



Keeyask Generation Project Terrestrial Effects Monitoring Plan

Priority Plants and their Habitats Monitoring Report

TEMP-2022-08



KEEYASK GENERATION PROJECT

TERRESTRIAL EFFECTS MONITORING PLAN

REPORT #TEMP-2022-08

PRIORITY PLANTS AND THEIR HABITATS MONITORING

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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.

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 will affect the environment, and whether or not more needs to be done to reduce harmful effects.

This report evaluates Project effects during construction on plants that are particularly important for ecological reasons and/or social reasons.

Why is the study being done?

Plants perform important functions in land ecosystems. Among other things, they provide food and shelter for wildlife, contribute to soil development, store carbon and ultimately are the source for most life because they convert solar energy to plant tissue. Some plants, called priority plants, are particularly important for ecological reasons (e.g., rare species) and/or social reasons (e.g., traditional food and cultural importance to the Keeyask partner First Nations).

This study is being conducted to evaluate whether Project effects on plant species that are particularly important for ecological and/or social reasons are consistent with what was predicted in the environmental impact statement (EIS).

What was done?

This study monitors Project effects on priority plant species using the number of known locations that are affected by the Project, as well as the amounts of their habitats that are affected by the Project. This is the first year of this study. The affected plant locations and habitat areas were determined using information from other TEMP studies, including the Terrestrial Habitat Clearing, Disturbance and Indirect Effects and Wetland Function studies. Another terrestrial monitoring study, the Provincially Very Rare and Rare Plant study, carried out additional searches for rare plant species in the Project areas and, if any such plants were found, recommended mitigation to reduce effects on those species (e.g., avoiding those areas or transplanting plants to an area that won't be disturbed).

Project effects on known priority plant locations during construction included a desktop review of directly affected locations as of September 2021. This review identified locations that fell within the Construction Footprint. Known priority plant locations included those that were known at the time the EIS was completed, as well as additional locations recorded during pre-clearing surveys

and monitoring studies during construction. Project effects on priority plant habitat were evaluated using information from the terrestrial habitat monitoring.

What was found?

As of September 2021, Project construction impacted 250 (74%) of the 337 known priority plant locations in the Licensed Project Footprint. This included 29 priority plant locations that were found after the EIS studies, during construction monitoring.

No endangered or threatened plant species were found during pre-clearing surveys or construction monitoring. Surveys identified three provincially imperiled (rare) to vulnerable (uncommon) plant species that had not been previously found in the Licensed Project Footprint areas, including muskeg lousewort, American milkvetch and elegant hawksbeard. Of these species, elegant hawksbeard is of the highest concern because the Manitoba Conservation Data Centre (MBCDC) ranks it as critically imperiled (S1 rank, formerly very rare). It appeared that disturbance from Project development led to the emergence of elegant hawksbeard in some areas of the Construction Footprint.



Muskeg lousewort, a rare plant found in the Construction Footprint.



Elegant hawksbeard, a rare plant found in disturbed areas of the Construction Footprint.

All but four of the 28 priority plant species known to be within the Licensed Project Footprint during construction had fewer or the same number of locations in the actual Construction Footprint, meaning fewer locations were impacted by Project development than predicted. For the species that had more locations than assumed in the EIS, this was because additional locations were found in the Licensed Project Footprint during subsequent surveys. Mitigation was recommended for species that had additional locations and were classified as critically imperiled (very rare) or imperiled (rare), which only included elegant hawksbeard and muskeg lousewort. Additional mitigation was not needed for muskeg lousewort as further surveys outside of the Project areas found 14 additional locations for muskeg lousewort, increasing the total number of known locations outside the area affected by the Project to 22.

Elegant hawksbeard emerged in areas that had been disturbed by the Project. Patches or individuals of elegant hawksbeard were marked for avoidance where they occurred in Project areas unlikely to be further disturbed, or were transplanted to other areas.

What does it mean?

Monitoring has shown that the EIS predictions for construction phase effects on priority plants and their habitat were consistent with what was observed, and were cautious. Monitoring did not identify any major unanticipated Project effects.

Residual Project effects on priority plants and their habitat were lower than predicted. The primary reason for this was that the Construction Footprint was 20% smaller than assumed in the EIS. Mitigation for species of highest concern also reduced Project effects on priority plants.

Additionally, actual direct Project effects on priority plant habitat were much lower than assumed for the EIS. One positive effect was that Project disturbance appeared to have led to the emergence of one rare plant species, elegant hawksbeard, which is typically found in disturbed areas.

What will be done next?

Priority plant monitoring in 2022 will include a ground to survey to confirm the desktop determination as to which of the known plant locations are outside of the Construction Footprint.

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STUDY TEAM

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

This report uses data collected by other terrestrial monitoring studies.

Data analysis and report writing were completed by James Ehnes, Brock Epp and Alanna Sutton. Cartography was completed by Alex Snitowski.

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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 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. 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 (KHL 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; KHL 2012b).

The *Keeyask Generation Project Terrestrial Effects Monitoring Plan* (TEMP; KHL 2015) was subsequently developed as part of the licensing process for the Project. Monitoring activities for various components of the terrestrial environment were described, including the focus of this report, priority plants, during the construction and operation phases.

Priority plants are defined as those plants that are particularly important for ecological and/or social reasons. Specifically, priority plants are the native plant species that are highly sensitive to Project impacts, make high contributions to ecosystem function and/or are of particular interest to the partner First Nations. A plant species is considered to be highly sensitive to Project impacts if it is globally, nationally, provincially or regionally rare, near a range limit, has low reproductive capacity, depends on rare environmental conditions and/or depends on the natural disturbance regime (wildlife studies monitor plant species that are critical for the survival and/or reproduction of an animal species). The partner First Nations have noted a variety of plants of traditional importance that are present in the Project area, such as *wihkis* (sweet flag; *Acorus americanus*) and dwarf Labrador tea (tea leaves; *Rhododendron tomentosum*).

The Priority Plants and Their Habitats study (see KHL 2015, Section 3.1.3) verifies actual Project effects on known priority plant locations and priority plant habitats. This study begins at the end of Project construction, when the actual Project footprint is known, and is repeated periodically during operation. 2021 was the first monitoring year for this study.

The objectives of this study are to:

- Confirm Project effects on known priority plant locations; and,
- Locate and quantify Project effects on priority plant habitats.

This report addresses both of these objectives for the construction phase of the Project, which is considered to have ended in September 2021 for the purposes of the terrestrial studies.

2.0 METHODS

2.1 APPROACH

Section 3.1.3 of the Terrestrial Effects Monitoring Plan (TEMP) details the methods for this study. The following summarizes the monitoring activities conducted for the construction phase, which extended from June 2014 to September 2021.

Actual Project effects on priority plants and their habitat were monitored by ground surveys and by using the mapping produced by other TEMP studies, including Terrestrial Habitat Clearing, Disturbance and Indirect Effects (TEMP, Section 2.1) and Wetland Function (Section 2.5). Ground surveys evaluated the state of known priority plant locations within the Project zone of influence. Mapping was used to evaluate effects on priority plant habitat. Actual effects on priority plants were evaluated at the end of the construction phase, and this will also be done periodically during operation.

The areas that were predicted to be impacted by the Project during construction and operation at the time of the EIS are referred to as the Licensed Project Footprint. The areas actually impacted by the Project during the construction phase are referred to as the Construction Footprint. ECOSTEM (2022a) provides the Construction Footprint and the methods used to produce it. In brief, the Construction Footprint includes all areas where there was Project clearing or physical disturbance up to September 2021. The Construction Footprint includes both terrestrial and aquatic areas.

The parameters measured for each priority plant species are:

- The number of known locations affected by the Project; and,
- The locations and amounts of their habitat directly and indirectly affected by the Project.

For the second parameter, construction phase monitoring was limited to direct Project effects. Indirect effects will be evaluated during operation as it takes several years for these to be manifested.

2.2 KNOWN PLANT LOCATIONS

Construction phase monitoring for effects on priority plants began with a desktop review of the directly affected priority plant locations. This review included identifying which of the known locations were within the Construction Footprint, and then comparing the number of predicted versus actual locations impacted. Ground surveys in 2022 will confirm the desktop determination as to which locations were actually impacted. These ground surveys will also document the nature of Project effects at each location.

The known priority plant locations include those available at the time that the EIS was completed as well as the locations identified since then. The additional locations were obtained from the pre-clearing rare plant surveys (ECOSTEM 2022c), and from incidental observations recorded during ground surveys for other terrestrial habitat and plant monitoring studies.

2.3 PLANT HABITAT

Effects on priority plants during the Project's construction phase were evaluated by using the updated terrestrial habitat map. This map had been updated to identify areas that were within the Construction Footprint (see ECOSTEM 2022a), and was used to identify the directly affected priority plant habitat areas.

Effects on habitat were evaluated using the same approach as was used for the EIS analysis. A common approach to evaluating habitat effects is to develop a habitat quality model for each species of interest. The EIS did not use this approach because: habitat associations for many of the species were poorly understood; and, habitat effects were expected to be relatively low for every species given that residual Project effects on every native terrestrial habitat type were low.

Terrestrial habitat composition was used as a proxy for priority plant habitat because plant species tend to be as common as the habitat they are found in. As this was an assumption and the TEMP is providing additional habitat association data, the need for habitat quality models for selected species will be re-examined on a per species basis at year 5 of operation based on actual Project effects up to that time.

3.0 RESULTS

3.1 PRIORITY PLANT LOCATIONS

3.1.1 OVERALL

Table 3E-2 in the TE SV (KHLP 2012b) lists all of the priority plant species that could potentially occur in the Keeyask region. As a cautious approach was taken to the environmental assessment, the number of species in this list was higher than what was expected to occur in the Project area.

The list of potentially occurring priority plant species was updated for this report to reflect changes in the Manitoba Conservation Data Centre (MBCDC) rankings that were made after the EIS was completed. Since the time of the EIS, oblong-leaved sundew (*Drosera anglica*) was downgraded from vulnerable (S3) to possibly vulnerable (S3S4), and shrubby willow (*Salix arbusculoides*) was upgraded from vulnerable to possibly imperiled (S2S3).

Another of the MBCDC changes was in the ranking terminology. Previously, the S-Rank names for S1, S2 and S3 were provincially very rare, rare, and uncommon, respectively. This terminology was recently changed to critically imperilled, imperiled, and vulnerable.

Table 3-1 provides the priority plant species with known locations in the Licensed Project Footprint at the time that the EIS was submitted as well as the new locations identified during construction monitoring. See Map 3-1 for these plant locations.

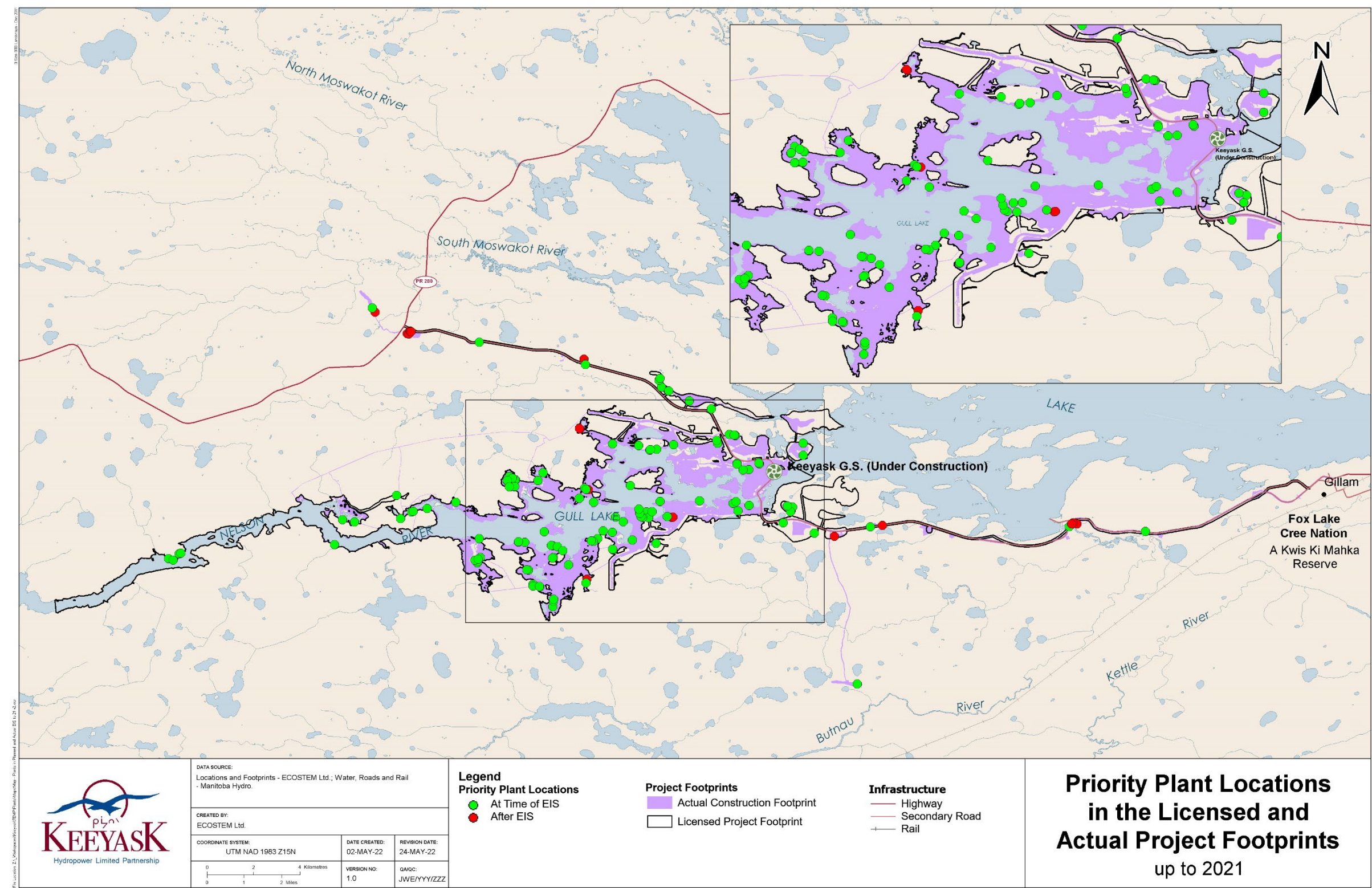
One of the provincially critically imperiled to vulnerable species, oblong-leaved sundew, had more locations in the Construction Footprint than were known at the time of the EIS. Three additional species with no known locations in the Licensed Project Footprint at the time of the EIS were found during subsequent studies. Elegant hawksbeard (*Crepis elegans*) emerged at numerous locations that were disturbed by the Project. Locations for muskeg lousewort (*Pedicularis macrodonta*) and American milkvetch (*Astragalus americanus*) were found during pre-clearing plant surveys.

Table 3-1. Known priority plant locations in the Licensed Project Footprint at the time of the EIS, and actual locations in the Construction Footprint as of September 2021

Species	Common Name	Reason(s) for Inclusion ¹	Number of Known Locations				
			Within the Licensed Project Footprint			Within Construction Footprint (i.e., the actual Project Footprint)	Construction Footprint Minus At Time of EIS
			At Time of EIS	Found After EIS	Total		
<i>Astragalus americanus</i>	American milkvetch	CI-V	0	1	1	1	1
<i>Betula papyrifera</i>	White birch	KCN	57	-	57	32	-25
<i>Calypso bulbosa</i>	Venus'-slipper	RL	1	-	1	1	0
<i>Carex sychnocephala</i>	Long-beaked sedge	RL	4	-	4	4	0
<i>Crepis elegans</i>	Elegant hawksbeard	CI-V; RL	0	19	19	19	19
<i>Drosera anglica</i> ²	oblong-leaved sundew	CI-V; RL	2	2	4	4	2
<i>Elaeagnus commutata</i>	Silverberry	RL	4	-	4	4	0
<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush	RL	1	-	1	1	0
<i>Equisetum pratense</i>	Meadow horsetail	RL	1	-	1	1	0
<i>Eriophorum viridicarinatum</i>	Thin-leaved cotton-grass	RL	1	-	1	1	0
<i>Fragaria virginiana</i>	Smooth wild strawberry	KCN	11	-	11	6	-5
<i>Glaux maritima</i>	Sea-milkwort	RL	2	-	2	2	0
<i>Limosella aquatica</i>	Mudwort	RL	5	-	5	5	0
<i>Muhlenbergia glomerata</i>	Bog muhly	RL	1	-	1	1	0
<i>Nuphar variegata</i>	Yellow pond-lily	RL	9	-	9	9	0
<i>Pedicularis macrodonta</i>	Muskeg lousewort	CI-V	0	5	5	5	5

Species	Common Name	Reason(s) for Inclusion ¹	Number of Known Locations				
			Within the Licensed Project Footprint			Within Construction Footprint (i.e., the actual Project Footprint)	Construction Footprint Minus At Time of EIS
			At Time of EIS	Found After EIS	Total		
<i>Populus balsamifera</i>	Balsam poplar	RL	9	-	9	7	-2
<i>Potamogeton pusillus</i> spp. <i>Tenuissimus</i>	small pondweed	CI-V	4	-	4	4	0
<i>Rhododendron tomentosum</i>	Dwarf Labrador-tea	RL; KCN	0	1	1	1	0
<i>Ribes triste</i>	Wild red currant	KCN	11	-	11	7	-4
<i>Rubus chamaemorus</i>	Baked-apple-berry	KCN	29	-	29	21	-8
<i>Rubus idaeus</i>	Wild red raspberry	KCN	6	-	6	4	-2
<i>Rubus pubescens</i>	Dewberry	KCN	12	-	12	12	0
<i>Sagina nodosa</i>	Knotted pearlwort	RL	1	-	1	1	0
<i>Salix arbusculoides</i> ³	shrubby willow	CI-V; RL	9	-	9	6	-3
<i>Salix vestita</i>	rock willow	CI-V; RL	7	1	8	2	-5
<i>Solidago hispida</i>	Hairy goldenrod	RL	11	-	11	5	-6
<i>Vaccinium uliginosum</i>	Bog whortleberry	KCN	54	-	54	36	-18
<i>Vaccinium vitis-idaea</i>	Bog cranberry	KCN	85	-	85	48	-37
All			337	29	366	250	-87

Notes: ¹ Reasons for inclusion changed to reflect change in terminology used by the MBCDC for S-Ranks. CI-V = "Critically imperiled to vulnerable"; RL = "Regionally rare and range limit"; KCN = "Particular interest to the KCNs" ² Status changed from vulnerable to possibly vulnerable since the EIS. ³ Status changed from vulnerable to possibly imperiled since the EIS.



Map 3-1: Known priority plant locations in the Licensed Project Footprint and the Construction Footprint.

3.1.2 ENDANGERED AND THREATENED PLANT SPECIES

The EIS anticipated that federally or provincially listed endangered or threatened plant species would not be found during construction monitoring since none of these species were either known to occur or expected to occur within the Project area.

Construction monitoring and EnvPP surveys did not find any of these species.

3.1.3 PROVINCIALY CRITICALLY IMPERILED TO VULNERABLE PLANT SPECIES

Provincially critically imperiled to vulnerable plant species within known locations for the EIS included small pondweed, shrubby willow, oblong-leaved sundew and rock willow. Construction monitoring increased the number of locations for the latter two of these species (Table 3-1).

Pre-clearing surveys and monitoring conducted after the EIS analysis recorded locations for three provincially imperiled to vulnerable plant species that had not been previously found in the Licensed Project Footprint.

Muskeg lousewort (Photo 3-1) is classified as possibly imperiled (S2S3) by the MBCDC. It was found at five locations during pre-clearing surveys in the future reservoir area (Table 3-1; Map 3-1). Details are provided in ECOSTEM (2015).

American milkvetch (Photo 3-2) is classified as possibly imperiled (S2S3) by the MBCDC. It was found at one location during pre-clearing surveys in the future reservoir area (Table 3-1; Map 3-1).

Elegant hawksbeard (Photo 3-3) was the only species found during field studies that had a MBCDC rank of critically imperiled (S1). For the EIS, it was thought that there was a low likelihood of it occurring in the Project area because it was not found there during extensive field studies in the Project area and its recorded local habitat was roadsides.

Elegant hawksbeard was found at 19 locations during construction monitoring. The number of plants has been increasing since 2018 (ECOSTEM 2022c).

All of the known locations of critically imperiled to vulnerable plant species in the Licensed Project Footprint were in the Construction Footprint, with the exception of shrubby willow and rock willow. The total number of locations for these two species in the Licensed Project Footprint was nine and eight, respectively, but the Construction Footprint impacted only six and two locations (Table 3-1).



Photo 3-1: Muskeg lousewort growing in the future reservoir area in 2015



Photo 3-2: American milkvetch growing in the future reservoir area in 2016



Photo 3-3: Elegant hawksbeard growing in the Start-up Camp in 2021

3.1.4 REGIONALLY RARE AND RANGE LIMIT PLANT SPECIES

Eleven regionally rare species and six range limit species had known locations in the Licensed Project Footprint (Table 3-1). Studies after the EIS and during construction monitoring increased the number of locations for four of these species, including dwarf Labrador-tea, oblong-leaved sundew and rock willow (Table 3-1). One new range limit species, elegant hawksbeard was found during construction monitoring.

Excluding elegant hawksbeard, which colonized sites created by the Project, 55 (81%) of the 68 regionally rare and range limit species locations known at the time of the EIS were impacted by the Project as of September, 2021. Fewer locations than predicted were impacted for balsam poplar (*Populus balsamifera*), shrubby willow and rock willow (Table 3-1).

3.1.5 PLANT SPECIES OF PARTICULAR INTEREST TO THE KCNS

Eight species identified as being of particular interest to the Keeyask Cree Nations (KCNs or the partner First Nations) occurred at 265 locations in the Licensed Project Footprint (Table 3-1). One additional species, dwarf Labrador-tea (discussed above), was found during studies after the EIS (Table 3-1). One additional species of particular interest to the KCNs, dwarf Labrador-tea, was found during studies conducted after the EIS.

The number of locations impacted for all but two species were lower than assumed for the Licensed Project Footprint (Table 3-1). For example, the Construction Footprint impacted 37 fewer bog cranberry (*Vaccinium vitis-idaea*) locations than assumed for the EIS, and 25 fewer white birch (*Betula papyrifera*) locations. One additional previously known location for bog cranberry was impacted by the Construction Footprint. This location was outside of the Licensed Project Footprint, but fell within the Ellis Esker borrow area, an area that was approved for use after the EIS (ECOSTEM 2019a).

Only one species, dwarf Labrador-tea, had one more location than assumed in the Construction Footprint.

3.2 PRIORITY PLANT HABITAT

Actual direct Project effects on native terrestrial habitat were much lower than assumed for the EIS (see Section 5.3).

4.0 DISCUSSION

Construction monitoring found that vast majority of direct Project effects on priority plants were lower than assumed in the EIS. This was primarily due to the actual Construction Footprint being 20% smaller than assumed in the EIS (ECOSTEM 2022a).

Three new provincially critically imperiled to vulnerable species were found in the Construction Footprint after the EIS studies. Two of the species, muskeg lousewort and American milkvetch, were found during pre-clearing surveys in the future reservoir area. Both of these species have known locations outside the Construction Footprint in the Project region (ECOSTEM 2017a; KHLP 2012a).

Construction monitoring identified one critically imperiled species (elegant hawksbeard) in areas disturbed by Project construction. It appeared that Project disturbance had facilitated the germination of elegant hawksbeard. All of the locations were on granular mineral substrates which had been exposed by Project activities. This was consistent with roadsides being its known local habitat in surrounding areas. All of the elegant hawksbeard locations known at the time of the EIS were along Highways 280 and 290 and in adjacent borrow areas, which are continually disturbed environments. Elegant hawksbeard was also found growing in borrow areas created for the Wuskwatim Generation Project (ECOSTEM 2017b). The Project had created similar conditions, which facilitated colonization from the seed bank.

Measures were taken to protect the elegant hawksbeard plants by blocking access to their locations, and transplanting plants from locations that were at risk for further disturbance during decommissioning and rehabilitation activities. The transplanting program is described in ECOSTEM (2020), and monitoring of the transplant locations is detailed in ECOSTEM (2021 and 2022c). As of 2021, the number of elegant hawksbeard plants within the Construction Footprint was increasing.

5.0 COMPARISON WITH PREDICTED EFFECTS

5.1 PREDICTED EFFECTS

The *Keeyask Generation Project Response to EIS Guidelines* (KHLP 2012a) included predictions as to how the Project was expected to affect priority plants and their habitat. The EIS predicted that Project construction was not expected to substantively affect priority plants. None of the species of highest conservation concern were either known or expected to occur in the Local Study Area. For the remaining species, the Project was expected to affect low percentages of their known locations and/or available habitat.

A moderately low level of uncertainty was associated with these predictions, primarily because: the species of highest concern were not expected to occur in the Local Study Area; and, practicable mitigation was available in the unlikely event that any such species are discovered during subsequent field surveys. For the remaining species, uncertainty was expected to range from moderately low to moderate because: the estimated proportions of affected locations in the Regional Study Area was low for each species; and, there was a limited understanding of the factors that substantially influence the abundance and distribution for many of these species. To the extent that these species are as common as their habitat, uncertainty related to effects on priority plant habitats was moderately low to moderate.

5.2 MITIGATION

The EIS predictions were based on the following mitigation measures being implemented during the construction period:

1. Pre-construction rare plant surveys will be conducted in the Project Footprint and nearby areas that were not previously surveyed and have the highest potential for supporting provincially critically imperiled to imperiled species; and
2. In the unlikely event that a provincially critically imperiled to imperiled species is discovered in the terrestrial plants zone of influence and there are not at least 20 known healthy patches outside of the terrestrial plants zone of influence, then the discovered locations will be avoided where practicable and where avoidance is not practicable the plants will be transplanted outside of the terrestrial plants zone of influence.
3. Clearing and disturbance within the Project Footprint will be minimized to the extent practicable;

4. Disturbance of areas adjacent to the Project Footprint will be avoided to the extent practicable;
5. Except for existing resource-use trails (see Construction Access Management Plan), Project-related cutlines and trails will be blocked where they intersect the Project Footprint, and the portions of these features within 100 m of the Project Footprint will be revegetated to minimize the risk of invasive plant, accidental fire and other access-related effects;
6. EnvPP measures that are described under the Fire Regime key supporting topic; and
7. Invasive plants are not expected to become a problem within the Local Study Area.

Mitigation Items 1 and 2

Pre-construction and monitoring surveys identified three plant species ranked as critically imperiled in the Province of Manitoba. At the time of the surveys in summer 2016, American milkvetch was classified as vulnerable (S3) by the MBCDC, and mitigation measures were not triggered for the one location found. Later, this species' status was upgraded to possibly imperiled (S2S3). At the time of the EIS, there were at least nine other known locations outside the Construction Footprint.

Muskeg lousewort was classified as imperiled (S2) by the MBCDC at the time they were detected in 2014 (ECOSTEM 2015). This species status was later downgraded to possibly imperiled (S2S3). Additional surveys for muskeg lousewort outside of the terrestrial plants zone of influence were carried out in 2015 (ECOSTEM 2016). The surveys identified an additional 14 locations for this species, increasing the total known locations outside of the Project to 22.

Elegant hawksbeard is classified as critically imperiled (S1) by the MBCDC. The species was detected growing inside the Construction Footprint. Patches of plants in areas where no further construction was planned were flagged for avoidance. In areas where ongoing disturbance was a risk, plants were transplanted to other areas where no further disturbance was anticipated (Photo 5-1). Details of this mitigation measure are discussed in a separate report (ECOSTEM 2022c).



Photo 5-1: Elegant hawksbeard plants prepared for transplanting in 2019

Mitigation Items 3 to 5

The Priority Habitats Monitoring study evaluated Project clearing and disturbance within and outside of the Project Footprint as well as the blocking of Project-related cutlines and trails. It was concluded that these mitigation measures were implemented effectively and contributed to lower than predicted Project effects on the terrestrial habitats (ECOSTEM 2022b).

Mitigation Item 6

There were no Project-related affects on the fire regime.

Mitigation Item 7

Invasive plant monitoring in the Construction Footprint found that the introduction and spread of invasive plants was confined to the Construction Footprint, and there was no evidence for spread into other portions of the Local Study Area (ECOSTEM 2022d).

5.3 RESIDUAL PROJECT EFFECTS

Direct Project effects on priority plants during the construction phase were evaluated by identifying which of the known priority plant locations habitats were within the actual Construction Footprint, and the degree to which the various terrestrial habitat types were directly affected.

Monitoring has shown that direct Project effects on priority plants during the construction phase were consistent with the EIS predictions, and predominantly either lower or the same as was predicted. The major reason why actual Project effects were lower than predicted was that the actual Construction Footprint was much smaller than assumed for the EIS predictions. Effective implementation of mitigation measures also contributed to lower than predicted effects. Additionally, as anticipated, Project construction affected low percentages of the known species locations and/or their available habitat.

The following summarizes actual construction phase effects on the various categories of priority plants.

Four out of the 28 priority plant species had more locations impacted by Project construction than assumed for the EIS (see Table 3-1). Note that elegant hawksbeard is not included in this total because its appearance was facilitated by Project construction.

Species with higher impacts included American milkvetch, oblong-leaved sundew, muskeg lousewort and dwarf Labrador-tea. Effects were higher than expected as additional locations were found during pre-clearing and monitoring surveys.

At the time of the EIS, no species of highest conservation concern were known or expected to occur in the Local Study Area.

Pre-construction surveys identified one imperilled species (muskeg lousewort) inside the Construction Footprint. Additional surveys conducted to confirm that the population was secure identified sufficient additional locations outside the Local Study Area (ECOSTEM 2016). Recently the status of this species was downgraded to potentially imperilled (S2S3).

As predicted, Project construction affected low percentages of priority plant habitats. The total amount of priority habitat in the Construction Footprint was 39% lower than predicted (ECOSTEM 2022b). As plant species tend to be as common as the habitat in which they are found, actual construction effects on the rare to uncommon habitat types were of particular interest. Actual direct Project effects were lower than predicted for 33 of these types and the same for five types (ECOSTEM 2022b). While actual effects were higher than predicted for three habitat types, the increases in area were very small (ranging from 0.05 to 0.2 ha).

6.0 SUMMARY AND CONCLUSIONS

As of September 2021, Project construction impacted 250 (74%) of the 337 known priority plant locations that were in the Licensed Project Footprint. This included 29 priority plant locations that were found after the EIS studies.

As expected, no endangered or threatened plant species were found during pre-clearing surveys or construction monitoring. Post-EIS studies identified new locations for two critically imperiled to vulnerable plant species (oblong-leaved sundew and rock willow) that were known to be in the Licensed Project Footprint. Pre-clearing surveys and monitoring recorded locations for three provincially imperiled to vulnerable plant species that had not been previously found in the Licensed Project Footprint. These included muskeg lousewort (5 locations), American milkvetch (1 location) and elegant hawksbeard (19 locations). Of these species, elegant hawksbeard is of the highest concern because the MBCDC ranks it as critically imperiled (S1).

All of the known locations of critically imperiled to vulnerable plant species that were in the Licensed Project Footprint were impacted by Project construction, with the exception of shrubby willow and rock willow. New locations were found for oblong-leaved sundew.

New locations were found for three of the 17 regionally rare and range limit species known to occur in the Licensed Project Footprint, including dwarf Labrador-tea, oblong-leaved sundew and rock willow. No additional locations were recorded for plant species of particular interest to the KCNs aside from the species indicated above.

Mitigation was implemented for the two priority plant species of highest concern that were found in the Construction Footprint. Patches or individuals of elegant hawksbeard were marked for avoidance where they occurred in Project areas unlikely to be further disturbed. Monitoring of these sites is ongoing. Plants in the remaining locations were transplanted to other areas that were at low risk for further disturbance. Additional surveys outside the terrestrial plants zone of influence were conducted to identify additional locations for muskeg lousewort. These surveys identified 14 new locations, increasing the total number of known locations outside the terrestrial plants zone of influence to 22.

Monitoring has shown that the EIS predictions for construction phase effects on priority plants were consistent with what was observed, and were cautious. Overall Project effects on priority plants and their habitat were lower than predicted. The primary reason for this was that the Construction Footprint was 20% smaller than assumed in the EIS. Mitigation implemented for species of highest concern also reduced Project effects on priority plants.

All but four of the 28 priority plant species known to be within the Licensed Project Footprint during construction had fewer or the same number of locations in the actual Construction Footprint. For the species that had more locations than predicted, this was because additional locations were found in the Construction Footprint during subsequent surveys. Mitigation was triggered for species that had additional locations and were classified as critically imperiled or imperiled, which only included muskeg lousewort. Additional mitigation was not required for muskeg lousewort as

additional surveys outside of the Project areas had identified 14 additional locations for muskeg lousewort, increasing the total number of known locations outside the terrestrial plants zone of influence to 22.

Additionally, actual direct Project effects on priority plant habitat were much lower than predicted for the EIS.

Monitoring identified one major unanticipated Project effect, which was a positive effect. Project disturbance appeared to have facilitated the emergence of elegant hawksbeard, which is a critically imperiled species in Manitoba.

Priority plant monitoring in 2022 will include a ground survey to confirm the desktop determination as to which of the known plant locations are outside of the Construction Footprint.

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