



Keeyask Generation Project
Terrestrial Effects Monitoring Plan

Priority Habitats Monitoring Report

TEMP-2023-02



KEYYASK GENERATION PROJECT

TERRESTRIAL EFFECTS MONITORING PLAN

REPORT #TEMP-2023-03

PRIORITY HABITATS MONITORING

YEAR 1 OPERATION

2022

Prepared for
Manitoba Hydro

By
ECOSTEM Ltd.

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SUMMARY

Background

Construction of the Keeyask Generation Project (the Project) at Gull Rapids began in July 2014. The vast majority of construction activities had been completed by fall 2021, and the station was fully operational by March 2022.

The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the generating station on the terrestrial environment. Monitoring results will help the KHLP, government regulators, members of local First Nation communities, and the general public understand how construction and operation of the generating station are affecting the environment, and whether or not more needs to be done to reduce harmful effects.

This report describes the results of the priority habitat and other terrestrial sensitive site monitoring conducted during 2022.

Why is the study being done?

Ecosystem diversity refers to the number, size and distribution of different ecosystem, or habitat, types within the Keeyask region. Some of these habitat types are especially important for ecosystem health and/or to people. These are the habitat types that are rare or uncommon, support more plant or animal species than other habitat types, or are very sensitive to disturbance from Project construction (called “priority habitat types”). The Project’s Environmental Protection Plans (EnvPPs) include measures to avoid or lessen Project effects on the priority and other habitat types. Additional habitat types are included because they are very important to wildlife (e.g., caribou calving islands, vegetation along streams). The terrestrial sensitive sites monitored by this study include all of these habitat types.

The purpose of this study is to confirm the predicted Project effects on the terrestrial sensitive sites.



A sensitive riparian site being monitored for disturbance



A rare white birch stand along Gull Lake being monitored for disturbance

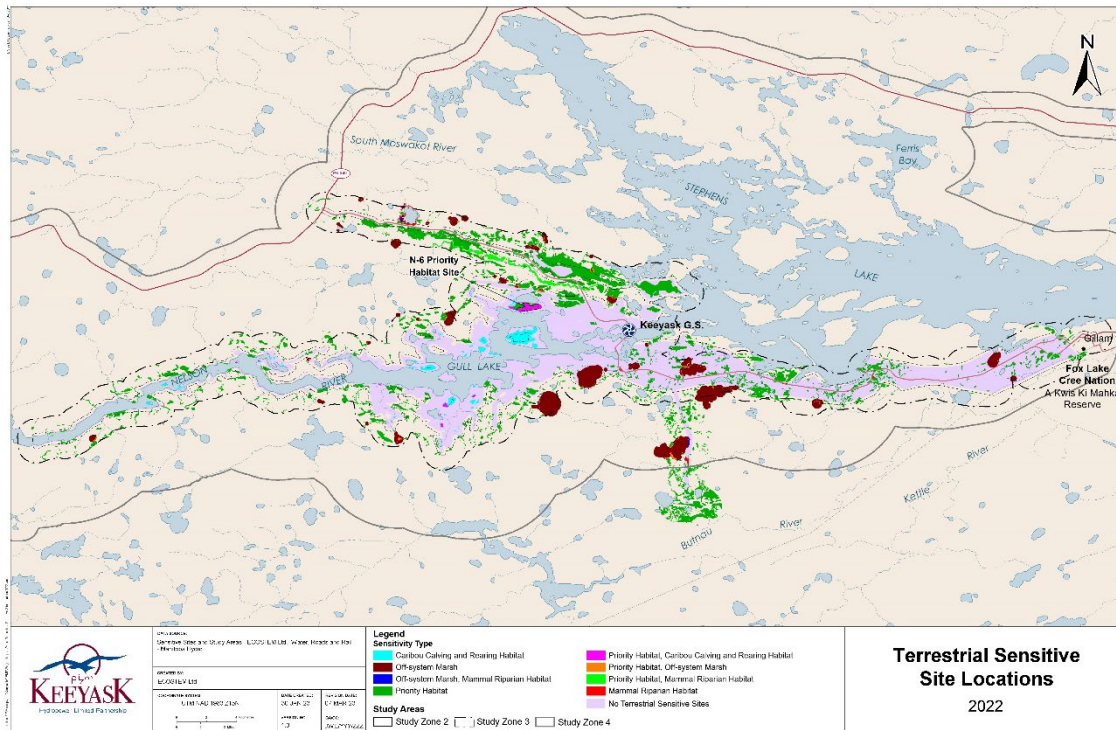
What was done?

This study monitors Project effects on terrestrial sensitive sites that could be affected by the Project.

The portion of the Keeyask region being monitored by this study is larger than where Project effects on terrestrial sensitive sites are expected to occur. This is being done in case there are unanticipated effects beyond the Project footprint and, if there are any, they are documented.

Some of the monitored sensitive sites include more than one type of sensitivity. For example, some areas are both caribou calving habitat and a priority habitat type. In total, approximately 6,684 ha of terrestrial sensitive sites are being monitored.

Another terrestrial monitoring study mapped Project clearing and physical disturbance areas as of September 2022. This mapping was used to determine which sensitive sites and how much of each type of sensitive site was impacted as of September 2022, and how Project construction had affected ecosystem diversity. Ground surveys were also carried out at eight sensitive sites because they were of special interest (e.g. vegetation beside streams) or they were already being visited for other studies.



Locations of sensitive sites near the Project that were monitored in 2022

What was found?

There were no new documented impacts on priority habitats or sensitive sites between September of 2021 and 2022.

What does it mean?

The absence of new impacts was not surprising as the vast majority of construction activities had been completed by fall 2021. Most of the remaining activities included decommissioning of temporary features and revegetation of areas not needed for Project operation.

So far, there have been no major unanticipated Project effects on the terrestrial sensitive sites. Monitoring is continuing to show that actual Project effects on priority habitats are consistent with the EIS predictions, and that the EIS predictions were cautious.

What will be done next?

Monitoring Project effects on priority habitats and the other types of terrestrial sensitive sites will continue in summer of 2024.

ACKNOWLEDGEMENTS

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Custom Helicopters is thanked for providing transportation during fieldwork and Claire Brueckner for coordinating the logistics.

STUDY TEAM

Dr. James Ehnes was the project manager and study designer.

Fieldwork in 2022 was conducted by Alex Snitowski.

Data analysis and report writing in 2022 were completed by Alex Snitowski and James Ehnes. GIS analysis and cartography was completed by Alex Snitowski and James Ehnes.

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GLOSSARY

Term	Definition
approved Project footprint areas	All areas that were either initially licenced or subsequently approved for use by the Government of Manitoba.
DOI	A spatial dataset produced from satellite images or digital stereo photos that have been stitched together and processed so that all pixels are positioned in an accurate ground position. Such processing is necessary because the earth's surface is round and has topography.
ecosystem diversity	The number of different ecosystem types, as well as their size and distribution, within a defined geographic area.
habitat loss	Permanent physical removal or alteration of previously undisturbed habitat.
licensed Project footprint	Footprint licensed for Project use under the Project's <i>Environment Act</i> Licence.
marsh	A class in the Canadian Wetland Classification System which includes non-peat wetlands having at least 25% emergent vegetation cover in the water fluctuation zone.
off-system	Water body or waterway outside of the Nelson River hydraulic zone of influence.
planned Project footprint	A subdivision of the licensed Project footprint where clearing or disturbance was expected and is largely comprised of permanent Project features.
possibly disturbed Project footprint	A subdivision of the licensed Project footprint where clearing or disturbance could potentially occur.
priority habitat	Native habitat types that are particularly important for ecological and/or social reasons.
Project clearing	Project areas with complete removal of trees and tall shrubs. Includes terrestrial areas that were flooded, or formerly aquatic areas that were dewatered.

Term	Definition
Project component	Defined areas within the Project footprint that serve a specified general purpose.
Project disturbance	Physical disturbance in an area of intact vegetation or use of pre-existing trails or borrow areas.
Project effect	Ecological consequences resulting from the physical impact of Project activity.
Project impact	Physical impact on terrestrial habitat and ecosystems as a result of Project activity.
Project footprint	Boundary of all areas affected by Project activities.

ACRONYMS

Acronym	Name
DOI	Digital orthorectified imagery
EIS	Environmental Impact Statement
EMPA	Excavated material placement area
EnvPP	Environmental Protection Plan
GIS	Geographic Information System
GS	Generating Station
KHLP	Keeyask Hydropower Limited Partnership
KIP	Keeyask Infrastructure Project
KM	Kilometre
NAR	North Access Road
TEMP	Terrestrial Effects Monitoring Plan

1.0 INTRODUCTION

The Keeyask Generation Project (the Project) is a 695-megawatt hydroelectric generating station (GS) and the associated facilities. The Project is located at the former Gull Rapids on the lower Nelson River in northern Manitoba where Gull Lake flows into Stephens Lake, 35 km upstream of the existing Kettle GS. Project construction began in July 2014 and the vast majority of construction activities had been completed by fall 2021. The reservoir was first brought to full supply level in September 2020 and the final generating unit went into service on March 9, 2022.

The *Keeyask Generation Project Response to EIS Guidelines* (the EIS), completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project (KHLP 2012a). Technical supporting information for the terrestrial environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs is provided in the *Keeyask Generation Project Environmental Impact Statement Terrestrial Supporting Volume* (TE SV; KHLP 2012b). The *Terrestrial Effects Monitoring Plan* (TEMP; KHLP 2015) was developed as part of the licensing process for the Project (KHLP 2015). Monitoring activities for various components of the terrestrial environment were described, including ecosystem diversity, which is the focus of this report.

Ecosystem diversity refers to the number of different ecosystem types, as well as their size and distribution, within a defined geographic area. Habitat types are used to represent ecosystem types. Priority habitat types are those native habitat types that are particularly important for ecological and/or social reasons.

Habitat composition and priority habitat types were the indicators for Project effects on ecosystem diversity in the EIS. Habitat composition provides an overall representation of ecosystem diversity, while priority habitats focus on the habitats that make particularly important contributions to ecosystem diversity. In this monitoring study, priority habitat types are the native habitat types in the Keeyask region that are rare or uncommon, highly diverse (i.e., species rich and/or structurally complex), highly sensitive to disturbance, have a high potential to support rare plants and/or are highly valued by people.

As described in TEMP, during construction and operation, the Priority Habitats study is evaluating effects on ecosystem diversity based on changes in the various priority habitat types. The Priority Habitats study also monitors the sensitive terrestrial sites that are not being monitored by other TEMP studies.

The goal of the Priority Habitats study is to determine the nature of Project effects on ecosystem diversity. The objectives of this study are to:

- Confirm that the N-6 priority habitat site identified for avoidance in the EIS is not disturbed;
- Determine the degree to which the other priority habitat types and other terrestrial sensitive sites identified in the Project environmental protection plans (EnvPP; excluding sites whose condition is being monitored by another program) are disturbed;

- Quantify and locate the amounts and locations of priority habitat types affected by the Project; and,
- Quantify and locate Project effects on ecosystem diversity.

Monitoring for this study has been conducted in each year from 2015 to 2022. Previous ECOSTEM reports (ECOSTEM 2016; 2017; 2018; 2019; 2020; 2021, 2022a) provide the findings for the priority habitat monitoring conducted for each of these years up to 2021. This report presents the priority habitat monitoring conducted in 2022, which includes addressing the first two of the study objectives.

As set out in the TEMP (Section 2.1.2.3.3), the *Keeyask Generation Project Terrestrial Footprint Map for Construction* (i.e., the Construction Footprint) was mapped within one year of construction phase completion. ECOSTEM (2022b) provides the Construction Footprint, which was mapped based on Project impacts as of September, 2021. This report also details the progressive results of the priority habitats and sensitive site monitoring during construction.

ECOSTEM (2022a) also compared actual with predicted Project effects on ecosystem diversity during construction. It was concluded that the vast majority of actual Project effects on ecosystem diversity during construction were lower than predicted, and some were considerably lower. Also, there had been no major unanticipated Project effects on the terrestrial sensitive sites.

This report, which is the first for the operation phase, focuses on changes to that have occurred since September, 2021.

2.0 METHODS

2.1 APPROACH

The terrestrial sensitive sites included in this study (Section 2.2) were monitored to meet the first and second objectives of the Priority Habitat study, which are to:

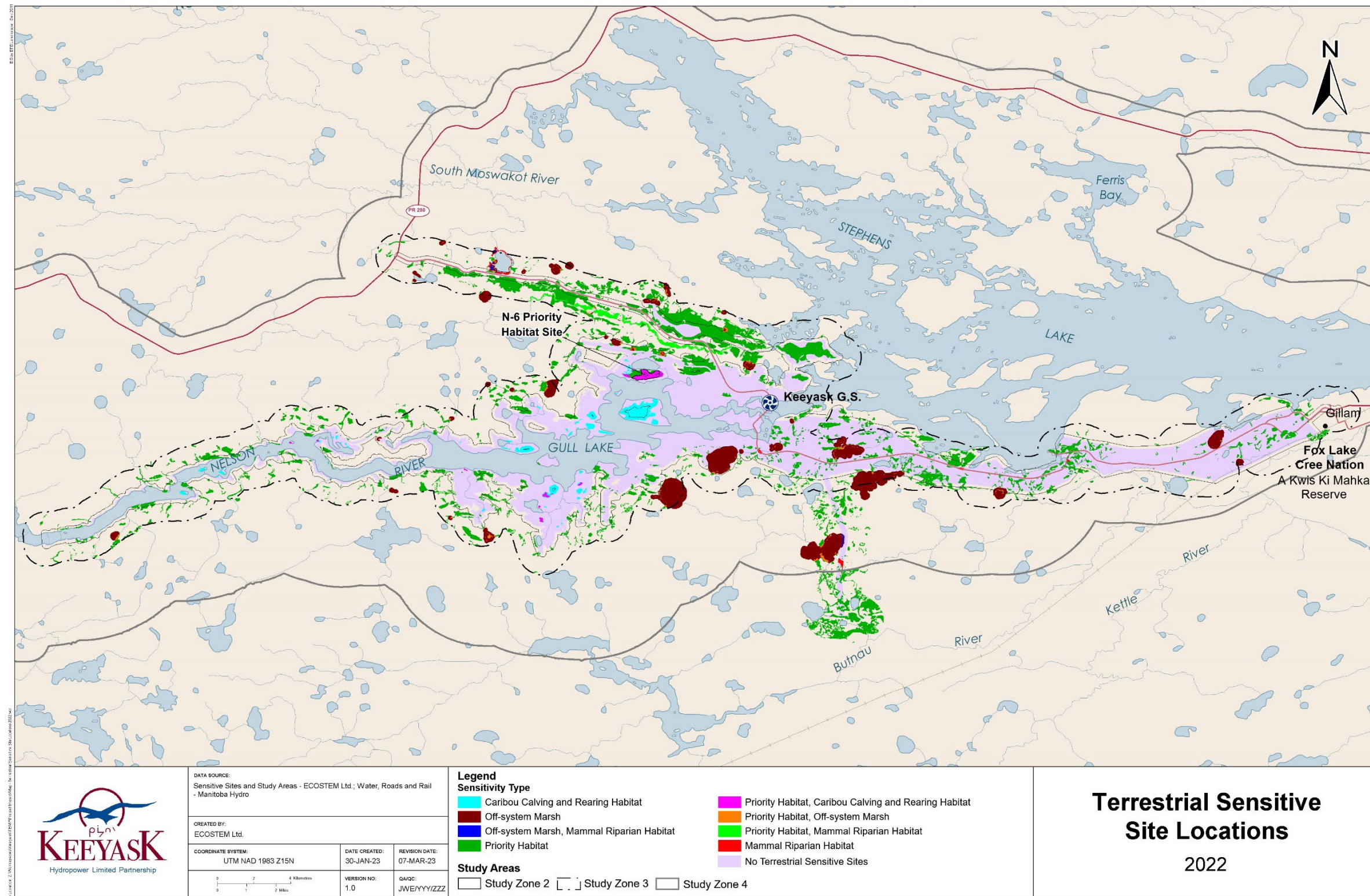
- Confirm that the N-6 priority habitat site identified for avoidance in the EIS is not disturbed; and,
- Determine the degree to which the other priority habitat types and other terrestrial sensitive sites identified in the EnvPP (excluding sites whose condition is being monitored by another program) are disturbed.

The remaining sensitive sites within Study Zone 3 (Map 2-1) were monitored to support the third and fourth objectives of this study, which are to:

- Locate and quantify the amounts and locations of priority habitat types affected by the Project; and,
- Locate and quantify Project effects on ecosystem diversity.

Section 2.3.2 of the TEMP details the methods for this study. This section summarizes the activities conducted during 2022. The methods were the same as in previous years (ECOSTEM 2022a).

All of the terrestrial habitat, ecosystems and plant studies use the same definitions of clearing and disturbance. Clearing is defined as complete vegetation removal in a patch that was at least 400 m² in size. Disturbance is defined as either physical disturbance in an area of intact vegetation (e.g., machinery trail, test pits), use of a pre-existing trail or a clearing smaller than 400 m². Also, an “impact” refers to what the Project does in terms of the physical impact (e.g., vegetation clearing), while an “effect” refers to the ecological consequences resulting from the physical impact (e.g., marsh habitat loss, reduced wetland function).



Map 2-1: Terrestrial sensitive sites included in the Priority Habitat study

2.2 SENSITIVE SITES MONITORED

The general types of terrestrial sensitivities included in this monitoring study are priority habitats, off-system marsh habitat, mammal riparian habitat and caribou calving and rearing habitat (Map 2-1). As shown on the map, a given sensitive site may include more than one of the four general types of sensitivities (see above).

The total area of terrestrial sensitive sites being monitored is 6,684 ha. This total area has not changed since 2018.

The total monitored area included 2,878 individual sites (i.e., with one or more sensitivities) that may or may not be adjacent to another site. After grouping adjacent sites, there were 1,503 spatially distinct sensitive areas.

One sensitive site, referred to as the “N-6 priority habitat to avoid” in the EIS, was of particular interest because it encompasses a priority habitat type (white birch (*Betula papyrifera*) dominant or mixed forest on mineral soil) that is very rare in the Keeyask region. Project mitigation includes avoiding clearing in this site or indirectly affecting it.

2.3 PROJECT AREAS

Four distinct Project areas (Map 2-2) are used when reporting on where Project clearing or disturbance occurred. This is being done to facilitate comparisons with EIS predictions. See ECOSTEM 2022b for a detailed description of what is included in each Project area.

The first two Project areas are a subdivision of the Footprint licensed for Project use under the Project’s *Environment Act* Licence (i.e., licensed Project Footprint) into: the planned Project Footprint; and, the possibly disturbed Project Footprint (Map 2-2). The planned Project Footprint is largely comprised of permanent Project components. The possibly disturbed Project Footprint provided for some of the unknown components of the Project design at the time the Project was being licensed.

Subsequently approved Project areas include areas approved for Project use by the Government of Manitoba after the Project was licensed.

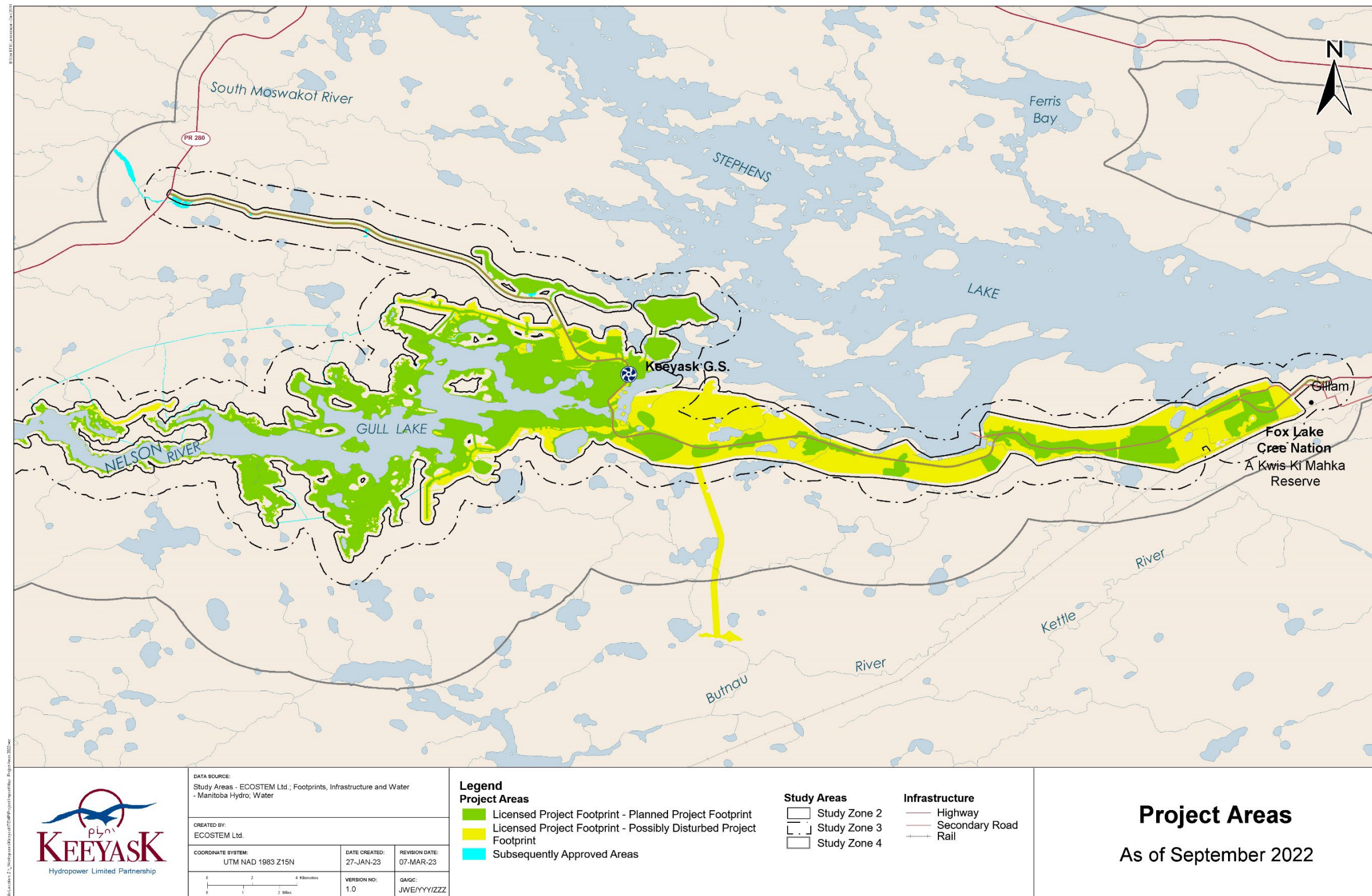
The preceding three Project areas are collectively referred to as the “approved Project Footprint”.

The fourth type of Project area includes all cleared or disturbed areas that are outside of the approved Project Footprint.

In summary, the Project areas are the:

- Approved Project Footprint
 - Planned Project Footprint;
 - Possibly disturbed Project Footprint;

- Subsequently approved Project areas; and,
- Areas outside of the approved Project Footprint.



Map 2-2: Project areas as of September 2022

2.4 IMPACT MAPPING

Initial site selection for the 2022 aerial surveys was based on sites surveyed in 2021 and digital orthorectified imagery (DOI) of the Project from October 2, 2021. Aerial surveys conducted on August 31, 2022 were used to identify any other sensitive sites that may have been affected by recent clearing. The aerial surveys showed that the footprint clearing boundaries had not grown since September 2021.

Ground surveys were also carried out at eight sensitive sites because they were of special interest or because they were already being visited for other reasons. Four of the terrestrial sensitive sites were surveyed as part of the Wetland Loss and Disturbance study, the results of which are provided in a separate report (ECOSTEM 2023b).

Ground surveys were not done at the “N-6 priority habitat to avoid” because low altitude aerial surveys in 2022 found that there had been no additional clearing or construction activity within or near this site since 2016.

Ground sampling recorded conditions in the visited sensitive sites using reconnaissance surveys, geo-referenced photographs, marked-up maps and notes. Field data were mapped in a Geographic Information System (GIS) using DOIs as the base maps. The DOI was created from stereo photo imagery acquired on October 2, 2021.

This study used the Project clearing or disturbance mapping produced by the Habitat Loss and Disturbance study (ECOSTEM 2023a) to quantify and locate the terrestrial sensitive sites that were impacted as of September 2022.

Clearing or disturbance boundaries were overlaid on the sensitive sites map in a GIS, and then the boundaries were used to subdivide each sensitive site into cleared, disturbed or undisturbed.

3.0 RESULTS

3.1 OVERALL IMPACTS

The total area of the 2,878 sensitive sites being monitored for this study is 6,684 ha (Section 2.2).

Map 3-1 and Map 3-2 show the sensitive sites that had been impacted by the Project through either clearing (see Photo 3-1 for an example) or disturbance (see Photo 3-2 for an example; see Section 2.1 for definitions of clearing and disturbance).

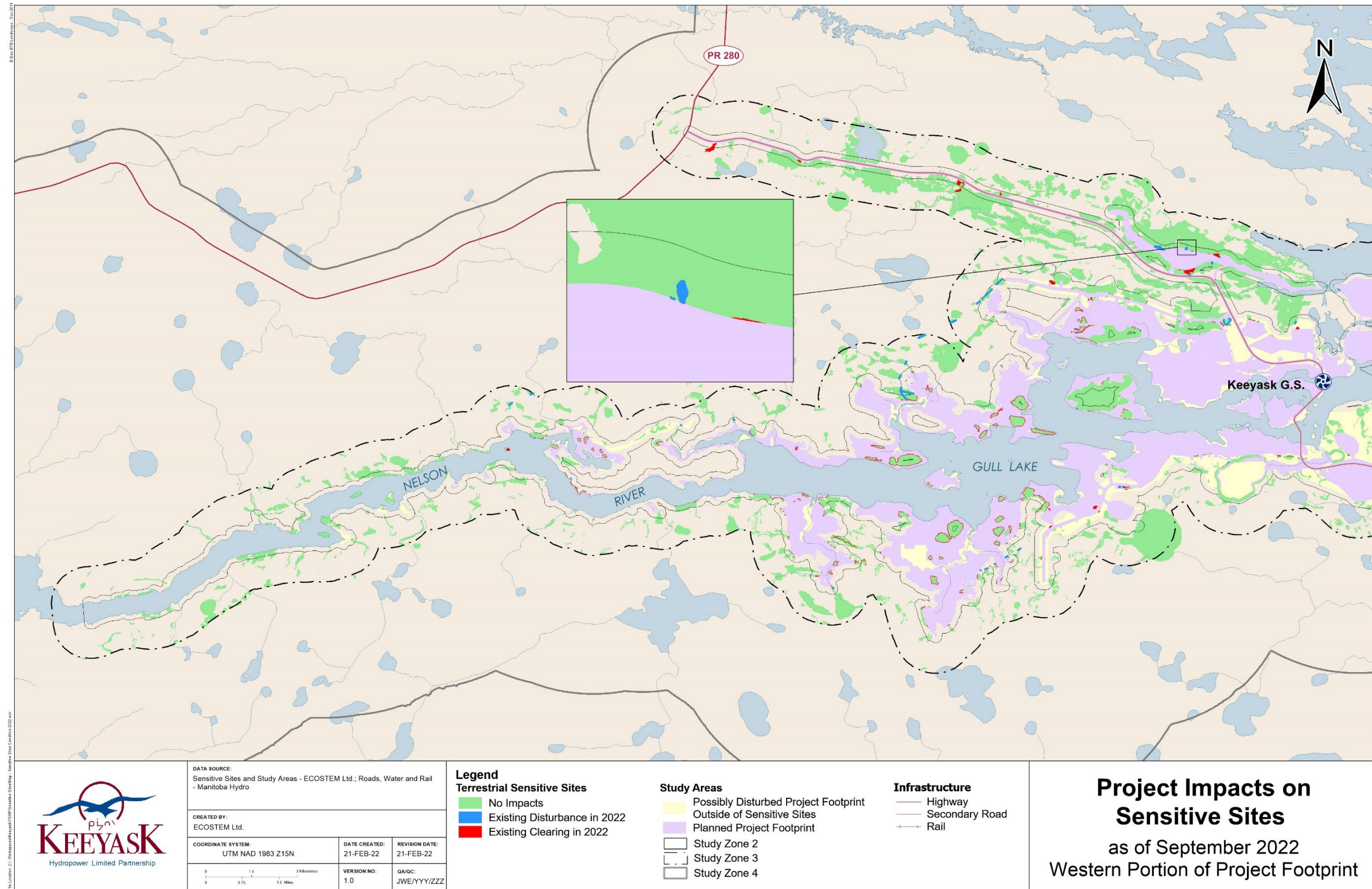
As of September 2022, Project impacts in the form of clearing or disturbance had affected 443 of the 2,878 sensitive sites. The total impacted area was 220.2 ha, or 3.3%, of total sensitive site area (Table 3-1).

The total area of impacts on sensitive sites remained unchanged between September 2021 and September 2022.

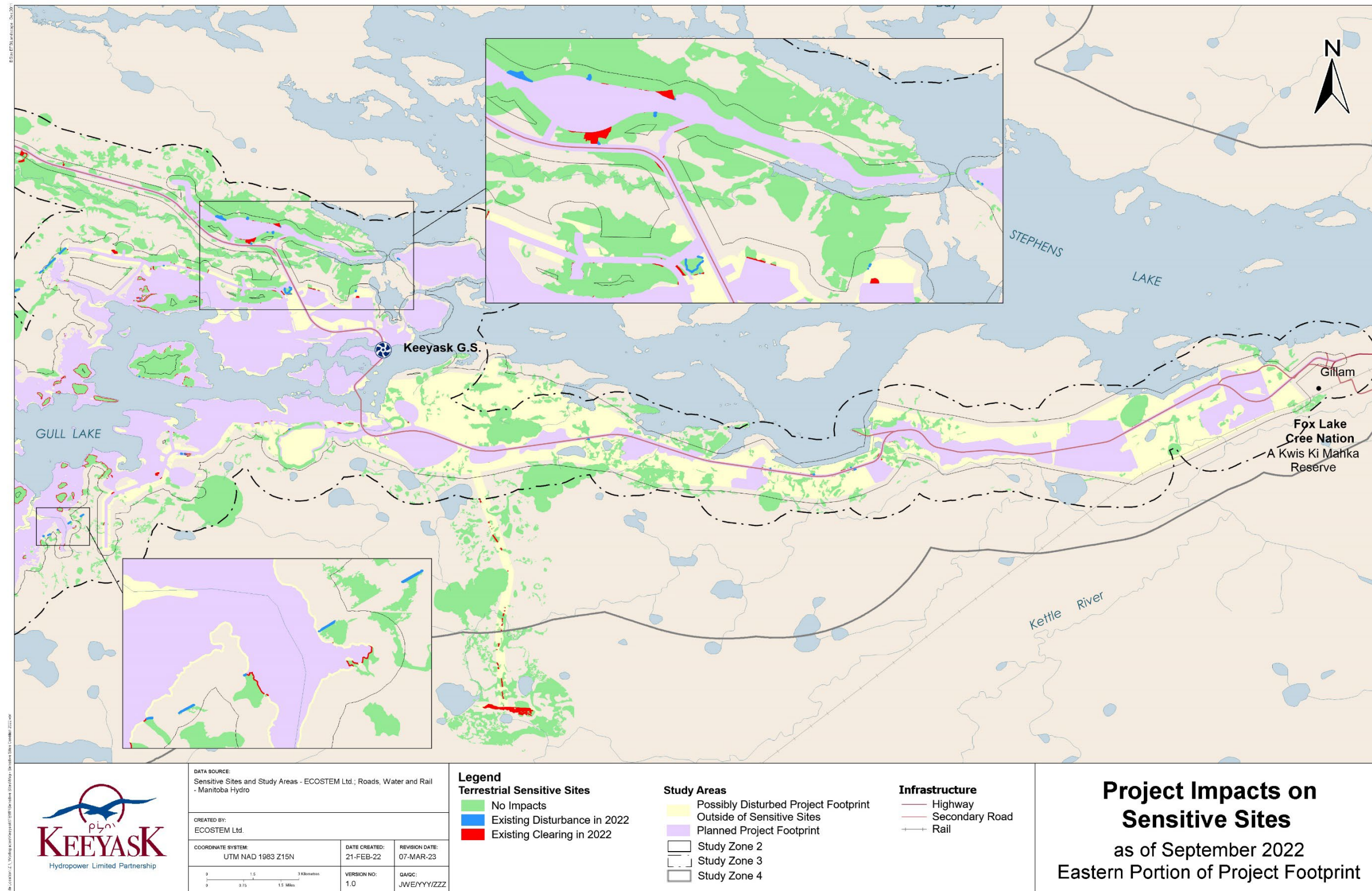
Table 3-1: Cumulative number and area of impacted sensitive sites as of September 2022

Parameter	Pre-Project	Project Impacts (cleared or disturbed)		
		2021	2022	Change from 2021 to 2022
Number of Sites				
Total number	2,878	443	443	-
Cumulative number of sites impacted as a percentage of pre-Project total	0.0	15.4	15.4	-
Area (ha)				
Total area	6,684.4	220.2	220.2	-
Cumulative area impacted as a percentage of pre-Project total	0.0	3.3	3.3	-

Notes: A "0.0" value indicates an area less than 0.05 ha; a "-" value indicates no area.



Map 3-1: Project impacts on terrestrial sensitive sites as of September 2022 – western portion of Project footprint



Map 3-2: Project impacts on terrestrial sensitive sites as of September 2022 – eastern portion of Project footprint



Photo 3-1: Example of Project clearing in a priority habitat type (black spruce mixture vegetation on shallow peatland)



Photo 3-2: Example of an area with sediment deposition into priority habitat (Tall shrub vegetation on thin peatland site) in August, 2022

3.2 MAMMAL RIPARIAN HABITAT SITES

Previous monitoring where the North Access Road (NAR) crosses Looking Back Creek documented erosion of the road shoulder that was depositing sediment into the waterbody adjacent to the creek. Ground surveys at this location did not occur in 2022 due to construction crews making repairs and improvements to the abutments and traffic barriers. (Photo 3-3).

This site will continue to be monitored for substantive change.



Photo 3-3: Construction work on the North Access Road adjacent to Looking Back Creek in 2022

3.3 OFF-SYSTEM MARSH SITES

No new disturbance was found within off-system marsh sites between September 2021 and September 2022.

3.4 CARIBOU CALVING AND REARING HABITAT SITES

No new disturbance was found within caribou calving and rearing habitat sites between September 2021 and September 2022.

3.5 PRIORITY HABITAT SITES

For the “N-6 priority habitat site to avoid”, aerial surveys in 2022 found no evidence of additional activity in the already cleared areas near the N-6 site or in the site itself.

No new disturbance was found within the remaining priority habitat sites between September 2021 and September 2022.

4.0 DISCUSSION

It was not surprising that there were no new documented impacts on priority habitats or sensitive sites between September of 2021 and 2022. The vast majority of construction activities had been completed by fall 2021. Most of the remaining activities included decommissioning of temporary features and revegetation of areas not needed for Project operation.

Ground surveys near the Looking Back Creek mammal riparian habitat sites were not done due to construction activity.

5.0 SUMMARY AND CONCLUSIONS

Ecosystem diversity monitoring in 2022 focused on changes to the priority habitats and other sensitive sites that occurred between September of 2021 and 2022.

There were no new documented impacts on priority habitats or sensitive sites during the 2022 monitoring. This was not surprising as the vast majority of construction activities had been completed by fall 2021. Most of the remaining activities included decommissioning of temporary features and revegetation of areas not needed for Project operation.

Monitoring to document the amount of priority habitat and other sensitive sites affected by the Project will continue in 2024.

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