

Electrical Distribution to the Kettle Falls District

Voyageurs National Park

Floodplain Statement of Findings

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FLOODPLAIN STATEMENT OF FINDINGS

1 INTRODUCTION

Executive Order (EO) 11988, *Floodplain Management*, requires the National Park Service (NPS) and other federal agencies to evaluate the likely impacts of actions in floodplains. The objective of EO 11988 is to avoid, to the extent possible, the long-term and short-term adverse impacts associated with occupancy, modification, or destruction of floodplains and to avoid indirect support of development and new construction in such areas wherever there is a practicable alternative. The National Park Service administers floodplain policy through Director's Order 77-2: *Floodplain Management* (DO 77-2) and Procedural Manual 77-2 *Floodplain Management* (PM 77-2). The National Park Service also complies with departmental guidance outlined in 520 DM 1, *Floodplain Management and Wetlands Protection Policy and Responsibilities*, and 520 DM 2, *Floodplain Management and Wetlands Protection Program Requirements*.

It is NPS policy to preserve floodplain functions and values and minimize potentially hazardous conditions associated with flooding, including threats to human health and safety, risk to NPS capital investment, and impacts on natural and beneficial floodplain values. If a proposed action is found to be in, or possibly affecting a floodplain, and relocating the action to a non-floodplain site is considered not to be a viable alternative, then a formal Floodplain Statement of Findings (FSOF) must be prepared unless the action is considered excepted. The FSOF must (a) describe the rationale for selection of a floodplain site, (b) disclose the amount of risk associated with the chosen site (with respect to human life, health, and safety, resource protection, and capital investment), and (c) explain strategies for mitigation of flood risk. The FSOF will be available for public review and comment in coordination with the National Environmental Policy Act (NEPA) and other compliance procedures, as applicable. If public review is not provided through the NEPA process (e.g. environmental assessment), another opportunity for public review is required.

This FSOF provides:

1. A detailed justification for selecting a proposed action that would adversely impact the Federal Flood Risk Management Standard (FFRMS) floodplain (Section 2).
2. A detailed and comprehensive description of the flood hazard and risk associated with implementation of the proposed action (Section 3).
3. A thorough description of mitigation measures chosen to eliminate, to the extent possible, adverse floodplain impacts associated with the proposed action(s) (Section 4).

1.1 PREPARER

In accordance with DO 77-2 and PM 77-2, I, Julie Lawson, the author of this FSOF, affirm I am a civil engineer and certified floodplain manager with NPS' Denver Service Center and am technically qualified to prepare this document.

1.2 LOCATION

The project site, shown in red on Figure 1, spans the Kettle Falls Historic District on the Kabetogama Peninsula of 218,054-acre Voyageurs National Park (VOYA), northern Minnesota (Kettle Falls coordinates: 48.5030, -92.6395; boxed in red on Figure 1). The Kettle Falls Historic District is located at the primary outflow of Namakan Lake into Rainy Lake, and the project extends through Namakan Lake approximately 13 miles to the mainland (red line from the box to the mainland on Figure 1). Namakan Lake is about 24,000 acres in area with 320 miles of shore, a mean depth of 44.5 feet, and a maximum depth of 150 feet. The entirety of the project is located on NPS land.

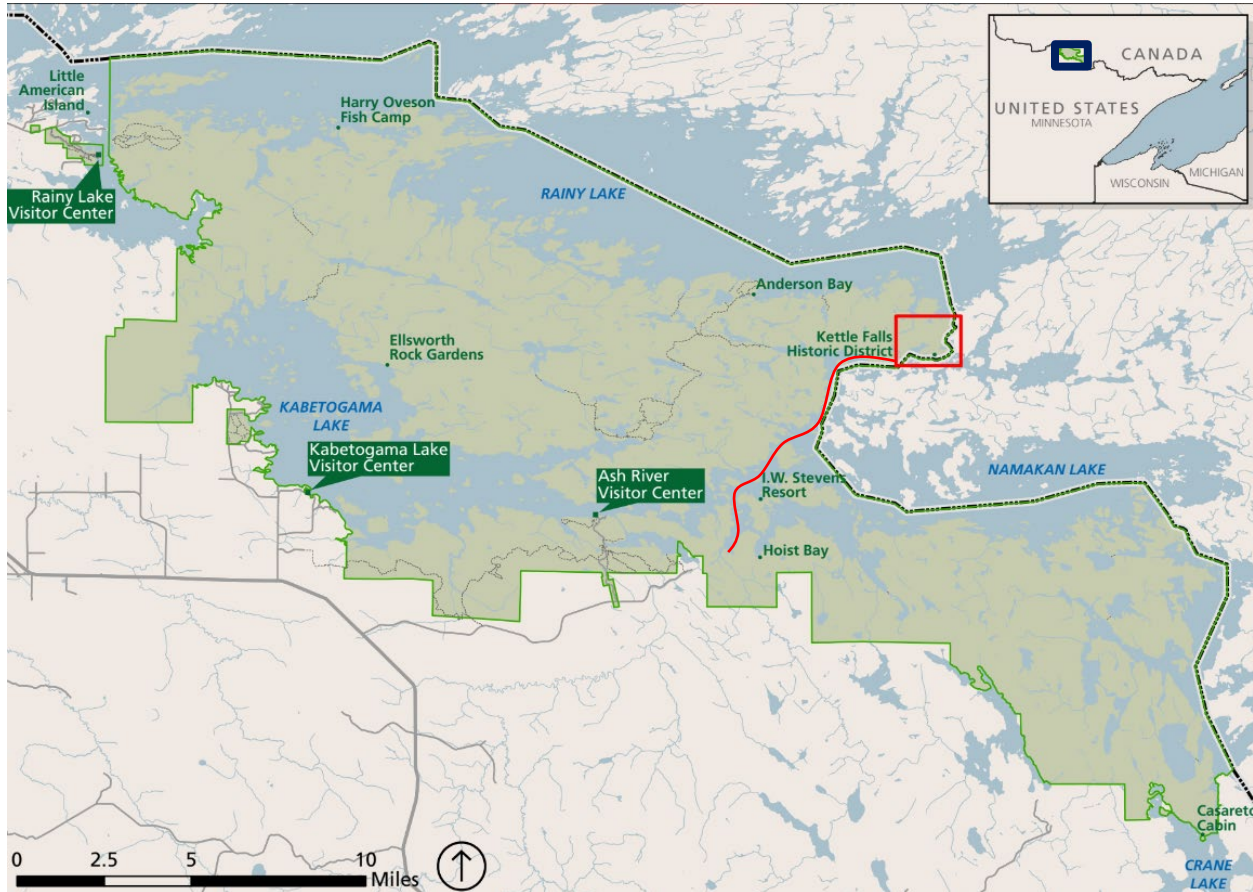


Figure 1 – Location Map.

Prior to installation of dams in the early 1900s, Rainy and Namakan Lakes (Figure 1) existed as natural water bodies. Flows are now regulated to satisfy multiple uses, including power generation, resource benefits, and recreation. The water levels in Rainy Lake and Namakan Lake are controlled by a privately owned hydropower dam at the outlet of Rainy Lake and by two regulatory dams on the two outlets from Namakan Lake, referred to as Kettle Falls and Squirrel Falls. When lake levels are very high, water also flows into Rainy Lake via the natural channels of Bear Portage and Gold Portage, which are uncontrolled. Because these lakes are international waters, the International Joint Commission (IJC) has regulatory authority and stipulates water-management practices (rule curves) to the private-sector dam operators. Rule curves are bands of allowable high- and low-water levels throughout the year. During years in which

a high risk of flooding is predicted, a separate rule curve is used for Rainy Lake prior to the spring melt and rains to reduce flooding. Typically, Rainy Lake may fluctuate from about 1,105.5 to 1,107.7 feet above sea level throughout the year. Namakan Lake may fluctuate from about 1,113.8 to 1,118.0 feet above sea level throughout the year, with a rule curve maximum allowable level at the end of May of 1,118.6 feet. When the water level of Namakan Lake reaches 1119.1 feet and inflows exceed outflows, all gates and fishways at both Namakan Lake outlet dams must be removed (Thompson, 2015). If extremely high inflows to Namakan Lake or Rainy Lake are anticipated, the International Rainy Lake Board of Control, after obtaining the approval of the IJC, may authorize the levels of Namakan and Rainy Lake be raised temporarily to greater than the maximum elevations of the Rule Curves. Table 1 lists the five highest recorded elevations for Namakan Lake, including a recent event in 2022.

Table 1. Namakan Lake Highest Recorded Water Elevations (WLC, 2022).

Namakan Lake			
Rank	Date	Level (m)	Level (ft)
1	1916-05-23	342.25	1,122.92
2	1950-06-07	342.2	1,122.76
3	2022-05-31	342.18	1,122.69
4	1927-05-19	341.97	1,122.00
5	1938-05-22	341.84	1,121.58

Rain-on-snow events bring the greatest threat of flooding for the Rainy River system. An understanding of changing snowpack conditions in the large Namakan watershed, along with accurate long-range forecasts, is critical to managing the Rainy-Namakan system. The 2022 flooding event highlights the continued difficulty of this task. In that event, spring snowmelt, record April precipitation, and frequent May rain events led to strong hydrologic responses within the Rainy Lake basin. Namakan Lake, Kabetogama Lake, and Rainy Lake rose to elevations near or above the flood of record during the months of May and June before subsiding in July and returning to levels closer to normal (HSEM, 2024).

1.3 PROPOSED ACTION

This project will replace the main underwater high voltage cable and multiple transformer boxes that run from the mainland to the Kettle Falls district. Floodplain compliance is required for a subset of project components, as described in Table 2.

Table 2. Proposed Action, Electrical Distribution System for Kettle Falls

<u>Proposed Action Element</u>	<u>NPS Floodplain Compliance Required?</u>	<u>Notes</u>
Underwater High Voltage Cable	Yes	Underwater sections only; land-based sections will be installed below grade and are excepted under PM 77-2.

Transformer boxes Pad-mounted switchgear Sectionalized enclosures Elbow terminations Emergency backup power / fuel storage at Kettle Falls Junction boxes Reclosers	No	All instances above regulatory floodplain
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See Appendix 1 for the conceptual plan.

The current cable and transformer boxes were installed in 1987. The system has an underwater line with an exposed neutral braid that has been completely corroded. The current system has been struck by lightning several times over the years. Since the neutral has been compromised, the protection of the main line is gone. This causes line destruction and power outages. The power supplies a historic hotel district that brings in thousands of visitors each year. The hotel is active and is run by concessionaires.

The compromised neutral wire poses a serious safety risk to visitors as well as employees. The neutral serves as a ground for the cable, and as more lightning strikes occur the chances of someone being struck increases. Furthermore, when power goes out facilities are forced to be closed such as restrooms, showers, and the restaurant. There is also a food safety factor at the restaurant due to the freezers and coolers losing power. This has potential for food to develop bacteria that could lead to sickness of visitors. The Fire suppression system pumps are run by electricity; therefore, if there is no power then there is no fire protection for the Historic hotel. This jeopardizes the visitors' safety as well as the historic building. The new backup generator will allow the concession to continue to stay operational in the event of a power outage.

The project will establish a safe and reliable electric service to the historic Kettle Falls hotel, guest villas, restaurant, and many other buildings within Kettle Falls area. This project will allow the NPS to minimize power outages. With the installation of the primary and backup power to Kettle Falls, risks caused by multiple day outages are mitigated.

Two alternatives were evaluated for this project: rebuild the primary distribution system or utilize the Kettle Falls Dam as a new hydrogeneration source. Both alternatives included a backup generator for contingency power. The option to rebuild the primary distribution system was selected since replacing the electrical infrastructure in kind and maintaining it would be simpler for the electric utility personnel who are familiar with the area and have the availability to maintain the system when needed. It would also provide year-round service if desired. The option to build a new hydrogeneration source would require considerable coordination with the IJC, the International Rainy Lake Board of Control, and the Packaging Corporation of America. There are also considerable constraints including land availability for a powerhouse, conveyance specific to hydrogeneration applications, and technical Operations and Maintenance commitment.

1.4 DETERMINATION OF ACTION CLASS AND REGULATORY FLOODPLAIN

Following PM 77-2, three action classes were considered when establishing the regulatory floodplain:

1. Class I Actions (i.e., non-critical actions) include location or construction of administrative, residential, warehouse, and maintenance buildings; non-excepted parking lots; or other man-made features, which by their nature entice or require individuals to occupy the site, are prone to flood damage, or result in impacts to natural floodplain values.
2. Class II Actions (i.e., critical actions) include any activity for which even a slight chance of flooding is too great, such as construction of schools, medical facilities, emergency services, hazardous material storage, and records/collections storage.
3. Class III Actions include any action that involves human occupation or substantial human exposure in high hazard areas, such as drainages subject to flash flooding.

This project meets the definition of a Class I Action.

Proposed actions on NPS land must comply with FFRMS for new construction, substantial improvement, or repairing substantial damage. Per departmental guidance, agencies may select one of three approaches to implement flood resiliency measures:

- **Climate-Informed Science Approach (CISA)** – The elevation and flood hazard area that result from using the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding, including climate change and other physical processes (e.g. land-use change).
- **Freeboard Value Approach (FVA)** – The elevation and flood hazard area that result from adding an additional 2 feet to the base flood elevation (BFE) for non-critical actions and by adding an additional 3 feet to the BFE for critical actions.
- **0.2% Annual-Chance Flood Approach (0.2PFA)** – The area subject to flooding by the 0.2% (500-year) annual-chance flood.

A Freeboard Value Approach establishing FFRMS flood elevations is employed for this proposed action. Therefore, the regulatory floodplain for the proposed action is the 1% annual chance (100-year) flood elevation plus 2 feet.

The FEMA Flood Insurance Study, effective March 25, 2025, indicates that regression equations were used for the hydrologic method and HEC-RAS 4.1 was used for the hydraulic model. Based on those data, Minnesota Department of Natural Resources (DNR) Lake and Flood Elevations Online (LFEO) tool reports the BFE for Namakan Lake to be 1121.60 (NAVD88) (MNDNR LFEO). Based on the BFE determined by Minnesota DNR, the regulatory floodplain elevation for the proposed action is 1123.6 (NAVD88), an elevation nearly 0.7-foot higher than the highest water surface elevation ever recorded for the Lake

2 JUSTIFICATION FOR USE OF THE FLOODPLAIN

This project replaces infrastructure that is already located in the floodplain. As noted in Table 2, transformer boxes and supporting infrastructure will be placed above the regulatory floodplain; however, the main high voltage cable is underwater, so it is not possible to construct these improvements outside of the floodplain.

3 DETAILED FLOOD HAZARD AND FLOOD RISK ANALYSIS

3.1 DESCRIPTION OF SITE-SPECIFIC FLOOD HAZARD

For a lake of this size, wind-driven wave action is an important flood hazard consideration. Longest Namakan Lake fetch (the distance of uninterrupted wind travel over open water for a given water body) for the project area is from the east-southeast and is estimated to be approximately 11 miles. A basic storm-wave height calculation, assuming an 11-mile fetch and average lake depth of 44 feet, produces wave run-up of 3.5 feet (Wisconsin DNR). For the regulatory flood event, assuming a stillwater 100-year floodplain of 1121.6 plus a 3.5-foot wave run-up, supporting infrastructure associated with the high voltage cable may experience approximately 1.5 feet of inundation. However, this combination of high water and wind direction is exceedingly rare; the remote automatic weather station (RAWS) at Fernberg, Minnesota, indicates wind direction in the mid-April through mid-June period of greatest risk is primarily from the northwest or south-southeast. From those directions, the lake provides an estimated four-mile fetch and yields a two-foot wave run-up (Wisconsin DNR). Under the most likely regulatory flooding scenario, the underwater high voltage cable will be inundated by an additional two feet of water and associated structures (e.g., transformer boxes) will remain out of inundation.

Flashiness, the frequency and speed at which a body of water's flow rate increases and decreases in response to rainfall or snowmelt events and an important risk indicator, is quantified using a variety of indices. Mapping available at the United States Forest Service's flood potential portal (floodpotential.era.ms.com) indicates the project watershed exhibits low flashiness (Beard Flashiness Index = 0.49 out of 2.82; Richard-Baker Flashiness Index = 0.11 out of 1.62). With an average of 30% of the landscape in this region covered with wetland and lakes, capacity in the Namakan and Rainy River watersheds for hydrologic storage is high, resulting in damped flood pulses through the system. Flashiness in this landscape is primarily associated with ice- and beaver-dam breaks, which are rare.

3.2 DESCRIPTION OF SITE-SPECIFIC FLOOD RISK

The proposed action does not increase the potential risk to human health and safety. The project will reduce risk to visitors by replacing the exposed line. Visitor use during the periods of greatest risk (spring melt and flash floods due to ice dam breaks) is low, thus overall flood risk is low. Any effect to the hydraulics of the lake and change in risk associated with the project is vastly overwhelmed by the size and volume of the lake, thereby eliminating additional flood risk associated with the project. The proposed action also does not increase the potential risk to property. There are no facilities, including buildings, restrooms, or campgrounds, in the floodplain area. The proposed cable is designed to be underwater; therefore, any fluctuations in the lake elevation won't impact the infrastructure being proposed. Transformer boxes will be placed above the regulatory floodplain. The proposed action will have minimal impacts to the floodplain values including riparian/aquatic habitat, groundwater recharge, erosion and sediment control, flood attenuation, water quality, nutrient cycling, and geomorphic considerations.

4 FLOODPLAIN IMPACT MITIGATION MEASURES

Mitigation for this proposed action are via elevation and dry floodproofing. Given a rule-curve maximum allowable Namakan Lake elevation at end of May of 1,118.6, the regulatory floodplain elevation (1123.6) provides five vertical feet of inundation protection. As noted in Table 2, all infrastructure supporting the high voltage cable, as well as the backup generator and its fuel source, will be located above the regulatory floodplain.

The proposed action will not increase the risk of flooding or increase the hazards to human life and property. The structures and facilities associated with this action are required to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60). To comply with the intent of these regulations, all new construction will be:

- Designed and adequately anchored to prevent floatation, collapse, or lateral movement of the cable resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- Constructed with materials resistant to flood damage; and
- Constructed by methods and practices that minimize flood damage

5 SUMMARY

The National Park Service has determined that implementing the proposed action to replace the main underwater high voltage cable and transformers is an essential maintenance action needed to continue services at the Kettle Falls district. The high voltage cable is designed for submersion and will be buried for overland sections. Failure to perform this project would result in increased power outages and an increased safety risk to employees and visitors. Locating the new transformer boxes above the regulatory floodplain will provide resiliency and longevity of the infrastructure.

6 REFERENCES

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