vicinity

Bird Species	Scientific Name
American coot	*Fulica americana*
American crow	*Corvus brachyrhynchos*
American goldfinch	*Spinus tristis*
American redstart	*Septophaga rutilla*
American robin	*Turdus migratorius*
Bald eagle	*Haliaeetus leucocephalus*
Baltimore oriole	*Icterus galbula*
Barred owl	*Strix varia*
Belted kingfisher	*Megaceryle alcyon*
Black-billed cuckoo[11]	*Coccyzus erythropthalmus*
Black-capped chickadee	*Poecile atricapillus*
Black-throated green warbler	*Setophaga virens*
Blue-gray gnatcatcher	*Polioptla caerulea*
Blue jay	*Cyanocitta cristata*
Blue-winged teal	*Anas discors*
Broad-winged hawk	*Buteo platypterus*

[11] (WBCI, 2013)

Bird Species	Scientific Name
Brown creeper	*Certhia americana*
Brown-headed cowbird	*Molothrus ater*
Bufflehead	*Bucephala albeola*
Cackling goose	*Branta hutchinsii*
Canada goose	*Branta canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Chimney swift	*Chaetura pelagica*
Chipping sparrow	*Spizella passerina*
Common grackle	*Quiscalus quiscula*
Common loon	*Gavia immer*
Common raven	*Corvus corax*
Common yellowthroat	*Geothylpis trichas*
Dark-eyed junco	*Junco hyemalis*
Double crested cormorant	*Phalacrocorax auritus*
Downy woodpecker	*Picoides pubescens*
Eastern kingbird	*Tyrannus*
Eastern meadowlark	*Sturnella magna*
Eastern phoebe	*Sayornis phoebe*
Eastern wood-pewee	*Contopus virens*
European starling	*Sturnus vulgaris*
Field sparrow	*Spizella pusilla*
Fox sparrow	*Passerella iliaca*
Gadwall	*Mareca strepera*
Great blue heron	*Ardea herodias*
Great crested flycatcher	*Myiarchus crinitus*
Greater scaup (bluebill)	*Aythya marila*
Hairy woodpecker	*Leuconotopicus villosus*
Hermit thrush	*Catharus guttatus*
Herring gull	*Larus argentatus*
Horned lark	*Eremophila alpestris*
House finch	*Haemorhous mexicanus*
House sparrow	*Passer domesticus*
Indigo bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Least flycatcher	*Empidonax minimus*
Mallard	*Anas platyrhynchos*
Mourning dove	*Zenaida macroura*
Northern cardinal	*Carinalis cardinalis*
Northern flicker	*Colaptes auratus*

Bird Species	Scientific Name
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Ovenbird	*Seiurus aurocapilla*
Pied-billed grebe	*Podilymbus podiceps*
Pileated woodpecker	*Drycopus pileatus*
Pine siskin	*Spinus pinus*
Pine warbler	*Setophaga pinus*
Purple finch	*Haemorhous purpureus*
Red-eyed vireo	*Vireo olivaceus*
Red-bellied woodpecker	*Melnarpes carolinus*
Red-breasted nuthatch	*Sitta canadensis*
Redhead	*Aythya americana*
Red-headed woodpecker	*Melnarpes erythrocephalus*
Red shouldered hawk	*Buteo lineatus*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-billed gull	*Larus delawarensis*
Ring-necked duck	*Aythya collaris*
Rink-necked pheasant	*Phasianus colchicus*
Rock pigeon (rock dove)	*Columba livia*
Rose-breasted grosbeak	*Pheucticus ludovicianus*
Ruby-throated hummingbird	*Archilochus colubris*
Sandhill crane	*Grus canadensis*
Savannah sparrow	*Passerculus sandwichensis*
Scarlet tanager	*Piranga olivacea*
Solitary sandpiper	*Tringa solitaria*
Song sparrow	*Melospiza melodia*
Spotted sandpiper	*Actitis macularius*
Tree swallow	*Tachineta bicolor*
Tufted titmouse	*Baeolophus bicolor*
Turkey vulture	*Cathartes aura*
White-breasted nuthatch	*Sitta carolinensis*
White-throated sparrow	*Zonotrichea albicollis*
Wild turkey	*Meleagris gallopavo*
Wood duck	*Aix sponsa*
Wood thrush	*Hylocichla mustelina*
Yellow-billed cuckoo	*Coccyzus americanus*
Yellow-rumped warbler	*Setophaga coronata*
Yellow-throated vireo	*Verio flavifrons*
Yellow warbler	*Setophaga petechia*

No changes to the operation of the Project are proposed. Therefore, its continued operation is unlikely to influence the population or the diversity of wildlife in the area.

6.1.8 Botanical Resources

The habitat along the shoreline of the Project was characterized in 2020 during the ATIS study, which showed most of the Project shoreline as forested. A map showing the terrestrial habitat within the Project boundary and along the reservoir shoreline is in the ATIS Study Report (Figure 6) included in **Appendix E-18**. Forested habitats within the Project vicinity include northern hardwood forests, conifer dominated forests, and mixed northern hardwood/conifer forests. The dominant botanical species identified in the forested shoreline areas during the ATIS survey are shown in **Table 6.1.8-1**, **Table 6.1.8-2**, and **Table 6.1.8-3** (EA, 2021).

Table 6.1.8-1 Dominant Tree Species

Tree Species in Forested Shoreline Areas	
Common Name	**Scientific Name**
Ash species	*Fraxinus spp.*
Basswood	*Tilia americana*
Eastern Hemlock	*Tsuga canadensis*
Eastern Red Cedar	*Juniperus virginiana*
Eastern White Pine	*Pinus strobus*
Northern Red Oak	*Quercus rubra*
Red Maple	*Acer rubrum*
Silver Maple	*Acer saccharinum*
Yellow Birch	*Betula alleghaniensis*

Table 6.1.8-2 Dominant Shrub Species

Shrub Species in Forested Shoreline Areas	
Common Name	**Scientific Name**
Alder species	*Alnus spp.*
Common Buckthorn	*Rhamnus cathartica*
Dogwood species	*Cornus spp.*
Glossy Buckthorn	*Rhamnus frangula*
Morrow’s Honeysuckle	*Lonicera morrowii*
Prickly Ash	*Zantholylum americanum*
Staghorn Sumac	*Rhus typhina*

Table 6.1.8-3 Dominant Herbaceous Species

Herbaceous Species in Forested Shoreline Areas	
Common Name	**Scientific Name**
Allegheny Blackberry	*Rubus allegheniensis*
Bracken Fern	*Pteridium aquilinum*
Blue Cohosh	*Caulophyllum thalictroides*
Goldenrod species	*Solidago spp.*
Lady Fern	*Athyrium filix-femina*
Turtlehead	*Chelone glabra.*
White Baneberry	*Actaea pachypoda*
White Rattlesnakeroot	*Prenanthes alba*
Wild Sarsaparilla	*Aralia nudicaulus*

In addition to forested areas, portions of the shoreline are dominated by emergent vegetation and open or developed areas with botanical communities that differ substantially from the forested areas. Emergent vegetation is typically found in shallow water areas of the Project reservoir where less flow occurs. Open and developed areas are primarily located near the Cornell Dam, Mill Yard Park, utility right-of-way, and residential shoreline properties along North Riverside Drive. The dominant botanical species in non-forested areas are shown **Table 6.1.8-4** and **Table 6.1.8-5** (EA, 2021).

Table 6.1.8-4 Dominant Emergent Vegetation Species

Emergent Vegetation Species, Shallow Water Areas	
Common Name	**Scientific Name**
Arrowheads	*Sagittaria spp.*
Bur-reeds	*Sparganium spp.*
Cattails	*Typha spp.*
Pickerelweed	*Pontedaria cordata*
Softstem bulrush	*Schoenoplectus tabernaemotani*

Table 6.1.8-5 Dominant Botanical Species

Botanical Species, Open/Developed Areas	
Common Name	**Scientific Name**
Annual ragweed	*Ambrosia artemisiifolia*
Butter and eggs	*Linaria vulgaris*
Groundnut	*Apios americana*
Lesser burdock	*Arcticum minus*
Prickly ash	*Zantholylum americanum*
Riverbank grape	*Vitis riparia*
White snakeroot	*Agertina altissima*

6.1.9 Terrestrial Invasive Species

No terrestrial invasive species have previously been documented within the Cornell Project boundary. As part of relicensing, the stakeholders recommended a study to document observed invasive species in the Project vicinity. Information regarding terrestrial invasive species was collected during the ATIS survey.

When conducting the terrestrial portion of the survey, the Licensee utilized both the prohibited and restricted lists described in NR 40 to determine if a species should be considered invasive for the study. Upland shoreline not owned by the Licensee was surveyed from a boat while moving slowly along the shoreline. Upland shoreline not owned by the Licensee was surveyed utilizing a meander method. For both types of upland areas, the terrestrial plants included in NR 40 were recorded if found and an estimate of relative abundance and length of shoreline where each species was present was recorded for mapping.

Much of the reservoir shoreline does not support invasive species. However, the more developed areas along the shoreline, including Mill Yard Park and the Licensee's property around the Cornell Dam, had a relatively high concentration of terrestrial invasive species when compared to the entire Project area. Terrestrial invasive species observed during the surveys are shown in **Table 6.1.9-1** (EA, 2021). The ATIS Study Report is included in **Appendix E-18**.

Table 6.1.9-1 Terrestrial Invasive Species Identified During Surveys

Common Name	Scientific Name	NR 40 Status
Aquatic Forget-Me-Not	*Myostis scopiodes*	Restricted
Black Locust	*Tobina pseudoacacia*	Restricted
Canada Thistle	*Cirsium arvense*	Restricted
Common Buckthorn	*Rhamnus cathartica*	Restricted
Glossy Buckthorn	*Rhamnus frangula*	Restricted
Hybrid Cattail	*Typha x glauca*	Restricted
Japanese Barberry	*Berbis thunbergia*	Restricted
Moneywort	*Lysmachia nummularia*	Restricted
Morrow's Honeysuckle	*Lonicera morrowii*	Restricted
Multiflora Rose	*Rosa multiflora*	Restricted
Narrowleaf Cattail	*Typha angustifolia*	Restricted
Purple Loosestrife	*Lythrum salicaria*	Restricted
Queen of the Meadow	*Filipendula ulmaria*	Restricted
Spotted Knapweed	*Centaurea stoebe*	Restricted
Tansy	*Tanacetum vulgare*	Restricted
Yellow Iris	*Iris pseudacorus*	Restricted

6.1.10 Threatened and Endangered Resources

6.1.10.1 Federally Listed Species

The USFWS Information for Planning and Conservation (IPaC) website was accessed on February 26, 2021 to develop an official list of federally threatened or endangered species within the Cornell Project vicinity. The list identified the potential presence of the endangered Karner blue butterfly and

threatened northern long-eared bat (USFWS, n.d.). A copy of the official species list is included in **Appendix E-28**.

Karner Blue Butterfly

In Wisconsin, the Karner blue butterfly (KBB) usually occupies open barrens, savannas, and prairies that contain wild lupine. Lupine is widespread in Wisconsin's central and northwest sands where KBB caterpillars feed exclusively on wild lupine leaves. KBB can also be found in other habitats such as roadsides, utility right-of-way, or other areas maintained in an open early successional stage (WDNR, n.d.d).

The WDNR developed a probability model to identify areas where KBB have the highest probability of occurring within its Wisconsin range. The model analyzed variables including known locations of KBB, soil types, land cover, water table, and climate to develop a map showing the KBB High Potential Range (HPR) (WDNR, n.d.e). This map is included in **Appendix E-29**. While there is a KBB HPR within Chippewa County, it is limited to the extreme southern portion of the County, near the Eau Claire County and Chippewa County boundary. The Cornell Project is located within the northern portion of the County, well outside of the mapped HPR. Therefore, the Project is not expected to adversely impact this species.

Northern Long-Eared Bat

The northern long-eared bat (NLEB) is a Wisconsin and federally threatened mammal species. The NLEB roosts during the summer months underneath loose bark or in cavities or crevices of both live and dead trees. Non-reproducing females and males may also roost in cool places such as caves or mines. The NLEB feeds in the forest interior and hibernates in caves and mines during the months of October through April. Chippewa County is within the NLEB range (USFWS, 2019). The location of hibernacula and maternity roost trees are tracked in Wisconsin's National Heritage Inventory (NHI). However, there are no known hibernacula or roost trees within Chippewa County. Project operations that involve tree removal activities may impact unknown maternity roosts. A more thorough discussion of potential impacts is discussed in Section 6.3.

6.1.10.2 State Listed Species

A review of the Wisconsin NHI indicated that two state endangered species, the extra-striped snaketail dragonfly (*Ophiogomphus anomalus*) and the purple wartyback mussel, may occur within the Project vicinity. The NHI review also identified the presence of a bald eagle nest within the Project boundary. A copy of the NHI review is included in **Appendix E-30** as privileged information.

Extra-Striped Snaketail Dragonfly

The extra-striped snaketail dragonfly is a state endangered species that prefers fast flowing, warm water streams with approximate widths of 100 to 800 feet. The streams are located in heavily forested areas and generally have abundant gravel and excellent water quality. The dragonfly can be found near streamside bushes but are believed to forage above the forest canopy (WDNR, 2020b). Project operations that involve ground disturbing activities adjacent to the reservoir or river that could cause erosion or sedimentation, or work on the bed of the reservoir or river, have the potential to impact the species. A more thorough discussion of potential impacts is discussed in Section 6.3.

Purple Wartyback Mussel

The purple wartyback mussel is a state endangered species that lives in medium to large rivers in the western and southern parts of Wisconsin. It is commonly found in areas of slow to moderate current with water depths up to five feet. Its preferred substrate is gravel and cobble. Host fish species, which breed from May through June, include the yellow bullhead and channel catfish (WDNR, 2020c). Project operations that involve ground disturbing activities adjacent to the reservoir or river that could cause erosion or sedimentation, or work on the bed of the reservoir or river, have the potential to impact the species. A more thorough discussion of potential impacts is discussed in Section 6.3.

Bald Eagle

As of August 9, 2007, the bald eagle population had recovered to the extent it no longer required the protection of the federal Endangered Species Act. However, the species is protected by the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and Lacey Act (USFWS, 2020). The bald eagle is no longer listed as a threatened, endangered, or special concern species in Wisconsin.

The bald eagle lives near rivers, lakes, and marshes. In winter, birds congregate near open water in tall trees for spotting prey and night roosts for sheltering. Eagles mate for life and choose the tops of large trees to build nests, which they typically use and enlarge each year. They may have one or more alternate nests within their breeding territory. Eagles typically return to breeding grounds within 100 miles of where they were raised. Project activities that involve disturbance within 660 feet of a nest during the nesting season may cause impacts to the species. A more thorough discussion of potential impacts is discussed in Section 6.3.

6.2 Agency/Stakeholder Recommended Mitigation Measures

Fishery, terrestrial, and endangered resources mitigation measures recommended by resource agencies and stakeholders are described in the following sections.

6.2.1 Recommended Aquatic Mitigation Measures

- The RAW recommended the existing trashracks with 5.38-inch spacing be replaced with new trashracks with 2-inch spacing to reduce the number of adult lake sturgeon, muskellunge, redhorse, and walleye entrained by the Project. The WDNR recommended either a field entrainment study be completed to quantify the amount of entrainment occurring or mitigation measures be implemented to reduce the amount of entrainment.
- The stakeholders have not recommended specific aquatic invasive species mitigation measures but have previously provided study requests.
- 2020 WDNR NHI review identified several specific measures for the protection of listed aquatic species. Their review requested further consultation with the WDNR for all activities occurring under the ordinary high-water mark to evaluate and minimize potential impacts and recommended strict erosion and siltation control measures to prevent negative impacts.

6.2.2 Recommended Terrestrial Mitigation Measures

- The stakeholders have not recommended specific terrestrial mitigation measures but have previously provided study requests.
- The stakeholders have not recommended specific terrestrial invasive species mitigation measures but have previously provided study requests.
- The 2020 WDNR NHI review identified measures to reduce the impacts to the bald eagle and NLEB.

6.3 Anticipated Project Impacts

6.3.1 Aquatic Impacts

6.3.1.1 Impacts Associated with Water Level Fluctuations

As a result of the 2001 Lower Chippewa River Settlement Agreement, the license for the Cornell Project was amended in 2003 to include revised operating parameters regarding reservoir elevations and minimum flows. Water level fluctuations under the current operating regime may lead to dewatering of backwater areas, which can have negative effects on aquatic and semi-aquatic organisms. However, the current operating regime will remain in effect until the Settlement Agreement expires in 2033. Any changes to the existing operating regime would impact the operation of the upstream and downstream hydroelectric projects. Evaluation of operational impacts will be further discussed under Section 6.4.

6.3.1.2 Aquatic Invasive Species

Maintenance of recreational facilities and Project works can pose a risk to the transfer of invasive species. These potential impacts will be further discussed under Section 6.4.

6.3.1.3 Work on Reservoir Bed

Work on the reservoir or riverbed below the ordinary high-water mark can have an adverse impact upon rare and sensitive resources. These potential impacts will be further discussed under Section 6.4.

6.3.1.4 Erosion and Siltation

Project maintenance and construction can result in ground-disturbing activities. Uncontrolled erosion and siltation from ground-disturbing activities can have an adverse impact upon aquatic resources. These potential impacts will be further discussed under Section 6.4.

6.3.1.5 Reservoir Drawdowns

Normal operation of the Project does not require regular reservoir drawdowns. However, from time to time, it will be necessary for the Licensee to draw down the reservoir for dam structure repairs. The timing, rate of drawdown, and other specific aspects of a reservoir drawdown can have adverse impacts upon aquatic resources. These potential impacts will be further discussed under Section 6.4.

The Project currently features wood flashboards supported by steel pins embedded into slots in the concrete crest. When the flashboards are overtopped by approximately one foot of water, the pins are designed to activate or trip, thus releasing the flashboards. The flood event required to trip the

flashboards ranges from the .05 to 0.2 percent annual exceedance probability (200-year to 500-year return period). When the flashboards trip, the reservoir is lowered by 3.8 feet from maximum normal pool elevation of 1002.0 feet NGVD to the flashboard crest elevation of 998.2 feet NGVD until the flashboards can be replaced (Ayres, 2021). According to the licensee's records, the flashboard have never tripped from a flood event.

Flashboard replacement, which occurs approximately every 10-12 years due to their deterioration from the elements, requires a reservoir drawdown of approximately 5 feet. At the request of the WDNR, NSPW conducted a flashboard study in 2021 to evaluate alternatives for replacing the existing flashboards and thus reducing the need for future drawdowns.

Of the four options evaluated, licensee recommends the steel dewatering panel. This alternative is the most economical and would eliminate the need for a reservoir drawdown when the wood flashboards have reached their lifespan. While a drawdown would still be necessary to replace the boards if they released during a flood event, the flood frequency is so low that a more costly alternative cannot be justified. The flashboard study will be eFiled as an independent document because it contains Critical Energy Infrastructure Information.

6.3.1.6 Fish Entrainment and Mortality

The Cornell Project features a main trashrack with 5.38-inch clear spacing and an approach velocity of 5.41 fps for Units 1, 2, and 3. Unit 4 has a separate trashrack with a clear spacing of 2.375 inches and an average approach velocity of 1.8 fps.

In 2016, the Licensee conducted a desktop study to predict turbine passage survival for seven common species including: black crappie, bluegill, lake sturgeon, muskellunge, smallmouth bass, walleye, and yellow perch. Overall, the average turbine passage survival of small resident fish species was estimated at 97.3% for Units 1, 2, and 3 and 91.7% for Unit 4.

In 2020, the Licensee conducted a desktop study to determine the probability of entrainment mortality of lake sturgeon, muskellunge, redhorse suckers, and walleye for lengths that can pass through the existing 5.38-inch trashracks. The study also evaluated and determined the size of fish that would be excluded as well as the approach velocities should 2.5-inch clear spacing trashracks be installed. The study results indicated that entrainment survival rates decreased as fish length increased. If the smaller 2.5-inch clear spacing trashracks were installed, the largest size class of fish would be excluded from entrainment. While the model showed increased mortality rates for larger fish, it did not take intake velocities into account. The adult size classes evaluated all had sustained swim speeds or burst swim speeds exceeding the intake velocity. Therefore, all adult size classes studied in 2020 had the ability to escape entrainment. Only fish willingly entering the turbines would become entrained.

The RAW and WDNR indicated that due to the migratory nature of the species studied, the number of fish volitionally entering the turbines would be significant. The RAW requested the existing trashracks be replaced with those with a maximum 2-inch clear spacing. The WDNR requested an additional

field study be conducted to quantify the magnitude of entrainment mortality or that mitigation measures be taken.

NSPW retained an independent expert to review the Kleinschmidt report and make recommendations regarding entrainment mortality at the Project. The independent expert reviewed the results of the Kleinschmidt 2020 report and attempted to re-create the results using the USFWS's Turbine Blade Strike Analysis desktop model. To date, the independent expert has been unable to duplicate the results. Further discussion is necessary to develop a better understanding of the potential adverse effects of the operation of the Project on fish entrainment mortality.

NSPW believes it may have to revise the Kleinschmidt report, however, we maintain our position that a field entrainment study, as proposed by the WDNR to quantify the number of fish entrained, is unnecessary and cost-prohibitive to this effort.

Entrainment impacts will be further discussed under "Applicant proposed mitigation".

6.3.1.7 Woody Debris

The process of removing woody debris which collects on the trashracks at hydroelectric projects can have an adverse impact downstream because of its potential to provide aquatic habitat. Under current practice, when woody debris is encountered at the Project, it is floated over to the spillway gates and sluiced downstream. Therefore, no adverse impacts to aquatic habitat downstream is anticipated.

6.3.2 Terrestrial Impacts

6.3.2.1 Recreational Site Improvements

The Licensee is proposing to make improvements to recreational sites as described in Section 8.5. Installation of improvements could cause terrestrial impacts due to vegetation management or ground disturbing activities. These potential impacts will be further discussed under "Applicant proposed mitigation".

6.3.2.2 Bald Eagle Nests

ER Review Log # 20-278, included in **Appendix E-30** as privileged information, identified one bald eagle nest within the Project boundary. Project construction or maintenance activities have the potential to cause adverse impacts to the species if they are located within a 660-foot buffer of an eagle nest. There are currently no Licensee facilities within the 660-foot buffer area. The potential impacts will be further discussed under "Applicant proposed mitigation".

6.3.2.3 NLEB Roosting Sites

Roosting sites of the federally threatened NLEB can occur in any tree. Much of the shoreline along the Project reservoir is forested. It is likely that trees will need to be cut or removed during the normal course of Project operation. ER Review Log # 20-278, included in **Appendix E-30** as privileged information, did not identify any federally protected trees that are known maternity roosts or any areas where known hibernacula could be impacted within the Project boundary. As such, under the requirements of the Broad Incidental Take Permit and Broad Incidental Take Authorization (BITA) for Wisconsin Cave Bats dated August 25, 2016, the Licensee proposes to follow the applicable

mitigation measures outlined in the BITA. The BITA is included in **Appendix E-31**. Under the BITA, hydroelectric project activities are not likely to jeopardize the continued existence and recovery of the state population of the protected bats or the whole plant-animal community of which they are part. The impacts will be further discussed under “Applicant proposed mitigation”.

6.3.2.4 Terrestrial Invasive Species

Activity within the Project boundary can pose a risk to the transfer of invasive species. The potential impacts will be further discussed under “Applicant proposed mitigation”.

6.3.2.5 Erosion and Siltation Impacts

Erosion and siltation from ground-disturbing activities can have an adverse impact upon rare and sensitive resources. These potential impacts are further discussed under “Applicant proposed mitigation”.

6.4 Applicant Proposed Mitigation

With the implementation of the following proposed mitigation measures, the continued operation of the Project is not expected to adversely impact the resources described herein.

6.4.1 Proposed Aquatic Mitigation

6.4.1.1 Evaluation of Operational Impacts

The Licensee proposes to study the effects of current Project operations, including reservoir elevations, reservoir fluctuation, and minimum flows, concurrent with the relicensing process for the other five Lower Chippewa River hydroelectric projects beginning no later than 2028. This will ensure that current information is being used to make comprehensive operational decisions for all six hydroelectric projects. The resulting information from the comprehensive study can then be used to assess the need to modify the operation of the Cornell Project.

6.4.1.2 Aquatic Invasive Species

To mitigate the spread of invasive species, the Licensee will develop a rapid response invasive species monitoring plan to monitor for the introduction of new “rapid response” invasive species and limit the dispersal of established species. Within one year of license issuance, the Licensee proposes to develop a plan in consultation with the WDNR prior to filing the plan with the FERC for approval.

6.4.1.3 Reservoir Bed

To mitigate the impacts of work below the ordinary high-water mark within the Project boundary, the Licensee will consult with the USFWS and WDNR to determine appropriate measures to implement which will minimize or eliminate impacts to federal and state listed species.

6.4.1.4 Erosion and Siltation

To mitigate the impacts of erosion and siltation on the resource, the Licensee will implement best management practices for erosion and siltation control during ground-disturbing activities occurring within the Project boundary.

6.4.1.5 Reservoir Drawdowns

There are no routinely scheduled drawdowns necessary for the operation of the project with the exception of flashboard replacement. To mitigate the potential environmental impacts of any future drawdown, the Licensee will draft a drawdown management plan in consultation with the USFWS and WDNR, as part of its request for a temporary license amendment. This process would apply to non-emergency drawdowns greater than three weeks in duration. After the USFWS and WDNR comments are addressed, the Licensee will file the amendment request with the FERC for approval.

To eliminate the periodic drawdowns every 10 to 12 years that are currently necessary to replace the deteriorated flashboards, the Licensee proposes[12] to construct a steel dewatering panel. The steel panel would span pier-to-pier and allow each spillway bay to be dewatered, thus allowing replacement of the flashboards without a drawdown.

The proposed steel dewatering panel is expected to mitigate the adverse impacts from routine drawdowns required for the sole purpose of replacing deteriorated flashboards. The expected cost of the steel dewatering panel is approximately $80,000, which does not include engineering and installation. Annual maintenance costs are expected to be minimal.[13]

In the event the steel panel approach cannot be approved by FERC Dam Safety, the Licensee proposes to continue to use the existing flashboard system that would incorporate measures to increase its overall longevity. Cost for the other alternatives evaluated in the study ranged from $1,100,000 for initial installation of a rubber dam, to $2,500,000 for installation of a crest gate. These alternatives are clearly cost-prohibitive and would require additional substantial costs for annual maintenance.

6.4.1.6 Fish Entrainment and Mortality

The Licensee is currently in the process of determining the potential impact the Project has on fish entrainment mortality. Further consultation among the Licensee, its consultant, and the WDNR will be necessary. The proposed measures to address any potential adverse impacts due to the operation of the Project will be outlined in the FLA.

6.4.2 Proposed Terrestrial Mitigation

6.4.2.1 Recreational Site Improvements

To mitigate for impacts associated with ground disturbing or vegetation management activities due to the installation/construction of proposed recreational improvements, the Licensee is proposing to implement the terrestrial mitigation measures identified in the following four sections.

6.4.2.2 Eagle Nests

To mitigate impacts to the federally protected bald eagle, the Licensee is proposing to implement a buffer of at least 660 feet between any eagle nest and proposed Project vegetation maintenance, construction, or tree clearing activities. If any nests are encountered within 660 feet of proposed

[12] Pending FERC Dam Safety approval.
[13] This estimate is based upon a budgetary estimate obtained from Steel-Fab, Inc. of approximately $80,000 to fabricate one steel panel, but does not include, engineering, permitting, procurement of the four steel panels, installation, and contingency.

activities, the Licensee will schedule activities to occur between August 1 and January 15, which is outside of the eagle nesting season. In the event that work within 660 feet of an eagle nest cannot be avoided during the nesting season, the License will consult with the USFWS and implement agreed-upon protection measures during the work.

6.4.2.3 NLEB Roosting Sites

To protect the federally threatened NLEB, the Licensee proposes to avoid tree removal at the Project unless the tree poses a threat to human life or property, or removal occurs outside of the NLEB pup season, which is June 1 to July 31. Additionally, the Licensee will only remove bats from structures within the Project boundary after consulting with the USFWS and following their recommendations.

6.4.2.4 Terrestrial Invasive Species

To mitigate the spread of invasive species, the Licensee will develop a rapid response invasive species monitoring plan to monitor for the introduction of new “rapid response” invasive species and limit the dispersal of established species. Within one year of license issuance, the Licensee proposes to develop a plan in consultation with the WDNR before filing the plan with the FERC for approval.

6.4.2.5 Erosion and Siltation

To mitigate the impacts of erosion and siltation on the resource, the Licensee will implement best management practices for erosion and siltation control during ground-disturbing activities occurring within the Project boundary.

7. Report on Historical and Archeological Resources

7.1 General History of the Area and Waterway

Although the Chippewa River was heavily used by Native American communities for travel, trading, and subsistence for several thousand years prior to European occupation, the general history of the area and waterway, post-European occupation, is best described for relicensing purposes by the following summary taken from the June 1972 License Application for the Cornell Hydroelectric Project:

During the nineteenth century, the Chippewa River was an important artery for travel and commerce in northern and western Wisconsin. Large hand powered river craft up to 30 feet long used the water even above Cornell. Lumber rafts of considerable size were floated to Mississippi River markets from Chippewa Falls at mile 77 and until the coming of the railroads, steam boats made regular runs up the first 61 miles of the river to Eau Claire. Today, there is no commerce carried out on the river and its only use is be small pleasure craft.

At the times of the earliest pioneers a climax or sub-climax forest was present containing heavy stands of pine, hemlock, and hardwood.

This timber was logged during the last half of the nineteenth century and the country was burned many times through accident or design as settlers tried to farm the poor soils. Such efforts were due to fail and by the early 1900's much of glaciated Wisconsin was turned into barren brushland with recurring fires keeping tree growth to a minimum.

During the period of 1925 to 1935, Wisconsin developed a good forest fire control organization and with fires well controlled, the forest growth began its comeback. This growth was mainly in the fire types of aspen, birch and jack pine. Now 45 years later, these species are reaching maturity and as they are harvested or die, they are being gradually replaced by more tolerant hardwoods mixed with scattered clumps and stands of conifers.

As the Chippewa River wound its way through the glaciated lands of the State, it cut a modest valley into the stony soils. In some places this cutting action exposed the granite bedrock and where this occurred rapids and falls developed. This happened at Cornell where a rather spectacular drop of 15 to 20 feet occurred as the water passed over and between large granite outcroppings. It was called Brunet Falls.

Named after Jean Brunet (pronounced Broo-nay'), an early pioneer and settler of the middle Chippewa River Valley, Brunet Falls was an obstacle to log runs and the scene of many serious log jams during the lumbering era when the river was the main artery for log movement from the pineries of the north to the saw mills of the lower river. It was just below this falls that the Cornell dam was built in 1913. Cornell grew as a typical Chippewa River logging town, peaking operations in the late nineteenth century and declining with the end of the sawmill era. Most of the saw timber was gone by 1910, but pulpwood species were still available and the Brunet Falls Manufacturing Company, sometime prior to 1911, acquired fee title and flowage rights to lands upstream from Cornell.

This company constructed a dam, powerhouse and abutting paper mill during the period of 1911 to 1913. In addition to using the developed water power for mechanical pulp grinding, limited 25-cycle

electric generation was installed for in-plant use. A minor portion of the normal stream flow was also diverted for use as processing water in the paper mill.

In 1914 the Cornell Wood Products Company acquired the development and in 1929 Northern States Power Company purchased the dam and powerhouse portion of the project. The Cornell Wood Products company and its successor, the St. Regis Paper Company, continued to utilize the dam and powerhouse facility under a lease agreement in conjunction with their adjacent paper mill operation. There have been few changes in design or construction since 1913. As of June 1972, the powerhouse is still operated to produce 25-cycle energy for in-plant use in addition to mechanical power for pulp grinding and as an intake for processing water.

St. Regis Paper Company abandoned their lease for the Cornell Operation in 1972. On December 26, 1973, the FERC issued an Order Issuing License (major) to NSPW. After the license was issued, the Licensee began a major reconstruction of the powerhouse and generation equipment. The original powerhouse was reconstructed to add a non-overflow spillway section containing two bays with tainter-type gates and a new powerhouse containing three horizontal units and one minimum flow unit. Reconstruction was completed between 1974 and 1976.

7.2 Efforts to Identify Significant Properties (National Register Status)

The Licensee completed efforts to identify historic and archaeological properties within the Project's Area of Potential Effects (APE) in accordance with the Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, the State of Wisconsin - State Historic Preservation Officer, and the State of Michigan - State Historic Preservation Officer, for Managing Historic Properties That May Be Affected By New and Amended Licenses Issuing for the Continued Operation of Existing Hydroelectric Projects in the State of Wisconsin and Adjacent Portions of the State of Michigan, executed on December 30, 1993 (Programmatic Agreement).

The APE is defined in the Programmatic Agreement to include:

- Lands enclosed by the Project boundary as delineated in the existing license.
- Attached or associated buildings and structures extending beyond the Project boundary, which contribute to the National Register of Historic Places eligibility of the hydroelectric generating facility.
- Lands or properties outside the Project boundary, where the Project may cause changes in the character or use of historic properties, if any historic properties exist.

For the Cornell Project, the APE was established to include all three items listed above. Associated structures that are functionally, historically, structurally, or spatially connected to the licensed facility were also evaluated.

7.2.1 Historic Properties

A review of the Wisconsin Historic Preservation Database Architecture and History Inventory (AHI) did not reveal any NRHP structures within the Project boundary. However, the Cornell Pulpwood Stacker, located within Mill Yard Park and just outside the Project boundary, was listed on the NRHP in 1993. The Cornell Pulpwood Stacker is a steel lattice-type structure that was assembled onsite in 1912 and used to stack pulp wood for the large mill complex located immediately adjacent and east of the Project (SHPO, n.d.).

The AHI also listed several other structures in the Project boundary, all of which are in Brunet Island State Park. Each structure was evaluated for eligibility to the NRHP yet none were considered eligible on an individual basis. However, the structures would be considered a contributing feature if a Brunet Island Historic District were formed. The structures are identified in the AHI by the following numbers: 3094, 45770, 45772, 45774, 45775, 45777, 45779, and 45780.

In 2019 an evaluation of the eligibility of the Cornell Wood Products Co. Historic District (District) for NRHP was conducted. The District includes the Cornell Dam, powerhouse, mill yard, pulp wood stacker, and mill buildings associated with paper and pulp milling and production. The evaluation determined the District is eligible for the NRHP. The NRHP Evaluation is included in **Appendix E-32** as privileged information.

7.2.2 Archaeological Properties

Section 106 of the National Preservation Act and 36 CFR Part 800 requires a Phase I Archaeological Survey to determine whether any archaeological sites are eligible for the National Register of Historic Places and if they will be affected by normal Project operations. The Licensee hired an archaeologist to research existing archaeological information in the WHPD at the Wisconsin Historical Society. This research identified five archaeological sites either overlapping or immediately adjacent to the Project boundary. The sites are identified as CH0001/BCH-0096, CH-0002, CH-0030, CH-0137/BCH-0106, and CH-0150. A literature review and archives research determined site CH-0137/BCH-0106 likely does not exist at Cornell, Wisconsin. All documentation for this site describes a site more likely located at Chippewa Falls, Wisconsin (TRC, 2019). Archeological sites identified in this literature search are shown in **Table 7.2.2-1** (TRC, 2019).

Table 7.2.2-1 Previously Identified Archaeological Sites within Project APE

State Site #	Site Type	Location
CH-0001/BCH0096	Uncatalogued Burial	Within APE
CH-0002	Campsite/Village	Within APE
CH-0030	Isolated Finds	Within APE
CH-0137/BCH-0106	Uncatalogued Burial	Mapped incorrectly in WHPD; likely not in Project APE
CH-0150	Mill/Sawmill	Within/Adjacent to APE

The archaeologist also conducted a Phase 1 Archaeological Survey in 2019 that encompassed all lands owned by the Licensee and all shorelines within the current Project boundary. The report is included in **Appendix E-32** with privileged information redacted from the public copy.

No artifacts were found and no remnants of the previously reported archaeological sites were encountered during the survey. The facilities associated with the mill/sawmill (CH-0150) and the NRHP-listed Cornell Pulpwood Stacker are located outside of the Project boundary. Archaeological monitoring of the shoreline of known sites noted that the banks were well vegetated and stable. The archaeologist recommended monitoring the archaeological sites on a five-year schedule to ensure continued shoreline stability (TRC, 2019).

7.2.3 Wisconsin Historic Society Review of Historical/Archaeological Reports

On February 6, 2020, the Licensee submitted the NRHP Evaluation, NPS 10-900 form, and the Phase 1 Archaeological Survey Report to the WHS for review. On March 12, 2020, the WHS responded to the Determination of Eligibility for the Cornell Wood Products Company Historic District requesting additional contributing elements be added to the District. WHS concurred with the other contributing and non-contributing elements and the conclusion that the facilities are eligible for the National Register. On July 28, 2020, the WHS submitted comments on the Phase 1 Archaeological Survey concurring with the archaeologist's recommendation to conduct shoreline monitoring on a 5-year schedule.

On February 25, 2020, the Licensee submitted the NRHP Evaluation and Phase 1 Archaeological Survey reports to the Forest County Potawatomi THPO for review. The THPO responded on March 23, 2020 via email indicating the Forest County Potawatomi concurs with the Phase 1 Archaeological Survey including the recommendation to conduct shoreline monitoring on a 5-year schedule. The Forest County Potawatomi also requested the THPO be informed in the event archaeological materials are exposed by future erosion or construction activities. No specific comments on the NRHP Evaluation were provided.

All correspondence with the Wisconsin SHPO and Forest County Potawatomi THPO is included in **Appendix E-32**, with privileged information redacted from the public copy.

7.3 Agency Mitigation Recommendations and Response

The WHS recommendations have been incorporated into the Historic Properties Management Plan (HPMP), which is included in **Appendix E-32** for Commission approval and discussed in the following section.

7.3.1 Programmatic Agreement

The Programmatic Agreement among the Federal Energy Regulatory Commission; the Advisory Council on Historic Preservation; the State of Wisconsin, State Historic Preservation Officer; and the State of Michigan, State Historic Preservation Officer, for Managing Historic Properties That May Be Affected By New and Amended Licenses Issuing for the Continued Operation of Existing Hydroelectric Projects in the State of Wisconsin and Adjacent Portions of the State of Michigan, executed on December 30, 1993, assigns licensees responsibility to "ensure that historic properties are considered in the continued operation and maintenance of hydroelectric facilities during the term of their licenses." To further this purpose, licensees are required to develop a Historic Resources Management Plan (HRMP) or HPMP within one year of any license issuance.

7.3.2 Historic Properties Management Plan

In accordance with Stipulation II of the Programmatic Agreement, the Licensee developed a HPMP in consultation with the Wisconsin SHPO and the Forest County Potawatomi THPO. The HPMP is included in **Appendix E-32,** with privileged information redacted from the public copy, and is awaiting Commission approval.

8. Report on Recreational Resources

8.1 Existing Recreational Resources

The Cornell Dam and southern portion of the reservoir are located within the City of Cornell. The Project is surrounded by industrial and public use lands. The tables below include recreation sites located in the Project vicinity and each site's location relative to the proposed Project boundary. The tables also include information on the site's owner, who is responsible to operate/maintain the site, and a list of recreation amenities. **Table 8.1-1** includes recreation sites located within or partially within the proposed Project boundary and **Table 8.1-2** includes recreation sites located adjacent to or outside the proposed Project boundary. The locations of recreation sites on Licensee-owned property are depicted on the Project boundary drawings provided in Exhibit G of this application. Drawings of the recreation site locations not located on Licensee-owned property are provided in the City of Cornell's Comprehensive Outdoor Recreation Plan (pages 11 and 21) included in **Appendix E-35**.

Table 8.1-1 Recreation Sites Within or Partially Within the Proposed Project Boundary

Recreation Site	Boundary Location	Owner	Operate/ Maintain	Amenities
266th Street Informal Access Site	Within	NSPW	NSPW	No formal facilities, but includes: • Carry in access • Parking • Bank fishing
Portage Trail, Portage Take-Out, Portage Put-In	Within	NSPW	NSPW	• Canoe portage trail, length of 1,000 feet • Parking
Tailwater Fishing Area (East Side)	Within	NSPW	NSPW	• Pathway • Parking • Shoreline fishing with leveled aggregate area along riverbank
Tailwater Fishing Area (West Side)[14]	Within	NSPW	NSPW	No formal facilities, but includes: • Grass pathway from canoe portage to tailwater area • Shoreline fishing
Brunet Island State Park	Partially Within	State of WI	State of WI	• Hard surface boat landing • Campground • Swimming beach • Hiking, biking, cross country skiing trails • Fishing pier • Restrooms • Picnic areas • Playground equipment
City of Cornell Public Boat Landing	Partially Within	City of Cornell	City of Cornell	• Hard surface boat landing • Parking • Picnic area

[14] Same site as the Portage Put-In.

Table 8.1-2 Recreation Sites Adjacent to or Outside the Project Boundary

Recreation Site	Boundary Location	Owner	Operate/ Maintain	Amenities
Old Abe Trail	Adjacent	State of WI	State of WI	• 19.5-mile trail • Paved, multi-use, accessible • Connects Lake Wissota and Brunet Island State Parks
Mill Yard Park	Adjacent	City of Cornell	City of Cornell	• Shelter • Visitor Center • Museum • Ball fields • Playground equipment • Benches • Skate park • Historic information • Restrooms • Picnic tables
Ice Age Trail	Adjacent	Chippewa Moraine Chapter of Ice Age Trail Alliance	Chippewa Moraine Chapter of Ice Age Trail Alliance	• Wisconsin Ice Age National Scenic Trail • 23-mile section
Brunet City Park	Outside	City of Cornell	NSPW	• Hard surface boat landing • Playground equipment • Picnic pavilion and grills • Benches • Memorial • Accessible restrooms

The Portage Trail, Portage Take-Out, and Portage Put-In are the only recreation sites currently identified as FERC-approved Project recreation facilities according to the Form 80 Report filed with FERC in 2015 (Xcel Energy, 2015). The Form 80 Report also provided recreation use information for the City of Cornell's Public Boat Landing and Brunet Island State Park's boat landing, fishing area, beach, and hiking trails, given their proximity to the Project. The Form 80 Report showed moderate usage of the City of Cornell's Public Boat Landing, with use estimated at 55% capacity. The Brunet Island State Park campground showed the highest estimated use at 95% capacity. The remaining Brunet Island State Park facilities showed moderate use estimated at 55%-60% capacity. The Licensee-owned Portage Trail, Portage Take-Out, and Portage Put-In showed low use estimated at 10% capacity (Xcel Energy, 2015). The Form 80 Report from 2015 is included in **Appendix E-33**.

The Project vicinity offers an abundance of opportunities for outdoor recreation. Chippewa County has recognized the contribution of recreation to the quality of life for its citizens. Recognizing the need to plan for orderly growth, each unit of government has developed an outdoor recreation plan. **Appendix E-34** presents the Chippewa County Outdoor Recreation Plan. Chippewa County owns and maintains four parks as well as forested lands. However, none of these facilities are located in the Project vicinity. The outdoor recreation plan prioritized recreation activities for Chippewa County. High priority activities included improving multi-use recreational opportunities, fishing and boating access, handicapped accessibility, and

hiking and biking opportunities. General recommendations under the plan include facilitating public-private partnerships, optimizing the use of existing facilities, and participating in federal and state recreational aid programs to assist communities in meeting their recreational needs (County, 2010b).

The City of Cornell developed a Comprehensive Outdoor Recreation Plan 2020-2025 (CORP), which is included in **Appendix E-35**. The CORP addresses the importance of parks and recreation within the City. Proposed recreational improvements identified in the CORP included improvements to the City of Cornell's Public Boat Landing, Mill Yard Park, and Brunet City Park.

Proposed improvements to be undertaken by the City at the City's boat landing include paving the parking areas and adding new signage, an Americans with Disabilities Act (ADA) accessible (barrier free) boarding dock, public boat dock, restrooms, picnic shelter, and camping area (City, 2019).

Several improvements are proposed by the City for Mill Yard Park. More specifically, the City proposes to improve the barrier free accessibility of existing facilities, create a canoe/kayak access to the Chippewa River, install a barrier free accessible dock, improve signage, resurface parking areas, make improvements to existing buildings, improve landscaping, upgrade the skateboard park and ball diamonds, and repaint the stacker. The City also plans to work with the Licensee to obtain ownership of, or easement for, NSPW's shoreline property adjacent to the Mill Yard Park in order to develop river access via a riverfront trail (City, 2019). The Licensee is working with the City of Cornell to grant them access rights to its shoreline property so that the proposed improvements may proceed resulting in a quality recreational experience available to the public.

There are plans for the City to upgrade existing facilities at Brunet City Park including trash receptacles, sidewalks, benches, and picnic tables. There are also plans to move the Jean Brunet monument inside the Park and construct a new splash pad (City, 2019). Brunet City Park is located within the center of the City of Cornell and is not associated with the Cornell Project.

At the statewide level, Wisconsin publishes a Statewide Comprehensive Outdoor Recreation Plan (SCORP) every five years as required by the Federal Land and Water Conservation Fund Act of 1965. The SCORP is used to help allocate federal funds among local communities. It also focuses on preserving and improving recreation opportunities in Wisconsin while targeting relationships such as public health and wellness, urban access to outdoor recreation, and public and private partnerships (WDNR, 2019a). The SCORP recognizes that one of the top-priority needs is to provide more places near urban centers to support a variety of nature-based recreation. Of particular note is the demand for more trails (both non-motorized and motorized), as well as water and shore access for fishing, boating, and swimming. The SCORP is included in **Appendix E-36**.

8.2 Estimated Use of Existing and Potential Recreation Resources

8.2.1 Recreation Survey Methods and Results

As part of relicensing consultation, stakeholders requested recreation use information be collected at recreational areas in the Project vicinity to understand and document recreation utilization and needs within the Project boundary. The recreation study consisted of the following:

- Recreation site inventory
- Recreation facility condition assessment
- Recreation use surveys
- Future and potential recreation questionnaire

Recreation in the Project vicinity is dominated by Brunet Island State Park. Brunet Island State Park collects its own detailed recreation use records. Recreational needs for Mill Yard Park have already been determined in the City of Cornell's CORP. Therefore, these two sites were not evaluated during the study.

8.2.1.1 Recreation Site Inventory

The recreation site inventory was completed during the summer of 2020 to collect information on recreation amenities and capacities, primary type of recreation provided at the site, existing sanitation facilities, type of vehicle access and parking, presence and type of barrier free facilities, location of site, and photographs of amenities. A summary of amenities at each site is shown in **Table 8.2.1.1-1**. The only barrier free facilities identified during the surveys were barrier free picnic tables at the City of Cornell's Public Boat Landing.

Table 8.2.1.1-1 Recreation Site Inventory

Recreation Site	Parking Sites	Boat Launch / Carry-in Access	Picnic Facilities	Bank Fishing	Part 8 Sign	Other Signage
266th Street Informal Access Site	6	Carry-in Access	No	Yes	No	No
Portage Trail	6*	No	No	Yes	No	Directional (3 signs)
Portage Take-Out	5	Carry-in Access	No	Yes	No	Directional (1 sign)
Portage Put-In	6*	Carry-in Access	No	Yes	No	Directional (2 signs)
Tailwater Fishing Area (East Side)	6	No	No	Yes	No	No
Tailwater Fishing Area (West Side)	6*	No	No	Yes	No	No
City of Cornell Public Boat Landing	5	Boat Launch (concrete ramp)	Yes	Yes	Yes	No

* Parking for Portage Trail, Portage Put-In, and Tailwater Fishing Area (West Side) is available at Portage Take-Out.

8.2.1.2 Recreation Facility Condition Assessment

A facility condition assessment was completed for each recreation site to determine if the amenities (including signage) were in good working condition, needed maintenance or repair, or needed to be replaced. A summary of recommended site improvements is shown in **Table 8.2.1.2-1**. The complete results of the site condition assessments can be found in the Recreation Study Report in **Appendix E-37**.

Table 8.2.1.2-1 Recommended Recreation Facility Improvements

Recreation Site	Recommended Improvements
266th Street Informal Access Site	Install Part 8 sign if formalized as a FERC-approved recreation site
	Block vehicular access to shoreline
	Install signage listing acceptable uses and hours of operations
Portage Take-Out	Continue to grade parking area on regular basis
	Update Part 8 sign to meet current requirements
Portage Trail	Continue to maintain canoe portage trail on a regular basis
Portage Put-In	Continue to maintain Portage Put-In on a regular basis
Tailwater Fishing Area (East Side)	Make improvements to access path leading to shoreline fishing area
	Install directional signage to make it clear the site is open to public
	Install acceptable use signage
	Install Part 8 sign meeting current requirements
	Establish designated parking area
Tailwater Fishing Area (West Side)	Install signage directing bank anglers to Portage Put-In area

8.2.1.3 Recreation Use Surveys

The recreation use survey was completed at intervals described in the study plan on 13 randomly selected weekdays, weekend days, and holiday weekend days, between the hours of 7am to 7pm from March through September of 2020. The City of Cornell Public Boat Landing showed the most use with 73 users observed, followed by the Portage Take-Out with 22 users observed.[15] The remaining recreation sites showed less usage. The Tailwater Fishing Area (East Side) and Portage Put-In showed 10 users observed each, the 266th Street Informal Access Site showed seven users observed, the Portage Trail showed four users observed, and the Tailwater Fishing Area (West Side) with one user observed.

Of all the recreation sites, only the City of Cornell Public Boat Landing was utilized at a rate above 20% capacity during the recreation season. Overall, the site was utilized at 74.9% capacity over the entire recreation season. For this analysis, it was assumed the number of parking spaces was the limiting factor for capacity for each recreation site. It was assumed there would be an average of 1.5 people per vehicle. Therefore, daily capacity was determined by multiplying 1.5 by the number of parking spaces at each site. For the three sites without parking, which include the Portage Trail, Portage Put-In, and Tailwater Fishing Area (West Side), capacity was assumed to be the same as the Portage Take-Out because this is where recreation users would park to use these three facilities. Recreation use recorded during the survey is summarized in **Table 8.2.1.3-1**. The complete results of the recreation use survey can be found in the Recreation Study Report included in **Appendix E-37**.

[15] All the observed recreationists were either shoreline fishing or hiking/walking/jogging.

Table 8.2.1.3-1 Recreation Use Survey Summary

Recreation Site	Total Users Observed	Percent Capacity Observed
266th Street Informal Access Site	7	6.0%
City of Cornell Public Boat Landing	73	74.9%
Portage Take-Out	10	10.3%
Portage Trail	4	3.4%
Portage Put-In	22	18.8%
Tailwater Fishing Area (East Side)	10	8.5%
Tailwater Fishing Area (West Side)	1	0.9%

8.2.1.4 Estimate of Current and Future Recreation Use

Based upon the results from the recreation use study, a total of 127 users were observed over 13 observations for an average of 9.8 users per day. Assuming each observation accounted for an entire recreation day, the recreation season total use as surveyed from March through September (214 days at 9.8 users per day) is 2,097 days. The Project experienced 2,097 recreation days during the primary recreation season. Assuming recreation use is 25% during the off-season (October, November, December, January, February), the Project experienced 524 recreation days during the off-season. This provides an annual total of 2,621 estimated recreation days for the Project recreation facilities in 2020.

Brunet Island State Park, which is located within the Project boundary, experienced 124,799 visitors in 2018 according to the CORP. Assuming 90% of the visitors stayed for the day, and assuming a 2% increase in both 2019 and 2020, this equates to 116,856 recreation days in 2020.

The Mill Yard Park currently does not have recreation facilities within the Project boundary. Therefore, no recreation counts were made outside of the City of Cornell Public Boat Landing and Licensee's facilities. Anecdotal information provided by Ms. Judy Talbot regarding the Recreation Survey Report indicated recreation use at the Visitor Center and Mill Yard Park increased in 2020 due to impacts from COVID-19.

As stated in Section 4.6, the City of Cornell is projected to have a population decrease of 4% during the 2020 to 2040 timeframe (DSC, 2013). Chippewa County is projected to have a population increase of 6.7% during the same timeframe (DSC, 2014). Assuming a corresponding 5% population growth impacting recreation use, the number of recreation days for Project facilities is expected to increase to 2,752 recreation days[16] by 2040.

The same methodology could be applied to Brunet Island State Park; however, since it is a state park that receives state-wide exposure, the same projection methodology may not apply. Brunet Island State Park has not updated its Master Plan since 1986; therefore, no improvements are anticipated at the state park which would significantly increase use in the near future.

[16] The projected use figure does not include recreation use at Brunet Island State Park because it is not a project recreation facility.

The City's Proposed enhancements for Mill Yard Park are expected to significantly increase use; therefore, any future projections would be unreliable.

8.2.1.5 Future and Potential Recreation Questionnaires

To determine future recreation needs within the Project vicinity, a questionnaire was sent to municipalities and other entities responsible for recreation. Those entities included the City of Cornell, Chippewa County, Town of Birch Lake, Town of Cleveland, Town of Estella, Town of Holcombe, WDNR, and the local chapter of the Ice Age Trail Foundation. No questionnaire responses were received from Chippewa County, WDNR, Town of Birch Lake, or Town of Cleveland.

City of Cornell

The City of Cornell is responsible for recreation opportunities at Mill Yard Park, City Shop Property (City of Cornell Public Boat Landing), and Jean Brunet City Park. The City indicated Mill Yard Park exceeds its parking capacity during the annual community fair/softball tournament and the Chippewa River Rendezvous. A summary of their proposed improvements is identified below and the CORP is included in **Appendix E-35**.

- Mill Yard Park
  - Reconstructing restrooms in the pavilion to make them barrier free
  - Creating a canoe/kayak launch area
  - Constructing a trail along the river to the city boat landing
  - Obtaining shoreline property access rights from the Licensee
  - Improving parking and signage

- City of Cornell Public Boat Landing
  - Improving the boat ramp, parking, and signage
  - Constructing restrooms
  - Adding a barrier free skid-pier
  - Adding additional picnic and camping areas

Town of Estella

The Town of Estella responded to the questionnaire indicating they are not responsible for any recreation sites within the Project vicinity.

Town Lake Holcombe

The Town Lake Holcombe responded to the questionnaire indicating they are not responsible for any recreation sites within the Project vicinity.

Ice Age Trail Alliance

The Ice Age Trail Alliance (IATA) oversees two trail segments within the Project vicinity and is responsible for trail building and maintenance. The Chippewa River Segment has trailheads at County Highways CC and Z. A spur trail leads from the IATA parking lot on County Highway CC to the Firth Lake Segment. There is good signage along the trails and trailheads at both the County Highway CC and County Highway Z parking areas.

The IATA is proposing to extend the Chippewa River Segment from County Highway Z to the City of Cornell via the Blue Bridge (State Highway 64) and Mill Yard Park via an unassigned connecting route. A portion of the proposed trail is located on private land and will require permission from the owners. The portion of the unassigned connecting route in Mill Yard Park is also included in the City of Cornell CORP but is designated as a river walk trail. These improvements are expected to be completed within the next five years.

Susan Courter

A questionnaire was returned by Ms. Susan Courter, a local resident along the Chippewa River between the City of Cornell and Jim Falls, who indicated she was not responsible for recreation sites in the Project vicinity. Ms. Courter stated the natural resources and recreation areas in the Project vicinity have experienced an exponential increase in use with the COVID-19 pandemic as people turn to open spaces for fresh air, wellness, and recreation along the river.

8.3 Stakeholder Comments and Recommended Development

Development recommendations brought forward by stakeholders throughout Stage 1 and Stage 2 consultation are contained in *Volume 4, Documentation of Consultation*. Recommended development activities that were brought forward independent of the consultation section of the Recreation Study Report are contained in **Appendix E-37** and outlined below. Development recommendations that are proposed in the Recreation Study Report are also listed as proposed recreation measures in Section 8.5, regardless of the source of the recommendations.

8.3.1 City of Cornell

The City of Cornell requested several recreation enhancements which are captured in the CORP as included in **Appendix E-35**. The requests are further explained in Sections 8.4 and 8.5. Two items initially requested, which were outside of the CORP, included improvements to the tailwater areas on both the east and west side of the Chippewa River.

The City of Cornell initially requested an additional boat launch be installed below the Cornell Dam on the west side because the rock rapids prevent access to the tailwater from other downstream boat landings. This area is accessed by carry-in via the Portage Put-In. It is not feasible to install a boat landing for trailered, motorized boats downstream of the Cornell Dam because these boats would be limited to the area immediately around the boat ramp due to the rock rapids just downstream. Therefore, the Licensee is not proposing a new boat ramp downstream of the Cornell Dam on the west side.

The City of Cornell requested access be restored to the east side of the Chippewa River downstream of the Cornell Dam for tailwater fishing. The Tailwater Fishing Area (East Side) is currently open to the public. The Licensee is proposing improvements to the site as described in Section 8.5.

8.3.2 Ms. Susan Courter

Ms. Susan Courter recommended the City of Cornell acquire rights to the shoreline at Mill Yard Park to improve the view from the park. Ms. Courter also requested vehicle access to the Chippewa River below the Cornell Dam to include a barrier free boat ramp with a fishing pier or deck. As described in Section

8.3.1, rock rapids located downstream of the tailwater area prevent operation of motorized boats in the area. The existing Portage Put-In provides carry-in boat access. The Licensee is proposing improvements to the Tailrace Fishing Area (East Side) as described in Section 8.5.

8.4 Measures Recommended for Creating, Preserving, or Enhancing Recreational Opportunities

8.4.1 Cooperate with Local Entities

The City of Cornell and Chippewa County have planned for and developed numerous recreational facilities throughout the City and County. Each entity's recreation plan includes projections of future demands for recreational facilities, identifies existing deficiencies, and determines local and County needs.

In addition, each recreation plan presents a series of proposals to address the identified needs. The future needs and recommendations for the City of Cornell and Chippewa County are provided in **Appendix E-35** and **Appendix E-34**, respectively. Since most of the recreation activity on the lower reservoir occurs within the City of Cornell, the Licensee has committed to work with the City to create, preserve, and enhance recreational opportunities consistent with FERC's Policy encouraging licensees to cooperate with local agencies in recreational use of lands administered by those agencies adjacent to a project area. The Licensee met with the City of Cornell on April 7, 2021 to discuss cooperative efforts for enhancing recreation in the Project vicinity. The result of those discussions and proposed enhancements are outlined in Section 8.5.

8.5 New Measures or Facilities Proposed by the Applicant

8.5.1 Establish Informal Sites as FERC-Approved Recreation Site

The Licensee proposes to designate two informal sites as FERC-approved recreation sites.

8.5.1.1 266th Street Informal Access Site

The Licensee proposes to designate the 266th Street Informal Access Site as a FERC-approved recreation site. The site will be used for bank fishing and carry-in boat access. The Exhibit G Drawing will be modified prior to the Final License Application to include the property within the project boundary. Proposed improvements include restricting unauthorized vehicle access to the shoreline (to limit shoreline erosion), and adding signage pursuant to Part 8, to include acceptable usage, hours of operation, and contact information.

8.5.1.2 Tailwater Fishing Area (East Side)

The Licensee proposes to designate the Tailwater Fishing Area (East Side) as a FERC-approved recreation site. The site will be improved by adding a designated parking area, modifying the shoreline access trail, and installing signage that meets Part 8 requirements (i.e. acceptable uses, hours of operation, and contact information). The directional signage will also be upgraded to include language making it clear that anglers are welcome.

8.5.2 Brochure Including Recreation Information in the Vicinity

The existing recreation brochure for the Lower Chippewa River Hydroelectric Projects will be updated or a new brochure will be developed to include the recreation areas at the Cornell Project. This brochure will be made available for distribution at the Visitor Center in Mill Yard Park.

8.5.3 Portage Trail

The existing portage trail sign contains a directional arrow that is weathered and worn. The worn directional arrow with be replaced or added to the existing sign. In addition, the part 8 sign at the take-out will be reviewed to ensure it meets part 8 requirements and updated or replaced as necessary.

8.5.4 Redirecting Tailwater Fishing Area (West Side)

Due to safety concerns at the Tailwater Fishing Area (West Side) immediately downstream of the spillway, the Licensee proposes to redirect anglers to the Portage Put-In with additional directional signage.

8.5.4.1 Signage

The Licensee will install additional directional signage in the parking area near the Portage Trail to welcome anglers and direct them towards the Portage Put-In. An additional directional sign at the Tailwater Fishing Area (West Side) will be installed to welcome anglers and direct them towards the Portage Put-In for shoreline fishing.

8.5.5 City of Cornell CORP

The Licensee has coordinated with the City of Cornell and has agreed to assist the City on several recreation improvements at the City's facilities in the Project area listed in the CORP as outlined below.

8.5.5.1 Mill Yard Park and City Boat Landing Improvements

The Licensee will grant the City of Cornell access rights or fee title to its shoreline property on the east side of the reservoir, adjacent to Mill Yard Park, to enable the City to develop and maintain its proposed park improvements. The type of conveyance made will be of a duration such that the City can apply for grants to improve the park shoreline.

In addition, the Licensee will install a barrier-free skid pier at the City of Cornell Boat Landing and improve the Existing kayak launch pier at Mill Yard Park to accommodate barrier-free fishing.

The Licensee plans to work with the City to install the barrier-free improvements at the City's facilities. It is believed that Licensee's proposed funding for the City's proposed recreation enhancements discussed above will be leveraged to secure state and/or federal cost share dollars.

8.6 Specific Recreation Development Plans

8.6.1 Entities Responsible for Implementing, Constructing, Operating, or Maintaining Existing or Proposed Measures or Facilities

As discussed throughout this report, there are several entities responsible for improving, constructing, operating, or maintaining existing recreation facilities in the Project area. These entities include the City of Cornell, WDNR, Ice Age Trail Alliance, and the Licensee.

8.6.2 Implementation or Construction Schedule

Improvements at the following sites will be completed by the end of year 1 after the license is issued:

- Tailwater Fishing Area (east Side) Improvements
- City of Cornell Mill Yard Park Shoreline Access

Improvements at the following sites will be completed by the end of year 3 after the license is issued:

- 266th Street Informal Access Site Improvements
- Portage Trail and Tailwater Fishing Area (West Side) Improvements
- City of Cornell Boat Landing Barrier-Free Skid Pier and Mill Yard Park Fishing Pier Donation

8.6.3 Estimated Costs

Estimated costs for proposed improvements are described in 2021 dollars in **Table 8.6.3-1**.

Table 8.6.3-1 Estimated Improvement Costs

Recreation Site	Improvement	Estimated Costs	
		Capital in 2021 Dollars	Annual Maintenance
266th Street Access Site	Blocking unrestricted vehicular access to shoreline, install additional signage	$30,000	$5,000
Portage Trail and Tailwater Fishing Area (West Side)	Signage and Brochure	$10,000	$1,000
Tailwater Fishing Area (East Side)	Adding designated parking area, modifying shoreline access trail, installing signage	$10,000	$5,000
City of Cornell Public Boat Landing	Barrier Free Skid Pier donation	$25,000	$0
City of Cornell Mill Yard Park	Barrier Free Fishing Pier improvements donation	$25,000	$0
	Shoreline Access Rights	$95,000	$0

8.6.4 Maps or Drawings

A conceptual drawing of the improvements to the Tailwater Fishing Area (East Side) is included in **Appendix E-38**.

The Licensee proposes to make the following modifications to the project boundary consistent with the clarification of roles and responsibilities for maintaining recreation sites in the Project area discussed in this report:

- Include the 266th Street Recreation Access Site within the project boundary.
- Remove the City of Cornell Public Boat Landing from the project boundary.
- Remove the Brunet Island State Park from the project boundary.

9. Report on Land Management and Aesthetics

9.1 Existing Development and Use of Project

In Wisconsin, land-use regulation and zoning occurs at the county government level, excluding incorporated villages and cities within the county. The provisions of certain county zoning ordinances may not take effect for a particular rural civil town area within the county until the county ordinance is adopted by the respective civil town government.

Regulations for navigable waters of the state occur at the state and federal level and are controlled by the WDNR and USACE. For the Cornell Project, the Chippewa River is designated as a Section 10 waterway by the USACE. As such, there is additional regulatory authority from the USACE.

In the area of the Cornell Project, regulatory land use and zoning matters are controlled by the City of Cornell and Chippewa County. Project facilities are located within the City of Cornell and are surrounded by public park lands, as well as commercial, residential, and industrial areas.

The City of Cornell developed a Comprehensive Plan for the years 2009-2029. The Comprehensive Plan indicates existing land uses near the Cornell Project should remain as such in the future (City, 2009). A copy of the City of Cornell Comprehensive Plan is included in **Appendix E-39**.

9.2 Measures Proposed to Ensure Modifications Blend with Surrounding Environment

The Licensee, or its designee (via lease), has been operating the Cornell Dam and its associated hydroelectric facilities in their present location since 1929. The Dam was originally built in 1913 (NSPW, 2008). From inception to the present, the Cornell Project has become part of the local environment.

Continued operation of the Cornell Project will not violate any federal or state policies or regulations once relicensed. There are no known conflicts between the respective local governmental planning and/or zoning ordinances and the Cornell Project development or operation.

9.3 Project Boundary Changes

The current Project boundary extends to elevation 1,010.0 feet and includes lands that are not needed for Project operations. The current boundary encompasses 1,340.4 acres, which includes 504.0 acres of Project lands and 836.4 acres of submerged land. The inundated land is further divided into 832.4 acres of reservoir area upstream of the Cornell Dam and 4.0 acres of tailwater area downstream (MH, 2021).

The proposed Project boundary depicted in Exhibit G is derived from georeferenced topographic map data and 2018 Chippewa County parcel data. The proposed boundary was modified to include lands upstream of the Dam to elevation 1,002.0 feet, which is the maximum operational elevation of the Project's reservoir. The proposed boundary includes all land and water necessary for the safe and effective operation of the Cornell Project and all lands required for other Project purposes, including, but are not limited to, flowage, public recreation, shoreline control, and protection of environmental resources. The proposed boundary

encompasses approximately 1,071.0 acres, 234.6 acres of which is upland and 836.4 acres of which is inundated. The inundated area is further divided into 832.4 acres of reservoir area upstream of the Cornell Dam and 4.0 acres of tailwater area downstream (MH, 2021).

Maps depicting Licensee's upland and submerged land within the current and proposed Project boundary are included in **Appendix E-40**[17].

9.4 Wetlands or Floodplains within or Adjacent to the Project Boundary

9.4.1 Description of Existing Wetlands

Wetlands are transition habitats between land and water and have unique hydrologic, soil, and vegetative parameters that allow them to be differentiated (delineated) from other habitat types. Wetlands function to improve water quality, wildlife habitat, nutrient cycling and storage, and aesthetics or recreation. Large wetlands absent from human influence are generally higher quality wetlands.

In riverine systems, wetlands provide flood water storage and filtration for water contaminants and sediment. They also provide an environmental corridor for enhanced recreation and aesthetics.

The WDNR wetland data layers were used to determine the types of wetlands located within the Cornell Project boundary. The acreage of each wetland type was calculated within the proposed Project boundary, which extends to elevation 1,002.0 feet, and the current Project boundary, which extends to elevation 1,010.0 feet. Maps illustrating wetlands within each boundary are included in **Appendix E-41**. The area of each wetland type identified within the proposed Project boundary and current Project boundary are shown in **Table 9.4.1-1**.

Table 9.4.1-1 Wetlands within Proposed and Current Cornell Project Boundary

Wetland Type	Project Boundary	
	Proposed (1,002.0 feet)	**Current (1,010.0 feet)**
Lacustrine (Lake)	552.5 acres	553.0 acres
Riverine	233.2 acres	235.4 acres
Freshwater Forested/Shrub	58.6 acres	130.5 acres
Freshwater Pond	12.1 acres	12.2 acres
Freshwater Emergent	0.4 acres	8.8 acres
TOTAL	**568.8 acres**	**939.8 acres**

Wetlands identified within the Cornell Project boundary, in order of abundance, are categorized as follows: lacustrine, riverine, freshwater forested/shrub, freshwater pond, and freshwater emergent. A comparison between the proposed and current Project boundary shows significant acreage changes for only freshwater forested/shrub and freshwater emergent wetlands. These two wetland types are located on lands between elevation 1,002.0 feet (maximum allowed reservoir operating elevation) and 1,010.0

[17] The proposed project boundary does not include the proposed addition of the 266th St. Access Site nor the proposed removal of the upland area of the Brunet Island State Park as discussed in Section 8.

feet. Most wetland areas that would be excluded under the proposed Project boundary lie within Brunet Island State Park boundary and thus would remain protected.

There are no proposed operational changes regarding minimum flows or reservoir elevations. Therefore, the continued operation of the Cornell Project is not anticipated to cause wetland impacts.

9.4.2 Description of Existing Floodplains

The Chippewa River in the Project vicinity is underlain by metamorphic rock of widely varied composition that can generally be classified as gneiss (NSPW, 2008). The water surface profile drops approximately 240 feet in the 58 miles (approximately 4.1 feet per mile) between the Holcombe Dam (about 5.5 miles upstream from the Cornell Dam) to the Dells Dam (City of Eau Claire). The Licensee operates six hydroelectric projects in this stretch of the Chippewa River.

As with all rivers, the Chippewa River includes areas that are subject to periodic flooding. These floodplain areas are defined as a floodway or a flood fringe. The floodway includes the river channel and adjacent areas where water continues to flow downstream and is moving under flood conditions. The flood fringe includes the portion of the floodplain outside the floodway where standing water will collect during a flood. A flood occurs when water flows outside of the stream banks and activates the floodplain. Typically, a floodplain includes land area that would be flooded during the 100-year flood. A 100-year flood is defined as having a 1% chance of occurring in any given year over a period of 100 years. The FEMA floodplain mapping for the Cornell Project vicinity is included in **Appendix E-14**.

Areas of the Chippewa River floodplain throughout most of the reservoir are rural and consist of wooded undeveloped shorelines. Areas of the floodplain near the Cornell Dam within the City of Cornell are urban in nature and consist of industrial, residential, and park areas. Areas of the floodplain downstream of the Project are generally rural.

9.5 Shoreline Erosion

As a part of the preparation of the draft license application, the Licensee retained TRC, Inc. (TRC) to conduct an archaeological survey of Cornell Project lands and document any existing shoreline erosion. TRC conducted the work on August 19 and 20, 2019. The shoreline survey included inspection of the entire reservoir shoreline and included four previously documented sites. The reservoir shorelines are predominantly vegetated and stable. No areas of active erosion were identified. While no impacts to the four known sites were identified, TRC recommended the reservoir shoreline be inspected on a 5-year cycle to ensure known archaeological sites are not adversely impacted by routine Project operations (TRC, 2019). The archaeological survey is provided in **Appendix E-32** as privileged information.

The Licensee will implement best management practices to mitigate the impacts of erosion and siltation during ground-disturbing activities within the Project boundary.

9.6 Buffer Zone

As stated previously herein, the Licensee has been operating the Cornell Dam and its associated hydroelectric facilities in the present location from 1929 until present. During that period, the Project has become part of the environment. The east side of the Chippewa River near the Cornell Dam and powerhouse is fully developed and includes industrial lands and public park lands. The remaining lands in the Project vicinity are associated with Brunet Island State Park and are relatively undeveloped. These lands include existing forested riparian buffers and recreational lands.

9.7 Applicant's Policy Toward Development of Shoreline Facilities

The WDNR is charged under Wisconsin Statutes with the licensing, permitting, and supervision of all structures in lakes or streams that extend beyond ordinary high-water mark. The Licensee plans to monitor shoreline use during routine field activities according to the appropriate statutes as administered by the WDNR and its administrative regulations of any piers, docks, boat landings, extended bulkheads, or other structures owned by others that extend into the Project waters. The Licensee is not opposed to these developments as permitted by the WDNR and will develop a consistent policy regarding these structures if the demand requires.

9.8 Maps or Drawings of Proposed Measures

Volume 2, Exhibits F and G include drawings and maps depicting the nature and location of the Cornell Project. As part of this DLA, the Licensee is not proposing any new measures concerning project works, right-of-way, access roads, or any other topographic alternations.

10. Comprehensive Plans per 18 CFR Part 16.8 [F][6]

Section 10(a)(2) of the Federal Power Act requires the FERC to consider the extent to which a proposed project is consistent with existing federal and state comprehensive plans, as defined in Section 2.19 under Part 2 of Chapter 1, Title 18, Code of Federal Regulations (CFR).

The following presents a current listing of FERC-approved comprehensive plans that may be applicable to the relicensing of the Cornell Hydroelectric Project. This draft license application was prepared in consultation with various resource agencies, including those that prepared the comprehensive plans outlined in the following sections.

Volume 4, Documentation of Consultation details all consultation between the applicant and stakeholders. The license application incorporates various recommendations made by stakeholders during consultation, which are outlined in the license application.

In general, the Licensee is not proposing any changes to the current operation of the Cornell Project. If the environmental reviews conducted the resource agencies identified any operational characteristics that require mitigation, appropriate mitigation has been proposed herein. As such, continued Project operation, with the proposed mitigation measures, is not expected to adversely impact the habitat in the area.

10.1 National Park Service Plans

10.1.1 The Nationwide Rivers Inventory (1993)

The Chippewa River section where the Cornell Project is located is not listed in the inventory (NPS, n.d.).

10.2 USFWS Plans

10.2.1 North American Waterfowl Management Plan (1986)

This plan covers geographical areas the size of Michigan and Wisconsin. The plan is general in nature regarding outlining specific plan policies, goals, and recommendations and does not establish goals or recommendations specific to the Project area. However, this plan does stress the importance of resource conservation, management, and enhancement (USFWS, 1986). This draft license application has been developed to analyze impacts based upon resource conservation, management, and enhancement, therefore, there are no conflicts between this comprehensive plan and continued Project operation.

10.2.2 Upper Mississippi River & Great Lakes Region Joint Venture Implementation Plan (1993)

The Joint Venture is a partnership of resource agencies, Tribes, corporations, individuals, or organizations that have accepted the responsibility of implementing conservation plans within this geographic region. The Joint Venture conducts activities that support bird conservation goals and are the standard for effective, science-based delivery of bird conservation through partnerships (USFWS, 1993).

10.2.3 Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish & Wildlife Service (1989)

This plan covers geographical areas the size of Michigan and Wisconsin. The plan is general in nature regarding outlining specific plan policies, goals, and recommendations and does not establish goals or

recommendations specific to the Project area. However, the plan does stress the importance of resource conservation, management, and enhancement (USFWS, 1989). This draft license application has been developed to analyze impacts based upon resource conservation, management, and enhancement, therefore, there are no conflicts between this comprehensive plan and continued Project operation.

10.3 WDNR Plans

10.3.1 Lower Chippewa River Basin Plan (2001)

This plan provides a snapshot of the current condition of land and water resources in the basin and creates a means for increased interagency cooperation and public involvement through identification and prioritization of issues and objectives (WDNR, 2001).

10.3.2 Statewide Comprehensive Outdoor Recreation Plan for 2019-2023 (2019)

The SCORP is discussed in Section 8 and provided in **Appendix E-36**.

10.3.3 Wisconsin Water Quality Report to Congress (2020)

This report details findings of water quality assessments in the state and describes specific state programs that control, manage, and prevent water quality degradation (WDNR, 2020d). This report indicates the Project meets water quality standards.

10.3.4 Wisconsin's Biodiversity as a Management Issue (1995)

This document presents a strategy for the conservation of biological diversity and presents general strategic recommendations and possible actions for specific biological community types (WDNR, 1995a).

10.3.5 Wisconsin’s Forestry Best Management Practices for Water Quality (1995)

This document provides cost-effective methods to protect water quality in lakes, streams, and wetlands before, during, and after forest management activities. While no forest management practices are proposed as part of this draft license application, any tree removal activities needed during the term of the license will follow the Forestry Best Management Practices for Water Quality (WDNR, 1995b).

11. Requested License Term

The Cornell Project is one of six hydroelectric projects located on the Lower Chippewa River that is owned and operated by the Licensee. With the exception of the Cornell Project, all the other project licenses expire in 2033, ten years later than Cornell. In order for all six projects to be licensed concurrently in the future, the Licensee respectfully requests a license term of 50 years for the Cornell Project. If granted, a 50-year license term will allow the Licensee to coordinate future relicensing efforts for all six hydroelectric projects at the same time, allowing for a more comprehensive, basin-wide analysis of project impacts.

12. Documentation of Consultation

Volume 4, Documentation of Consultation, details all phases of consultation between the Licensee and resource agencies, Indian Tribes, and the public during the development of this draft license application. By reference here, *Volume 4, Documentation of Consultation,* becomes part of Exhibit E of this draft license application.

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Cornell Hydroelectric Project
FERC Project No. 2639

Exhibit H
Additional Information Required Under Section 16.10

Draft License Application

Prepared for

Prepared by

Mead & Hunt

meadhunt.com

June 2021

TABLE OF CONTENTS

TABLES

LIST OF ABBREVIATIONS

Applicant	Northern States Power Company – Wisconsin d/b/a Xcel Energy
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Cornell Project	Cornell Hydroelectric Project
d/b/a	doing business as
DSM	Demand Side Management
FERC	Federal Energy Regulatory Commission
FOE	Focus on Energy® Program
Licensee	Northern States Power Company-Wisconsin d/b/a Xcel Energy
MW	Megawatt
MWh	megawatt hour
NGVD	National Geodetic Vertical Datum 1929
NSPW	Northern States Power Company-Wisconsin d/b/a Xcel Energy
PSCW	Public Service Commission of Wisconsin

1. Information Provided by All Applicants

A. Discussion of the plans and ability of the Applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service, including efforts and plans to:

The Cornell Hydroelectric Project (Cornell Project) is operated in a daily peaking mode subject to minimum flow and seasonal reservoir elevation requirements. Headwater and tailwater levels are continuously monitored, and generating units are placed on-line and taken off-line as required to utilize available flow for generation. A preventive maintenance program is employed to increase reliability and efficiency of the mechanical and electrical components of the system. Northern States Power Company – Wisconsin d/b/a Xcel Energy (NSPW) maintains hydro department personnel and financial resources that are sufficient to reliably maintain and operate its hydroelectric projects and has a demonstrated record of license compliance.

(1) Increase capacity or generation at the project;

NSPW does not propose additional development or upgrades for the Cornell Project at this time. Routine maintenance and/or replacement of project facilities will be implemented as-needed.

(2) Coordinate the operation of the project with any upstream or downstream water resource projects; and

NSPW operates and maintains six hydroelectric projects on the lower Chippewa River. The names and Federal Energy Regulatory Commission (FERC, Commission) project numbers in order from upstream to downstream include Holcombe (P-1982), Cornell (P-2639), Jim Falls (P-2491), Wissota (P-2567), Chippewa Falls (P-2440), and Dells (P-2670). Cornell Project operation is coordinated with the other projects on the Chippewa River (NSPW, 2001). Daily coordination and communication occur via the Northern States Power Company-Wisconsin d/b/a Xcel Energy (Licensee) Wissota Generation Control Center where personnel are present 24 hours per day, 365 days per year[1]. Operators at the Generation Control Center can remotely operate the two tainter gates (Gates A and B) on the left gated spillway adjacent to the powerhouse and monitor the headwater and tailwater elevations. The Cornell Dam is operated in a daily peaking mode while maintaining a 400 cubic feet per second (cfs) minimum flow at all times. Reservoir elevations are maintained between 1,001.5 and 1,002.0 feet National Geodetic Vertical Datum (NGVD) [2] between April 1 and June 7; between elevations 1,001.0 and 1,002.0 feet from noon and 8:00 p.m. each day between June 8 and Labor Day; and between elevations 1,000.0 and 1,002.0 at all other times (FERC, 2003).

(3) Coordinate the operation of the project with the Applicant's other electrical systems to minimize the cost of production.

Within the Licensee's system, hydroelectric generation is one of the least costly alternatives and will be used to the extent possible. NSPW operates the Cornell Project in a daily peaking mode within the required reservoir elevations, as described in Section 1.A.(2), above, and

[1] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document filed with the FERC on April 30, 2020 (NSPW, 2020a).
[2] All elevations in this document are given in National Geodetic Vertical Datum 1929.

maintains a minimum flow release of 400 cfs at all times to protect aquatic habitat and fish spawning areas downstream (FERC, 2003). NSPW has historically operated in this mode and will continue to do so over the term of the next License.

B. Discussion of the need of the Applicant over the short- and long-term for the electricity generated by the project, including:

(1) Reasonable costs and reasonable availability of alternative sources of power that would be needed by the Applicant or its customers, including wholesale customers, if the Applicant is not granted a license for the project;

If a license is not granted for the Cornell Project, the Applicant would need to obtain alternative power on the open market. Over the 2018-2020 time period, the average cost to obtain replacement power (including all on-peak and off-peak usage) was $24.29 per megawatt hour (MWh). With the annual energy usage of 113,839 MWh, the cost to replace power generated at the Cornell Project is estimated to be $2,765,149 per year (NSPW, 2020b; NSPW, 2020e).

Table B-1 Surplus Capacity Credit and Table B-2 Fuel and Market Price Forecasts, from the June 30, 2020 NSP Integrated Resource Plan Supplement, represent the current forecast for capacity and energy costs.

Table B-1 Surplus Capacity Credit

Surplus Capacity Credit

The surplus capacity credit of up to 500 MW is applied for all twelve months of each year and is priced at the avoided capacity cost of a generic brownfield H-Class combustion turbine on an economic carrying charge basis.

Table IV-10: Surplus Capacity Credit

Surplus Capacity Credit																				
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
$/kw-mo	4.57	4.66	4.75	4.85	4.95	5.05	5.15	5.25	5.35	5.46	5.57	5.68	5.80	5.91	6.03	6.15	6.27	6.40	6.53	6.66
	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057
$/kw-mo	6.79	6.93	7.07	7.21	7.35	7.50	7.65	7.80	7.96	8.12	8.28	8.44	8.61	8.79	8.96	9.14	9.32	9.51	9.70	9.89

Source: June 30, 2020 NSP Inetgrated Resource Plan Supplement

Table B-2 Fuel and Market Price Forecasts

Table IV-9: Fuel and Market Price Forecasts

	Base Price Forecast				Low Price Forecast				High Price Forecast			
	Fuel Price ($/mmBTu)		Market Price ($/MWh)		Fuel Price ($/mmBTu)		Market Price ($/MWh)		Fuel Price ($/mmBTu)		Market Price ($/MWh)	
Year	Generic Coal	Ventura Hub	Minn Hub On-Peak	Minn Hub Off-Peak	Generic Coal	Ventura Hub	Minn Hub On-Peak	Minn Hub Off-Peak	Generic Coal	Ventura Hub	Minn Hub On-Peak	Minn Hub Off-Peak
2018	$2.19	$2.74	$28.60	$21.61	$2.19	$2.74	$28.60	$21.61	$2.19	$2.74	$28.60	$21.61
2019	$2.08	$2.60	$26.93	$20.98	$2.08	$2.60	$26.93	$20.98	$2.08	$2.60	$26.93	$20.98
2020	$2.11	$2.26	$25.78	$20.13	$2.11	$2.26	$25.78	$20.13	$2.11	$2.26	$25.78	$20.13
2021	$2.14	$2.23	$25.32	$19.06	$2.14	$2.23	$25.32	$19.06	$2.14	$2.23	$25.32	$19.06
2022	$2.19	$2.33	$26.92	$20.45	$2.17	$2.28	$26.33	$20.00	$2.24	$2.38	$27.52	$20.90
2023	$2.25	$2.45	$29.31	$22.19	$2.19	$2.34	$27.96	$21.17	$2.36	$2.57	$30.68	$23.23
2024	$2.30	$2.58	$30.00	$23.20	$2.22	$2.40	$27.94	$21.60	$2.46	$2.76	$32.16	$24.87
2025	$2.35	$2.79	$31.47	$24.36	$2.24	$2.50	$28.17	$21.80	$2.57	$3.11	$35.04	$27.12
2026	$2.40	$2.98	$32.30	$24.99	$2.27	$2.58	$28.01	$21.67	$2.69	$3.42	$37.09	$28.70
2027	$2.45	$3.12	$33.35	$26.71	$2.29	$2.64	$28.28	$22.64	$2.81	$3.66	$39.16	$31.36
2028	$2.51	$3.26	$34.09	$26.97	$2.32	$2.71	$28.25	$22.35	$2.93	$3.92	$40.92	$32.38
2029	$2.57	$3.44	$35.21	$28.25	$2.34	$2.78	$28.42	$22.79	$3.07	$4.24	$43.38	$34.80
2030	$2.62	$3.70	$38.27	$30.69	$2.37	$2.88	$29.83	$23.92	$3.20	$4.71	$48.76	$39.09
2031	$2.68	$3.87	$39.33	$32.07	$2.40	$2.95	$29.97	$24.44	$3.35	$5.04	$51.22	$41.77
2032	$2.75	$4.02	$39.75	$33.14	$2.43	$3.01	$29.71	$24.77	$3.51	$5.34	$52.76	$43.99
2033	$2.81	$4.10	$39.93	$33.46	$2.45	$3.03	$29.58	$24.79	$3.67	$5.48	$53.47	$44.80
2034	$2.87	$4.20	$41.13	$34.56	$2.48	$3.07	$30.08	$25.28	$3.83	$5.70	$55.76	$46.86
2035	$2.94	$4.35	$42.15	$35.66	$2.51	$3.13	$30.32	$25.65	$4.00	$6.00	$58.12	$49.17
2036	$2.99	$4.47	$42.79	$36.60	$2.53	$3.17	$30.37	$25.97	$4.14	$6.24	$59.80	$51.13
2037	$3.07	$4.65	$44.00	$38.21	$2.56	$3.24	$30.61	$26.58	$4.36	$6.63	$62.69	$54.44
2038	$3.14	$4.86	$44.95	$39.45	$2.60	$3.31	$30.80	$26.85	$4.58	$7.08	$65.43	$57.42
2039	$3.23	$5.04	$45.82	$40.48	$2.63	$3.37	$30.63	$27.06	$4.83	$7.47	$67.88	$59.98
2040	$3.31	$5.22	$46.61	$41.48	$2.66	$3.43	$30.61	$27.25	$5.06	$7.87	$70.25	$62.53
2041	$3.37	$5.32	$46.52	$41.48	$2.69	$3.46	$30.27	$26.99	$5.26	$8.10	$70.79	$63.12
2042	$3.45	$5.47	$47.61	$42.64	$2.72	$3.51	$30.57	$27.38	$5.51	$8.43	$73.40	$65.74
2043	$3.53	$5.62	$48.37	$43.71	$2.75	$3.56	$30.64	$27.69	$5.77	$8.78	$75.56	$68.28
2044	$3.62	$5.78	$49.72	$44.99	$2.79	$3.61	$31.04	$28.09	$6.05	$9.17	$78.79	$71.29
2045	$3.70	$5.99	$51.23	$46.37	$2.82	$3.68	$31.45	$28.46	$6.31	$9.65	$82.57	$74.73
2046	$3.78	$6.17	$52.49	$47.53	$2.85	$3.73	$31.74	$28.74	$6.59	$10.09	$85.85	$77.73
2047	$3.86	$6.29	$53.27	$48.57	$2.88	$3.77	$31.89	$29.08	$6.88	$10.40	$87.98	$80.22
2048	$3.95	$6.46	$54.39	$49.88	$2.91	$3.82	$32.15	$29.49	$7.20	$10.80	$90.96	$83.42
2049	$4.04	$6.66	$55.69	$50.92	$2.95	$3.88	$32.43	$29.65	$7.53	$11.30	$94.52	$86.43
2050	$4.13	$6.77	$56.64	$51.71	$2.98	$3.91	$32.70	$29.85	$7.87	$11.60	$96.97	$88.53
2051	$4.22	$6.96	$58.23	$53.16	$3.01	$3.96	$33.16	$30.27	$8.21	$12.08	$101.05	$92.24
2052	$4.31	$7.13	$59.62	$54.42	$3.04	$4.01	$33.56	$30.63	$8.57	$12.51	$104.64	$95.53
2053	$4.41	$7.29	$61.00	$55.68	$3.08	$4.06	$33.94	$30.99	$8.94	$12.95	$108.29	$98.85
2054	$4.50	$7.46	$62.38	$56.95	$3.11	$4.10	$34.33	$31.34	$9.33	$13.39	$111.97	$102.21
2055	$4.60	$7.62	$63.76	$58.21	$3.14	$4.15	$34.71	$31.69	$9.73	$13.83	$115.69	$105.61
2056	$4.69	$7.79	$65.15	$59.47	$3.17	$4.19	$35.09	$32.03	$10.12	$14.28	$119.45	$109.05
2057	$4.79	$7.95	$66.53	$60.73	$3.21	$4.24	$35.46	$32.37	$10.52	$14.74	$123.26	$112.52

**Coal prices are delivered prices, while gas and market prices are hub prices.*

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Source: June 30, 2020 NSP IRP Supplement

(2) Discussion of the increase in fuel, capital, and any other costs that would be incurred by the Applicant or its customers to purchase or generate power necessary to replace the output of the licensed project, if the Applicant is not granted a license for the project;

If the Applicant is not granted a license for the Cornell Project, additional power would need to be procured to replace the power that would no longer be supplied by the hydroelectric project. It is assumed this power would be supplied via a purchase on the open market. If all the power produced by the Cornell Project were instead purchased, the annual cost for NSPW to purchase power would increase by approximately $1,079,352 (NSPW, 2020e).

(3) Effect of each alternative source of power on:

(a) Applicant's customers, including wholesale customers:
The rates charged to customers for power generated by NSPW are based on the cost of production, operation, maintenance, debt service, and a Public Service Commission of Wisconsin (PSCW) approved profit from sale of power. The use of alternative sources of power would increase the costs to NSPW electricity end users.

(b) Applicant's operating and load characteristics: and
NSPW uses all power generated by the Cornell Project. Alternative sources of power would have no significant effect on the NSPW operating and load characteristics.

(c) Communities served or to be served, including any reallocation of costs associated with the transfer of a license from the existing licensee.
Since NSPW is the regional utility, if the Cornell Project were transferred to a different entity, it would still be responsible for distributing power to residential, commercial, and industrial customers within the area. The power currently generated by the Cornell Project would need to be replaced from another source. It is assumed a transfer of the existing license would therefore result in higher power costs for residential, commercial, and industrial customers that utilize the power sold by NSPW.

C. Following data showing need and the reasonable cost and availability of alternative sources of power:

(1) Average annual cost of power produced by project, including basis for calculation;
For calendar year 2020, the following costs were estimated for the existing licensed project:

Operation and maintenance	$538,091 (NSPW, 2021b)
Taxes	$123,200 (NSPW, 2021d)
Depreciation	$134,356 (NSPW, 2021a)

The Cornell Project had a gross book value of $22,369,116 (NSPW, 2021a) as of December 31, 2020. Based on NSPW's estimated 4.58% long-term capital cost, the capital cost associated with project ownership is estimated at $1,024,506. Based on these figures, the cost of power produced by the existing project is estimated at $1,685,797.

(2) Projected resources required by the Applicant to meet the Applicant's capacity and energy requirements over the short- and long-term including:

(a) Energy and capacity resources, including the contribution from the Applicant's generation, purchases, and load modification measures (such as conservation, if considered as a resource), as separate components of the total resources required;
NSP has existing and committed resources available to meet its customer capacity and energy requirements. These resources include:

- NSPW-owned generating facilities (see Table C-1)
- RFPs for new resources
- Demand side management (DSM)

Table C-1 NSPW System Resources

System Resources Located in Wisconsin[3]															
Year	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**
MW	494	493	493	493	493	493	493	493	493	493	493	170	170	170	170

In 2020, NSP's existing supply side resource mix was made up of 7,900 MW thermal resources, 1,875 MW renewable intermittent resources and 1,045 MW of demand response [4]. The resources consist of owned generation resources, purchase power agreements, and Utility DSM programs (NSPW, 2021e).

NSP's plans are developed recognizing the uncertainty associated with forecasting demand, as well as supply including the level of non-utility purchases and life-extendible capacity. The generation technologies, fuels used, sites, and costs for these resources will be determined through the Integrated Resource Planning process, and subsequent resource acquisition efforts. System resource additions are acquired through competitive Request for Proposals (RFP).

NSP's resource mix is a diverse mix of generation sources. Table C-2 shows the Load and Resources Table from NSP's 2020-2034 Integrated Resource Plan (NSPW, 2021e). This represents the most current forecast of system obligation and resources need. The planned resources reflect the proposed preferred plan. New technologies and fuel types are continually evaluated to create a more diverse energy mix to prevent reliance on any single fuel, make better use of available resources, and satisfy customers demands for environmentally sound, low-cost energy.

[3] NSPW system resources are a part of the overall NSP system. Additional system resources are located outside of Wisconsin.
[4] This resource mix applies to the overall NSP system.

Table C-2 Load and Resources Table[5]

Load and Resources Table

NSP 2020-2034 Integrated Resource Plan

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
2 Forecast Net Load	9,115	9,067	9,101	9,111	9,092	9,068	9,057	9,072	9,080	9,029	9,041	9,049	9,090	9,143	9,205
3 MISO System Coincident	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
4 Coincident Load	8,659	8,614	8,646	8,655	8,638	8,615	8,604	8,618	8,626	8,578	8,589	8,597	8,636	8,686	8,745
5 MISO PRM	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%	8.9%
6 NSP Obligation	9,430	9,380	9,416	9,426	9,406	9,382	9,370	9,385	9,393	9,341	9,354	9,362	9,404	9,459	9,523
7															
8	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
9 Thermal Resources, Existing and Appro	7,905	7,905	7,905	7,881	7,088	6,753	6,462	6,255	6,223	5,740	5,229	4,677	4,401	3,880	3,382
10 Large Hydro, Existing	709	831	831	831	831	-	-	-	-	-	-	-	-	-	-
11 Small Hydro, Existing	172	170	162	162	162	162	162	162	162	162	162	162	156	152	152
12 Wind, Existing	498	623	672	647	635	631	626	611	605	583	582	566	563	498	479
13 Solar, Existing	495	531	574	606	595	576	557	536	516	497	476	454	432	408	412
14 Demand Response	1,045	1,192	1,273	1,349	1,407	1,454	1,470	1,485	1,499	1,511	1,518	1,526	1,536	1,547	1,560
15 Total Existing & Approved Resources	10,824	11,252	11,418	11,478	10,717	9,576	9,278	9,052	9,007	8,493	7,967	7,386	7,087	6,486	5,986
16															
17 Net Resource (Need)/Surplus Position	1,394	1,871	2,002	2,052	1,311	195	-92	-334	-386	-848	-1,387	-1,976	-2,317	-2,973	-3,537
18 Planned Resources	0	0	0	0	0	230	440	420	600	950	1,581	2,153	2,529	3,226	3,672
19 Net Resource (Need)/Surplus Position	1,394	1,871	2,002	2,052	1,311	425	348	86	214	102	194	176	212	253	135

The Applicant is committed to DSM measures as resources to meet customer energy needs. Cost-effective DSM resources, in the form of capacity and energy savings, are in essence "purchased" from the customer through incentives, subsidies, rate structures, or other means needed to meet system DSM goals and commitments. NSPW offers programs for the residential sector, business sector, and agricultural sectors. Specific options in these programs include but are not limited to:

Residential Programs

- Residential Rate Plans
  - Time of Day Service
  - Optional Off-Peak Service
  - Savers Switch Credit
- Residential Rewards {Focus on Energy (FOE)[6]}
  - Energy Saving Tips
  - Home rebates
    - Home Performance
    - Simple Energy Efficiency
    - New Homes
- Renewable Choices
  - Renewable Connect
  - Solar Connect Community
  - Net metering

[5] Load and Resources Table applies to entire NSP system.

[6] Funded through the Focus on Energy® program. Focus on Energy® is Wisconsin's energy efficiency and renewable resource program. It is funded by Wisconsin's investor-owned utilities and participating municipal and electric cooperative utilities, including Xcel Energy.

Business Programs

- Equipment Rebates
- Energy Audits
- Renewable Programs
    - Renewable Connect
    - Solar
    - Working with Third Party Providers
- Energy Efficient Buildings
    - Multi-Family Building Efficiency (FOE)
    - Custom Efficiency
    - Efficient Facilities (FOE)
    - Energy Benchmarking
- Rate Programs
    - Electric Rate Savings
    - Savers Switch for Business

Farm Programs

- Farm Rewiring
- Agriculture and Farm Rebates

(b) Resource analysis, including a statement of system reserve margins to be maintained for energy and capacity; and
The Applicant and its parent company are members of Midwest Reliability Organization, which requires members to carry an 8.9% reserve margin. NSP obligation and net capacity position reflects this requirement (see Table C-2) (NSPW, 2021e).

(c) If load management measures are not viewed as resources, the effects of such measures on the projected capacity and energy requirements indicated separately;
Applicant considers all DSM load measures as resources.

(3) For alternative sources of power, including generation of additional power at existing facilities, restarting deactivated units, the purchase of power off-system, the construction or purchase and operation of a new power plant, and load management measures such as conservation:

(a) The total annual cost of each alternative source of power to replace project power;
The total annual cost to purchase equivalent power off-system from an alternative source is estimated to be 2,765,149 per year (NSPW, 2021e).

(b) The basis for the determination of projected annual cost; and
Annual cost was determined by multiplying the average off-system cost of on-peak and off-peak power of $24.29 per MWh by the average annual energy demand of 113,839 MWh (NSPW, 2021e).

(c) Discussion of the relative merits of each alternative, including the issues of the period of availability and dependability of purchased power, average life of alternatives, relative equivalent availability of generating alternatives, and relative impacts on the Applicant's power system reliability and other system operating characteristics; and

The best source of power available for NSPW is power produced by its own facilities. If the Cornell Project is not granted a new license, the hydroelectric project average annual generation of approximately 113,839 MWh would be replaced with purchased power.

The availability and dependability of purchased alternative power is considered to be approximately equal to the availability and dependability of power from the existing hydroelectric plant.

(4) Effect on direct providers (and immediate customers) of alternate sources of power.
No detrimental effect would be expected, as it is anticipated adequate supply is available or could be developed to replace power generated by the hydro plant.

D. If an Applicant uses power for its own industrial facility and related operations, the effect of obtaining or losing electricity from the project on the operation and efficiency of such facility or related operations, its workers, and the related community.

Applicant does not use project power to meet its own industrial needs; not applicable.

E. If an Applicant is an Indian tribe applying for a license for a project located on the tribal reservation, a statement of the need of such tribe for electricity generated by the project to foster the purposes of the reservation.

Applicant is not an Indian tribe; not applicable.

F. Comparison of the impact on the operations and planning of the Applicant's transmission system of receiving or not receiving the project license, including:

(1) Analysis of the effects of any resulting redistribution of power flows on line loading (with respect to applicable thermal, voltage, or stability limits), line losses, and necessary new construction of transmission facilities or upgrading of existing facilities, together with the cost impact of these effects;
Since the existing facilities are capable of handling the maximum capacity of the Cornell Project, no impacts to line loading, line losses, new construction of transmission facilities, or upgrading of existing facilities would be necessary whether or not a new license is issued.

(2) Analysis of the advantage that the Applicant's transmission system would provide in the distribution of the project's power; and
The NSPW transmission system, consisting of transformers and switchgear, along with associated metering and protection equipment, is necessary to distribute generated power to its customers. If the Cornell Project were operated by another entity, the Licensee would be required to either wheel the power through the existing transmission system or construct additional facilities.

(3) Detailed single-line diagrams, including existing system facilities identified by name and circuit number that show system transmission elements in relation to the project and other principal interconnected system elements. Power flow and loss data that represent system operating conditions may be appended if Applicants believe such data would be useful to show that the operating impacts described would be beneficial.

A copy of the one-line system diagram for the Cornell Project is included in Appendix A-3.

G. If the Applicant has plans to modify existing project facilities or operations, a statement of the need for, or usefulness of, the modification, including at least a reconnaissance-level study of the effect and projected costs of the proposed plans and any alternate plans, which in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.

Applicant has no plans to modify existing Cornell Project facilities or operations; not applicable.

H. If the Applicant has no plans to modify existing project facilities or operations, at least a reconnaissance-level study to show that the project facilities or operations in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.

Discussion of the Cornell Project's conformance with comprehensive plans for developing or improving the waterway and for other beneficial uses is provided in Exhibit E, Section 10.

I. Statement describing the Applicant's financial and personnel resources to meet its obligations under a new license, including specific information to demonstrate that the Applicant's personnel are adequate in number and training to operate and maintain the project in accordance with the provisions of the license.

NSPW resources are adequate to meet the needs of the hydro department. NSPW has a consistent record of satisfactory performance with respect to reliability, price competitiveness, and safety. NSPW maintains a staff of more than 60 individuals with expertise, including engineering, electric system operations, mapping, and planning. Hydro department personnel conduct routine training and have adopted standardized maintenance practices for all NSPW hydro facilities.

J. If Applicant proposes to expand the project to encompass additional lands, a statement that the Applicant has notified, by certified mail, property owners on the additional lands to be encompassed by the project and governmental agencies and subdivisions likely to be interested in or affected by the proposed expansion.

There are no plans to expand the Cornell Project to encompass additional lands; not applicable.

K. Applicant's electricity consumption efficiency improvement program, as defined under Section 10(a)(2)(c) of the Federal Power Act, including:

(1) Statement of the Applicant's record of encouraging or assisting its customers to conserve electricity and a description of its plans and capabilities for promoting electricity conservation by its customers; and

The Applicant's continued and dedicated commitment to energy conservation is included in its DSM programs listed in Section 1.C.(2)(a). The Applicant, along with other Wisconsin utilities, are nationally recognized as leaders in promoting and implementing DSM measures that benefit both the consumer and the company.

(2) Statement describing the compliance of the Applicant's energy conservation programs with any applicable regulatory requirements.

NSPW's conservation programs have been approved by the PSCW.

L. Names and mailing addresses of every Indian tribe with land on which any part of the proposed project would be located or which the Applicant reasonably believes would otherwise be affected by the proposed project.

Mr. Nathan Allison, THPO
Stockbridge-Munsee Community Band of Mohican Indians
86 Spring Street
Williamstown, MA 01267

Mr. Gary Bahr, Vice Chairperson
Sac and Fox Nation of Missouri in Kansas and Nebraska
305 N. Main Street
Reserve, KS 66434

Mr. Brian Bissontte, THPO
Lac Courte Oreilles Band of Lake Superior Chippewa Indians of WI
13394 West Trepania Road
Hayward, WI 54843

Mr. Jonathon Buffalo, NAGRAPRA Representative
Sac and Fox of the Mississippi in Iowa
349 Meskwaki Road
Tama, IA 532339-9629

Ms. Paula Carrick, THPO
Bay Mills Indian Community of WI
12140 Lake Shore Drive
Brimley MI 49715-9319

Mr. Marvin Defoe, THPO
Red Cliff Band of Lake Superior Chippewa Indians of WI
88385 Pike Road, Hwy. 13
Bayfield, WI 54814

Mr. Robert Deschampe, Chairperson
Grand Portage Band of Chippewa Indians
PO Box 428
Grand Portage, MN 55604

Mr. David Grignon, THPO
Menominee Indian Tribe of WI
PO Box 910
Keshena, WI 54135

Ms. Jill Hoppe, THPO
Fond du Lac Band of Lake Superior Chippewa
1720 Big Lake Road
Cloquet, MN 55720

Mr. Ryan Howell, THPO
Prairie Island Indian Community
5636 Sturgeon Lake Road
Welch, MN 55089

Iowa Tribe of Oklahoma
Cultural Preservation Office
RR 1, Box 721
Perkins, OK 74059

Mr. Michael LaRonge, THPO
Forest County Potawatomi Community of Wisconsin
PO Box 340
Crandon, WI 54520

Ms. Edith Leoso, THPO
Bad River Band of Lake Superior Tribe of Chippewa Indians
PO Box 39
Odanah, WI 54861

Ms. Sandra Massey, NAGRA Representative
Sac and Fox Nation of Oklahoma
920883 S. Highway 99, Building A
Stroud, OK 74079

Ms. Wanda McFaggen, THPO
St. Croix Band Chippewa Indians of WI
24663 Angeline Avenue
Webster, WI 54893-9246

Ms. Daisy McGeshick, THPO
Lac Vieux Desert Band of Lake Superior Chippewa Indians
Ketegitigaaning Ojibwe Nation
PO Box 249
Watersmeet, MI 49969

Mr. Earl Meshigaud, Cultural Director
Hannahville Potawatomi Indian Community
M-14911 Hannahville B1 Road
Wilson, MI 49896

Mr. Clinton Parish, Chairman
Bay Mills Indian Community of MI
12410 W. Lakeshore Drive
Brimley, MI 49715-9319

Mr. Cecil E Pavlat Sr., Cultural Repatriation Specialist
Sault Ste. Marie Tribe of Chippewa Indians
523 Ashmun Street
Sault Ste. Marie, MI 49783

Mr. William Quackenbush, THPO
Ho-Chunk Nation
Executive Offices
PO Box 667
Black River Falls, WI 54615

Mr. Warren C. Swartz, Jr., President
Keweenaw Bay Indian Community
107 Beartown Toad
Baraga, MI 49908

Mr. Adam Van Zile, THPO
Sokoagon Chippewa Community, Mole Lake Band
3051 Sand Lake Road
Crandon, WI 54520

Mr. Warren Wahweotten Jr., THPO
Prairie Band Potawatomi Nation
162Q Road
Mayetta, KS 66509

Mr. Noah White, THPO
Prairie Island Indian Community
5636 Sturgeon Lake Road
Welch, MN 55089

Ms. Sherry White, THPO
Stockbridge – Munsee Community of WI
N8476 Mo-He-Con-Nuck Road
Bowler, WI 54416

Ms. Corina Williams THPO
Oneida Nation of Wisconsin
PO Box 365
Oneida, WI 54155-0365

James Williams, Jr., President
Lac Vieux Desert Band of Lake Superior Chippewa Indians
PO Box 249
Watersmet, MI 49969

Ms. Melinda Young, THPO
Lac du Flambeau Band of Lake Superior Chippewa Indians of WI
PO Box 67
Lac du Flambeau, WI 54538

2. Information Provided by Existing Licensee

A. Information provided by all applicants.

See Section 1 of this Exhibit.

B. A statement of measures taken or planned by the licensee to ensure safe management, operation, and maintenance of the project, including:

The Cornell Project is supervised and controlled from the Wissota Generation Control Center located at the Wissota Project, which is staffed at all times. Operators at the Generation Control Center can remotely operate the two tainter gates (Gates A and B) on the left gated spillway adjacent to the powerhouse and monitor the headwater and tailwater elevations. An operator is assigned to the Cornell Project site for local operation whenever the remote system is out of service and for general housekeeping, minor maintenance duties, and operation of the original tainter gate spillway that cannot be controlled remotely. An operator is on site during normal daytime working hours. On weekends and times outside of normal working hours, additional operators can be called to the site if assistance is needed. The average response time is 30 minutes. In addition, if an alarm sounds and cannot be cleared by the Generation Control Center, the operator is contacted.

(1) Description of existing and planned operation of the project during flood conditions;
During flood flows, the Cornell Dam is operated according to the regulations detailed in Exhibit B of this license application.

(2) Discussion of any warning devices used to ensure downstream public safety;
NSPW maintains an Emergency Action Plan (EAP) for its Cornell Project that was developed in consultation with the FERC and the local emergency management organizations. In addition to the measures identified in the EAP, a boat warning system includes floats and connecting rope upstream of the Cornell Dam and public warning signs are located on the upstream and downstream sides. A siren sounds and two strobe lights are activated whenever any gates are opened.

(3) Discussion of any proposed changes to the operation of the project or downstream development that might affect the existing Emergency Action Plan, as described in Subpart C of Part 12 of this chapter, on file with the Commission;
There are no proposed changes to the operation of the Cornell Project at this time. In the event NSPW personnel detect an actual or potential failure through remote surveillance or direct observation, they will implement the FERC-approved EAP.

(4) Description of existing and planned monitoring devices to detect structural movement or stress, seepage, uplift, equipment failure, or water conduit failure, including a description of the maintenance and monitoring programs used or planned in conjunction with the devices; and
The monitoring instruments at the Cornell Project include headwater and tailwater gages, horizontal and vertical control points, drain measurements, upstream and downstream soundings, underwater inspections, and river and rain gaging stations.

Headwater and Tailwater Gauges

Headwater and tailwater levels are read and recorded every hour using an electronic gage at the powerhouse and are monitored continuously by the Wissota Generation Control Center. Staff gages are located upstream and downstream for electronic sensor calibration. A high and low headwater alarm system with control points are set to ensure reservoir levels are maintained within the range prescribed by the license. Gages are recalibrated if any reading deviates more than 0.1 feet when compared to the permanently installed staff gages.

Horizontal and Vertical Points

Two sets of baselines have been established at the Cornell Project; one located downstream of the powerhouse and one located upstream of the powerhouse along the spillway. The location of several control points in the upstream-downstream direction is recorded relative to these baselines. Control point elevations are also recorded. Most control points are either aluminum or brass caps and are surveyed using standard survey equipment, such as a total station of level. Coordinates and elevations are established for each monument and compared to previous data to determine whether movement has occurred.

Drain Measurements

Seepage collecting behind the right downstream abutment wall drains through the wall at a weep hole near the flashboard rollway. Flow from the weep hole is measured and recorded monthly. The frequency of monitoring is increased to weekly if monthly measurements are above the pre-determined action level. The efflorescence height on the abutment wall joints displays the historical phreatic level.

Underwater Inspections

Underwater inspections are conducted every five years in conjunction with the Part 12D inspections to evaluate the condition of underwater components of the Cornell Project.

River and Rain Gaging Stations

The United States Geological Survey has active stream gaging stations located upstream of the Cornell Dam on the Chippewa River (05356500 – Chippewa River near Bruce, Wisconsin), Flambeau River (05360500 – Flambeau River near Bruce, Wisconsin), and Jump River (0536200 – Jump River near Sheldon, Wisconsin). In addition, the Licensee operates three dams upstream of the Cornell Project on the Flambeau River, the Chippewa Reservoir on the upper Chippewa River, and the Holcombe Project, which is immediately upstream on the lower Chippewa River (Fisher, 1972). Rain gages are located at the Licensee's nearby Holcombe Project and through the watershed at various locations.

Upstream and Downstream Soundings

NSPW began conducting upstream and downstream soundings in coordination with Part 12 inspections in 1977. The soundings measure the riverbed contours upstream and downstream of the project structures. They were used primarily to detect the development of scour downstream of the project. As of 2006, FERC determined that soundings were no longer required to be performed in conjunction with Part 12 inspections (NSPW, 2020a).

(5) Discussion of the project's employee safety and public safety record, including the number of lost-time accidents involving employees and the record of injury or death to the public within the project boundary.

One lost-time accident has been logged to the NSPW hydro department in the last five years. No injuries or deaths have occurred within the Cornell Project boundary during the current License term (NSPW, 2020b).

C. Description of the current operation of the project, including any constraints that might affect the manner in which the project is operated.

As described in Section 1.A.(2) of this Exhibit, the Cornell Project is operated in a limited peaking mode. From April 1 through June 7 of each year, the reservoir elevation is maintained and operated between 1,001.5 and 1,002.0 feet; from June 8 through Labor Day of each year during the hours of noon and 8:00 p.m., elevation is maintained between elevations 1,001.0 and 1,002.0 feet. At all other times, elevation is maintained and operated between 1,000.0 and 1,002.0 feet. A minimum flow of 400 cfs is also released from the Cornell Project at all times (FERC, 2003).

The Cornell Project is operated remotely from the Licensee's Wissota Generation Control Center. Operators at the Generation Control Center can remotely operate the two spillway gates adjacent to the powerhouse and can monitor headwater and tailwater elevations.

D. Discussion of the history of the project and record of programs to upgrade the operation and maintenance of the project.

The Cornell Project was originally constructed to furnish water, mechanical power, and in-plant electrical energy for a paper mill operation. Brunet Falls Manufacturing Company began preliminary clearing of the flowage areas, dam site, and paper products manufacturing plant in 1911. The dam powerhouse and adjacent paper products plant were placed into operation in 1913. In 1914, Cornell Wood Products Company acquired all of Brunet Falls Manufacturing Company property. NSPW obtained ownership of flowage lands and associated land rights, dam, powerhouse, turbines, and hydroelectric generating equipment from Cornell Wood Products Company in 1929 (Fisher, 1972). Between 1974 and 1976 the powerhouse was reconstructed, two new spillway tainter gates were installed, and the right abutment was rebuilt (NSPW, 2020a). Routine maintenance of the facility has been completed since that time. See Exhibit C for a full reporting of construction activities.

E. Summary of any generation lost at the project over the last 5 years because of unscheduled outages, including the cause, duration, and corrective action taken.

Lost generation data is provided in Table E-1 for the period of January 2016 through December 2020 and is considered representative of typical operations.

Table E-1: Cornell Project Lost Generation Summary (2016-2020)

Unit ID	Cause Code	Event Start	Event End	Verbal Description	Equivalent MWh	Total Duration (Hours)
COR01	3898- Misc. plant auxiliary process and services	1/8/2016	2/15/2016	Replaced RTD in Outboard Bearing	9,373	910
COR01	3898- Misc. plant auxiliary process and services	2/16/2016	3/11/2016	Bad RTD	5,953	578
COR04	7142- Wicket Gate Shear Pin	8/15/2016	8/17/2016	Broken Wicket Link	33.6	48
COR04	7142- Wicket Gate Shear Pin	3/28/2018	4/2/2018	Broken Wicket Link	85.4	122
COR03	7162- Relief Valve and Vacuum Breakers	6/29/2020	7/6/2020	Turbine Vacuum Breaker Proxi Sensor Fail	1,903.8	167
COR03	4552- Generator Lube Oil System	7/14/2020	7/15/2020	Lube Oil Leak	239.4	21
COR01	4800- Generator Main Leads	10/23/2020	12/31/2020	Generator Lead Insulation Fail	17,170	1,667

F. Discussion of the licensee's record of compliance with the terms and conditions of the existing license, including a list of all incidents of noncompliance, their disposition, and any documentation relating to each incident.

There are no known outstanding compliance issues associated with the Cornell Project.

G. Discussion of any actions taken by the existing licensee related to the project which affect the public.

Applicant maintains signage to warn the public of potential danger associated with turbulent water from flow release and electrical hazards. Electronic surveillance is in place to detect the presence of unauthorized persons in areas that are not safe for public use.

Under its existing license, the Applicant is subject to a number of license article requirements that specify operational and other requirements designed to protect the environment. License articles provide for NSPW to maintaining required reservoir elevations and minimum flows and to protect environmental, aesthetic, and cultural resources.

H. Summary of the ownership and operating expenses that would be reduced if the project license were transferred from the existing licensee.

The ownership and operating expenses associated with the Cornell Project include various components of production costs. Total ownership and operating costs that would be reduced if the project license were transferred to another licensee will be provided in the Final License Application. Personnel expenses would not be significantly reduced because control room personnel would still be required for NSPW's other hydro plants.

I. Statement of annual fees paid under Part I of the Federal Power Act for the use of any Federal or Indian lands included within the project boundary.

None.

3. List of References

- Federal Energy Regulatory Commission (FERC). 2003. Order Amending License (Article 13) and Modifying Minimum Flows and Reservoir Elevations. Issued February 12, 2003.
- Fisher, Jim. 1972. Environmental Report Cornell Hydro Project No. 2639. Exhibit W of Application for License December 8, 1972.
- Northern States Power Company – Wisconsin (NSPW). 2001. Lower Chippewa River Settlement Agreement. January 17, 2001.
- Northern States Power Company – Wisconsin (NSPW). 2020a. Standard Technical Information Document. April 30, 2020.
- Northern States Power Company – Wisconsin (NSPW). 2020b. Matt Miller Personal Communication, May 19, 2020.
- Northern States Power Company (NSPW). 2021a. Courtney Young, Email with Table. January 25, 2021.
- Northern States Power Company (NSPW). 2021b. Sean Lacy, Email with O&M Cost Breakdown Table. January 29, 2021.
- Northern States Power Company (NSPW). 2021c. Matt Schmidt, Email with 2020 On-Peak and Off-Peak Data. January 29, 2021.
- Northern States Power Company (NSPW) 2021d. Matt Miller. Email regarding Property Tax Information. February 9, 2021.
- Northern States Power Company (NSPW). 2021e. Mary Morrison, Email with Resource Planning Information. February 16, 2021.