Manitoba Hydro

# Keeyask Transmission Project
# Environmental Effects Monitoring Plan
# Technical Reports

Prepared by:
Manitoba Hydro
Winnipeg, Manitoba
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# KEEYASK TRANSMISSION PROJECT

## ENVIRONMENTAL EFFECTS MONITORING PLAN

## ECOSYSTEM DIVERSITY MONITORING IN 2016

Prepared for

Manitoba Hydro

By

ECOSTEM Ltd.

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# SUMMARY

This report provides results for the ecosystem diversity monitoring conducted in 2016/2017 for the Keeyask Transmission Project (the Project), specifically for the Construction Power lines.

Ecosystem diversity is a type of biodiversity that essentially refers to the variety of ecosystem types. Maintaining native ecosystem diversity is fundamental to maintaining terrestrial ecosystem health. The indicators for ecosystem diversity are stand level habitat composition and priority habitat types. Priority habitat types are those native habitat types are regionally rare or uncommon, highly diverse (i.e., species rich and/or structurally complex), highly sensitive to disturbance or have high potential to support rare plants.

Habitat mapping completed for the Project environmental impact assessment studies identified 15 priority habitat patches along the Construction Power ROW. No additional patches were subsequently identified during the 2016/2017 monitoring.

Aerial and ground surveys conducted in summer 2016 found that overall impacts on the 15 priority habitat patches situated along the Project ROW were minor. Relative to their pre-Project boundaries, 10 of the 15 patches had some clearing for the ROW, as expected. The remaining five patches had no clearing either because they were buffered from the ROW by undisturbed vegetation, or because clearing within the ROW was unnecessary since the native vegetation was already short. Remediation efforts in the cleared or disturbed areas are not recommended as these areas are expected to revegetate naturally.

Of the 10 patches with some clearing, only one had clearing outside of the standard ROW width, and this area was very small (20 $m^2$). In the remaining nine patches, while clearing was confined to the ROW, the amount of clearing was generally much narrower than the standard 60 m ROW width. At four of these nine patches, construction impacts were limited to narrow tracks or clearing of larger trees.

Possible indirect construction effects, manifested in the form of tamarack mortality adjacent to the clearing, were observed at three of the patches. However, a natural cause for this mortality was also possible since tamarack was the only tree species affected.

Monitoring results to date indicated that actual direct Project effects on priority habitats situated along the Construction Power Line were consistent with those predicted in the EA Report. A more detailed evaluation, including the number and areas of priority habitat types affected, will be made after the habitat mapping is updated in late 2018 (i.e., after priority habitat surveys along the Generation Outlet Lines are conducted). Monitoring to date also indicated that Environmental Protection Plan measures were implemented well during Project construction.

Further ground monitoring of these locations is not recommended given their ecological conditions and the limited degree of Project effects to date. Mapping completed for a synthesis report in 2019 will confirm actual Keeyask Transmission Project effects on ecosystem diversity during construction.

# ACKNOWLEDGEMENTS

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We would also like to thank North/South Consultants Inc., in particular Ron Bretecher, Shari Fournier and Mary Lang, for their guidance, logistical support and other resources that made these studies possible.

Custom Helicopters is gratefully acknowledged for providing transportation during fieldwork and Ben Hofer for coordinating the logistics.

# STUDY TEAM

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

Fieldwork in 2016 was conducted by Alex Snitowski and Brock Epp.

Data analysis and report writing in 2016 were completed by Brock Epp and James Ehnes. GIS analysis and cartography was completed by Alex Snitowski.

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# 1.0 INTRODUCTION

In 2014, Manitoba Hydro received an Environment Act Licence for construction, operation and maintenance of the Keeyask Transmission Project. Terms and conditions of the licence include monitoring the environmental impact from development of the Project as outlined in the licence conditions and the Project EA Report.

The Keeyask Transmission Project Environmental Effects Monitoring Plan includes monitoring effects on terrestrial ecosystems and vegetation, focusing on intactness, ecosystem diversity, priority plants and invasive plants. Vegetation monitoring in the 2016/2017 year was related to ecosystem diversity, priority plants and invasive plants. This report provides results for the ecosystem diversity monitoring conducted in 2016/2017, which is based on field surveys conducted in summer 2016.

Ecosystem diversity refers to the number of different ecosystem types and their areal distribution at various ecosystem levels. Maintaining native ecosystem diversity is fundamental to maintaining terrestrial ecosystem functions and overall ecosystem health.

The indicators for ecosystem diversity are stand level habitat composition and priority habitat types. Priority habitat types are those native habitat types are regionally rare or uncommon, highly diverse (i.e., species rich and/or structurally complex), highly sensitive to disturbance or have high potential to support rare plants.

The EA Report predicted that Project construction will not change the total number of native broad habitat types in the region, and that Project construction is not expected to substantially change the regional proportions of any of the regionally common or uncommon native habitat types by more than 0.01%. Before considering additional mitigation measures, the Project is expected to affect 32 of the 46 priority habitat types. The EA Report concluded that cumulative effects on ecosystem diversity from past and current projects and activities were already in the moderate magnitude range for all of the affected priority habitat types. On this basis, mitigation includes avoiding all of these priority habitat types to the extent practicable during final routing of the transmission lines. Also, the EnvPPs include measures to minimize the risk that accidental fires and accidental spills will affect priority habitat. The EnvPPs will also include measures to minimize the risk that invasive plants will affect terrestrial habitat.

The objectives of the ecosystem diversity monitoring (Manitoba Hydro 2015) are to:

- Determine the degree that priority habitat patches identified for avoidance where practical, are not disturbed; and,
- Confirm actual project effects on ecosystem diversity during construction.

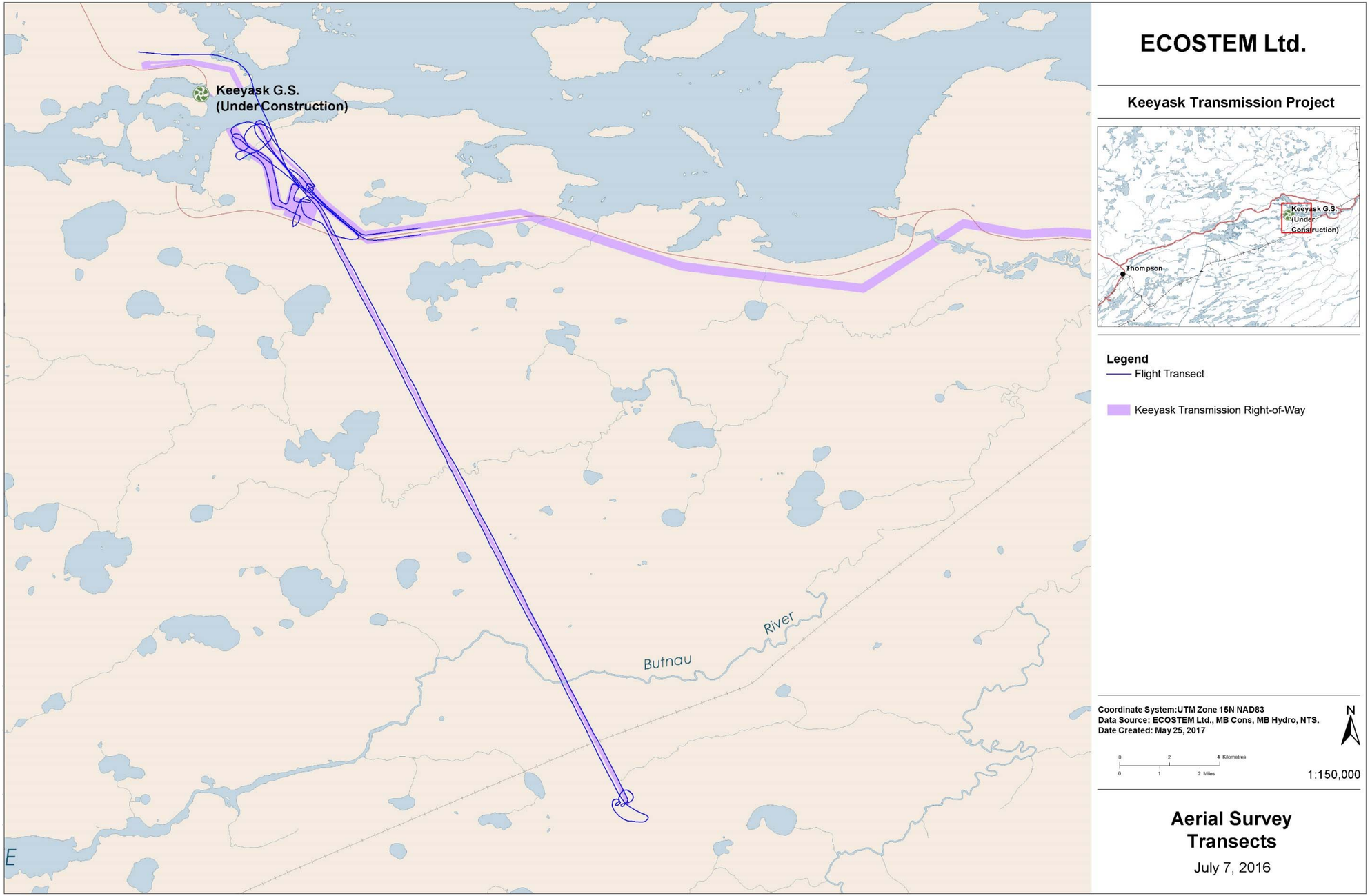
Monitoring activities in the 2016/2017 year included fieldwork to address the first study objective, specifically with respect to the Keeyask Construction Power Line.

# 2.0 METHODS

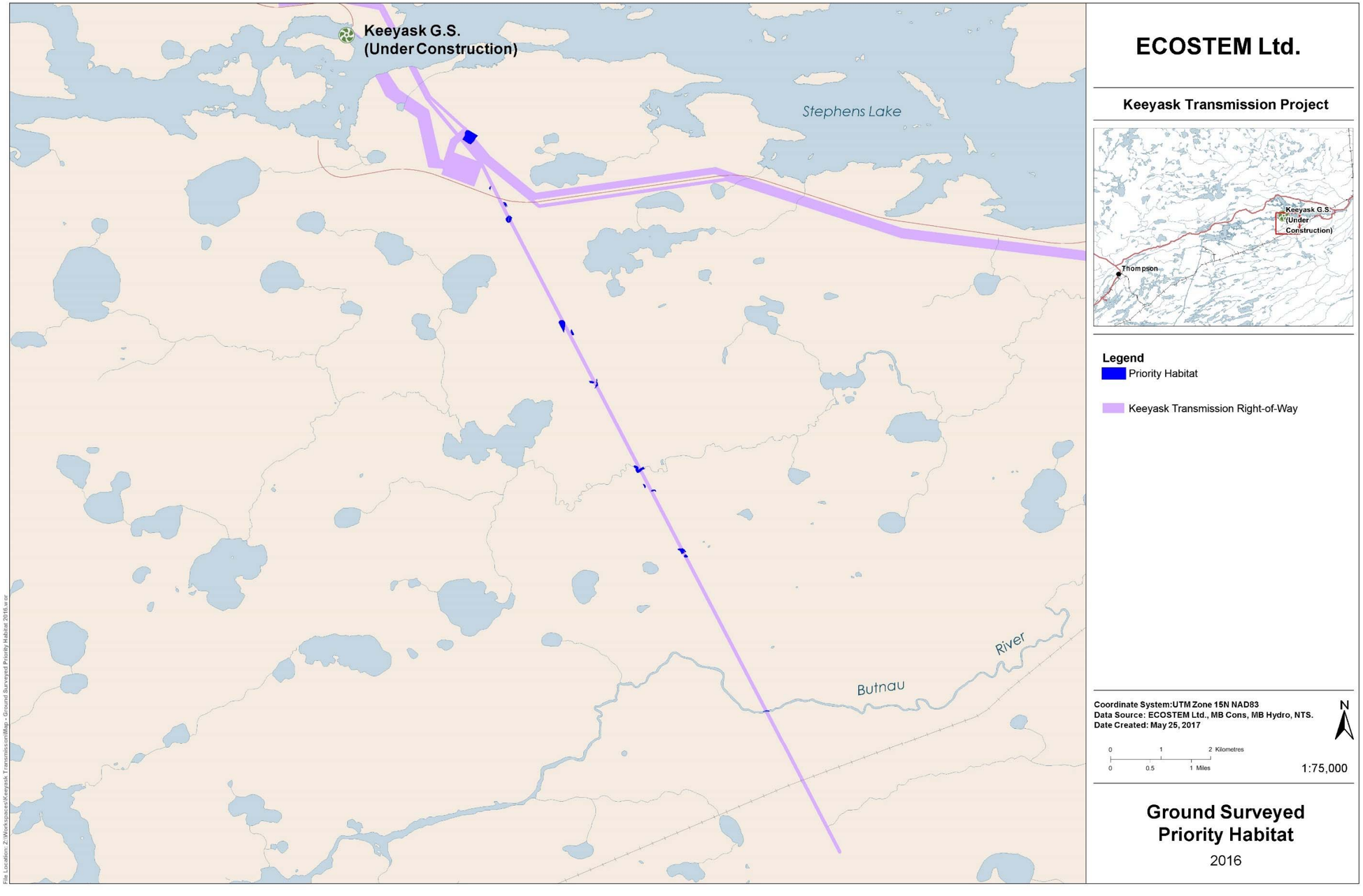
Section 4.2.3 of the monitoring plan outlines the methods for this study (Manitoba Hydro 2015). The following summarizes the activities conducted during summer 2016.

Aerial surveys of the Project were conducted by two qualified surveyors in a Bell Jet Ranger helicopter on July 7, 2016. These surveys extended along the entire Project right-of-way (ROW) as well as a western segment of the Keeyask Generation Outlet Transmission ROW (Map 2-1). During the aerial surveys, one person noted any disturbances potentially affecting priority habitat patches adjacent to the ROW as the helicopter flew along each side of the ROW. Meanwhile, the second surveyor acquired low-level oblique photography of the entire cleared ROW. These photos were reviewed in the office for any evidence that a priority habitat patch had been missed, and to further document effects on the 15 known priority habitat patches.

Ground surveys of the 15 priority habitat patches along the Project ROW (Map 2-2) were conducted by a terrestrial ecologist on August 20 and 21, 2016. At each of these priority habitat patches, the surveyor noted any disturbances, including clearing within the priority habitat patch that was outside of the ROW, understory impacts at the priority habitat patch and unusual impacts within the adjacent transmission ROW (e.g. deep rutting). The location of any encountered impact was recorded with a GPS (Garmin Map 62 or Map 78), and photos were acquired.




**Map 2-1: Aerial survey transects flown on July 7, 216**




**Map 2-2: Priority habitat patches surveyed by foot on August 20 and 21, 2016**

# 3.0 RESULTS

Habitat mapping completed for the Project environmental impact assessment studies identified 15 priority habitat patches along the Construction Power ROW (Map 2-2). Twelve of the habitat patches were included because they were sensitive types (Table 3-1) due to their regional rarity, degree of past cumulative effects, or being riparian habitat. The remaining three priority habitat patches were included because they were a terrestrial habitat type that may support rare plant species.

In 2016, monitoring of the 15 priority habitat patches focused on Project impacts in the portion of each that was outside of the cleared Construction Power ROW. The standard cleared width for the Construction Power ROW was 60 m.

Aerial surveys the 15 mapped priority habitat patches (Map 2-2) were conducted on July 7, 2016. Clearing or disturbance in these patches was not observed outside of the ROW from the air. Also, additional priority habitat patches were not identified during these aerial surveys, or during a subsequent review of the oblique aerial photos acquired during this survey. All 15 priority habitat patches adjacent to the Construction Power ROW (Map 2-2) were ground surveyed on August 20 and 21, 2016.

Relative to their pre-Project boundaries, impacts on the 15 priority habitat patches were generally limited (Table 3-1). Ten patches had some clearing for the ROW, as expected. Relative to their pre-Project boundaries, the remaining five had no clearing either because they were buffered from the cleared ROW by undisturbed vegetation, or because clearing within the ROW was unnecessary since the native vegetation was already short. Map 3-1 shows the status of the priority habitat patches, including any impacts at each patch.

In four of the ten patches with some ROW clearing, the clearing was limited to either a narrow track or clearing of larger trees without disturbing the substrate and low vegetation (Photo 3-1). These situations occurred in wetlands with low vegetation or very sparse tree cover.

One priority habitat patch (PH0938) had clearing beyond the edge of the ROW. This was an approximately 20 $m^2$ patch with cleared trees, accompanied by mechanical damage to the surrounding trees and to the substrate (Photo 3-2).

Three other priority habitat patches (PH1271, PH0910 and PH0001) had tree mortality in the undisturbed forest adjacent to the ROW (Photo 3-3). At these patches, all of the dead trees were tamaracks (*Larix laricina*). The mortality was limited to areas adjacent to the ROW, extending from a few metres, up to 20 metres into the undisturbed forest. Tamarack trees further from the ROW appeared healthy.

Rutting or excavation in the ROW was recorded because they could potentially have indirect effects on soils or vegetation in the physically undisturbed portion of the priority habitat patch. Examples of potential sources of indirect effects from these impacts include tree root damage or alterations to surface or ground water.

Deeper rutting from two sets of vehicle tracks was present within the ROW adjacent to patch PH9998 (Photo 3-4). At other locations within the ROW with shallow organic substrates, deeper excavations were also present. While these usually appeared to be places where material for transmission tower foundation construction was excavated, these excavations or disturbances were at least 80 m from towers at locations near priority habitat patches PH9998 and PH0001 (Photo 3-5).

**Table 3-1: Status of priority habitat patches adjacent to the Construction Power ROW visited in 2016.**

| Patch ID | Reason Included as a Priority Habitat Patch | Clearing Inside[1] | Clearing Outside[2] | Effect | Impact or Effect Description |
|---|---|---|---|---|---|
| PH0820 | Rare, highly affected forest/woodland on peatland | No | None | None | None. |
| PH0754 | Rare, highly affected forest/woodland on peatland | No | None | None | None. |
| PH9999 | Riparian wetland | No | None | None | None |
| PH0001 | Rare forest/woodland on peatland | No | None | Tree Mortality | Dead or dying tamarack extending several metres from the ROW edge into the patch; Filled mineral pit at patch boundary. Deeper excavation in adjacent ROW distant from towers. |
| PH0910 | Rare, highly affected upland forest/woodland | No | None | Tree Mortality | Dead or dying tamarack extending into forest up to 20 m. |
| PH9998 | Rare Plant Habitat | Yes | None | None | 5-6m wide vehicle track with ruts. Deeper excavation in adjacent area. |
| PH0563 | Rare forest/woodland on peatland | Yes | None | None | ROW clearing adjacent to patch only. |
| PH9997 | Rare Plant Habitat | Yes | None | None | Impacts limited to narrow trail in ROW and clearing of larger trees only. |
| PH9996 | Rare Plant Habitat | Yes | None | None | Impacts limited to narrow trail in ROW and clearing of larger trees only. |
| PH0044 | Rare tall shrub on peatland | Yes | None | None | Impacts limited to 5m wide path through patch. Willow beginning to regenerate. |
| PH0698 | Rare, highly affected forest/woodland on peatland | Yes | None | None | ROW clearing adjacent to patch only. |
| PH0109 | Rare, highly affected forest/woodland on peatland | Yes | None | None | ROW clearing adjacent to patch only. |
| PH1298 | Rare, highly affected upland forest/woodland | Yes | None | None | None. |
| PH1271 | Rare, highly affected upland forest/woodland | Yes | None | Tree Mortality | Approximately 5m x 25m dugout in adjacent ROW with excavated material placed near treeline; Dead or dying tamarack extending into forest up to 10 m. |
| PH0938 | Rare, highly affected upland forest/woodland | Yes | Clearing | None | 4m x 5m cleared area into habitat patch, mechanical tree and ground disturbance. Deeper excavation in ROW. |

[1] Clearing was observed within the Pre-Project patch boundaries. [2] Clearing outside of ROW but within the remaining portion of the patch.

PH9998

PH9997

Source: ECOSTEM Ltd. 2016

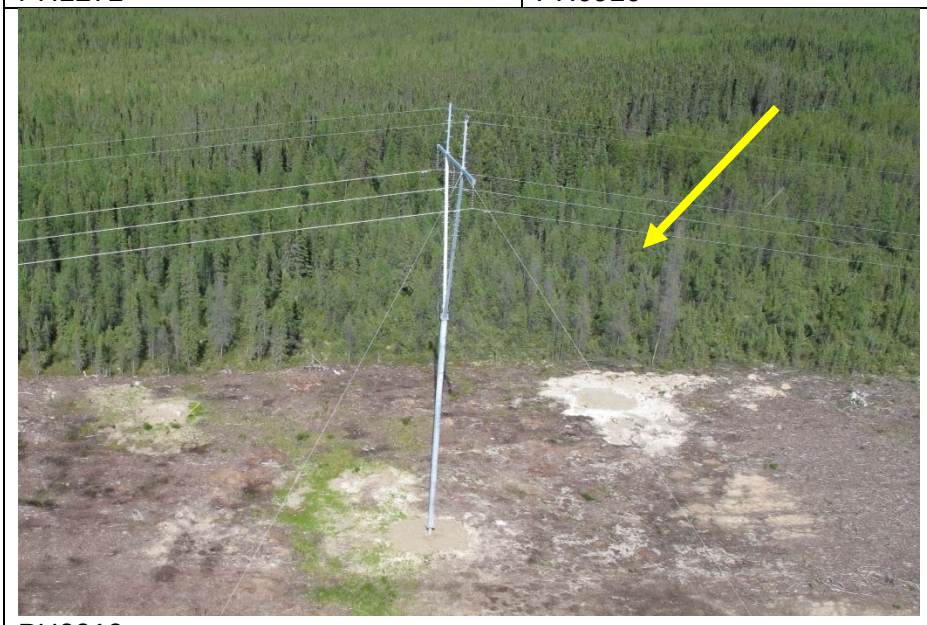
**Photo 3-1: Two priority habitat patches adjacent to a ROW segment having minimal clearing.**

Source: ECOSTEM Ltd. 2016

**Photo 3-2: Clearing and disturbance adjacent to the ROW in priority habitat patch PH0938.**

PH1271

PH0910



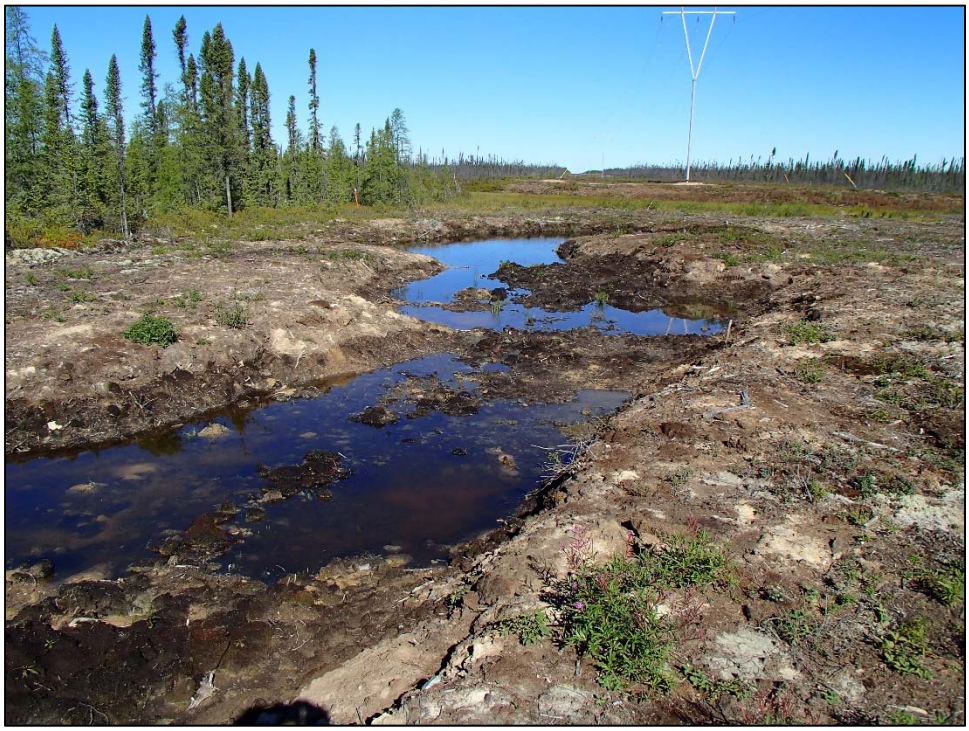
PH0910

Source: ECOSTEM Ltd. 2016

**Photo 3-3: Tamarack mortality in two priority habitat patches adjacent to the ROW.**

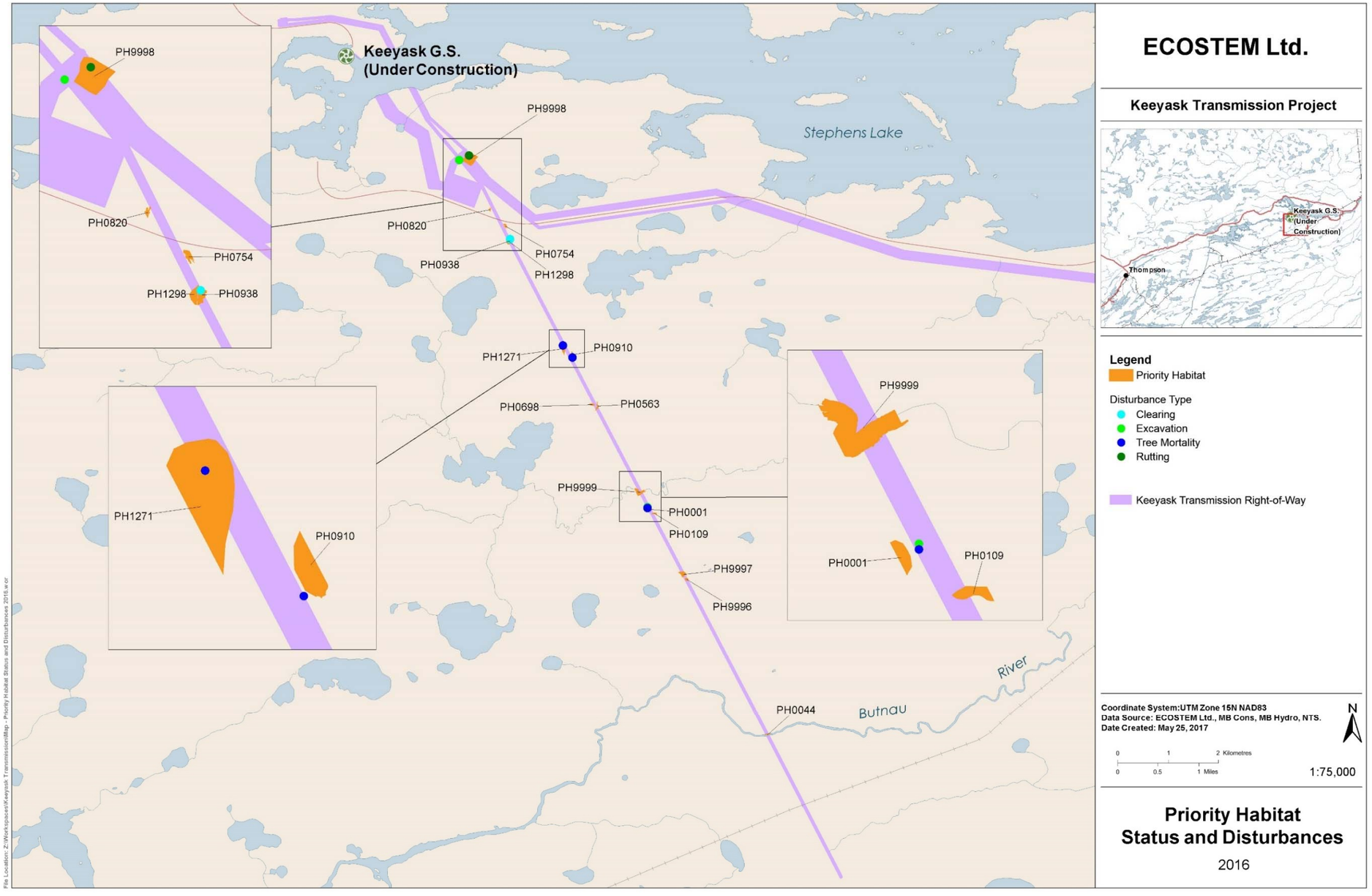
Source: ECOSTEM Ltd. 2016

**Photo 3-4: Rutting in ROW adjacent to priority habitat patch PH9998.**



Source: ECOSTEM Ltd. 2016

**Photo 3-5: Excavation in ROW near priority habitat patch PH0001.**




**Map 3-1: The status of priority habitat patches, and locations where disturbances occurred outside of the cleared Construction Power ROW**

# 4.0 SUMMARY AND CONCLUSIONS

Ecosystem diversity refers to the number of different ecosystem types and their areal distribution at various ecosystem levels. Maintaining native ecosystem diversity is fundamental to maintaining terrestrial ecosystem functions and overall ecosystem health.

The indicators for ecosystem diversity are stand level habitat composition and priority habitat types. Priority habitat types are those native habitat types which are regionally rare or uncommon, highly diverse (i.e., species rich and/or structurally complex), highly sensitive to disturbance or have high potential to support rare plants.

The EA Report (Manitoba Hydro 2015) predicted that Project construction is not expected to change the total number of native broad habitat types in the region, or to substantially change the regional proportions of any of the regionally common or uncommon native habitat types by more than 0.01%. Before considering additional mitigation measures, the Project was expected to affect 32 of the 46 priority habitat types.

For all 32 of the affected priority habitat types, the EA Report concluded that cumulative effects from past and current projects and activities were already in the moderate magnitude range. On this basis, mitigation included avoiding all of these priority habitat types to the extent practicable during final routing of the transmission lines. Also, the EnvPPs included measures to minimize the risk that accidental fires and accidental spills will affect priority habitat. The EnvPPs also included measures to minimize the risk that invasive plants would affect priority habitat.

Ecosystem diversity monitoring for the Project is: determining the degree to which priority habitat patches are avoided where practical; and, confirming actual Project effects on ecosystem diversity during construction. In support of these objectives, monitoring activities in the 2016/2017 year determined the locations and nature of impacts on the priority habitat patches found along the Keeyask Construction Power ROW.

Habitat mapping completed for the Project environmental impact assessment studies identified 15 priority habitat patches along the Construction Power ROW. No additional priority habitat patches were discovered during the aerial surveys conducted in July, 2016.

Aerial and ground surveys conducted in summer 2016 found that overall impacts on the 15 priority habitat patches situated along the Project ROW were minor. Relative to their pre-Project boundaries, there were no impacts at five of the priority habitat patches. Impacts at the remaining 10 patches involved either small cleared areas or physical disturbance. Only one patch had any clearing outside of the standard cleared ROW width. Remediation efforts in the cleared or disturbed areas are not recommended as these areas are expected to revegetate naturally.

Two of the five patches with no clearing within their pre-Project boundaries had possible indirect construction effects within the patch. These possible effects consisted of dead or dying tamarack trees at the patch edge closest to the conductors (see below for further details).

The following summarizes impacts for the 10 priority habitat patches with some clearing within their pre-Project boundaries.

Only one of these 10 patches had some clearing outside of the standard cleared ROW width. This clearing impacted approximately 20 $m^2$ of the priority habitat patch.

At the nine priority habitat patches where clearing was entirely within the standard ROW limits, the clearing was generally much narrower than the standard 60m ROW width. Limited clearing resulted either because the EnvPP identified it as a sensitive site included provisions to minimize clearing or the habitat consisted of vegetation that was too short to require clearing.

At four of the preceding nine locations, construction impacts were limited to narrow tracks or clearing of larger trees. The substrate had no apparent disturbance. As these were sparsely treed or untreed wetland and riparian habitat types, it was likely that clearing was conducted when the ground was frozen, which limited construction impacts.

In total, three priority habitat patches had some tamarack mortality at the boundary closest to the conductors. Construction impacts appeared to be the most likely cause of this mortality because it was only included trees adjacent to the clearing. It was possible that ROW clearing or transmission tower excavations may have caused tree root damage, permafrost melting or localized changes to ground/surface water conditions and/or drainage, which eventually led to tree mortality (see Section 7.2.5.1 of EA Report for pathways of potential Project effects). However, a natural cause was also possible since only tamarack was affected, while black spruce still appeared healthy.

In summary, monitoring results indicated that actual direct Project effects on priority habitats situated along the Construction Power Line were consistent with those predicted in the EA Report. A more detailed evaluation, including the number and areas of priority habitat types affected, will be made after the habitat mapping is updated in late 2018 (*i.e.*, after priority habitat surveys along the Generation Outlet Lines are conducted).

Monitoring results also indicated that Environmental Protection Plan measures were implemented well during Project construction.

Further ground monitoring of these locations is not recommended given the limited degree of Project effects to date and their ecological conditions.

Project effects on the priority habitat patches situated along the Generation Outlet Transmission ROW will be documented during summer 2018. Mapping completed for a synthesis report in 2019 will confirm actual Keeyask Transmission Project effects on ecosystem diversity during construction (*i.e.*, for the second study objective).

# 5.0 LITERATURE CITED

Manitoba Hydro 2015. Keeyask Transmission Project Environmental Effects Monitoring Plan. Prepared for: Manitoba Conservation and Water Stewardship, Environmental Approvals Branch, July 2015. 61pp.

Available in accessible formats upon request

Available in accessible formats upon request