A-MILL ARTIST LOFTS HYDROELECTRIC PROJECT

(FERC No. 14628)

MINNEAPOLIS LEASED HOUSING ASSOCIATES IV, LIMITED PARTNERSHIP

ENVIRONMENTAL ASSESSMENT

Prepared for
MINNEAPOLIS LEASED HOUSING ASSOCIATES IV,
Limited Partnership
Minneapolis, Minnesota

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ALP	Alternative Licensing Process
AFAP	Aesthetic Flow Adequacy Plan
APE	Area of Potential Effect
BMP	best management practice
cfs	Cubic feet per second
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	Dissolved oxygen
EA	Environmental Assessment
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
°F	Degrees Fahrenheit
Ft	Feet
fps	Feet per second
kW	Kilowatt
HPC	Minneapolis Heritage Preservation Commission
LFCMP	Low Flow Contingency Management Plan
MCES	Metropolitan Council for Environmental Sciences, formally Metropolitan Waste Control Commission (MWCC)
Minnesota DNR	Minnesota Department of Natural Resources
MLHA	Minnesota Leased Housing Associates IV, Limited Partnership
mg/l	Milligrams per liter
MPRB	Minnesota Park and Recreation Board
MNRRA	Mississippi National River and Recreation Area
MPCA	Minnesota Pollution Control Agency
MWCC	Metropolitan Waste Control Commission
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIEBNA	Nicollet Island East Bank Neighborhood Association
NOI	Notice of intent
NPS	National Park Service
NRHP	Nation Register of Historic Places

Acronym	Definition
PAD	Pre-Application Document
PLC	Programmable logic controller
Project	A-Mill Artist Loft Hydroelectric Project
RM	River mile
SAFL	St. Anthony Falls Laboratory
SCORP	State Comprehensive Outdoor Recreation Plan
UMR	Upper Mississippi River
SHPO	State Historic Preservation Officer
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
Xcel Energy	Northern States Power Company d/b/a Xcel Energy

1.0 INTRODUCTION

1.1 APPLICATION

Minneapolis Leased Housing Associates IV, Limited Partnership (MLHA) is proposing the development and operation of the A-Mill Artist Lofts Hydroelectric Project (Project), which would restore hydroelectric generation utilizing existing infrastructure at the Pillsbury A-Mill building on the Mississippi River in Minneapolis, Minnesota. The Project, located at St. Anthony Falls on the Mississippi River at river mile (RM) 854 in Minneapolis, Hennepin County, Minnesota, would generate up to 600 kilowatts (kW) of renewable energy for consumption by on-site apartment residents.

This Applicant-Prepared Environmental Assessment (EA) is prepared as part of MLHA's engagement and consultation with resource agencies, stakeholders, and Federal Energy Regulatory Commission (FERC) Alternative Licensing Process (ALP) as outlined in 18 CFR § 4.34(i). In particular, the EA has been prepared to address the relevant environmental effects of the Project as defined during the ALP and in FERC's Scoping Document.

Prominent issues identified in the Scoping Document include:

- Effects of Project construction on soils and geologic resources;
- Effects of Project construction and operation on water quality of the Mississippi River;
- Effects of Project construction and operation on fisheries, mussels, and aquatic habitats;
- Effects of Project operation on aquatic invasive species;
- Effects of Project operation on impingement, entrainment, and turbine-induced fish mortality;

- Effects of Project construction and operation on vegetation;
- Effects of Project construction, operation, and maintenance on recreation resources in the Project vicinity;
- Effects of Project construction, operation, and maintenance on other land use activities in the Project vicinity;
- Effects of Project construction and operation of the on historic, archaeological, and traditional resources that may be eligible for inclusion in the National Register of Historic Places;
- Effects of Project construction and operation on aesthetic resources in the Project vicinity;
- Effects of noise from Project construction on recreational and residential use in the Project vicinity; and
- Effects of the Project on the local economy of Hennepin County, Minnesota.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

FERC must decide whether to issue an original license for the Project, and what conditions to place on any license issued. Issuing a license would allow MLHA to develop a new source of hydroelectric power for a term of 30 to 50 years. In deciding whether to issue a license, FERC must consider the power and developmental purposes of the Project in equal consideration with the purposes of energy conservation; the protection, mitigation of damages to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

This EA assesses the effects associated with construction and operation of the Project, and recommends environmental measures that would become part of the Project license.

In doing so, MLHA provides information and analyses for resources identified in FERC's Scoping Document as potentially affected by the Project.

The Pillsbury A-Mill is a National Historic Landmark, one of 23 in the state of Minnesota. The water infrastructure for the Project was constructed with the A-Mill in 1881. The infrastructure was designed and constructed to utilize the Mississippi River and power of St. Anthony Falls to provide hydropower for the flour milling operations. The A-Mill was the largest flour mill in the world for several decades and Pillsbury operated the hydropower facilities until 1955. However, Pillsbury retained all ownership and operating rights to the Project's infrastructure as well as 12.44 mill powers (a local water right equivalent), which MLHA subsequently acquired and has the current right to utilize. The Project will restore hydropower production to the historic Pillsbury A-Mill and is expected to reduce the apartment complex's requirement for utility-supplied energy by over 50%.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

1.3.1 Federal Power Act

The Federal Power Act (FPA) provides statutory authority for FERC to issues licenses to non-federal hydropower projects for license terms of 30 to 50 years. MLHA will follow FERC's ALP in pursuit of a FERC license, and filed a notice of intent (NOI) to file a license application and a Pre-Application Document (PAD) for the Project on July 28, 2014, and July 29, 2014, respectively. FERC approved the use of the ALP on November 13, 2014.

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA provides that FERC must require a licensee to construct, operate, and maintain such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce. To date, the Secretaries have made no such prescriptions, nor reserved authority to do so.

1.3.1.2 Section 10(j) Requirements

Under Section 10(j) of the FPA, each license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

1.3.2 Clean Water Act

Under Section 401(a)(1) of the Clean Water Act (CWA), license applicants must obtain a certification, from the state in which the project discharge will originate, that any discharge from a project would comply with applicable provisions of the CWA, or a waiver of certification by the appropriate state agency. MLHA has consulted with the Minnesota Pollution Control Agency (MPCA) regarding a 401 certification or waiver for the Project, providing all requested information. In an email dated March 12, 2015, William Wilde of the MPCA indicated that no further information was needed, and the 401 certification review process was in progress.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Three ESA-listed endangered species and one species proposed for listing as endangered have the potential to occur in Hennepin County. MLHA's environmental analysis finds that licensing, construction, and operation of the Project will have no effect on these species, because they do not occur in the Project vicinity.

1.3.4 Coastal Zone Management Act

Section 307(c)(3) of the Coastal Zone Management Act (CZMA) requires that all federally licensed and permitted activities be consistent with approved state Coastal Zone Management Programs. If a project is located within a coastal zone boundary or if a project affects a resource located in the boundaries of the designated coastal zone, the applicant must certify that the project is consistent with the state Coastal Zone Management Program.

The Minnesota Coastal Zone Program focuses on Lake Superior. The boundary of the Lake Superior Coastal Enhancement Program is generally within six miles of the Lake Superior coastline. Hydropower projects outside the coastal area and watershed of Lake Superior are exempt from CZMA federal consistency requirements (FERC 2005). In an email dated March 10, 2015, Cliff Bentley, Federal Consistency Coordinator for the Lake Superior Coastal Program, confirmed that CZMA consistency certification is not required for the Project.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations require FERC to take into account potential effects on properties listed or eligible for listing in the National Register of Historic Places (NRHP). In accordance with Section 101(b)(3) of the NHPA, the State Historic Preservation Officer (SHPO) is required to advise and assist federal agencies in carrying out their Section 106 responsibilities for taking into account Project effects on historic properties. As a result, FERC must consult with the SHPO and seek concurrence on any effects finding. Section 106 further requires that FERC consult with interested Native American Tribes that may attach religious or cultural significance to such properties, as discussed at 36 CFR § 800.2(c)(2)(ii).

On August 14, 2014 FERC initiated consultation with Tribes, provided notice of the Project NOI and PAD filings, and requested indications of interest from representatives of the following Tribes:

- Shakopee Mdewakanton Sioux Community of Minnesota
- Flandreau Santee Sioux Tribe
- Lower Sioux Indian Community of Minnesota
- Prairie Island Indian Community of Minnesota
- Santee Sioux Nation of Nebraska
- Sisseton-Wahpeton Oyate of the Lake
- Traverse Reservation
- Spirit Lake Tribe of North Dakota
- Upper Sioux Community of Minnesota

Responses were requested by September 15, 2014. To date, no Tribal representatives have filed comments or requested a meeting with FERC or MLHA.

On September 11, 2014, FERC issued notice to the SHPO and Tribal representatives that it would designate MLHA as non-federal representative for day-to-day consultation under Section 106 of the NHPA, while retaining overall responsibility for Section 106 compliance. On December 15, 2014, MLHA distributed to the SHPO and interested parties a proposed Area of Potential Effects (APE) for the Project and requested concurrence with the APE as proposed. The SHPO provided comments on MLHA's request in a letter dated January 16, 2016, and met on-site with MLHA staff on February 4, 2015. Following this meeting, the APE boundary was revised and redistributed to the SHPO and interested parties on February 6, 2015. The SHPO provided concurrence on the revised APE in a letter dated March 9, 2015.

A list of historic properties potentially affected by the Project as well as MLHA's analyses of effects regarding these properties is provided in Section 3 of this document.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, FERC would decline to issue a license for the Project and the Project would not be constructed. The current state of the Project vicinity, described below, would be unaffected and MLHA would turn to existing sources of power for residents of the A-Mill Artist Lofts.

2.2 PROPOSED ACTION

2.2.1 Proposed Project Facilities

If licensed by FERC, the constructed Project will consist of the following principal components: (1) an existing concrete and stone masonry intake structure that will be modified and rehabilitated to include: removing the existing concrete deck and stone center pier; installing a new concrete intake passage between the existing stone wing walls to provide hydraulic convergence to a 5-foot-square opening fitted with a new sluice gate; installing stoplog slots and a new fish-friendly (low inlet velocity) trashrack with 1.25 inch clear spacing between bars; (2) an existing concrete bulkhead that was installed in the 1950s to seal off the headrace tunnel will be removed and replaced with a new concrete bulkhead with a rectangular to round transition segment and a cast-in fitting to connect with a new steel penstock; (3) a new 616-foot-long, 5-foot-diameter steel penstock will be installed on concrete cradles (saddles) attached to the limestone floor of the existing head race tunnel; a 50-foot-long penstock segment will be installed vertically in the existing A-Mill Wheel 2 drop shaft; (4) a new vertical axis, 600-kilowatt Kaplan-type turbine/generator unit will be installed at the bottom of the drop shaft; a related programmable logic controller (PLC)-based control system will be installed in a nearby mechanical room located above the water passages in the A-Mill Building; (5) a steel elbow type draft tube segment will be embedded in concrete at the bottom of the former drop shaft and transition to a new 6-foot-wide by 4-foot-tall concrete outlet conduit (box culvert) that will be installed on the floor of the existing concrete tailrace tunnel and canal and discharge onto an existing concrete apron between existing stone and concrete

canal walls; beyond the apron, outflow will continue down the existing unlined A-Mill tailrace channel to merge with the Mississippi River; and (6) appurtenant facilities.

As proposed, the Project is low hazard; it will not include a dam, a spillway, an access road, a substation, a transmission line, a powerhouse building, new tunnels, new canals, or new foundations. The majority of new construction will occur within, upon, or under existing waterpower infrastructure associated with historical milling operations. Work beyond the existing infrastructure will be limited to removal of brush, debris and accumulated sediment from previously active conduits and waterways (these removals are described in detail in Appendix A). There will be no utility relocations or substantial earth disturbing activity.

Project construction will require the removal of sediment material that has accumulated immediately in front of the intake since the A-Mill has ceased operation. This material will be removed to the invert of the existing intake structure (approximately 15 feet below the normal water surface level) for a distance 10 feet riverward and a width of approximately 20 feet, tapering up to the existing bed elevation at nominally a 2:1 slope. The volume of sediment material to be removed is estimated to be 500 cubic yards.

Reactivation of the outlet structure will also require the removal of sediment and debris that has accumulated since the A-Mill ceased operation. An estimated 150 cubic yards will be removed from the bottom of the existing tailrace tunnel to allow installation of the box culvert outlet tunnel. In addition, approximately 100 cubic yards of sediment will be removed from the submerged concrete apron at the outlet, in the form of a wedge approximately 10 feet wide by five feet deep at the outlet and tapering up to the existing tailrace channel bed in a generally trapezoidal shape.

Project construction will require removal of eight trees (average diameter of approximately 15 inches) in the vicinity of the intake structure, and twelve small trees

(average diameter of less than 12 inches) in the vicinity of the outlet structure. These removals and planned restoration activities are detailed in Appendix A.

Figure 2-1. Location of the A-Mill Hydroelectric Project

2.2.2 Proposed Project Operation

Project controls will be installed above the raceway and generation levels in a dedicated mechanical room of the A-Mill building. The single Kaplan generating unit will be operated and monitored by a dedicated industrial grade PLC furnished by the water-to-wire equipment supplier. To provide for maximum safety and reliability, control options will include *Manual and Automatic* as well as *Local and Remote.* An automatically-controlled Kaplan turbine is well adapted to efficiently operate over a wide range of inflows while continuously responding to small changes in pool elevation. As described in the proposed Operations and Management Plan, MLHA proposes to coordinate with Northern States Power Company (Xcel Energy to monitor spillway flow (pool elevation) and to proportionately share Project inflow reductions if they become necessary to hold the pool elevation during periods of low river flow. Xcel Energy is a party to the Mississippi River Low Flow Management Plan (MRLFMP) that governs low river flow situations; MLHA has agreed to join as a party to the MRLFMP as well.

Additionally, MLHA will accept a proportional share of the aesthetic flow regime that is established by Xcel Energy's Aesthetic Flow Adequacy Plan (AFAP) for the St. Anthony Falls Project (FERC No. 2056). The AFAP was approved by FERC in December 2005 and is currently in process. Current license requirements for the St. Anthony Falls Project provide for an approximately 100-cfs minimum spillway flow to meet aesthetic considerations during certain periods of the day. MLHA expects that the details of this future arrangement, together with appropriate monitoring and communications requirements, will be addressed as part of license conditioning for the Project, including any potential increase in minimum flow as required by FERC.

Run-of-river operation with a minimum pool elevation will be the prescribed operating mode for the Project. An automatically-controlled Kaplan turbine is well adapted to efficiently operate over a wide range of inflows while continuously responding to small changes in pool elevation. MLHA will coordinate with Xcel Energy's St. Anthony Falls

Project to monitor pool elevation and to proportionately share Project inflow reductions when they become necessary to hold the pool elevation during periods of low river flow.

Project operations are additionally described in the draft A-Mill Operations and Management Plan, provided as an appendix to Exhibit A of MLHA's FLA.

2.2.3 Proposed Project Boundary

The proposed Project boundary is presented in Exhibit G. In the direction of flow, the Project boundary includes (1) an angular area surrounding the existing Intake Structure riverward of Main Street; (2) a narrower curvilinear segment which generally follows the outline of the existing underground A-Mill headrace tunnel leading to and under the A-Mill building; (3) an angular area under the A-Mill Building that includes a forebay area and the Wheel A-1 and Wheel A-2 drop shafts; (4) an angular area along the southeast segment of the A-Mill Building and extending beyond the structure to include outdoor electrical switchgear; and (5) a curvilinear segment which generally follows the outline of the existing tailrace tunnel to the existing concrete outlet structure apron and extends onward along the A-Mill tailrace channel to the Mississippi River. The Project boundary includes only that property required to construct, operate and maintain the Project, including an extended tailrace channel component that is included within the Project boundary to allow MLHA to maintain the channel in an unobstructed state. MLHA's Exhibit G drawing provides additional important details regarding ownership of properties both inside and outside of the Project boundary. For example, the Project boundary within the A-Mill Building has a vertical component and does not extend the boundary up into the residential floors of the structure solely to reflect the inclusion of the distribution line in the Project boundary.

2.2.4 Proposed Environmental Measures

MLHA proposes the following environmental measures to minimize the potential for adverse effects of the Project on local resources. Costs associated with these measures are described in Exhibit A.

2.2.4.1 Water Resources

MLHA agrees to participate in the MRLFMP, a multi-party agreement designed to help ensure that run-of-river operations are maintained at Mississippi River hydropower facilities to minimize artificial flow fluctuations and protect aquatic resources and other values in this nationally important river.

MLHA will conduct all sediment removal work behind cofferdams, silt curtains, or similar structures to avoid downstream sedimentation. Additionally, MLHA will employ best management practices (BMPs) during the construction of the Project to mitigate any potential adverse effects on soil and water resources. Specifications for these practices and measures are provided in Appendix A of this EA.

2.2.4.2 Aquatic Resources

MLHA proposes to implement BMPs, as described above, during construction to reduce the potential for sedimentation to adversely affect the state-listed mudpuppy (*Necturus maculosus*) or freshwater mussels downstream of the Project.

Only small amounts of lubricant will be stored on-site. They will be located to prevent any spillage from getting to the river. If required, MLHA will develop and implement a Spill Management Plan to govern the management of these materials.

MLHA will collect material from the trashrack during Project operations and transport to an appropriate upland solid waste disposal facility.

2.2.4.3 Terrestrial Resources

MLHA will follow restrictions provided by Minnesota DNR to ensure the Project does not adversely affect tricolor bats (*Perimyotis subflavus*) in Chute's Cave, a known hibernaculum in close proximity to the Project. Specifically, the Project will be constructed and operated according to the following restrictions:

- There will be no Project-related blasting or drilling. The Project will be constructed beginning in early summer and the major components of the work in the area adjacent to Chutes Cave will be completed by mid-fall, prior to the beginning of tricolor bat hibernation (between October and April).
- There will be no Project-related noise greater than 75 decibels measured on the A scale (e.g., loud machinery) for more than 24 hours within a one-mile radius of the hibernaculum. The Project turbine-generator unit is expected to operate at 85 decibels or less. MLHA will design and construct the unit enclosures with appropriate acoustic measures to ensure that no Project-related noise in excess of 75 decibels is detectable outside of the Project powerhouse.
- A bat and animal-friendly grate/gate will be installed inside the downstream end of the tunnel to prevent urban explorers while allowing free passage by bats and smaller animals. The grate will be positioned so that it does not visually impact the historic fabric of the tailrace conduits.
- The Project will not alter temperature or humidity conditions in Chute's Cave. After passing through the turbine and draft tube all water used to generate hydroelectric power will be conveyed downstream in a submerged box-culvert conduit until past the point of the tunnel section where it will discharge onto an existing concrete apron that sets between the two masonry walls of the existing tailrace conduit. The turbine generator unit is situated under the A-Mill building and approximately 200 feet back from the downstream end of the tailrace walls. Laser scanning of the Project infrastructure has not shown a visible connection between the existing tailrace conduit and Chutes Cave, however the two appear to share a common man-made wall for a portion of the Project site, and an opening may exist. The location of the common wall is approximately 50 feet downstream of the downstream end of the turbine. Construction downstream of the turbine will be limited to the removal of accumulated brush, debris and sediment in the

bottom of the tunnel to allow for the placement of the box-culvert conduit and placement of the box culvert and riprap alongside of the culvert to provide for horizontal positioning. With the exception of some of the brush and debris most of the material is below the normal water level in the tunnel;

- The Project will not alter hydrology in Chute's Cave. At the present time the only water flowing down the headrace tunnel is related to what is believed to be a leaking City water main. Most of the moisture in the tunnel appears to come from the direct connection to the tailrace channel downstream of the outfall. With the re-construction the leaking water will be sealed off from the upstream end however the downstream end of the existing outfall will remain open and subject to the historic fluctuation of water level that occurs within the tunnel during floods as well as the sloshing that occurs as a result of the operation of the Upper and Lower St. Anthony Falls locks and gate operations at the Lower St. Anthony Falls lock. With the turbine operating a full capacity a localized rise in the water surface elevation of approximately 6 inches may be expected downstream of the tunnel where the box-culvert conduit discharges unto the apron.

2.2.4.4 Recreational Resources

MLHA proposes to provide an interpretive sing similar to the signage on display at the adjacent Water Power Park. The installation would entail an approximately 3 foot high steel sign, with a sign face measuring approximately 3 feet tall by 4 feet wide. The proposed sign would display two to three photographs of the historic Pillsbury A-Mill facility and related hydromechanical infrastructure, and would discuss the reactivation of the historic facilities to generate electricity for the A-Mill Artist Lofts Project. An example of existing signage at Water Power Park and the specific proposed location of signage is provided Appendix F of this FLA.

2.2.4.5 Cultural Resources

Should any historic period artifacts or items of cultural patrimony be inadvertently discovered during construction activities, MLHA will follow the procedures outlined in the Minnesota State law 307.08 and other procedures defined during the licensing process and required by FERC.

2.2.4.6 Aesthetic Resources

MLHA will work cooperatively with other licensed hydropower projects at Upper St. Anthony Falls to provide required aesthetic bypass flows over the main spillway as may be prescribed by the Commission following completion of the Xcel Energy Aesthetic Flow Study which is currently in progress.

3.0 ENVIRONMENTAL ANALYSIS

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Upper Mississippi River (UMR) extends 1,195 miles from Lake Itasca, Minnesota, to its confluence with the Ohio River at Cairo, Illinois, traversing five states (Minnesota, Wisconsin, Iowa, Illinois, and Missouri) and draining approximately 189,000 square miles. Most of the river stretch, from Minneapolis, Minnesota, to St. Louis, Missouri, has been altered for navigation. The navigation channel consists of 29 locks and dams that create a staircase-like waterway.

The topography of the basin is primarily rolling hills in the north with flatter terrain further south. The climate in the northern two-thirds of the basin is cold humid winters and hot humid summers. The average annual rainfall is 27 inches, and annual snowfall ranges from 17.5 to 95.0 inches.

The UMR provides habitats for a variety of fish and wildlife. The river and its adjacent forests and marshes provide cover, nesting sites, and food for many species. The river valley is well known as a migratory corridor for birds, especially waterfowl (Mississippi Headwaters Board 1981). In addition, the UMR offers excellent opportunities for outdoor recreation, which has become a multimillion dollar industry. The primary land use in the basin is agriculture. The Project is located on the Mississippi River at approximately RM 853.7 in the city of Minneapolis. The Project vicinity is within the Mississippi National River and Recreation Area (MNRRA), a unit of the National Park System. The drainage area upstream of the Project is 19,680 square miles.

Table 3-1 lists hydropower projects on the UMR in the vicinity of the Project.

Table 3-1. FERC-licensed hydroelectric projects on the UMR (upstream to downstream) (FERC 2014).

Project	FERC Project No.	Drainage Area (square miles)	Nameplate capacity (kW)	Year on-line
Rapids Energy Center	2362	3,370	2,100	1916
Brainerd	2533	7,320	3,342	1950
Little Falls	2532	11,450	4,720	1906
Blanchard	346	11,600	18,000	1925
Sartell Dam	8315	12,265	9,500	1916
St. Cloud	4108	13,320	8,860	1988
St. Anthony Falls	2056	19,680	14,245	1897
Crown Mill	11175	19,680	3,400	N/A[1]
A-Mill Artist Loft	14628	19,680	600	N/A[2]
Lower St. Anthony Falls	12451	19,680	8,980	2011
Ford	362	19,684	17,920	1924
Mississippi Lock & Dam No. 2	4306	37,000	4,400	1987

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (40 C.F.R. 1508.7), a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development activities.

Based on information in the PAD, agency comments, and preliminary analysis, MLHA has identified that aquatic resources have the potential to be cumulatively affected by the proposed construction and operation of the Project. MLHA used this analysis to determine the geographic and temporal scope to be analyzed in this EA. Additional

[1] Licensed but not constructed.
[2] Not licensed and the focus of this Environmental Assessment.

cumulative effects analyses for state-level determinations are provided in the Minnesota Environmental Assessment Worksheet in Appendix D of this EA.

3.2.1 Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by the physical limits or boundaries of: (1) the Project's potential effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the drainage basin. MLHA defines the geographic boundary as the same portion of the UMR used for cumulative effects analysis for the Lower St. Anthony Falls Hydroelectric Project (FERC No. 12451), which includes the Mississippi River from the Hennepin Avenue Bridge (upstream of St. Anthony Falls) to the 10th Avenue Bridge (downstream of Lower St. Anthony Falls).

3.2.2 Temporal Scope

The temporal scope of cumulative effects analysis in this EA includes past, present, and future actions and their effects on fishery resources. Based on the potential term of an original license, the temporal scope looks 30-50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions.

3.3 ENVIRONMENTAL ANALYSIS OF THE PROPOSED ACTION

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

The Project is located within the Mississippi River Gorge. This gorge is about 1,000 feet wide and is bounded by steep bluffs up to 200 feet high. The bluffs are capped by a 35-foot-thick hard limestone formation. Beneath the limestone is approximately five feet of softer shale, which in turn is underlain by a thick formation of very poorly cemented sandstone. The sandstone is easily disturbed and easily eroded. This alluvial outwash material is of glacial origin; erosion of the sandstone occurs very rapidly when it is subjected to flowing water. Shorelines upstream of St. Anthony Falls are stabilized from erosion by retaining walls, rock, and vegetation; there is no substantial shoreline erosion

in this area. Downstream of the St. Anthony Falls spillway, the limestone and sandstone is eroded in places, a natural process not associated with hydroelectric operations (FERC 2003).

The Mississippi River Gorge was formed by the gradual upstream retreat of St. Anthony Falls. St. Anthony Falls, the only major waterfall on the Mississippi River, eroded the riverbed moving upstream from the confluence of the Mississippi and Minnesota rivers to its present location. By 1880, the Corps had stabilized the Falls at its present location (Kane 1987).

MLHA proposes to restore hydropower operations at the Pillsbury A-Mill facility, which was built in 1881 and produced hydropower until 1955. Flour milling operations continued until 2003. The intake structure, which is located at the entrance to the main headrace tunnel below Main Street, is currently closed off by a concrete bulkhead. Modifying the intake structure will involve removing the concrete bulkhead, installing a trashrack and sluice gate, and removal of approximately 500 cubic yards of sediment immediately upstream of the intake structure. Additionally, installation of a new box culvert on the concrete floor of the existing outlet structure will require removal of approximately 260 cubic yards of sediment that has accumulated since the A-Mill ceased operations. Sediment removal work at the intake structure will be conducted behind a cofferdam or similar retaining structure; the absence of flowing water at the outlet will allow sediment to be removed using conventional silt curtain techniques. All sediment removal work will be conducted under permitted approval of the Minnesota Department of Natural Resources (Minnesota DNR). A Minnesota Interagency Water Resource Application Form was filed with Minnesota DNR on May 19, 2014.

The channel into which the Project outlet discharges is a dedicated tailrace channel designed and constructed specifically for the A-Mill facility. This channel currently has no substantial water flow; during Project operations this channel will once again receive up to 200 cubic feet per second (cfs) of outflow. Hydraulic modeling conducted by

MLHA indicates that the current slack water surface elevation at the upstream end of the channel will increase by 0.5-1.0 feet when the Project is operating at capacity. This localized rise effect is projected to become negligible at the point where the tailrace channel merges into the river. The Hydraulic Modeling Study is presented in Appendix C.

3.3.1.2 Environmental Analysis

Project construction will include removal of approximately 500 cubic yards of sediment at the intake and approximately 260 cubic yards at the outlet and tailrace. Removal of this accumulated sediment material will be conducted behind a temporary cofferdam or silt curtain. This work will be conducted under the permitted approval of the Minnesota DNR. Nevertheless, construction activities including sediment removal and construction of a temporary bulkhead or cofferdam could cause short-term turbidity and resettling of material in the channel downstream of the construction zone, resulting in the displacement of fish or localized impacts to other aquatic resources during construction periods. These activities could also disturb river sediments and redistribute them into the Mississippi River directly downstream of the Project.

Prior to the commencement of construction activities, MLHA will obtain sediment samples and have them tested in order to properly plan and perform the excavation and handling of sediment materials. MLHA's testing plan is provided in Appendix A. If the results of the testing conclude the sediments contain hazardous materials, MLHA will develop a Contaminated Sediments Contingency Plan in consultation with the MPCA. This plan will include: (1) steps for the identification and handling of impacted sediments; (2) develop steps for the proper disposal of any contaminated sediments; and (3) reporting of any findings of contaminated sediments to FERC and applicable state and federal agencies.

In addition to the potential Contaminated Sediments Contingency Plan, MLHA will employ BMPs during construction activities to mitigate any potential adverse effects on

soil and water resources. MLHA will also install a temporary bulkhead or cofferdam to exclude river flows from the work areas. These BMPs are described in detail in Appendix A. Use of BMPs and appropriate siting of the cofferdam is expected to result in minimal adverse effects.

MLHA conducted hydraulic modeling of the effects of the Project on the outlet channel, a dedicated tailrace channel originally constructed for the A-Mill facility. This channel currently has no substantial water flow; during Project operations this channel will once again receive up to 200 cfs of outflow when the Project is operating at full capacity. The banks of the channel are rocky and partially vegetated; erosion or other effects in this channel are not expected to be substantial because the channel was originally operated under active discharge conditions (FERC 2014).

Project operations will have no effect on reservoir shorelines and erosion. The Project will operate in run-of-river mode and therefore will not affect reservoir stage. Additionally, much of the shoreline in the Project vicinity is protected from the effects of stage fluctuations and any potential erosion that could result (FERC 2003).

3.3.2 Water Resources

3.3.2.1 Affected Environment

Water Quantity

The Mississippi River experiences significant variations in flows caused by seasonal precipitation and runoff within the nearly 19,680 square-miles drainage area upstream of the Project. The U.S. Geological Survey (USGS) maintains streamflow gage number 05288500 on the Mississippi River near Anoka, Minnesota, approximately 11 miles upstream from the Project. Flow records are available for water years 1932 to 2013. River flows are highest in the spring months (April-June) which reflects snow melt runoff and lowest in winter months (December-February) due to snow and ice accumulation. Figure 3-1 provides minimum, maximum, average monthly flows at USGS gauge number 05288500 for 1931-2013.

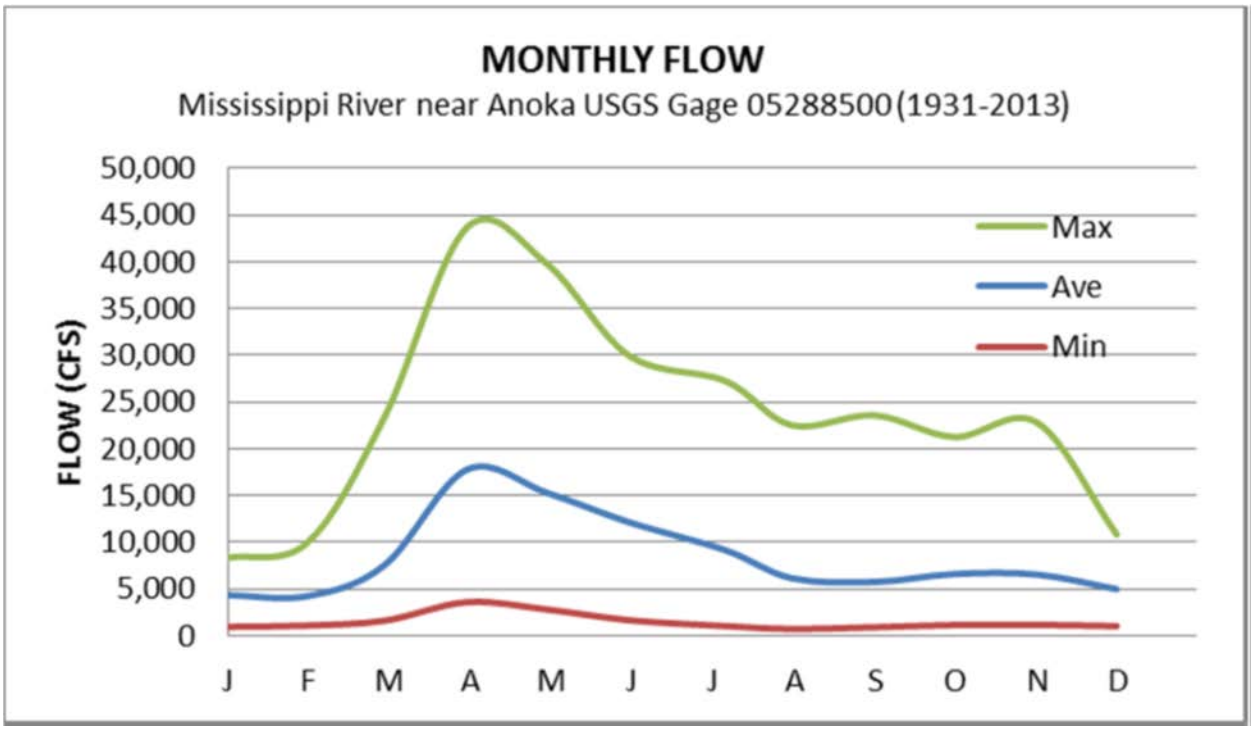

Figure 3-1. Monthly Flows of the Mississippi River at USGS gauge number 05288500 (FERC 2014).

The Mississippi River is used extensively for several purposes in the immediate Project vicinity. The twin cities (St. Paul and Minneapolis) withdraw water for municipal use; this draw is approximately 240 cfs. On rare occasions, the Minneapolis Park and Recreation Board has also withdrawn river water. Xcel Energy's St. Anthony Falls Hydroelectric Project has a maximum hydraulic capacity of 4,366 cfs, passing water though four horizontal Francis turbines and one vertical Kaplan turbine. The U.S. Army Corps of Engineers (Corps) releases water through the Upper and Lower St. Anthony locks as needed for navigational purposes (FERC 2003). In the summer of 2014, the President signed legislation to close the Upper St. Anthony Falls lock to boat traffic in 2015 to prevent further upstream migration of invasive carp species.

Water Rights

MLHA currently owns, through an 1887 lease, the water rights and rights to use of the related infrastructure associated with the Pillsbury A-Mill structure. Under the lease, until the year 2886, MLHA can utilize its water rights of 12.44 mill powers of water (203

to 222 cfs) to generate power and has the right to maintain, repair, and improve the infrastructure associated with using its water rights. MLHA makes monthly payments of $770.83 under this leasing arrangement and is current on its payments. MLHA's use of this water will be conducted under the permitted approval of Minnesota DNR; a Water Appropriation Permit Application was filed by MLHA on September 15, 2014.

Water Quality

The Minnesota Pollution Control Agency (MPCA) classified the Mississippi River in the Project vicinity as the dividing point for two different water use classifications: Class 1C and 2Bd for waters upstream and Class 2B for waters downstream of St. Anthony Falls. Classifications 1C and 2Bd indicates river waters upstream of the Project are suitable for domestic consumption, for use in food processing and other domestic purposes, and is suitable for aquatic life and recreation. Whereas, classification 2B indicates river waters downstream of the Project are not suitable for domestic use. However, the 2B water classification represents water quality that is suitable for the propagation and maintenance of cool or warm water sport or commercial fishes. In addition to these classifications, all waters described in this paragraph are likely classified as Class 3,4,5, and 6 waters as well. These classifications indicate that beneficial uses include: industrial consumption (Class 3), agriculture and wildlife (Class 4), aesthetic enjoyment and navigation (Class 5), and other uses not otherwise listed (Class 6).

Minnesota state water quality standards for all waters in the Project vicinity include: (1) maintaining an instantaneous minimum dissolved oxygen (DO) concentration of 5.0 milligrams per liter (mg/l); (2) temperatures that do not exceed 5 degrees Fahrenheit (°F) above natural stream temperatures; and (3) fecal coliform levels that do not exceed 200 organisms per 100 milliliters.

Historically, water quality in the Project vicinity complies with state water quality standards. From 1992 to 1997, the Metropolitan Council for Environmental Sciences (MCES, formerly known as Metropolitan Waste Control Commission [MWCC])

conducted extensive water quality monitoring in the Mississippi River in the Project vicinity. MCES sampled at two locations upstream of the project at RM 871.6 and 862.8 and one location at downstream of the project at RM 847.7. Preliminary data collected by MCES indicated that DO levels in the waters exceeded 5 mg/l at all times except for one day in 1996. No violations of temperature requirements were reported. The river water's pH ranged from 7.1 to 9.1, and usually fell in the standard range of 6.0 to 9.0. Only once did the pH exceed the 9.0 standard.[3]

In addition to MCES's water quality sampling, DO was recorded at USGS gauge no. 05288500 from October 4, 1972 to July 12, 2006. This gauge is at approximately RM 877, which is just upstream from the MCES's two sampling locations. During that 34-year period, 30 DO samples were taken and none of those samples fell below the state water quality standard of 5 mg/l. DO concentrations ranged from 7.4 mg/l to 14.3 mg/l. October 9, 1997, recorded the lowest DO concentration and March 16, 1998, recorded the highest DO concentration.

Recent DO data are available from the National Water Quality Monitoring Council's Water Quality Portal tool (NWQMC 2015). The Water Quality Portal is a cooperative effort by the Environmental Protection Agency (EPA), the USGS, the National Water Quality Monitoring Council, and other local agencies. Water quality data for monitoring stations within 7 miles of the Project was gathered. DO levels were recorded between 2004 and 2008 by the USGS, and each sample exceeded 5 mg/l during the period of record. DO concentrations ranged from 7.1 mg/l to 15.7 mg/l. Temperature records were available regularly at these monitoring stations between 1968 and 2013. No violations of temperature were reported from any of the above monitoring stations.

Between 2010 and 2013, MPCA conducted water quality monitoring at Station ID S006-164, upstream of the Project at approximately RM 853.5. Only one record indicated a DO level below 5 mg/l, occurring in 2013. The recorded DO level was 0.99 mg/l; which

[3] See EA, dated March 8, 2004, for St. Anthony Falls (FERC No. 2056) at pages 22-23.

is likely indicative of a measurement or instrumentation error rather than a low DO level representative of the river.

Hydraulics

The channel into which the Project outlet discharges is a dedicated tailrace channel constructed for the A-Mill facility. This channel currently has no substantial water flow; during Project operations this channel will once again receive up to 200 cfs of outflow. Hydraulic modeling conducted by MLHA indicates that the water surface elevation at the upstream end of the channel will increase by 0.5-1.0 feet when the Project is operating at capacity. This localized rise effect is projected to become negligible where the channel joins the river. The Hydraulic Modeling Study is presented in Appendix C.

3.3.2.2 Environmental Analysis

Construction Effects

Project construction has the potential to affect local water quality during sediment removal or other activities. MLHA proposes to work behind cofferdams or silt curtains and employ BMPs during construction to avoid adverse effects on water resources. These BMPs are described in detail in Appendix A. Work will be conducted in accordance with permits obtained from the Minnesota DNR. With these environmental measures in place, any effects of construction on local water quality are expected to be short in duration and limited in scope and degree, and not representing an adverse effect on water quality in the Mississippi River.

Operational Effects

The Project has no impoundment and will operate in run-of-river mode. Mississippi River waters in the Project vicinity typically exceed DO and temperature standards and FERC has previously found that operation of hydroelectric facilities at St. Anthony Falls will not have an adverse effect on water quality (FERC 2003).

The Project will modify local hydraulics in the outlet channel below the tailrace. This area, a dedicated tailrace channel formed by previous uses of the A-Mill facility, will receive up to 200 cfs of flow when the Project is operating at full capacity, and local water levels will increase between 0.5 and 1.0 feet when the Project is operating. This localized rise effect is projected to become negligible where the channel joins the river. A small quantity of sediment not removed during Project construction is expected to be flushed downstream over time as the channel is returned to active use. Consistent Project flows are expected to modestly increase DO levels in the outlet channel because Project outflows will introduce aerated water into a currently stagnant tailrace channel.

Because Project construction will be conducted under the permitted approval of the DNR and in compliance with the BMPs described in Appendix A, and because the Project's run-of-river operations will not affect local water quality, MLHA concludes that the Project will not adversely affect water resources.

3.3.3 Aquatic Resources

3.3.3.1 Affected Environment

Fish

The UMR provides habitat for as many as 125 species of fish, including walleye, sauger, smallmouth and white bass, bluegill, crappie, northern pike, and catfish (Minnesota DNR 2008). These resources provide substantial economic benefits to local communities. In 1990, USGS estimated that economic benefits from sport fishing in the UMR totaled $350 million (USGS 1999). Between 1978 and 1991 the value of commercial fishing was estimated at approximately $2 million annually (USGS 1999).

Historically, several fishery surveys on the Mississippi River have been conducted in the Minneapolis/St. Paul metropolitan area (FERC 2003). Based on these surveys, a total of 61 fish species from 17 different families have been collected from the Mississippi River in the metropolitan area. Game species were the predominant species present in and

below St. Anthony Falls. Fishing in the navigation channel is discouraged by the Corps due to the danger from heavy boat use.

No anadromous fish occur in the Project vicinity (FERC 2014). The American eel (*Anguilla rostrata)*, a catadromous species, occurs in the Mississippi River but has not been recently reported in the Project vicinity above or below St. Anthony Falls (FERC 2003). Lock and Dam 19 near Keokuk, Iowa, presents a fish passage barrier and American eels are only occasionally found upriver from this point (Corps 2004). Since 2003, American eels have been seen by DNR fisheries staff several times below Lock & Dam 1. American eels were also reported in Pool 2 in 2008, and were recently captured in Pool 2.

MLHA identified a select group of fish species that may be present within the Project vicinity for analysis of entrainment and turbine mortality, discussed below (HDR 2014). A list of those target species (species that represent interest from a management, economic, and ecological perspective) is provided in Table 3-2.

Table 3-2. List of target species for MLHA's entrainment analysis study

Target Species	Target Species
Gizzard shad	Black crappie
Emerald shiner	Brook silverside
Bluegill	Flathead catfish
Green sunfish	White sucker
Channel catfish	Walleye
Smallmouth bass	Rock bass
Quillback	Shorthead redhorse
Freshwater drum	Common carp
Mimic shiner	Oragnespotted sunfish
Bigmouth buffalo	Hybrid sunfish
Pumpkinseed	

Entrainment

Fish vulnerability to entrainment relates to powerhouse and spillway operations, fish sizes, movement patterns, swimming speeds, approach velocities, trashrack bar spacing,

and intake configurations. MLHA proposes to install a trashrack with 1.25 inch clear-bar spacing with a mean intake approach velocity of 1.0 feet per second (fps).

MLHA conducted a desktop analysis of potential entrainment and turbine mortality at the Project for target species present in the UMR within the Project vicinity (HDR 2014). Fish entrainment is generally measured as the number of fish that enter the turbine units over an identified time period. Tables 3-3 shows burst swim speeds for fish species commonly found in the Project vicinity. Most juvenile and adult game fish burst speeds exceed the Project's approach velocity of 1.0 fps which would occur in front of the Project's intake, suggesting that most life stages of fish species would be able to escape from velocities near, and at, the intake face and thereby avoid entrainment.

Table 3-3. Swim speed information for fish species in the Project vicinity.

Species	Life Stage	Burst Swimming Speed (fps)	Reference
Channel catfish	adult	3.9	Bell 1990
carp	Not documented	12.6	Bell 1990
smallmouth bass	juvenile adult	1.3-1.8 1.6-3.9	Larimore and Deuver (1968)

Turbine Mortality

Water intake structures at hydropower projects can injure or kill fish that are entrained through turbines. Typically, fish injury or mortality is caused by fish being struck by turbine blades, or being exposed to pressure changes, sheer forces in turbulent flows, and water velocity accelerations (Knapp et al. 1982; EPRI 1992; Odeh 1999; Cada and Rinehart 2000).

Project design will utilize a Kaplan turbine. Kaplan turbines have long been known for their relatively "fish-friendly" characteristics, with typical fish mortality rates in the range of 4 to 12 percent (Odeh 1999). Smaller fish typically survive passage at higher rates. Kaplan turbines have adjustable blades and gates, which result in higher rates of fish survival as compared to other types of turbines (OTA 1995; Heisey et. al. 2008).

The survival rate of fish passing through turbines varies for different sizes of fish and for turbines with different design characteristics. For example, Winchell et. al. (2000) reports mean survival rate of fish less than 8 inches was 94.8 percent and 95.4 percent for fish less than 4 inches. Generally, the survival of smaller fish is relatively high because they are less prone to mechanical injury from turbine passage than larger fish. Also, smaller fish are less prone to injury resulting from shear stresses and rapid pressure changes.

In addition to the desktop entrainment analysis, MLHA estimated turbine mortality rates for proposed Project operations (HDR 2014). MLHA identifies 91 percent of the species entrained at the Project range in size from 0 to 6 inches. For size class 0 to 2 inches, survival was calculated at approximately 98 percent following turbine passage. For size class 2.1 to 4.0 inches, survival was calculated at approximately 95 percent. And for size class 4.1 to 6.0 inches, survival was calculated at approximately 92 percent. For all size classes (0 to 15 inches) survival was estimated to be 95 percent, representing an annual loss of 130 fish due to entrainment and subsequent mortality.

Impingement

In addition to entrainment effects, fish can become impinged on the bars of a trashrack if they are not able to overcome the approach velocity and are not able to pass between the trashrack bars due to their larger body size. The Project has the potential to affect the reservoir and tailwater fishery as a result of impingement against the proposed trashrack.

Lawler et. al. (1991) developed an equation to determine minimum fish length protected by a trashrack or screen. The equation is TL=10^[log(w/α)/β], where TL is total length, w is trashrack spacing, and alpha and beta are standard values.

Table 3-4. Minimum fish length protected by 1.25-inch trashrack spacing.

Species	Trashrack spacing (w)	alpha (α)	beta(β)	Total Length (TL)
Channel catfish	1.25 inches	0.226701	0.914805	6.5
Carp	1.25 inches	0.114062	1.073365	9.3
Smallmouth bass	1.25 inches	0.100946	1.03942	11.3
Spottail shiner	1.25 inches	0.027806	1.305262	18.4
Walleye	1.25 inches	0.080001	1.06586	13.2

Based on the results of the studies conducted by Lawler et. al (1991), MLHA calculates that the trashrack's 1.25-inch clear bar spacing would not allow passage of channel catfish greater than 6.5 inches total length, carp greater than 9.3 inches total length, smallmouth bass greater than 11.3 inches total length, Spottail shiner greater than 18.4 inches total length, and walleye greater than 13.2 inches total length. The maximum approach velocity in front of the trashrack would be 1.0 fps. Effects on these species are discussed below.

Mussels

Freshwater mussel fauna has been thought to be limited in the metropolitan area, due primarily to lack of suitable habitat. Historically, differences in mussel fauna occurred above and below St. Anthony Falls, with only a fraction of the mussel species of the UMR being found upstream of the falls (Dawley 1947; USACE 2004).

Following the collapse of the former Lower St. Anthony Falls powerhouse and the subsequent dewatering of the Lower St. Anthony Falls Dam pool upstream of the former plant, the University of Minnesota and Minnesota DNR conducted surveys of stranded mollusk fauna in November, 1987, respectively (Bright 1987). Mussels were found to be abundant both in the bottom sediments and on the rocks on the east bank. The species found appeared to be healthy prior to the low water occurrence. Most of the observed species can tolerate large rivers and environmental degradation, and their glochidea (larvae) can utilize many different hosts.

In 2014, MLHA performed a mussel and habitat survey (Ecological Services, Inc. 2014). In the upstream sampling location, a total of 16 live mussels were collected which comprised of seven different species. In addition to the live mussels, three dead mussel species were collected upstream of the Project. In the downstream sampling location, a total of eight live mussels were collected and one additional species (fat mucket) was observed that was not collected upstream of the Project. Table 3-5 provides the survey results.

Table 3-5. Collection results from a mussel survey in the Project vicinity completed on August 19-20, 2014.

Common Name	Genus/Species	Live or Dead	Total Number of Live Mussels	Total Search Time (minutes)	Average Number of Mussels per min
Upstream			16	160	0.1
Wabash pigtoe	*Fusconaia flava*	Live	5		
giant floater	*Pyganodon grandis*	Live	4		
threeridge	*Amblema plicata*	Live	2		
mapleleaf	*Quadrula quadrula*	Live	2		
threehorn wartyback	*Obliquaria reflexa*	Live	1		
pink heelsplitter	*Potamilus alatus*	Live	1		
creeper	*Strophitus undulatus*	Live	1		
fragile papershell	*Leptodea fragilis*	Dead	N/A		
plain pocketbook	*Lampsilis cardium*	Dead	N/A		
deertoe	*Truncilla truncata*	Dead	N/A		
Downstream			8	150	0.05
giant floater	*Pyganodon grandis*	Live	5		
Wabash pigtoe	*Fusconaia flava*	Live	1		

Common Name	Genus/Species	Live or Dead	Total Number of Live Mussels	Total Search Time (minutes)	Average Number of Mussels per min
pink heelsplitter	*Potamilus alatus*	Live	1		
fat mucket	*Lampsilis siliquoidea*	Live	1		

The upstream and downstream survey areas are depicted below in Figure 3-2. The upstream area was just above the currently operating Xcel Energy power plant intake, and the downstream end of the area is walled off except for the intake opening. The dominant substrate in the area was comprised of a mixture of sand and silt near the bank, transitioning to 100 percent loose sand further riverward. A total of 16 live mussels were collected which comprised of seven different species. In addition to the live mussels, three dead mussel species were collected upstream of the Project. This area above the Project does not appear to support a substantial mussel community. Figure 3-3 illustrates where the live mussels were collected in the upstream sample area. (In Figure 3-3, the Project intake is located in sample area 2.)

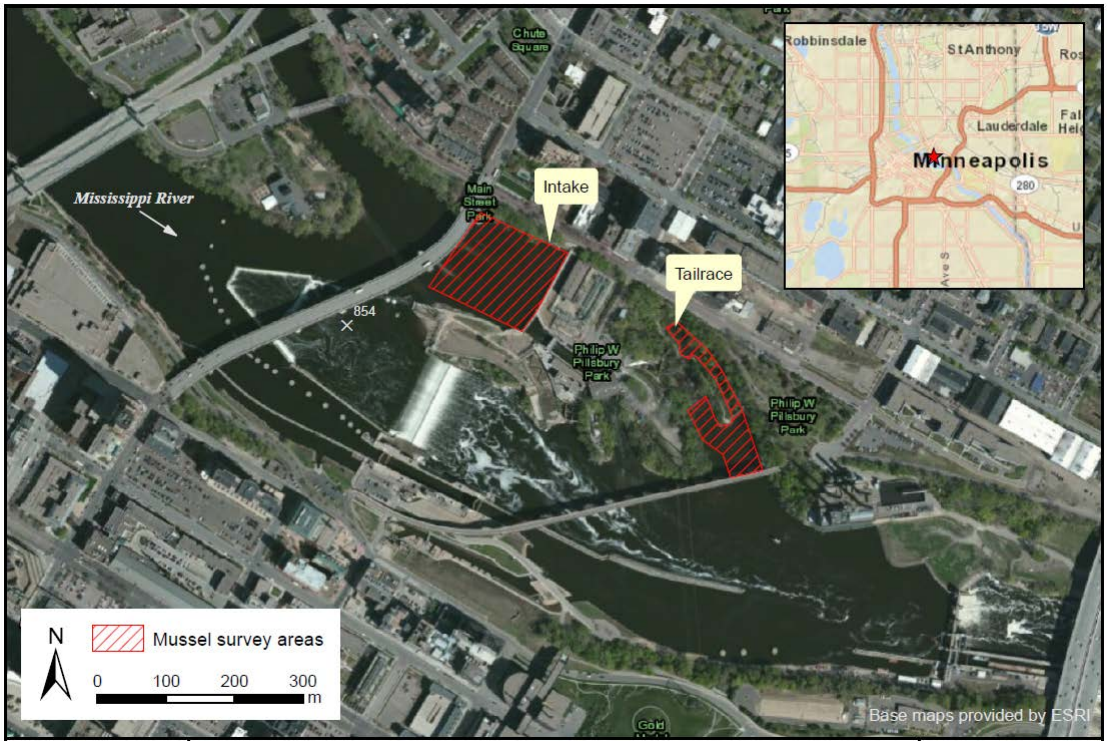

Figure 3-2. Mussel survey locations upstream and downstream of the Project.

Figure 3-3. Mussel abundance from upstream sampling.

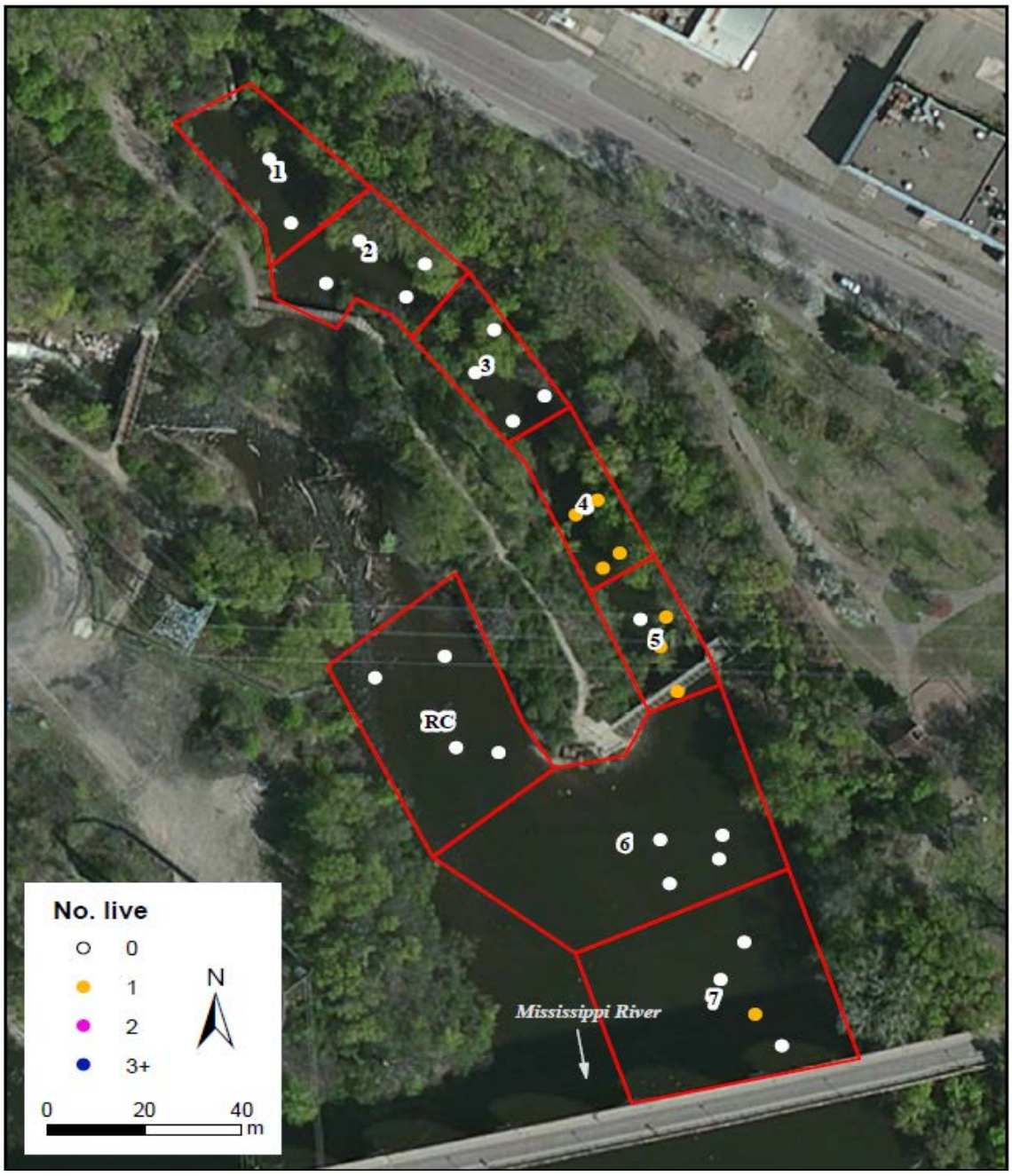

Figure 3-4. Mussel abundance from downstream sampling.

The downstream survey area covered the two existing tailrace channels. Substrate in this area was dominated by cobble and gravel near the edges of the channel however, sand and silt was the majority substrate in the center of the channel. Woody debris was found throughout the channel. A total of eight live mussels were collected and one additional species (fat mucket) was observed that was not collected upstream of the Project. Figure

3-4 illustrates where the live mussels were collected during downstream sampling. (The Project outlet is in downstream sample area 1.) Similar to upstream, downstream of the Project does not provide a substantial community or suitable habitat for mussels.

Aquatic Invasive Species

Invasive and exotic species are considered to be one of the major threats to the integrity of native ecosystems. The potential exists for Zebra mussels and Asian carp to become established during the term of a new license. The presence of these species can affect other aquatic resources through displacement of native species, and affect ecosystem processes (e.g., lower DO levels).

Adult zebra mussels colonize all types of living and nonliving surfaces including boats, water-intake pipes, buoys, docks, piers, plants, and slow moving animals such as native clams, crayfish, and turtles. They have been known to completely clog water-intakes, damage critical infrastructure, and alter native species assemblages. Because young zebra mussels are very small, they are spread easily by water currents and can drift for miles before settling.

State and federal agencies are monitoring the Mississippi River and its tributaries for Asian carp. These agencies are studying various barrier technologies that would prevent the further spread of these invasive species. In the summer of 2014, the President signed legislation to close the Upper St. Anthony Falls lock to boat traffic. Closure of the U.S. Army Corps of Engineers (USACE) lock would prevent Asian carp from migrating upstream and reaching Mille Lacs Lake and other important waters north of the Twin Cities. However, the risk of Asian carp still invading the UMR still exists due to human introductions. The Minnesota DNR will continue its education and enforcement efforts to minimize this risk.

Zebra Mussel

The zebra mussel (*Dreissena polymorpha*), a fingernail sized species native to the Caspian Sea, was accidentally introduced into the Great Lakes drainage in 1988 in ballast water releases (FERC 2004). They quickly spread into all of the Great Lakes and waterways in many states, including the UMR. Zebra mussels colonize and foul water supply pipes and intake screens.

Zebra mussels have been documented downstream of the Project at Mississippi Lock and Dam No. 2 (FERC No. 4306). In the Project vicinity, the Corps has reported several zebra mussels in the St. Anthony Locks area in 1992, 1994, and 1995, but none were reported for the same area in 1993 and 1996 (FERC 1997b). A single zebra mussel was discovered in cooling water piping at the Hennepin Island plant in September 1998 (FERC 2005). It appears likely that, over time, zebra mussels will become more abundant in the St. Anthony Falls Project vicinity.

In accordance with the license order for St. Anthony Falls, Xcel Energy developed and implemented a triennial Zebra Mussel Monitoring and Control Plan (ZMMC Plan; FERC 2004). In the most recent submittal of this triennial ZMMC Plan, no zebra mussels were detected (Xcel Energy 2014). In 2006, Xcel Energy installed two plate samplers above the Hennepin Island powerhouse to monitor for zebra mussels. Xcel Energy's operators, or other hydro operations staff, inspected the samplers several times per year (spring, summer, and late fall). The last inspection was September 10, 2014 (Xcel Energy 2014). To date, no zebra mussel specimens have been documented by Xcel Energy.

St. Anthony Falls Laboratory (SAFL) is located within the Project vicinity on Hennepin Island. In April 2014, three adult zebra mussels were found by SAFL researchers. One was found in the outdoor stream lab and the other two were found in the headbox as it was drained for maintenance. The mussels were removed, killed, and disposed of on site. According to SAFL researchers, the adults "were found after two seasons of unusually low activity and low flow in the outdoor stream lab, potentially providing appropriate

settling conditions for zebra mussel veliger (larvae) to settle out" (Xcel Energy 2014). Xcel Energy and SAFL will continue to share the results of their monitoring activities and include the information in future Zebra Mussel Monitoring Reports submitted by Xcel Energy to the Commission.

Asian Carp

Another aquatic invasive species that has the potential to be found in the Project vicinity is the Asian carp, a catchall name for species of silver, bighead, grass, and black carp from Southeast Asia. Voracious filter feeders, Asian carp consume up to 20 percent of their body weight per day in plankton and can grow to over 100 pounds. Asian carp were imported into the U.S. in the 1970s to filter pond water in fish farms in Arkansas. Flooding allowed them to escape and establish reproducing populations in the wild by the early 1980s. At present, bighead carp have been found in the open waters of 23 states and silver carp in 17 states. Asian carp represent over 97 percent of the biomass in portions of the Illinois and Mississippi Rivers and are swiftly spreading northward up the Illinois River in the direction of the Great Lakes.

Asian carp cause a number of problems in a riverine system. Typically, Asian carp out-compete native fish populations for food and space. This leads to Asian carp dominating entire streams and effectively pushing out the native species. It is thought that Asian carp lower water quality, which could kill sensitive aquatic species such as freshwater mussels (NPS 2014).

3.3.3.2 Environmental Analysis

Fish

The Project is not likely to adversely affect fisheries in the Project vicinity. MLHA's data analyses show that entrainment and turbine mortality will be minimal, with a total annual loss of approximately 133 fish, and that impingement of fish on the Project's trashrack is unlikely (HDR 2014). Trashrack spacing, low intake approach velocities,

and low flow through the turbine will minimize the effects of the Project on local and downstream fisheries.

Entrainment

MLHA analyzed fish entrainment through analysis of intake configuration, approach velocities, and fish burst speeds (HDR 2014). Based on this analysis, the estimated annual entrainment for the proposed project is 2,493 fish, primarily made up of fish smaller than 6 inches. Due to the size of the fish, the estimated average survival rate of entrained fish is 95 percent.

In a letter filed on February 18, 2015, USFWS recommended a maximum of one inch clear horizontal spacing between the bars to minimize juvenile fish entrainment. MLHA analyzed fish entrainment with this recommended spacing of 1 inch and determined the estimate of annual entrainment for the proposed project would be 2,485 fish. MLHA sees no advantage to reduce clear bar spacing to 1 inch. In addition, FERC has licensed numerous projects with clear bar spacing much greater than 1.25 inches and with higher approach velocities than 1.0 fps.

Gizzard shad and emerald shiner represent the majority of entrained species, and overall entrainment numbers (except for gizzard shad) generally increase from spring to fall, which is suggestive of increased activity and presence/dispersal of juveniles (HDR 2014). Therefore, it is likely that the majority of the entrained fish would be composed of the poorest swimmers (i.e., very small fish).

Turbine Mortality

The Project will use a Kaplan turbine for generation. Empirical measurements of fish survival through Kaplan-type turbines show high survival rates, especially for smaller fish. Entrainment and mortality analyses conducted by MLHA find that turbine mortality at the Project will be approximately 5% of entrained fish, a total of approximately 133 fish annually.

MLHA analyzed fish entrainment mortality with this recommended spacing of 1 inch and determined the estimated annual entrainment mortality for the proposed project would be 131 fish. Both a 1.25-inch and 1.0 inch clear bar spacing provide the same survival rate (95%). Therefore, MLHA sees no need to reduce the clear bar spacing to 1 inch because the 1.25-inch clear spacing provides the same protection as the 1.0-inch recommended by USFWS

High juvenile mortality is a natural occurrence for most species in the Mississippi River, and FERC has previously found that minor fish mortality will not cause an adverse effect on fisheries in the Project vicinity (FERC 2003). As a result, MLHA finds that the Project will not have an adverse affect on fisheries.

Impingement

Based on the results of the studies conducted by Lawler et. al (1991), MLHA calculates that the trashrack's 1.25-inch clear bar spacing would not allow passage of channel catfish greater than 6.5 inches total length, carp greater than 9.3 inches total length, smallmouth bass greater than 11.3 inches total length, Spottail shiner greater than 18.4 inches total length, and walleye greater than 13.2 inches total length (HDR 2014). The maximum approach velocity in front of the trashrack would be 1.0 fps.

If clear bar spacing was reduced to 1-inch then the likelihood of impingement would potentially increase. Based on the results of the studies conducted by Lawler et. al (1991), MLHA calculates that the trashrack's 1.0-inch clear bar spacing would not allow passage of channel catfish greater than 5.0 inches total length, carp greater than 7.5 inches total length, smallmouth bass greater than 9.1 inches total length, Spottail shiner greater than 15.5 inches total length, and walleye greater than 10.7 inches total length. Under the USFWS recommendation, the potential for impingement increases for all species within the Project vicinity. Therefore, MLHA's proposed 1.25-inch clear spacing provides the best approach to reducing impingement when compared to USFWS recommended 1.0-inch clear spacing.

Fish impingement and intake avoidance were determined utilizing intake velocity calculations, fish burst swim speeds, and trashrack spacing for a general qualitative assessment. Average approach velocity was calculated using trashrack drawings (clear spacing) and the Project's maximum hydraulic capacity. While river flows may be higher during specific events or times of the year, the Project has a maximum hydraulic capacity of 200 cfs. The proposed Project will operate as a run-of-river facility with a minimum operating capacity of 30 cfs and a maximum operating capacity of 200 cfs. Regardless of changes in river flows, the Project would utilize 30 to 200cfs, resulting in an approach velocity ranging from 0.13 feet per second (fps) to 1.0 fps. This range of approach velocities was calculated (EPRI 200) by dividing the Project's maximum hydraulic capacity (200 cfs) by the total gross area of the trashrack (216 square feet). Therefore, approach velocities will be limited to a maximum of 1.0 fps and impingement of adult fish can be determined using burst and sustained swimming speeds.

Water velocity is important to fish impingement at intakes. There is a substantial literature of laboratory and filed data that points to increased impingement with increased intake velocities (EPRI 2000). For example, there appears to be a positive correlation between fish that have low swimming abilities in laboratory tests or fish performing at cold temperatures (e.g. juvenile salmon and trout), with the incidence of impingement at power station intakes. The corollary is also generally true that species and life stages with high swimming performance capabilities in laboratory tests are less often impinged, although this depends on various features of organism and environmental health (EPRI 2000). Low dissolved oxygen (DO), low pH, and other water quality problems can debilitate fish and lower their ability to swim and avoid intakes. Historically, water quality in the Project vicinity complies with state water quality standards. From 1992 to 1997, water quality data (DO, temperature, and pH) was collected and indicated DO and pH exceeded state water quality standards for all but one time each, during that period. In addition, water temperature was never recorded outside the state water quality standard limits. DO has also been recorded at US Geological Service (USGS) gauge no.

05288500 from October 4, 1972 to July 12, 2006. During that 34- year period, 30 DO samples were taken and none of those samples fell below the state water quality standard of 5 mg/l. Mississippi River waters in the Project vicinity typically exceed DO and temperature standards and FERC has previously found that operation of hydroelectric facilities at St. Anthony Falls will not have an adverse effect on water quality (FERC 2003). Individual fish health should be considered satisfactory and swimming performance capabilities should be accurate for individual species. Therefore, water quality conditions in the Project vicinity will not be a limiting factor affecting fish health and impingement can be based on sustained and burst swimming speeds of fish species present in the Project vicinity.

There are three types of swimming capabilities of fish species which are prolonged, sustained and burst swimming speeds. Burst swimming results in rapid fatigue whereas prolonged swimming can be sustained for longer times before fatigue occurs and sustained swimming can go on essentially endlessly (EPRI 2000). Burst swimming is directly related to natural activities such as feeding and predator avoidance but it is also relevant to moving away from intake screens. Burst speeds are typically short in duration (1-3 seconds) and Table 4.2 in the Fish Entrainment and Mortality Study (Draft License Application, 2015) depicts burst swim speeds for species in the vicinity of the Project. The table below provides sustained and prolonged swim speeds of fish species used in the Fish Entrainment and Mortality Study.

Table 3-6. Target species sustained and prolonged swim speeds.

Species	Life Stage	Sustained swim speed	Prolonged swim speed	Reference
Bluegill	Juvenile	0.3-0.75		Schuler (1968)
	Juvenile	0.48-0.52		King (1969)
	Adult	1.0		Deng et. al. (2004)
	Adult		1.22	Gardner et. al. (2006)
Emerald Shiner	Adult		2.0	Bell (1991)

Species	Life Stage	Sustained swim speed	Prolonged swim speed	Reference
Hybrid Catfish	Juvenile	1.31	3.94	Beecham et. al. (2009)
Northern Pike	Adult		0.62-1.56	Jones et. al. (1974)
Smallmouth Bass	Juvenile Adult		1.3-1.8 1.6-3.9	Webb (1998) Bunt et. al (1999)
Walleye	Juvenile Adult		1.24 2.74	Jones et. al. (1974) Peake et. al. (2000)

Bluegill, one of the more abundantly collected species in the Project area, have burst swim speeds ranging from 1.8 ft/s to 4.3 ft/s depending on life stage. Bluegill adults have a sustained swim speed of 1.0 fps. In addition, Emerald shiner adults have a prolonged swim speed of 2.0 fps. These two species represent approximately 63 percent of the relative composition in the Upper and Lower St. Anthony Falls pools (GLEC 2013). Fish are at risk of impingement if their burst swimming speeds and/or prolonged and sustained swim speeds are less than the approach velocity and if their size prevents them from passing through the clear bar spacing on the trashrack. Based on the 1.25-inch clear bar spacing, an estimated minimum length of species excluded or impinged on the Project's trashracks can be determined. For bluegill the minimum size excluded is 10 inches, emerald shiner is not excluded because the maximum reported size is five inches, and gizzard shad is 12 inches. Generally, bluegill 10 inches or larger are adults; emerald shiners five inches are adults; and gizzard shad 12 inches or larger are adults. An adult bluegill has a sustained swim speed of 1.0 fps whereas emerald shiner has a prolonged swim speed of 2.0 fps. Based on this evidence and the information provided in the Fish Entrainment and Mortality Study burst and prolonged or sustained swim speeds of bluegill and emerald shiner are greater than the approach velocity. Generally, the fish species at risk at this project are game species (i.e. walleye, catfishes, northern pike, and smallmouth bass) and have the capability of avoiding impingement based on known burst, prolonged and/or sustained swim speeds.

In addition, the species susceptible to impingement that do not have the capability to avoid impingement tend to have higher fecundities rates or are fragile species with natural winter die-off (i.e. gizzard shad). Therefore, impingement at the Project would not be likely as most of the fish that are large enough to be subject to impingement would easily be able to escape the intake's approach velocity. The effects of any potential impingement mortality would not adversely affect the fish community in the Upper Mississippi River based on the high fecundity rates of the susceptible species.

Mussels

No ESA or state-listed mussel species were encountered in the Project vicinity during the mussel survey in 2014, and overall habitat was poor, with few mussels collected overall (Ecological Specialists, Inc., 2014). Although mussels further downstream could potentially be affected by sediment releases caused by construction, these effects will be minimized by use of cofferdams and construction BMPs. As a result, MLHA finds that the Project will not have an adverse effect on freshwater mussels.

Aquatic Invasive Species

Asian carp, zebra mussels, and similar aquatic invasive species each represent regional biological invasions that would not be affected by licensing and construction of the Project. In particular, there is no potential for Asian carp to travel upstream through the Project whether at high or low flows, due to the combination of flow velocities, wicket gates, rotation speed of the turbine blades, pressurized penstock, and trashrack bar spacing at the intake. As a result, MLHA finds that the Project will not adversely effect local species and habitats by supporting or encouraging the spread of aquatic invasive species.

3.3.3.3 Cumulative Effects

Construction and operation of the Project would result in minor loss of fish resulting from turbine entrainment. However, historical operation of the adjacent and surrounding hydroelectric projects has not resulted in any significant cumulative effect on the fishery

resources of the area. FERC has previously determined that the operation of the unconstructed Crown Hydro Project would not result in any significant fishery effect in the geographic and temporal areas of cumulative effects analysis for the Project (FERC 1997). Significant future hydroelectric development within the geographic and temporal scope of cumulative effects analysis is unlikely, as available hydroelectric resources are largely utilized under current conditions. As a result, MLHA concludes that cumulative effects of construction and operation of the Project on fishery resources in the area will not be significant.

3.3.4 Terrestrial Resources

3.3.4.1 Affected Environment

Vegetation

The Project is located both upstream and downstream of St. Anthony Falls, an area characterized by industrial, commercial, and residential facilities with patches of disturbed forested areas. Based on field observations conducted during October 2014, the Project area supports very few species typical of high quality habitat. The results of the October field observations are described below.

The Project intake is surrounded by a mix of constructed concrete abutments and pile driven walls along the eastern edge of the pool and disturbed forest consisting of mature cottonwoods (*Populus deltoides*), riverbank grape (*Vitis riparia*), and immature green ash (*Fraxinus pennsylvanica*) along the northern edge of the pool. The forested area upstream of St. Anthony Falls does not meet the criteria under the Minnesota Land Cover Classification System for a natural community, due to insufficient total tree cover (Minnesota DNR 2004). The ground along the banks of the intake pool is a mix of exposed limestone bedrock, broken bedrock pieces, cobbles near the shore, and substantial areas of dumped bituminous and concrete waste. Very little aquatic vegetation is present in the pool.

The Project outlet is located in altered, non-native floodplain forest with a cottonwood, hackberry (*Celtis occidentalis*), and green ash overstory and an understory dominated by non-native species including common buckthorn (*Rhamnus cathartica*), invasive honeysuckles (*Caprifolicaeae* spp.) and Siberian peashrub (*Caragana arborescens*). All areas downstream of the falls have been substantially altered by human activities such as installation of concrete walls, earth moving, and dumped fill and construction debris. The channel bottom is a mix of construction debris, cobbles, and gravel with silt and algae coating all substrate. Steep slopes comprised of bedrock, construction debris, and abandoned industrial materials line the proposed channel along with various riparian-adapted species.

A field study conducted by MLHA during October 2014 located a small (0.2 acre) wetland within the Project vicinity, located downslope of the Xcel's Mainstreet substation in a separate tailrace channel from the Project outlet (Figure 3-5). The wetland is approximately 100 ft from the Project outlet, and separated by uplands habitat. The wetland is characterized by disturbed hydric soils and hydrology that appears to be supplied by leaky mill race outfalls and stormsewers; the lowest portions were at or near river elevation at the time of field examination. Vegetation in the wetland is dominated by rice cutgrass (*Leersia oryzoides*) and jewelweed (*Impatiens capensis*). The seep and wetland are entirely separate from the St. Anthony Falls Hydroelectric Project.

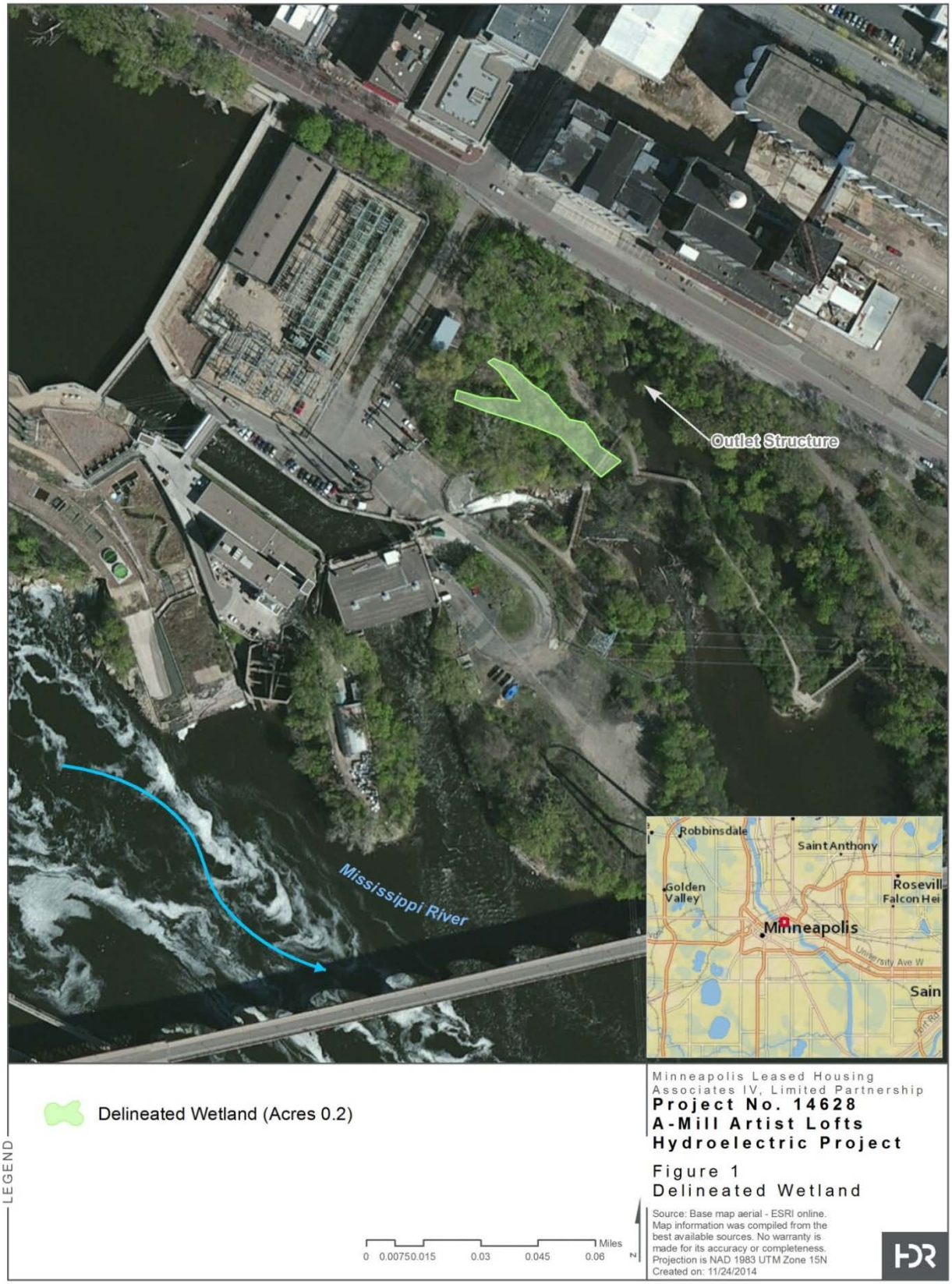

Figure 3-5. Wetlands in proximity to the A-Mill Hydroelectric Project.

Wildlife

Wildlife activity in the general St. Anthony Falls area is comprised of resident urban species and seasonal migrants. Remnants of natural habitat add to the species diversity that would normally be expected in such a highly developed area. For example, the observation of mink (*Neovison vison*), great crested flycatcher (*Myarchus crinitus*), and ovenbird (*Seirus aurocapilla*) have been observed in undeveloped habitats in the general Project vicinity, despite adjacent development activity. The most abundant animals are those typical of urban conditions, including starlings (*Sturnus vulgaris*), pigeons (*Columbidae* spp.), robins (*Turdus migratorius*), house sparrows (*Passer domesticus*), and squirrels (*Sciuridae* spp.) (FERC 1997a).

Of the 55 mammals potentially present in the Twin Cities, eight have been documented in the Project vicinity. Mink, woodchuck (*Marmota monax*), red squirrel (*Tamiasciurus hudsonicus*), eastern gray squirrel (*Sciurus carolinensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), Norway rat (*Rattus norvegivus*), and eastern cottontail (*Sylvilagus floridanus*) are all believed to occur near the Project. Although trapping studies have not been conducted to sample small mammals, white-footed mouse (*Peromyscus leucopus*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), and eastern mole (*Scalopus aquaticus*) and shrew (*Sorex* spp.) species are likely present.

Twenty-two reptiles and 13 amphibians have been found in the Twin Cities area, but studies conducted at the Broadway Avenue Bridge and the backwater pool area of the Project in 1985 proved unproductive. No specific sampling effort was conducted for the Project.

Table 3-7. Representative reptile and amphibian species found within the Twin Cities area (Hickok and Associates 1977).

Common Name	Scientific Name
Turtles	
Snapping Turtle	*Chelydra serpentine*
Wood Turtle	*Clemmys insculpta*
Map turtle	*Craptemys geographica*
False map turtle	*Craptemys pseudogeographica*
Painted turtle	*Chrysemys picta*
Blanding's turtle	*Embloidea blandingi*
Smooth softshell	*Trionyx muticus*
Spiny softshell	*Trionyx spiniferus*
Lizards	
Six-lined racerunner	*Cnemidophorushorus sexlineatus*
Prairie skink	*Eumeces septentrionalis*
Snakes	
Water snake	*Natrix sipedon*
Brown snake	*Storeria dekayi*
Red-bellied snake	*Storeria occipitomaculata*
Eastern garter snake	*Thamnophis sirtalis*
Plains garter snake	*Thamnophis radix*
Eastern hognose snake	*Heterodon platyrhinus*
Western hognose snake	*Heterodon nasicus*
Blue racer	*Coluber constrictor*
Smooth green snake	*Opheodrys vernalis*
Fox snake	*Elaphe vulpine*
Bullsnake	*Pituophis melanoleucus*
Milk snake	*Lampropeltis triangulum*
Salamanders	
Mudpuppy	*Necturus maculosus*
Blue-spotted salamander	*Ambystoma laterale*
Tiger salamander	*Ambystoma tigrinum*
Newt	*Notophthalmus viridescens*
Four-toed salamander	*Hemidactylium scutatum*
Frogs & Toads	
American toad	*Bufo americanus*
Spring peeper	*Hyla crucifer*
Gray tree frog	*Hyla crysoscelis*
Chorus frog	*Pseudacris triseriata*
Green frog	*Rana clamitans*
Mink frog	*Rana septrentrionalis*

Common Name	Scientific Name
Wood frog	*Rana sylvatica*
Leopard frog	*Rana pipiens*

Migratory Birds

The Migratory Bird Treaty Act (16 U.S.C. §§ 703-712) implements various treaties and conventions for the protection of migratory birds. Under this act, taking, killing, or possessing migratory birds (including any part, nest, or egg) is unlawful. Recent studies conducted in the Project vicinity documented 42 species of birds. Permanent residents probably include the mallard (*Anas platyrhynchos*), pigeon, starling, blue jay (*Cyanocitta cristata*), cardinal (*Cardinalis cardinalis*), and house sparrow. Another 15 – 20 species may nest in the vicinity, while the remainder will pass through during migration (FERC 1997a). Numerous species migrate through the Mississippi River Valley, a major migratory corridor for birds (FERC 2003).

When first enacted in 1940, the Bald and Golden Eagle Protection Act (16 U.S.C.§ 668) prohibited the take, transport, or sale of bald eagles (*Haliaeetus leucocephalus*), their eggs, or any part of an eagle except where expressly allowed by the secretary of interior. The Act was amended in 1962 to extend the prohibitions to the golden eagle (*Aquila chrysaetos*). Bald eagles have recently been sighted near the Project, and likely use the river and surrounding area for foraging habitat (FERC 2014). No eagle nests have been observed in or near the Project.

Invasive Species

Invasive species and other non-natives are common components of terrestrial habitats in the Project vicinity. The spread of purple loosestrife (*Lythrum salicaria*), an invasive exotic plant species, has to date been limited to the wasteways on Hennepin Island. An attempt at eradication is part of an ongoing weed control program (FERC 1997a).

3.3.4.2 Environmental Analysis

Project construction is limited to the intake and outlet areas, with limited use of established rights-of-way for construction access and short-term laydown. In-water work

will be completed behind cofferdams or silt curtains, avoiding impacts to terrestrial vegetation and wildlife. Habitats in the Project vicinity are fundamentally disturbed and situated in an urban environment; noise, machinery, and other anthropogenic disturbances are common components of the environmental baseline. As a result, while construction activities could temporarily displace local wildlife, no adverse effects of the Project on wildlife and botanical resources are anticipated.

MLHA conducted hydraulic modeling of the effects of the Project on the dedicated tailrace channel (Appendix C). This area, a former discharge channel constructed for previous uses of the A-Mill facility, will receive up to 200 cfs of flow when the Project is operating at full capacity, raising local water levels between 0.5 and 1 ft. This localized effect is projected to become negligible at the tailrace outlet. The banks of the channel are rocky and partially vegetated by riparian-adapted species; erosion or other effects in this channel are not expected to be substantial because the channel was originally operated under active discharge conditions (FERC 2014). Project operations may inundate small, riparian-adapted trees and brush in some parts of the discharge channel, potentially resulting in short-term mortality and succession to more hydrophytic species. These are already-disturbed habitats that have been substantially altered by human activities, as evidenced by the construction debris and abandoned industrial materials scattered throughout the area. Because Project effects on local water elevations will be minor and will dissipate at the tailrace outlet, and because the channel-adjacent habitats that may be affected by this change are of poor quality, MLHA concludes that the Project will not have an adverse effect on local habitats below the Project outlet.

A small wetland is known to exist approximately 100 ft from the Project outlet, in a separate discharge channel. While not directly affected by the Project (no flows from the Project are discharged into the wetland), this area may be affected by local increases in water elevations resulting from Project operations, potentially resulting in an increase in obligate wetland plant species at the lowest elevations of the wetland. The wetland is

small (0.2 ac) and does not provide high-quality habitat to any species. As a result, the wetland functions and values provided by the area are not expected to change, and MLHA concludes that licensing and construction of the Project will not adversely affect wetland habitats.

3.3.5 Threatened and Endangered Species

3.3.5.1 Affected Environment

ESA-listed Species

Section 7 of the ESA (19 United States Code [USC] § 1536(c)), as amended, states that any action authorized, funded, or carried out by a federal agency must not jeopardize the continued existence of a ESA-listed species, or result in the destruction or adverse modification of designated critical habitat. Action agencies are required to consult with USFWS and/or the NOAA to determine whether ESA-listed species or designated critical habitat are found within the vicinity of a proposed project, and to determine the proposed action's potential effects on those species or critical habitats.

MLHA queried the USFWS Information, Planning, and Conservation System to determine ESA-listed species potentially occurring within the Project vicinity (USFWS 2014a). According to the USFWS, three ESA-listed endangered species may occur in Hennepin County:

- Higgins eye mussel (*Lampsilis higginsii*)
- Snuffbox mussel (*Epioblasma triquetra*)
- Dwarf trout lily (*Erythronium propullan)*

Additionally, one species proposed for listing as endangered may occur:

- Northern long-eared bat (*Myotis septentrionalis*)

The Minnesota Natural Heritage Information System does not include records for any ESA-listed species within a one-mile radius of the Project (Minnesota DNR 2014b).

There is no designated critical habitat for these species located within the Project vicinity, and no recovery plans are in place (USFWS 2014a).

The Higgins eye is a freshwater mussel that occurs in larger rivers where it is usually found in deep water with moderate currents (USFWS 2012a). Higgins eyes occupy stable substrates such as sand and boulders, but not clay, silt, or organic material (Minnesota DNR 2014a). The Higgins eye is considered rare in the Mississippi River, but occurs in the lower portion of some of its large tributaries (Havlik 1980). MLHA conducted a mussel survey of the Project vicinity during 2014; no Higgins eye mussels were located and habitat was considered poor (Appendix C).

The snuffbox mussel typically occurs in small- to medium-sized creeks, in areas with swift currents and sand or gravel substrates (USFWS 2014b). The mussel historically inhabited the Mississippi River, but the only recent observations have been in the St. Croix River (Minnesota DNR 2014a). MLHA conducted a mussel survey of the Project vicinity during 2014; no snuffbox mussels were located and habitat was considered poor (Appendix C). Minnesota DNR does not list this species as occurring in Hennepin County (Minnesota DNR 2014a), and no occurrences have been reported in the Project vicinity.

Dwarf trout lily is a vascular plant species typically occurring on wooded floodplains, river terraces, or north-facing slopes above or near a stream. The species was introduced to Hennepin County prior to listing, and populations are restricted to sites outside of the Project vicinity (USFWS 2014c, Minnesota DNR 2014a). No occurrences of this species have been reported in the Project vicinity, and the highly disturbed habitats in the area are unlikely to be suitable for this species.

Northern long-eared bats are known to occur in small numbers in many caves in Minnesota, and have been found hibernating in natural caves or mines throughout the winter. In summer, the species is often associated with forested habitats, especially

around wetlands (Minnesota DNR 2014a). Summer roosts are believed to include separate day and night roosts, utilizing loose tree bark during the day and caves or mines at night (NatureServe 2008). Chute's Cave, a known hibernaculum for tricolored bat, is located under Main St. SE and adjacent to the A-Mill and its associated tunnels (Minnesota DNR 2014b). (Chute's Cave is discussed in additional detail below.) Minnesota DNR does not list northern long-eared bat as occurring in Hennepin County (Minnesota DNR 2014a), and no occurrences of this species have been reported in the Project vicinity.

Minnesota Endangered and Threatened Species

Minnesota's Endangered Species Statute (Minnesota Statute 84.0895) requires the Minnesota DNR to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. Minnesota's Endangered Species Statute and associated rules restrict the import, transport, or sale of any portion of an endangered or threatened species. (Species of special concern, addressed below, are not protected by Minnesota's Endangered Species Statute or the associated rules.)

MLHA requested a query of the Minnesota Natural Heritage Information System for records of State-listed species within a one-mile radius of the Project. No records of endangered or threatened species were identified (Minnesota DNR 2014b). Additionally, MLHA conducted a review of the Minnesota DNR rare species guide, which identified a total of eighteen species listed as threatened or Endangered and known from Hennepin County (Minnesota DNR 2014a). Table 3-6 lists these species and provides an assessment of the availability of potential habitat based on Minnesota DNR habitat descriptions and a field survey of the Project vicinity conducted during 2014. The Minnesota Natural Heritage Information System does not include records for any Minnesota Endangered and Threatened species within a one-mile radius of the Project (Minnesota DNR 2014b).

Table 3-8. Minnesota State Listed Threatened and Endangered Species Potentially Occurring in Hennepin County.

Common Name	Scientific Name	State Status	Potential Habitat
Mammal			
Eastern spotted skunk	*Spilogale putorius*	Threatened	X
Bird			
Henslow's sparrow	*Ammodramus henslowii*	Endangered	
Loggerhead shrike	*Lanius ludovicianus*	Threatened	
Peregrine falcon	*Falco peregrinus*	Threatened	X
Amphibian			
Blanchard's cricket frog	*Acris blanchardi*	Endangered	X
Reptile			
Blanding's turtle	*Emydoidea blandingii*	Threatened	X
Fish			
Paddlefish	*Polyodon spathula*	Threatened	X
Mussel			
Higgins eye	*Lampsilis higginsii*	Endangered	X
Mucket	*Actinonaias ligamentina*	Threatened	X
Pistolgrip	*Tritogonia verrucosa*	Threatened	X
Round pigtoe	*Pleurobema sintoxia*	Threatened	X
Wartyback	*Quadrula nondulata*	Endangered	X
Vascular Plant			
Valerian	*Valeriana edulis* var. *ciliata*	Threatened	
Dwarf trout lily	*Erythronium propullans*	Endangered	X
Kitten tails	*Besseya bullii*	Threatened	
Plantain-leaved sedge	*Carex plantaginea*	Endangered	
Rock clubmoss	*Huperzia porophila*	Threatened	
Fungus			
Fungus species	*Psathyrella rhosospora*	Endangered	X

Source: Minnesota DNR 2014a

Minnesota Species of Special Concern

A query of MLHA the Minnesota Natural Heritage Information System for records of State-listed species within a one-mile radius of the Project included records for two Species of Special Concern in the Project vicinity (Minnesota DNR 2014b):

- Tricolored bat (*Perimyotis subflavus*)
- Mudpuppy (*Necturus maculosus*)

Additionally, the query response noted, without specifics, that rare mussels have been documented downstream of the Project, though none occur immediately upstream or downstream of the Project intake or outflow. These mussels and the mudpuppy, an aquatic salamander, "are particularly vulnerable to deterioration in water quality, especially increased siltation" (Minnesota DNR 2014b).

Tricolored bat is known to hibernate in Chute's cave, which is considered the most important hibernaculum for the species in Minnesota. Chute's cave is located under Main St. SE, adjacent to the A-Mill and its associated tunnels (Minnesota DNR 2014b). Hibernation typically occurs from October into April, after which the species generally roosts singly in trees. Chute's cave is not known to serve as a maternity colony; no maternity colonies of tricolored bats have been documented in Minnesota, although they are assumed to occur.

Guidance from the Minnesota DNR indicates that the Project could adversely affect tricolored bat if any of the following circumstances occur (Minnesota DNR 2014b):

- Any structural modifications to the existing cave and tunnels;
- Changes in temperature or humidity within the existing cave and tunnels;
- Blasting or drilling within ½ mile of the hibernaculum during hibernation;
- Noise greater than 75 decibels measured on the A scale for more than 24 hours within a one-mile radius of the hibernaculum; or

- Impacts to water resources that flow through the hibernaculum during the winter.

Bald and Golden Eagles

The Bald and Golden Eagle Protection Act prohibits the take, transport, or sale of eagles, their eggs, or any part of an eagle except where expressly allowed by the secretary of interior (16 U.S.C.§ 668). Until August 2013 the Minnesota DNR had also designated the bald eagle to be a species of special concern; it is no longer listed and there are currently over 1,300 nesting bald eagle pairs in Minnesota. Golden eagles have been reported to occur along the Mississippi River during spring and summer, with several pairs overwintering along the Mississippi River (Mehus and Martell 2010). Specific occurrences of bald and golden eagles were not noted in MLHA queries of the Minnesota Natural Heritage Information System, but bald eagles are known to occur in the Project vicinity (FERC 2003).

3.3.5.2 Environmental Analysis

ESA-listed Species

No federal ESA-listed species are known to occur in the Project vicinity (Minnesota DNR 2014b), and no designated critical habitat is present. Of the four species listed or proposed for listing under the ESA, Minnesota DNR does not consider either long-eared bat or snuffbox mussel to occur in Hennepin County. The Higgins eye mussel, which does occur in Hennepin County, requires sand and gravel river bottoms, and would not likely be found in the silted environment adjacent to the Project. Field surveys conducted during 2014 confirmed that this species does not occur in the Project vicinity (Ecological Specialists, Inc. 2014). The dwarf trout lily was introduced to Hennepin County prior to the listing as endangered, and populations are restricted to sites outside of the Project vicinity.

MLHA concludes that licensing and construction of the Project will have no effect on ESA-listed species and designated critical habitat, because they do not occur in the Project vicinity.

Minnesota State Rare Species

No records of state-listed threatened or endangered species exist within the Project vicinity. The Minnesota DNR considers tricolor bat and mudpuppy salamander, both state Species of Special Concern, and rare mussels as species potentially affected by Project construction.

Minnesota DNR states that mudpuppy and rare mussels downstream of the Project are vulnerable to siltation, noting that "it is important that effective erosion prevention and sediment control practices be implemented and maintained during construction and operation of the proposed" Project (Minnesota DNR 2014b). Surveys conducted in 2014 confirmed that no rare mussels occur in proximity to the Project intake or outflow. MLHA will follow BMPs developed in consultation with resource agencies during Project construction, including sediment removal work around the intake and outflow. Cofferdams or similar retaining structures will be used to minimize sedimentation. As a result, MLHA concludes that the Project will have no effect on mudpuppy and rare mussels.

MLHA is committed to ensuring that the Project does not adversely affect tricolored bats or the Chute's Cave hibernaculum. Chute's cave was sealed off during A-Mill tunnel excavations in 1880 (Brick, undated), but access may still exist to this important bat habitat. MLHA will follow restrictions established by Minnesota DNR to ensure that the Project does not adversely affect tricolored bats:

- Project construction will be completed without the use of blasting, drilling, or structural modifications to Chute's Cave. Project construction will begin in early June and the major components of work in the area adjacent to Chute's Cave will be complete by mid-fall, prior to tricolored bat hibernation;

- MLHA will design and construct the turbine-generator unit enclosures with appropriate acoustic measures to ensure that no Project-related noise in excess of 75 decibels is detectable outside the Project powerhouse.
- No changes in water resources, temperature or humidity within Chute's Cave are anticipated following Project construction. Laser scanning of the project area has not shown a visible connection between the existing tailrace conduit and Chutes Cave, however the two likely share a common wall and an opening may exist. At the present time the only water flowing down the headrace tunnel is related to what is believed to be a leaking City water main. Most of the moisture in the tunnel appears to come from the direct connection to the tailrace channel downstream of the outfall. With the re-construction the leaking water will be sealed off from the upstream end however the downstream end of the existing outfall will remain open and subject to the historic fluctuation of water level that occurs within the tunnel during floods as well as the sloshing that occurs as a result of the operation of the Upper and Lower St. Anthony Falls Locks and gate operations at the Lower St. Anthony Falls lock. With the turbine operating a full capacity a localized rise in the water surface elevation of approximately 6 inches may be expected downstream of the tunnel where the box-culvert conduit discharges unto the apron.

Bald and Golden Eagles

No changes to foraging or potential nesting habitat are proposed as a part of the Project, and Project operations will not result in noise or other disturbance to eagles. If eagle nests are discovered within the immediate Project vicinity prior to construction, MLHA will confer with USFWS and determine appropriate actions to maintain compliance with the National Bald Eagle Management Guidelines (USFWS 2007). MLHA concludes that the Project will not adversely affect bald or golden eagles.

3.3.6 Recreation and Land Use

3.3.6.1 Affected Environment

Land Use

The Project is located on the east bank of the Mississippi River at the Upper St. Anthony Falls in Minneapolis, Hennepin County, Minnesota. Also located at the Upper St. Anthony Falls is the St. Anthony Falls Lock and Dam, owned and operated by the USACE, the St. Anthony Falls Hydroelectric Project (FERC No. 2056) owned and operated by Xcel Energy, and the proposed Crown Mill Hydroelectric Project owned by Crown Hydro LLC, an unconstructed project licensed by FERC as project No. 11175.

The area in the vicinity of the Project was once the grain milling capital of the world and was the birthplace of General Mills and Pillsbury (USACE undated). Today the Project is located in the mixed-use urban landscape of Minneapolis with land use in the vicinity of the Project consisting largely of historic buildings used for commerce, industry, and apartments/hotels.

Numerous outdoor recreation areas are located on both banks of the Mississippi River in the vicinity of the Project including the MNRRA and the Mississippi Central Riverfront Regional Park, both of which are further described below.

Project Recreation Areas

There are no recreation facilities or opportunities directly within the proposed Project boundary or proposed as part of Project licensing. The proposed Project boundary is limited to those areas specifically required to construct and operate the Project, consisting of the intake, tunnel, turbines, and outfall structures. The majority of Project features are underground, beneath Main Street SE in Minneapolis.

Other Recreation Areas in the Project Vicinity

Existing public recreational uses within the vicinity of the Project include sightseeing, bank fishing, walking, jogging, biking, kayaking, and some limited boating. The recreation areas located in the vicinity of the Project provide multiple opportunities for

residents and visitors to enjoy the riverfront area in an otherwise urban, highly developed landscape.

Boating and Fishing

Limited recreational boating and fishing occur on the Mississippi River in the vicinity of the Project. Some bank fishing takes place in the vicinity of the Project where river access is provided. A public boat launch is located on the east bank of the river upstream of the Project at Boom Island Park. Additionally, the University of Minnesota owns a private boat ramp located on the east bank of the river downstream of the Project; recreational boating currently represents a significant percentage of traffic through the Upper St. Anthon Falls lock and dam system.

In 1967, the Minnesota state legislature designated the entire Mississippi River in Minnesota as what is now called the Mississippi River State Water Trail, thereby directing the DNR to manage the river for recreation. In 2012, the U.S. Department of the Interior designated this stretch of the Mississippi River as a National Water Trail, managed by the National Park Service. In 2014, the Minnesota Legislature designated the area along the Mississippi River in the St. Anthony Falls area in Minneapolis as an urban whitewater trail. In 2012, the Secretary of the Interior designated the 72-mile Mississippi National River and Recreation Area a National Water Trail.

The Upper St. Anthony Falls Lock is the northern-most navigational structure on the Mississippi River. In June 2014, President Obama signed legislation to close the Upper St. Anthony Falls Lock to boat traffic to prevent invasive carp from migrating upstream and reaching Mille Lacs Lake and other important waters north of the Twin Cities. Boating in and around Upper St. Anthony Falls is likely to be affected by the planned closing of the Upper St. Anthony Falls Lock to boat traffic. For example, the closing will require that canoeists portage around the lock.

Specially Designated Recreation Areas in the Project Vicinity

None of the lands in the vicinity of the Project are included in, or designated for, study or inclusion in the National Wild and Scenic River System, Wilderness Area System, or National Trail System.

The Project is located within the MNRRA, which protects a 72-mile and 54,000-acre corridor along the Mississippi River from the cities of Dayton and Ramsey, Minnesota, to just downstream of Hastings, Minnesota. The MNRRA is a partner park, which is a place where the National Park Service (NPS) works with other agencies for the preservation, enhancement and availability of special places to visitors. The NPS owns only 35 of the approximately 54,000 acres within the MNRRA boundary with the rest of the acres owned and managed by partner agencies. This stretch of the Mississippi River includes natural, historical, recreational, cultural, scenic, scientific, and economic resources of national significance. Within the Minneapolis-St. Paul metropolitan area, the MNRAA provides numerous attractions, trails, and programs, many of which are described below (NPS Undated).

The Project is located near the center of the Mississippi Central Riverfront Regional Park, which includes both banks of the river from the Plymouth Avenue Bridge on the upstream end to the I-35W Bridge downstream. (The Park is being renamed that St. Anthony Falls Regional Park.) The Park is owned and operated by the Minneapolis Park and Recreation Board. Individual recreation areas within the Mississippi Central Riverfront Regional Park include the following (Figure 3-6) (MPRB Undated*a*):

- *Boom Island Park* is located approximately 4,000 feet upstream of the Project at the east end of the Plymouth Avenue Bridge and includes a playground, picnic area, boat launch/dock, and walking/biking paths.
- *B. F. Nelson Park* is located approximately 3,500 feet upstream of the Project between Boom Island Park and Nicollet Island Park. The park includes the

Pioneer Statue to commemorate the courage and hard work of early settlers to the area and offers spectacular views of the Mississippi River and Downtown Minneapolis skyline.

- *Nicollet Island Park* is located on an island in the Mississippi River approximately 1,200 feet upstream of the Project. The southern end of the island contains a promenade with scenic views of the 1858 horseshoe shaped dam. The park also features the Nicollet Island Pavilion as well as walking and biking paths, a picnic area, a garden, and public art on display.

- *Main Street Park* is located along the east bank of the river in the immediate vicinity of the Project from Hennepin Avenue to the Hennepin Bluffs Park and includes hiking/walking path and a picnic area.

- *Father Hennepin Bluffs Park* is located on the east bank of the river; the park lands include multiple tailrace channels as well as the A-Mill tailrace. The park offers direct access to footpaths and bridges that display a unique view of the Mississippi River Gorge, the downtown skyline, and the Stone Arch Bridge as well as direct access to the river. Amenities at the park include walking paths, picnic areas, and a bandstand. A portion of the park is officially known as *Phillip W. Pillsbury Park*, as the Pillsbury Company donated 2.4 acres of land to enlarge the park in 1981. Another half-acre of land on the bluff, known as *Lucy Wilder Morris Park*, was officially added to the park when title to the land was turned over to the Minneapolis Park Board by the Hennepin County Historical Society in 1989.

- *First Bridge Park* is located on the west bank of the Mississippi River under and adjacent to the Hennepin Avenue Bridge at the site of the first permanent bridge to span the Mississippi River at any point along its entire length. The park features a river-edge walkway with ornamental railings, lighting, and landscaping as well as

a continuous, curving seat wall along the back of the river-edge walkway offering spots to sit and enjoy the river.

- *Mill Ruins Park* is located on the west bank of the Mississippi River adjacent to St. Anthony Falls and the Stone Arch Bridge. Mill Ruins Park features the historic mill ruins, biking and walking paths, landscaping, raised catwalks, interpretive signs to provide information and guide visitors as they explore the river, and spectacular views of the falls and the Stone Arch Bridge.
- *St. Anthony Falls Heritage Trail* is a year-round walking trail that provides self-guided tours of the St. Anthony Falls Historic District with its nationally significant buildings, homes, and architectural ruins of former four mills. Guided tours on some or all of the trail are available between May and October. It is a two-mile trail that runs along both banks of the river via Nicollet Island, Hennepin Avenue, and the Stone Arch Bridge with kiosks, interpretive signs, waymarkers, and directional signs.
- *Stone Arch Bridge* was built in 1882-1883 by James J. Hill's Minneapolis Union Railway Company and is recognized as a National Civil Engineering Landmark. The bridge provides a link between Father Hennepin Bluffs Park on the east bank of the Mississippi River and Mill Ruins Park and West River Parkway on the west bank. In 1994, the bridge was converted into a pedestrian and bike trail and offers a panoramic view of St. Anthony Falls.
- *West River Parkway* winds along the west bank of the Mississippi River from Portland Avenue to Minnehaha Park, and is part of the Grand Rounds Scenic Byway. (The recreational parkway extends upriver from Portland Avenue, at which point the name changes to the James I. Rice Parkway.) The parkway is a scenic drive that blends a natural habitat in an urban setting and provides 7.24 miles of paved biking and walking/running trails. Additional recreation amenities provided by the West River Parkway include picnic areas and a playground.

- *Upper Saint Anthony Falls Lock and Dam Visitor Center* is located on the west bank of the river and is operated by the USACE. The Visitor Center offers excellent views of the falls, the Stone Arch Bridge and the Minneapolis skyline. The visitor center is free and open to the public for group tours, May through September, but is expected to close when the lock closes in 2015.

Figure 3-6. Recreational areas within the Central Mississippi Riverfront Regional Park (MPRB Undatedb.)

In addition to the recreational facilities described above, Northern States Power (doing business as Xcel Energy), owns the Xcel Energy Water Power Park located at the St. Anthony Falls Hydroelectric Facility on the east bank of the river. While owned by Xcel Energy, the park is managed by the Minneapolis Park and Recreation Board. The park offers walking trails, biking trails, and benches with excellent views of the river and the

dam. Interpretive panels illustrate the area's rich hydropower history; the park is adjacent to the Project intake structure.

Shoreline Buffers or Management Plans

The City of Minneapolis has adopted a Shoreland Management Plan that is consistent with the Minnesota DNR Shoreland Management Program. The goal of the Shoreland Management Program is to provide orderly development of the shoreland and protect lakes and rivers from pollution by individual sewage treatment systems and other non-point sources. The intent of the program is to encourage shoreland development in such a way that water quality is enhanced and scenic resources are preserved (MDNR 2015).

The Shoreland Management Plan applies to all lakes greater than 25 acres and rivers with a drainage area two square miles or greater. The minimum standards applicable to rivers are outlined in Table 3-9. These standards apply to the use and development of shoreland property including: (1) a sanitary code; (2) minimum lot size and water frontage; (3) building setbacks and heights; (4) land use; (5) Best Management Practices (BMPs); (6) shoreland alterations; and (7) subdivision and PUD regulations. MLHA is not proposing any new structures, shore impacts, or sewage as part of the Project and will protect water quality and local resources during construction and operation of the Project. As a result, MLHA believes the Project is consistent with the management goals and recommendations outlined in the Shoreland Management Plan.

Table 3-9. Statewide minimum shoreland standards for rivers (MDNR 2015).

River Class	River shoreland			
	Lot width (ft)	Structure Setback (ft)	Shore Impact Zone (ft)	Sewage Setback (ft)
Remote	300	200	100	150
Forested	200	150	75	100
Transition	250	150	75	100
Agricultural	150	50/100	25/50	75
Urban & Tributary	75/100	50/100	25/50	75

Recreation Management Plans

The current Minnesota State Comprehensive Outdoor Recreation Plan 2014-2018 (2014-2018 SCORP) is used in the development of the state's Parks and Trails Legacy Plan. The parks and trails legacy planning process was an effort required by the Minnesota Legislature to provide guidance for how funds generated by the newly created Parks and Trails Legacy fund should be used. The 2014-2018 SCORP includes a discussion of the challenges for outdoor recreation, Land and Water Conservation Fund, and Strategic Directions. No aspect of the SCORP is inconsistent with Project construction or operation.

Current Recreation Use Levels

No recreational facilities or opportunities are located within the proposed Project boundary—excepting where sidewalks, bike trails and walking paths pass over underground raceway tunnels. In 2012, approximately 1.8 million people visited the recreational areas within the Central Mississippi Riverfront Regional Park (FERC 2014).

3.3.6.2 Environmental Analysis

Small portions of Main Street Park and Father Hennepin Bluffs Park are located within the Project boundary, including bike trails and walking paths. These uses are compatible with Project operations, but may be temporarily affected during Project construction. The portion of the Parks that would be affected and a description of these effects is provided in Appendix A to this EA, including a description of all vegetation that is to be removed during Project construction and plans for restoration. (Costs for restoration measures are provided in Exhibit A.) Because effects on local parks and park users would be limited in scope and temporary, MLHA concludes that these resources will not be adversely affected by the Project.

The tailrace channel downstream of the outlet is a former mill discharge outlet channel that is now relatively stagnant; it is surrounded by and visible from the Father Hennepin Bluffs Park land. Hydraulic modeling conducted by MLHA indicates that Project

operations will increase flows into this channel, raising water levels by approximately one foot when the Project is operating at full capacity. This localized rise effect is projected to become negligible where the channel joins the river. None of these changes are anticipated to affect the recreational facilities of Father Hennepin Bluffs Park or other recreation facilities/opportunities in the vicinity of the Project, because there are no boat launches or substantial boating use of the affected channel, and views of the area from Park lands will not be substantially modified because the surrounding riparian habitats will be maintained.

3.3.7 Cultural Resources

3.3.7.1 Regulatory Context and Status of Consultation

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations found at 36 CFR § 800 require FERC to take into account potential effects on properties listed or eligible for listing in the National Register of Historic Places (NRHP)[4]. In accordance with Section 101(b)(3) of the NHPA, the State Historic Preservation Officer (SHPO) is required to advise and assist federal agencies in carrying out their Section 106 responsibilities for taking into account Project effects on historic properties. As a result, FERC must consult with the SHPO and seek concurrence on any effects finding. Section 106 further requires that FERC consult with interested Native American Tribes that may attach religious or cultural significance to such properties, as discussed at 36 CFR § 800.2(c)(2)(ii). Finally, because the Pillsbury A-Mill is a National Historic Landmark (NHL), the review process is subject to special requirements for protecting NHLs under by Section 110(f), which are outlined in 36 CFR § 800.10.

On August 14, 2014, FERC initiated consultation with Tribes, provided notice of the Project NOI and PAD filings, and requested indications of interest from representatives of the following Tribes:

[4] Properties that are listed in or eligible for listing in the NRHP are termed "historic properties."

- Shakopee Mdewakanton Sioux Community of Minnesota
- Flandreau Santee Sioux Tribe
- Lower Sioux Indian Community of Minnesota
- Prairie Island Indian Community of Minnesota
- Santee Sioux Nation of Nebraska
- Sisseton-Wahpeton Oyate of the Lake
- Traverse Reservation
- Spirit Lake Tribe of North Dakota
- Upper Sioux Community of Minnesota

Responses were requested by September 15, 2014. To date, no Tribal representatives have filed comments or requested a meeting with FERC or MLHA.

On September 11, 2014, FERC issued notice to the SHPO and Tribal representatives that it would designate MLHA as its non-federal representative for day-to-day consultation under Section 106 of the NHPA (as provided for at 36 CFR § 800.2(c)(4)), while retaining overall responsibility for Section 106 compliance. On December 15, 2014, MLHA distributed to the SHPO and interested parties a proposed Area of Potential Effects (APE) for the Project and requested concurrence with the APE as proposed. Following a meeting on February 4, 2015, the APE boundary was revised and redistributed to the SHPO and interested parties on February 6, 2015. The SHPO provided comments on the APE in letters dated January 15, 2014, and provided concurrence on the revised APE on March 9, 2015.

On February 18, 2015, FERC issued the Notice of Proposed Restricted Service List for a Programmatic Agreement for Managing Properties Included in or Eligible for Inclusion

in the National Register of Historic Places. Responses and comments were requested within 15 days. To date, no responses or comments have been filed.

This section provides assessments that are specific to effects associated with the Proposed Action and hydroelectric development at the A-Mill. MLHA is also conducting a separate Historic Preservation Certification Application process with the National Park Service and SHPO that relates to the larger A-Mill Artist Lofts development.

Figure 3-7. Area of Potential Effects.

3.3.7.2 Affected Environment

History and Description

Waterpower development in the St. Anthony Falls locale began in 1821, when Fort Snelling soldiers constructed a water-powered sawmill. Utilization of the Mississippi River flow at St. Anthony Falls for direct-drive flour milling grew exponentially over the nineteenth century, and Minneapolis dominated the U.S. flour milling industry between 1880 and 1930. Charles A. Pillsbury purchased mills along the Mississippi River in 1869 and formed the C.A. Pillsbury & Company in 1871. The firm began construction of the Pillsbury A-Mill in 1880, as its flagship operation using a design by Minneapolis architect LeRoy S. Buffington. When completed in 1881, the mill became the world's largest flouring operation and the work included construction of the tunnel system for hydropower by a team of 500 laborers.

The mill designers engineered the tunnel system to convey Mississippi River water to twin hydraulic turbines located under the mill's southwest wall. The intake is located upriver of the A-Mill's westernmost corner, and water flowed southeast through the headrace tunnel. The flow then entered two drop shafts, and passed down through twin turbines at the bottom of the drop shafts. The flow then exited the mill via parallel tunnels and returned to the river via dedicated tailrace channels (Mead and Hunt 2014). The Phoenix Flour Mill and North Star Grist Mill also utilized the tunnel for waterpower. Pillsbury continued to increase output by technological upgrades at the mill, including turbine upgrades in the tunnel in 1901.

As the Minneapolis dominance over wheat milling declined in the twentieth century, additional changes occurred to the tunnel. Construction of a Great Northern Railway spur line resulted in a roof tunnel segment being reinforced with steel I-beams. More substantially, the mill completely stopped using waterpower in 1955. This resulted in the headrace tunnel falling out of use. Pillsbury blocked off the tunnel river intake and converted the upriver tailrace into a storm water sewer for the city. The tunnel only

underwent periodic maintenance. Workers removed the two turbines in 1992. Flour milling halted at the A-Mill in 2003 after a run of 122 years (Mead and Hunt 2014).

The Project will be constructed within existing tunnel infrastructure associated with the A-Mill. As described in Section 2.2, the Project involves modifications to the existing stone and masonry intake structure, placement of a steel penstock in cradles on the floor of the existing tunnel, installation of a Kaplan turbine generator unit, and construction of a new box culvert outlet conduit on the invert of the existing concrete tailrace tunnel.

Specific elements of the project include:

Intake Structure

Project construction at the intake includes removal of the existing roof deck, center pier, and intake bulkhead, and installation of a new intake and gates. The center pier is historic; the roof deck and bulkhead date from the mid-1950s and are not historic. The bulkhead was installed inside the tunnel and a set of historic in-river wing walls that helped direct water flow toward the tunnel entrance. These stone wing walls will not be visibly modified, and will be supported by temporary shoring during dewatering and construction. The intake structure modifications will be constructed between and at the landward end of the exposed wing wall area. The wing walls will not be modified unless they are observed to be deteriorating once the bulkhead is removed; in this instance structural reinforcement may be provided below the water line. If these reinforcements are needed, their design would be developed in consultation with the SHPO architect to ensure that they meet the Secretary of the Interior's Standards. A new and narrower concrete intake structure will be constructed between the existing walls and covered with a new concrete roof deck. The height and exposed surface area of the existing intake structure will not be noticeably altered, although the hoist mechanism will be visible.

Tunnel and Dropshaft

The Project includes placement of a 5-foot-diameter penstock in the existing historic tunnel, and installation of a turbine and generator in the existing dropshaft. The penstock pipe will rest on concrete saddles that in turn will rest on the existing limestone bedrock floor. The tunnel does not have a paved or armored invert (or "floor") and there will be no support connections to the historic tunnel walls. The original mill turbines were removed in 1992. This procedure involved removal of large areas of the dropshaft "walls" – opening them to surrounding rooms, and leaving them incapable of containing water as they were designed to do. During a previous remodeling, a large amount of debris was dumped into a subterranean cavity, which ended up spilling down into the area where the bottom of the drop shaft is. This debris will be removed, and the existing floor structure and casing will largely need to be removed as well.

Outlet Structure

The Project will include construction of a new 6-foot-wide by 4-foot-tall concrete outlet conduit (box culvert) that would be installed on the invert of the existing concrete tailrace tunnel and extend outdoors between existing channel walls to discharge onto an existing concrete apron and flow down the existing A-Mill tailrace channel. To stabilize the culvert, rip rap will be placed between it and the existing channel walls. The culvert structure will not affect the integrity of the original building fabric, and the existing channel stone and concrete side walls will not otherwise be modified. Under most flow conditions, the outlet conduit will be submerged, so its visibility will be minimal. Even when it is exposed, vegetation and projecting sections of the adjacent bluffs will conceal the outlet conduit from nearly all vantage points, including the Stone Arch Bridge (see visual assessment in Appendix E).

Historical Designations

The A-Mill tunnel system is a contributing element to the National Register of Historic Places St. Anthony Falls Historic District[5], which was listed in the National Register of Historic Places in 1971. The District is also locally designated by the Minneapolis Heritage Preservation Commission (HPC). The St. Anthony Falls Historic District includes 267 buildings, structures, and historic period industrial archaeological sites. The Historic District boundary flanks the Mississippi River and is bound on the northeast by University Avenue; on the southeast from 6th Avenue Southeast to the east river bank and across the river to 10th Avenue on the west bank; on the southwest by Second Street South; and on the northwest by an irregular line extending from the vicinity of Plymouth Avenue on the west river bank to the intersection of 3rd and University Avenues Northeast on the east river bank.

The A-Mill tunnel system is also a contributing element to the National Historic Landmark status of the A-Mill, which was listed in 1975 (Mead and Hunt 2014, Minnesota Historical Society National Register of Historic Places List 2014). The mill tunnel and tailraces are concurrently historic structures and archaeological sites.

The A-Mill tunnel system was the subject of a documentation and condition survey in 2014 (Mead and Hunt 2014). Previous Historic American Building Survey documentation conducted in 1987 and available at the Library of Congress website has documented portions of the mill. Large-format photographs and laser scanning of the tunnel in 2014 supplement this documentation with existing conditions data (Mead and Hunt 2014).

Historic Properties

MLHA has reviewed SHPO files and other appropriate sources to develop a list of historic properties known to occur within the Project APE.

[5] A Historic District is a significant concentration, linkage, or continuity of archaeological sites, buildings, structures, and/or objects united historically or aesthetically by plan or physical development (Little et al. 2000).

This list is provided in Table 3.10 below.

3.3.7.3 Environmental Analysis

Potential effects on historic properties are categorized by criteria established by Section 106 of the NHPA and its implementing regulations. These include "No Effect," "No Adverse Effect," or "Adverse Effect," defined as follows:

- "No Effect" is defined as no historic properties present or there are historic properties present but the undertaking would have no effect upon them as defined in 36 CFR § 800.16(i).
- "No Adverse Effect" is defined as "when the undertaking's effects do not meet the criteria of 36 CFR § 800.5(a)(1) 'Adverse Effect' or the undertaking is modified or conditions are imposed to avoid adverse effects." A proposed action results in a 'No Adverse Effect' determination when the impacts on a historic property are minimal but do not completely alter the historic characteristics that qualify it for listing in the NRHP.
- "Adverse Effect" is defined as when the undertaking could alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that could have been identified subsequent to the original evaluation of the property's eligibility for the National Register (36 CFR § 800.5(a)).

Historic and Archaeological Resources in APE and Assessment of Effects

The APE is entirely within the Saint Anthony Falls Historic District (SAFHD), which was listed in the National Register of Historic Places (NRHP) in 1971. The status of each property in the district is noted in the "Contributing/Non-Contributing/Not Evaluated"

column in the table below. Although the archaeological sites within the APE are historically documented, none of them have been tested. Consequently, their NRHP status has not been evaluated. The SAFHD was also designated a state historic district by the Minnesota State Legislature in 1971. In addition, the district has been locally designated by the Minneapolis Heritage Preservation Commission. As an individual property, the A-Mill is a National Historic Landmark (NHL). Although the landmark designation did not offer details about features within the complex, the power canal and tailraces are considered among the contributing features.

The area around Saint Anthony Falls and upriver was radically changed by the development of the Upper Harbor in the mid-twentieth century. This development has been studied and found to be historically significant. While definitive boundaries for a historic district associated with the Upper Harbor Project (UHPHD) have not been established, it would likely include that part of the river and riverbanks that are within the APE for the A-Mill Project.

To avoid having an adverse effect, the Project must not damage the integrity of historic resources. The National Park Service has identified seven aspects of integrity—location, design, setting, materials, workmanship, feeling, and association. Effects can be direct—something that would physically change a historic property—or indirect. While projects can cause many indirect effects, such as vibration and noise, the most likely indirect effect of the A-Mill hydroelectric project is visual.

Findings

The following assessments are based on design information as of March 16, 2015, which reflects all substantive components of Project design that may affect historic and archaeological properties. If Project design is modified such that additional or modified assessments are warranted, MLHA will notify the SHPO and FERC and provide additional documentation. Conclusions relate to all historic resources (individually

eligible properties, contributing properties in the SAFHD and UHPHD) in the APE unless otherwise indicated.

A numbered list of properties in the APE and an analysis of effects is summarized in Table 3.10 below. The location of the properties is indicated on a map key that includes the APE boundaries.

Direct Effects

Direct effects of the project are as follows:

- Removing existing bulkhead
- Modifying existing stone and masonry intake structure
- Placing steel penstock in cradles on the floor of the existing tunnel
- Installing a Kaplan turbine-generator unit
- Constructing a new tailrace culvert in the existing concrete tailrace tunnel

The only property that will be directly affected by these activities is the Pillsbury Power Canal and Tailraces (#4 in Table 3.10):

- The center pier appears to be part of the original construction. Removing the center pier will damage the design, materials, and workmanship of the property resulting in an adverse effect. While Section 110 of the National Historic Preservation Act requires federal agencies to minimize harm to NHLs "to the maximum extent possible," the central pier must be removed or the project is not feasible, so the adverse effect is not avoidable.
- A concrete bulkhead was installed to seal off the tunnel entrance around 1955 when Pillsbury discontinued the use of waterpower for its mill operations. While this occurred during the same period that the Upper Harbor Project was being developed, it does not appear to be related to this development. Instead, it is

associated with an initiative undertaken by Pillsbury in the 1950s and 1960s to update some of its facilities, including the aging A-Mill. Once Pillsbury's flagship, the A-Mill had long been relegated to a minor role in the company's operation. Hence, the mid-twentieth-century upgrades at the A-Mill do not appear to be particularly significant to the company's history. While marking the end of the waterpower era at the mill, the bulkhead is not a significant component of the mill, so its removal is not an adverse effect. An overview of the history of the bulkhead and related contextual information is included in Appendix E.

- The construction date of concrete deck over the intake is not certain, but it was probably contemporary with the bulkhead, which falls outside the period of significance for the SAFHD. The concrete cap must be removed or the project is not feasible; and it is not feasible to remove and replace the concrete deck, so the adverse effect is not avoidable.

- The limestone wing walls flanking the intake are important elements of the historic power canal, particularly because, unlike most elements of the canal, they are visible to the public—and they will be further exposed by the Project, because the new bulkhead will be further recessed than the existing bulkhead. The wing walls will be protected during dewatering, demolition, installation of the new concrete components, a new sluice gate, and a new trashrack. If deterioration is evident, the wing walls will be repointed as needed following the guidance of *Preservation Brief 2: Repointing Mortar Joints in Historic Masonry Buildings* and other relevant publications. As a result, the Project will not have an adverse effect on the limestone wing walls.

- The masonry in the tunnel that forms the remainder of the canal is also character-defining. The penstock for the new hydroelectric development will be installed within the tunnel on saddles anchored to the limestone floor (which is bedrock) to avoid any adverse effects to the masonry.

- The new turbine-generator unit will be installed in the location of a previous hydraulic turbine unit. Its installation will avoid adversely affecting the surrounding masonry and steel rings in the dropshaft.
- Water will be directed from the turbine through a draft tube to a concrete tailrace culvert in an existing tailrace tunnel. A new concrete bulkhead will be installed within the tunnel to enclose the turbine/generator and will not be visible outside of the tunnel. The tailrace culvert will rest on the tunnel's existing concrete floor slab and be supported on both sides by riprap so that this installation will avoid damage to historic materials and is reversible. As a result, the Project will not have an adverse effect on the tailrace tunnel.
- A steel gate structure will be installed in the tunnel, recessed from the limestone bluff. Because it will not be visible, it will not have a direct physical effect.
- After exiting the tunnel, the tailrace culvert will continue through a short length of tailrace canal and then empty onto an existing concrete apron. From the outlet apron, water will flow down the existing A-Mill Tailrace channel to the Mississippi River. Because the water discharge point is coincident with the historical discharge, it will not have a direct physical effect on the Pillsbury Power Canal and Tailraces.

Indirect Effects

Most of the project will not be visible from the public right of way. Changes at the intake and outlet, however, will be visible. As a result, these changes have the potential to affect the design, setting, materials, workmanship, feeling, and association of the SAFHD, UHPHD, and A-Mill NHL. A visual analysis of the APE is included in Appendix E.

Intake

The Project will:

- replace the concrete deck over the intake structure

- place a two-pipe, 42"-high guardrail around the new cap
- install an electric gate operator (approximately 40" high) on the new concrete deck about 4.5' in front of the face of the historic stone tunnel arch.

While this will introduce new visual elements, they are small in scale and industrial in character. As a result, they are in keeping with the character of both the SAFHD and the UHPHD. Given their location, they are virtually invisible from the A-Mill NHL. As a result, they will not adversely affect the design, setting, materials, workmanship, feeling, and association of the SAFHD, UHPHD, and A-Mill NHL.

This is particularly apparent when considering other changes in the vicinity. For at least several decades during the period of significance and many years thereafter—almost to the time of the SAFHD's designation—a gatehouse stood directly above the intake structure. A variety of other small structures occupied the adjacent riverbank during the same timeframe. Railroad tracks ran down Main Street. The buildings edging the east side of the street were shops, taverns, and factories. After the period of significance, the riverfront has become parkland, the railroad tracks have been removed from Main Street and the surface has been repaved, and the Saint Anthony Main redevelopment has brought the buildings back to life for modern use. While most of these changes have conformed to the Secretary of the Interior's Standards, they have transformed the character of Main Street from a gritty industrial waterfront to an attractive commercial and recreational corridor. The proposed Project will return a historic function to the district with minimal visual impact.

Outlet

The tailrace conduit will empty onto a concrete outlet structure that will be submerged under most conditions. Even when exposed, its location will obscure it from most vantage points. Its visual impact is potentially the greatest to the design, setting, and feeling of several features in the immediate vicinity:

- A-Mill Power Canal Tailrace Outlets (#4): The setting and feeling of the tailrace outlets will be disturbed by the visibility of the outlet structure, which is an adverse effect.
- Father Hennepin Bluffs Park (#23): While this park might be historically significant, it has poor integrity and at this time does not appear to qualify for the NRHP.

Figure 3-8. Key to Project Features.

Table 3-10. Summary of Properties in APE and Effects of the Project

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
General Area and River						
1	Third Avenue Bridge (a.k.a. Central Avenue Bridge, Saint Anthony Falls Bridge, Bridge No. 2240)	Spanning the Mississippi River between Third Avenue South and Central Avenue SE	HE-MPC-0165	Contributing	Open-spandrel, concrete-arch bridge designed by F. W. Cappelen and Kristoffer Oustad. Built in 1914-1918; renovated in 1980.	Intake structure visible; impact of modifications at intake structure is minimal; no adverse effect
2	Horseshoe Dam	Mississippi River above Saint Anthony Falls	HE-MPC-0308	Contributing	Built in the mid-nineteenth century to divert water to the east and west channels to power industrial development.	Intake structure visible; impact of modifications at intake structure is minimal; no adverse effect
3	Main Street	Main Street		Contributing	The cobblestoned Main Street was specifically referenced as an important feature in the SAFHD NRHP nomination.	Intake structure visible; impact of modifications at intake structure is minimal; no adverse effect

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
4	Pillsbury Power Canal and Tailraces		HE-MPC-0214	Contributing Also National Historic Landmark (1966) and individual NRHP listing in 1979	Built in 1880-1881 by the Saint Anthony Falls Power Company to supply waterpower to the A-Mill, the canal runs below Main Street between Second and Third Avenues SE. Fifteen feet wide and at the most 15 feet deep, it has an arched masonry roof that was covered with fill and the cobblestones (since replaced) of Main Street. The inlet is located at the foot of Second Avenue SE. Two tailraces run from the A-Mill diagonally under Main Street and enter the east channel of the Mississippi below the falls. The canal was blocked off after the A-Mill completely discontinued using waterpower in 1955.	Adverse direct effects from demolition of central pier at intake structure; adverse indirect effect (visual) to setting and feeling from construction of outlet structure at tailrace

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
Main Street—East Side						
5	Pracna Building	117 Main Street	HE-MPC-0203	Contributing	Built as a saloon in 1890 by Frank Pracna and the Minneapolis Brewing Company. Three-story, red-brick, Queen Anne-style building designed by locally prominent architect Carl Struck. Renovated in 1969 and since 1973 used a restaurant.	Intake structure barely visible; impact of modifications at intake structure is minimal; no adverse effect
6	Martin and Morrison Block	123-127 Main Street	HE-MPC-0202	Contributing	Stone-faced retail and office block built in 1858. Architect unknown. Circa late 1870s, purchased by Union Iron Works and converted to industrial use. Together with the Upton Block (#7), sold by Union Iron in the 1930s and used as industrial and warehouse space until 1985, when they were rehabilitated as part of the Saint Anthony Main retail/office complex.	Intake structure barely visible; impact of modifications at intake structure is minimal; no adverse effect

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
7	Upton Block	129 Main Street	HE-MPC-0201	Contributing	Built in 1855. Three-story, flat-roofed, buff-brick building designed by local master builder B. O. Cutter for brothers R. and M. Upton, who used the ground floor as retail space and rented the upper stories as professional offices. In 1879, purchased by Union Iron Works and converted to industrial use. Together with the Martin and Morrison Block (#6), sold by Union Iron in the 1930s and used as industrial and warehouse space until 1985, when they were rehabilitated as part of the Saint Anthony Main retail/office complex.	Intake structure barely visible; impact of modifications at intake structure is minimal; no adverse effect
8	Salisbury and Satterlee Company	201-205 Main Street	HE-MPC-0199	Contributing	Six-story brick building erected in 1909 as part of Salisbury and Satterlee Company's bed and mattress manufacturing complex. Designed by local architects Bertrand and Chamberlin. Renovated in the 1970s as part of the Saint Anthony Main retail/office complex.	Intake structure barely visible; impact of modifications at intake structure is minimal; no adverse effect

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
Main Street—West Side						
9	Nudd and Knight Eave and Gutter Factory Site	110 Main Street		Not evaluated	Possible archaeological evidence of large water-powered, wood-frame structure built in 1865 and burned in 1882. Some foundations may remain under riverbank fill.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
10	Main Street Manufacturing Center Site	120-122 Main Street		Not evaluated	Possible archaeological evidence of adjoining one-story, stone, water-powered buildings. Built in 1875 and gone by 1892, but some foundations may remain under riverbank fill.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
11	Retaining Wall Adjacent to Pillsbury Power Canal Intake structure	Embedded within the eastern river bank upstream from the Main Street Station and just downstream from the A-Mill intake structure		Not evaluated	Deteriorating local Platteville limestone and mortar wall uncovered in 2006 during excavation to install an access ramp to Water Power Park, it is thought to be part of a retaining wall that flanks the sides of the intake for the Pillsbury Power Canal. The exposed portion of the wall was documented in photographs and measured drawings and then, in consultation with SHPO, covered immediately to protect it from further construction impact. Consequently, its full extent and exact relationship to the canal intake structure are yet to be determined and it may/may not prove to qualify as a contributing part of the NRHP listed A-Mill.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
12	Log Chute	Paralleling Main Street downriver from Second Avenue		Not evaluated	This chute allowed logs that did not belong to owners of the platform sawmills at the falls to pass over the falls to the channel below.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
13	Main Street Station	206-210 Main Street	HE-MPC-9992	Contributing	Hydroelectric generating plant built in 1894 on site of former platform sawmills and reconstructed after a fire in 1911. A cellular dam installed immediately upstream and on Hennepin Island to avoid potential undermining of the dam in 2000 permanently cut off water to the plant. No longer functional, the plant is owned by Xcel Energy and serves primarily as a storage area.	Intake visible; impact of modifications at intake structure is minimal; no adverse effect

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
14	Tower Mill Site	300 Main Street		Not Evaluated	Built in 1871. Tower for transmitting power to Northwestern Fence Works on Third Street; also served as a grist and feed mill. The wood structure and waterpower turbine were removed in 1891. No foundations are apparent on what is now parkland.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
15	Barnard Brothers Furniture Factory	308 Main Street		Not evaluated	Built in 1853. Four-story wood-frame building with a water-powered planing mill on the first floor and furniture manufacturing above. Burned in 1871. Construction of the Pillsbury Canal tailraces in 1881 may have destroyed most of the foundation remnants.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
16	Scott and Morgan Foundry/Ames Building	Main Street between Third and Fourth Avenues SE		Not evaluated	Built in 1856. Wood-frame foundry. Burned in 1863. Rebuilt in 1865 as a sash, door and blind factory. Destroyed by another fire in 1871. Construction of the Pillsbury Canal tailraces in 1881 may have destroyed most of the foundation remnants.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
17	Chalybeate Springs Resort	Main Street between Fourth and Fifth Avenues SE		Not evaluated	In 1875, on land leased from the Saint Anthony Water Power Company, Mannesseh P. Pettingill built a restaurant, dock, and walkway to the river, sold water from natural springs at the base of the bluff, and offered boat rides into "Chute's Tunnel" (under Main Street but outside of APE). The site was partially destroyed by construction of the tailraces in 1881 and the resort was abandoned by 1883. While surface traces have vanished, some buried foundations and occupation debris may still exist under what is now parkland.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
Hennepin Island						
18	Government Shaft House	East side of Upper Hennepin Island		Not evaluated	The Army Corps of Engineers excavated a vertical shaft at the northeastern end of Hennepin Island in 1874 to access a tunnel in which a dike was being constructed below the riverbed. The shaft house was removed in 1891; the top of the shaft is now covered by concrete and interpreted in Water Power Park.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
19	Mill Hands Boarding House	Upper Hennepin Island		Not evaluated	Two-story, wood-frame structure built by the Saint Anthony Falls Power Company in 1855 for mill hands. It was torn down in about 1865 but some foundations may remain in what is now parkland.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
20	First Hennepin Island Paper Mill	Upper Hennepin Island		Not evaluated	Three-story, wood-frame paper mill built by Chase and Secombe in 1859 and demolished after mill moved to a stone building on the lower part of the island in 1874. Foundations may remain under what is now parkland.	Archaeological site; no visual impact or physical impact due to Project-related soil disturbance
21	Falls of St. Anthony, East Channel Escarpment	Vicinity of tailrace outlet		Contributing	A limestone ledge that was once part of Saint Anthony Falls (East Channel) and the only segment that remains visible today.	Outlet barely visible; impact of outlet structure is minimal; no adverse effect

#	Name	Location	SHPO #	Contributing Non-contrib. Not evaluated	Historical Information	Effects Assessment
22	Main Street Station Tailrace Outlets	Vicinity of tailrace outlet		Contributing	Water flow to Main Street Station eliminated with construction of cell dam but outlets remain exposed downstream	Outlet barely visible; impact of outlet structure is minimal; no adverse effect
23	Father Hennepin Bluffs Park	Includes bluff and area above and below bluff; section on Hennepin Island has greatest potential for effect		Non-contrib. to SAFHD; potentially individually significant as park, but integrity is questionable, so assumed not to qualify for NRHP	Park includes south end of Hennepin Island. Established in late 1970s. A lack of maintenance since that time has resulted in deterioration of the original design.	Potential visual effect, but park appears to be non-contributing to district and not individually eligible because of integrity; therefore, no adverse effect

Traditional Cultural Properties

FERC has initiated consultation with Tribes, provided notice of the Project NOI and PAD filings, and requested indications of interest from potentially interested Tribes. To date, no Tribes have expressed interest in the Project licensing proceeding. Consultation during the licensing of the St. Anthony Falls Project also determined that no TCPs occur in the Project vicinity (FERC 2003). Because no TCPs have been identified in the Project vicinity, MLHA believes that a No Effect finding is appropriate with regard to Project effects on TCPs.

3.3.8 Aesthetic Resources

3.3.8.1 Affected Environment

Project Setting

The Project is located in the city of Minneapolis waterfront area at Upper St. Anthony Falls on the Mississippi River. The original Falls have been replaced by the structures of Upper St. Anthony Falls Lock & Dam, operated by the ACOE, and the concrete spillways of Xcel Energy's St. Anthony Falls Hydroelectric Project, FERC No. 2056. The only natural rock ledge occurs along the east bluff downstream of the Project (FERC 2003).

The Project will include modifications to the existing, unused intake and outlet structures of the Pillsbury A-Mill, a high-visibility commercial building located on the left bank of the River that is currently being converted to residential apartments. The A-Mill structure was being used by Xcel Energy for storage and to house control units for Xcel Energy's adjoining substation until MLHA purchased the property in 2013 (FERC 2014). Project modifications will not alter any major elements of the A-Mill structure, which is under redevelopment as housing, and will not be visible during normal operations. The bulk of Project equipment and facilities will be located underground in existing infrastructure at the A-Mill building.

The surrounding area is dominated by residential, commercial, industrial, and transportation developments. For example, the large, rectangular, lightly colored St. Anthony Falls Laboratory and associated structures are located on the right (west) side of the Hennepin Island plant entrance canal and are dominant visual elements. When viewed from the left (east) bank of the river, the laboratory is approximately two stories high and visually unobtrusive. However, when viewed from the right bank and from the river itself, the structure is a much larger, dominant visual element.

Since the 1970s, the city of Minneapolis, the Minneapolis Community Development Agency, Minneapolis Park and Recreation Board, and other entities have undertaken the redevelopment and beautification of the Minneapolis central riverfront, including several park developments on the left and right bank. Two National Scenic Byways overlap in downtown Minneapolis and include views of St. Anthony Falls (FERC 2003).

Aesthetic Flows

In its present configuration, St. Anthony Falls presents an important aesthetic resource for the community, as spills over the concrete main spillway and horseshoe dam spillway flashboards provide iconic, aesthetically pleasing views. These views are maintained by Xcel Energy as part of current operations at the St. Anthony Falls Project, FERC No. 2056. Current license requirements for the St. Anthony Falls Project provide for an approximately 100-cfs minimum spillway flow to meet aesthetic considerations during certain periods (Table 3-7). There are no minimum flow requirements between November 15 and March 15.

Table 3-11. Specific time periods for providing a minimum flow (approximately 100 cfs) sufficient to maintain a 2-inch depth across the crest of the main spillway as specified in the FERC license for Project No. 2056.

Time of Year	Time of day
March 16th to March 30th	6 a.m. to 7 p.m.
April 1st to October 31st	5 a.m. to 10 p.m.
November 1st to November 14th	6 a.m. to 7 p.m.

These flows also meet the provisions of a Low Flow Contingency Management Plan arranged between Xcel Energy and Crown Hydro LLC during licensing of the unconstructed Crown Mill Hydroelectric Project, FERC No. 11175. No changes to flows at St. Anthony Falls will occur as part of the Project, which will operate exclusively in run-of-river mode and will not alter existing license obligations at the St. Anthony Falls Project or the unconstructed Crown Mill Project.

To assure the maintenance of this key aesthetic resource, Xcel Energy prepared and is implementing an Aesthetic Flow Adequacy Plan (AFAP), approved by FERC in December 2005. The purpose of the plan is to confirm the adequacy of the existing minimum flow obligation to meet aesthetic considerations. On December 18, 2013, FERC issued an Order Granting Extension of Time until December 31, 2016 to complete the public perception survey portion of the AFAP

3.3.8.2 Environmental Analysis

The Project will use existing infrastructure and new generation equipment will be located inside the existing Pillsbury A-Mill facility and not visible to the public. The A-Mill building will not be substantially altered. Additionally, the Project will neither alter current minimum flows at St. Anthony Falls, nor any future flows that may be implemented as part of Xcel Energy's Aesthetic Flow Adequacy Plan or potential future construction of the Crown Mill Project. MLHA, through mutual agreement with Xcel Energy will accept a proportional share of these aesthetic flow requirements. As a result, FERC licensing of the Project will have no effect on aesthetic resources in the Project vicinity.

3.3.9 Socioeconomics

3.3.9.1 Affected Environment

The Project is located in the Marcy-Holmes Neighborhood of Minneapolis on the east bank of the UMR. Marcy-Holmes is an important mixed-use neighborhood, including a variety of urban land uses such as office commercial and residential properties and parks.

Industrial uses in the larger Minneapolis metropolitan area include milling, metal fabrication, and steam generation. Major employers in the metropolitan area include UnitedHealth Group, U.S. Bancorp, 3M, Target, Medtronic, and General Mills. Table 3-8 provides a description of population, number of households and median household income in the Project vicinity, City of Minneapolis, and State of Minnesota.

Table 3-12. Socioeconomics for the city of Minneapolis and the state of Minnesota. (U.S. Census Bureau 2014)

Description	Census Tract	City of Minneapolis	State of Minnesota
Population	3,015	382,578	5,303,925
Household Totals	1,787	163,540	2,087,227
Median Household Income	$28,634	$48,881	$59,126

In August 2014, the Marcy-Holmes Neighborhood Association's Master Plan was approved by the City Council. The Master Plan is meant to guide local development and promote the planned vision of the neighborhood, which specifically includes the A-Mill Artist Lofts (Cunningham Group Architecture 2014). MLHA has received a letter from the Marcy-Holmes Neighborhood Association in support of the Project.

3.3.9.2 Environmental Analysis

Project construction during 2015 would result in some local employment opportunities. Additionally, the Project is a component of the A-Mill Artist Lofts development, which represents an important local development that is consistent with the neighborhood plan. As a result, FERC licensing of the Project will likely provide modest socioeconomic benefits to the surrounding community.

4.0 ECONOMIC ANALYSIS

The Pillsbury A-Mill was constructed in 1881, including water infrastructure designed to use the Mississippi River and St. Anthony Falls to provide hydropower for flour milling operations. The Project will restore hydropower to the Pillsbury A-Mill and is expected to reduce the A-Mill Artist Lofts apartment complex's requirement for utility-supplied energy by over 50%. The Project will generate an average of 3,400 MWH annually. In addition, the electricity generated by the Project will reduce carbon emissions and help Minneapolis and Minnesota meet renewable energy goals.

The current estimated cost, costs for all proposed environmental measures, and a cost to date for licensing, are provided in Exhibit A and Appendix A to Exhibit A, of this License Application.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 UNAVOIDABLE ADVERSE EFFECTS

Environmental analysis shows the effects of the Project will consist of the following:

- Short-term water turbidity associated with construction;
- Fish entrainment and impingement as described in Section 3;
- Adverse effect to a historic resource by removing the center pier in the intake structure;
- Adverse effect to a historic resource by construction that will disturb the setting and feeling of the tailrace outlets.

With implementation of the environmental measures specified as part of the Proposed Action, the water turbidity and fish issues are considered minor. Mitigation will be needed to address the adverse effects to historic resources.

5.2 RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

On January 21, 2015, FERC issued a Notice of Availability of Draft License Application and Draft Environmental Assessment for the Project and Request for Preliminary Terms and Conditions for the Project. Four comment letters were received, from the following parties:

- City of Minneapolis, in a letter dated February 13, 2015;
- USFWS, in a letter dated February 17, 2015;
- DNR, in a letter dated February 20, 2015; and
- NPS, in a letter dated February 19, 2015.

These letters and MLHA's response to comments in Appendix B of this EA.

5.3 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA, 16 U.S.C. section 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. The following plans have been filed with FERC and are considered relevant to the Project:

- Minnesota State Comprehensive Outdoor Recreation Plan (SCORP): 2003-2008. St. Paul, Minnesota.
- National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.
- Upper Mississippi River Basin Commission. 1981. Comprehensive master plan for the management of the Upper Mississippi River system - environmental report. Minneapolis, Minnesota. September 1981.
- Upper Mississippi River Basin Commission. 1982. Comprehensive master plan for the management of the Upper Mississippi River system. Minneapolis, Minnesota. January 1982.
- U.S. Fish and Wildlife Service. Undated. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

Additionally, the following plans are relevant to the Project, but are not currently on file with FERC:

- Minneapolis Department of Community Planning and Economic Development. 2011. The Minneapolis plan for sustainable growth.
- Mississippi River Coordinating Commission and National Park Service. 1995. Comprehensive Management Plan, Mississippi National River and Recreation Area.

- Mississippi National River and Recreation Area. 1995. Comprehensive Management Plan, Mississippi National River and Recreation Area.
- Minneapolis Park and Recreation Board. 2014. Draft Central Mississippi Riverfront Regional Park Master Plan.
- Minneapolis Park and Recreation Board. 2013. Above the Falls Draft Regional Park Plan.
- Three Rivers Park District and Minneapolis Park and Recreation Board. 2011. Hennepin County 2030 Comprehensive Plan Update.
- City of Minneapolis. 2000. The Minneapolis plan for sustainable growth.
- City of St. Paul. 2010. City of St. Paul Comprehensive Plan.
- City of St. Paul. 2002. Mississippi River Corridor Plan.
- Minnesota State Comprehensive Outdoor Recreation Plan 2014-2018.

MLHA has reviewed these plans and has found no inconsistencies with the Project as proposed.

6.0 FINDING OF NO SIGNIFICANT IMPACT

Council on Environmental Quality regulations for NEPA implementation at 40 CFR §1508.27 state that the significance of environmental effects should be considered with reference to both the context and intensity of an action. Context refers to larger interests at the societal, national, regional, or local levels, while intensity is defined by "severity of impact". Site-specific actions such as licensing of the Project are assessed relative to the significance of effects in the local area. Intensity of effect is assessed relative to multiple criteria, presented in Table 6-1.

Table 6-1. NEPA intensity criteria associated with the Project.

NEPA intensity criterion	Project effect
Degree to which the proposed action affects public health or safety.	There is no mechanism by which the Project might affect public health or safety. No new dams, diversions, or substantial construction efforts are proposed and Project works are not accessible to the public.
Unique characteristics of the geographic area.	The Project is in a historic district and associated with St. Anthony Falls, a unique local resource. Excepting low-visibility modifications to the Project intake and outfall, no changes to existing structures will occur. There are no unique or ecologically critical habitats or species in the Project vicinity.
Degree to which the effects on the quality of the human environmental are likely to be highly controversial.	The Project is minor in scale and not substantially controversial. Letters of support have been received by members of the Minnesota Congressional delegation, Minneapolis City Council, Friends of the Mississippi River, Marcy-Holmes Neighborhood Association, and Minneapolis Department of Community Planning & Economic Development, among other parties.
Degree to which possible effects are uncertain or involve unique or unknown risks.	The potential effects of small run-of-river hydropower installations are well-understood and analysis shows Project effects to be very limited in scope and degree.

NEPA intensity criterion	Project effect
Degree to which the action may establish a precedent for future actions with significant effects, or represents a decision in principle about a future consideration.	Project licensing follows well-established regulatory processes and does not represent a precedent for future actions.
Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.	Project licensing is not related to other actions and the potential for cumulative effects is minor.
Degree to which the action may adversely affect National Register of Historic Places listed or eligible districts, sites, or structures.	Analysis finds that Project licensing will result in minor adverse effect s on the A-Mill but no adverse effects to other historic resources.
Degree to which the action may adversely affect an endangered or threatened species or designated critical habitat under the ESA.	Project licensing will not adversely affect any ESA-listed species because none are expected to occur in the Project vicinity, and suitable habitat is limited. No designated critical habitat is present in the Project vicinity.
Whether the action threatens to violate Federal, State, or local law or requirements imposed for the protection of the environment.	Project licensing will not violate any laws or environmental protection requirements. Applicable laws and regulations were considered in development of this EA. Additionally, the action is consistent with relevant local, regional, and national comprehensive planning documents.

Because the Project is local and site-specific in context, and represents very low severity of impact based on analyses presented in this EA and NEPA criteria for intensity, MLHA believes that FERC can find that Project licensing, and implementation of environmental measures and cultural resource considerations, is not a major federal action significantly affecting the quality of the human or natural environment.

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ENVIRONMENTAL ASSESSMENT

APPENDIX A

BEST MANAGEMENT PRACTICES AND REVEGETATION PLAN

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ENVIRONMENTAL ASSESSMENT

APPENDIX B

CONSULTATION RECORD AND AGENCY COMMENTS

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APPENDIX C

ENVIRONMENTAL STUDY REPORTS

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ENVIRONMENTAL ASSESSMENT

APPENDIX D

MINNESOTA ENVIRONMENTAL ASSESSMENT WORKSHEET AND JOINT PERMIT

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APPENDIX E

CULTURAL RESOURCES REPORTS

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APPENDIX F

SIGNAGE LOCATION AND EXAMPLE

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