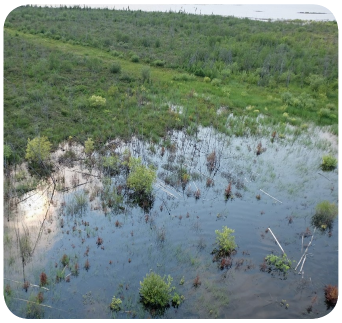
Keeyask Generation Project

Terrestrial Effects Monitoring Plan

Linear Density and Core Area Monitoring Report

TEMP-2022-07



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2021 - 2022

KEEYASK GENERATION PROJECT

TERRESTRIAL EFFECTS MONITORING PLAN

REPORT #TEMP-2022-07

LINEAR DENSITY AND CORE AREA MONITORING

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.

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 on intactness during construction, which was considered to have largely been completed in September 2021 for the terrestrial studies.

Why is the study being done?

The creation and use of infrastructure and other human features has a variety of effects on ecosystems and their wildlife. Examples of such effects are reducing the amount of habitat that is available for wildlife and plants, causing some wildlife species to avoid these areas (e.g., woodland caribou), and helping some predators (e.g., wolves) hunt more effectively. Intactness refers to the degree to which a region has not yet been affected by human features in these ways.

Intactness is being monitored because it is an umbrella indicator for many wildlife species and ecosystem processes, and because it is a good indicator for overall effects on regional ecosystem health. Additionally, the Keeyask Cree Nations (KCNs or partner First Nations) expressed concern that the construction of roads, camps and transmission lines would disrupt the habitat and migratory paths of wildlife.

What was done?

This study monitors Project effects on intactness using linear feature density (km of linear features per square km of land area) and core area abundance. A core area is a natural area that is at least 200 m from a human footprint, larger than 200 ha and wider than 350 m.

Project clearing and physical disturbance were mapped as of September 2021 by another terrestrial monitoring study. This mapping was used to determine how the Project had changed the amounts of linear features and core areas during construction.

What was found?

As of September 2021, Project construction had created 91.7 km of linear features, in addition to those that were already there. This total length was 22.8 km higher than assumed for the EIS; the

increased length of new linear features was predominantly due to the trails that were created to access the reservoir clearing areas and the Ellis Esker borrow area.

Even though Project construction created more linear features than expected, total linear feature density in the Local Study Area still declined by almost one-third (from 1.49 km/km^2 to 1.00 km/km^2) since the beginning of Project construction. This decline occurred because existing cutlines were replaced by Project features such as borrow areas and reservoir clearing, and most of the roads used by the Project were either built on existing cutlines or were already there before the Project (e.g., Butnau Road; the North Access Road).

Winter trail used to access the Ellis Esker, in September 2021.

As predicted, Project construction removed three core areas, and reduced the sizes of several larger core areas. While a few core areas were completely removed, the total number of core areas in the Regional Study Area remained at 111 because Project features split several other core areas into multiple blocks. The specific core areas affected were the same as predicted by the EIS, with one exception - the largest core area (270,769 ha in size) had its core area reduced by 0.1%.

What does it mean?

To date, there have been no unexpected Project effects on intactness.

Monitoring has shown that actual Project effects on intactness during construction were quite similar to what was predicted. The majority of intactness effects were either lower or the same as predicted. For the few effects that were higher than predicted, the differences between the predicted and actual values were relatively small. Regional values for all of the intactness measures were the same as was predicted with one minor exception.

What will be done next?

Construction monitoring for intactness has now concluded. Intactness monitoring will continue during Project operation, with the first re-evaluation occurring in 2026.

ACKNOWLEDGEMENTS

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Chiefs and Councils of Tataskweyak Cree Nation (TCN), War Lake First Nation (WLFN), York Factory First Nation (YFFN) and Fox Lake Cree Nation (FLCN) are gratefully acknowledged for their support of this program.

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

STUDY TEAM

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

This report uses data collected by other terrestrial monitoring studies.

Data analysis, GIS analysis and report writing were completed by James Ehnes and Brock Epp. 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 (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 *Keeyask Generation Project Terrestrial Effects Monitoring Plan* (TEMP; KHLP 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, intactness, during the construction and operation phases.

Intactness is the degree to which an ecosystem remains unaltered by human development and other activities that remove habitat and increase fragmentation. Fragmentation is a landscape-level process in which human features (such as cutlines and roads) progressively subdivide habitat blocks into smaller and more isolated fragments. Among other things, fragmentation reduces the size of large unaltered areas (i.e., core areas), creates edges, isolates habitat and reduces connectivity. Some wildlife species that are sensitive to human disturbance require large core areas.

Intactness was selected as a VEC because it is an umbrella indicator for many ecosystem processes and wildlife species, and provides a good indication for overall effects on regional ecosystem health. Additionally, there is concern among the Keeyask Cree Nations (KCNs or partner First Nations) that the construction of roads, camps and transmission lines will disrupt the habitat and migratory paths of wildlife. Linear feature density and core area abundance were the indicators used for intactness in the Project EIS.

The intactness monitoring program (TEMP, Section 2.4.2) includes a single study, Linear Density and Core Area, that periodically evaluates changes to intactness using information produced by other TEMP studies. Mitigation compliance and effectiveness relevant for intactness are monitored by the Terrestrial Habitat Clearing, Disturbance and Indirect Effects study (TEMP, Section 2.1.2) and the Terrestrial Habitat Rehabilitation study (TEMP, Section 2.2.2).

The goal of the Linear Density and Core Area study is to verify the nature of Project effects on intactness. The objectives of this study are to:

- Locate and quantify Project-related changes to linear density and core area; and,
- Verify net Project effects on intactness.

This study was first implemented at the end of Project construction, and will be repeated periodically during operation.

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

2.0 METHODS

2.1 APPROACH

Section 2.4.2 of the 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 intactness were monitored using the mapping produced by the Terrestrial Habitat Clearing, Disturbance and Indirect Effects study (TEMP, Section 2.1). Actual effects on intactness were evaluated at the end of the construction phase, and will be periodically evaluated again during operation.

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 terrestrial and dewatered aquatic areas.

Intactness monitoring focuses on the net effects of two counteracting trends. During construction, Project construction removes some pre-existing linear features as they are incorporated into Project features (e.g., borrow areas). During operation, the expanding reservoir will cover some linear features and reduce the sizes of some core areas. At the same time, vegetation regeneration in some portions of existing and Project-related linear features could increase intactness by converting these linear features back into native habitat.

The parameters measured for this study are:

- Project-related changes to linear feature density, by broad feature type; and
- Project-related changes to the number, size and locations of core areas.

Map 2-1 shows the Local Study Area (LSA) and Regional Study Area (RSA) for the intactness effects assessment and for monitoring.

2.2 LINEAR DISTURBANCE

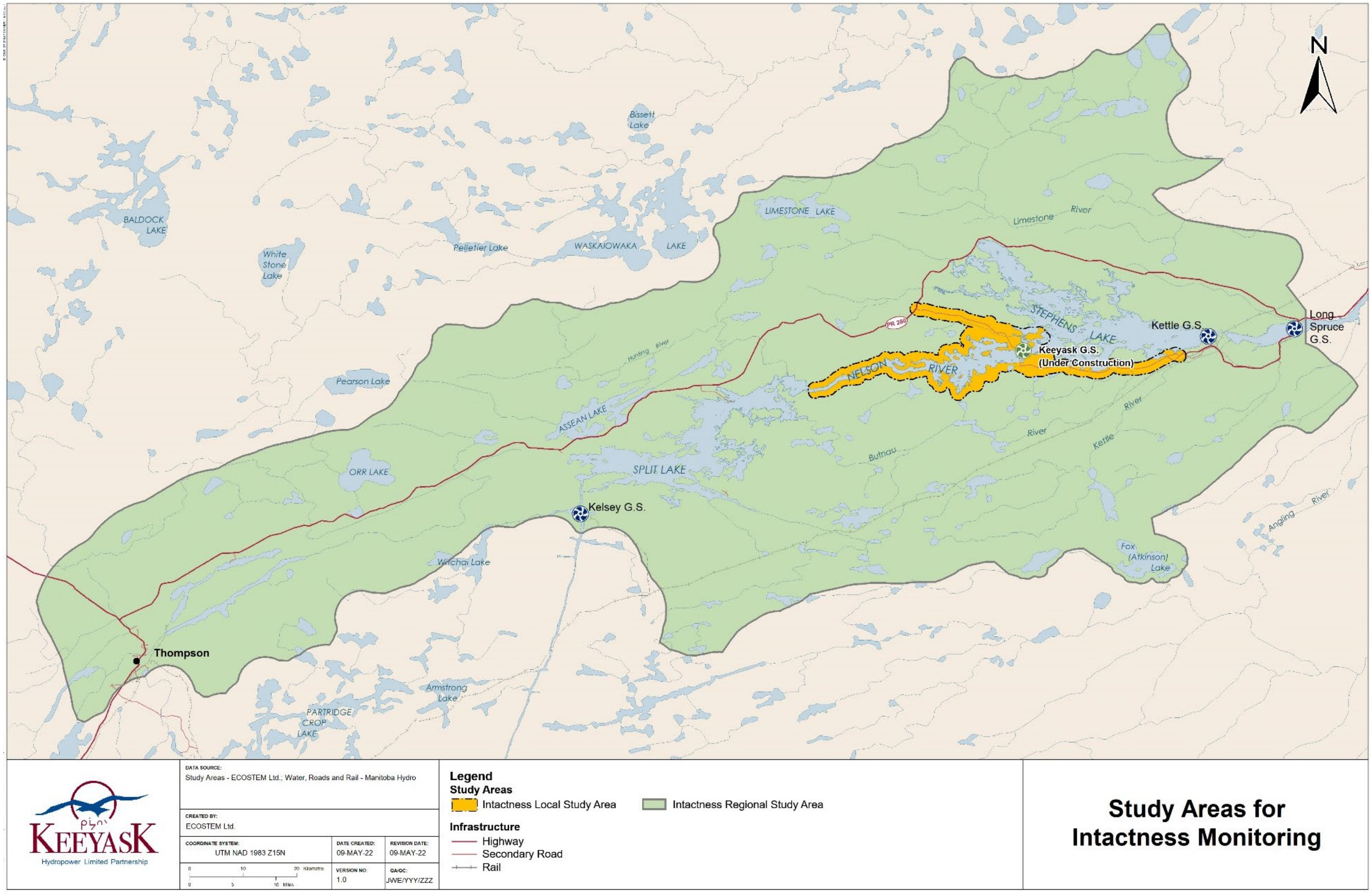
The metrics for linear feature density were total linear feature density (*i.e.*, km of all human linear features per square km of land area), transportation density and linear density by feature type.

New linear features created by the Project were mapped from digital stereo photos acquired on October 2, 2021 and from a digital orthorectified imagery (DOI) created from Worldview imagery acquired on August 30, 2021.

2.3 CORE AREA

Core area metrics included total core area as a percentage of land area, the total number of core areas by size class and the sizes of the largest core areas.

Core areas as of the end of construction (i.e., September, 2021 for the purposes of terrestrial monitoring) were created using the same methods as the for the EIS with the exception that the planned Project construction footprint was replaced with the Construction Footprint.



Map 2-1: Local and Regional Study Areas for intactness monitoring

3.0 RESULTS

3.1 LINEAR DISTURBANCE

The total length of linear features created by the Project was 91.7 km (Table 3-1). This total length was 22.8 km higher than assumed for the EIS predominantly due to the creation of new trails to access the reservoir clearing areas (Photo 3-1) and to access the Ellis Esker borrow area (Map 3-1). The access road to the Ellis Esker borrow area was classified as a trail because: a road bed was not constructed; it was only used in the winter; there were limited effects on ground vegetation and soils; and it appears that the trail will be at least partially revegetated over time as was observed for older trails in the Project area (Figure 3-1).

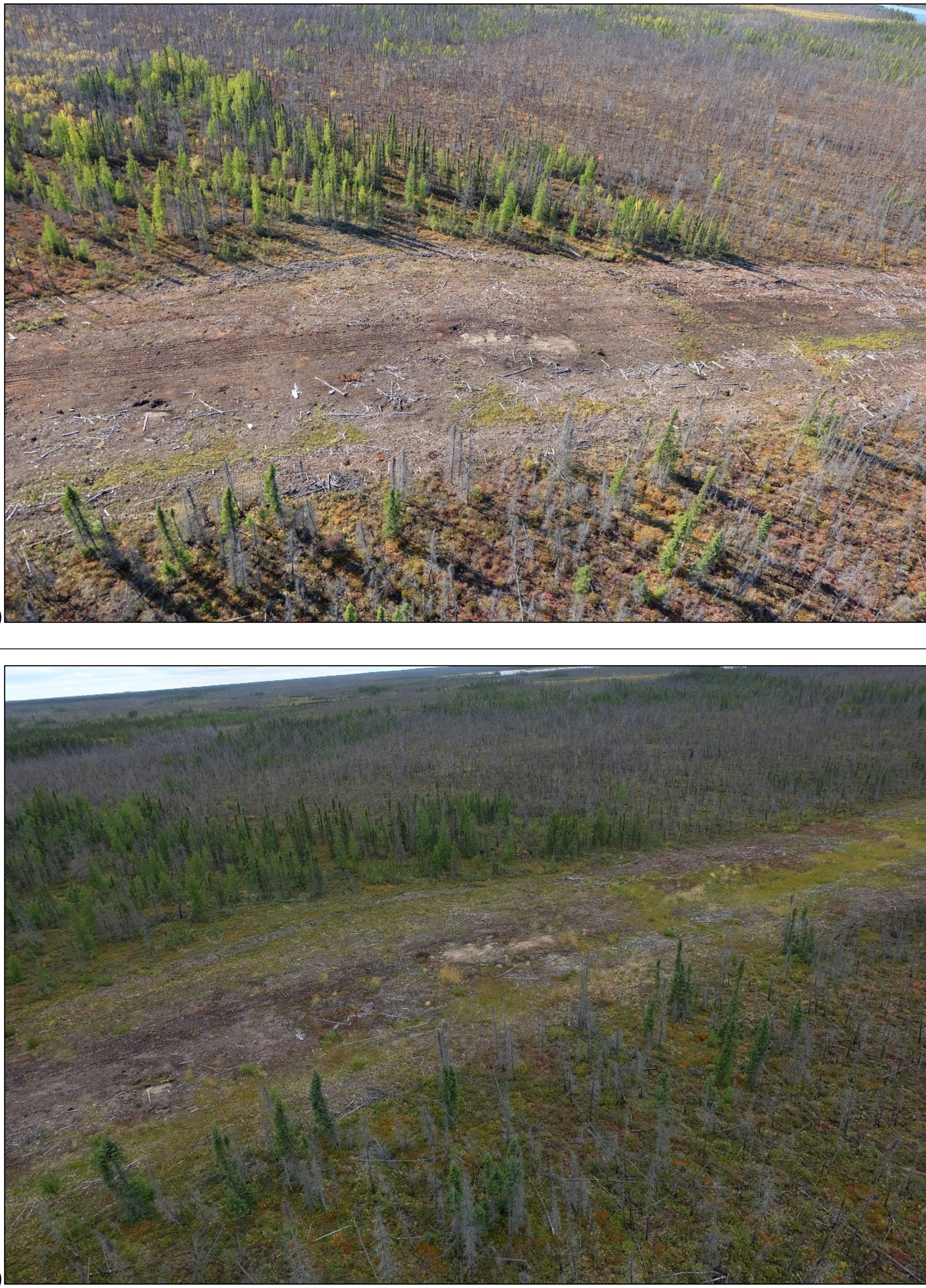
Actual highway length was slightly higher than assumed for the EIS (Table 3-1) because some of the final South Access Road (SAR) route had to be adjusted following the assessment to meet highway safety requirements.

Total all weather road length was lower than assumed for the EIS partly because the number of borrow areas that were used was lower than planned, and partly because opportunities to improve access efficiency into borrow areas were implemented during Project construction.

Table 3-1. Planned versus actual length of new linear features created by the Project during construction

Type	EIS	Actual	Difference
Dike	25.4	25.4	0.0
Highway	32.3	34.3	2.0
Road (all weather)	3.9	2.2	-1.7
Trail	7.3	29.8	22.6
All	**68.9**	**91.7**	**22.8**

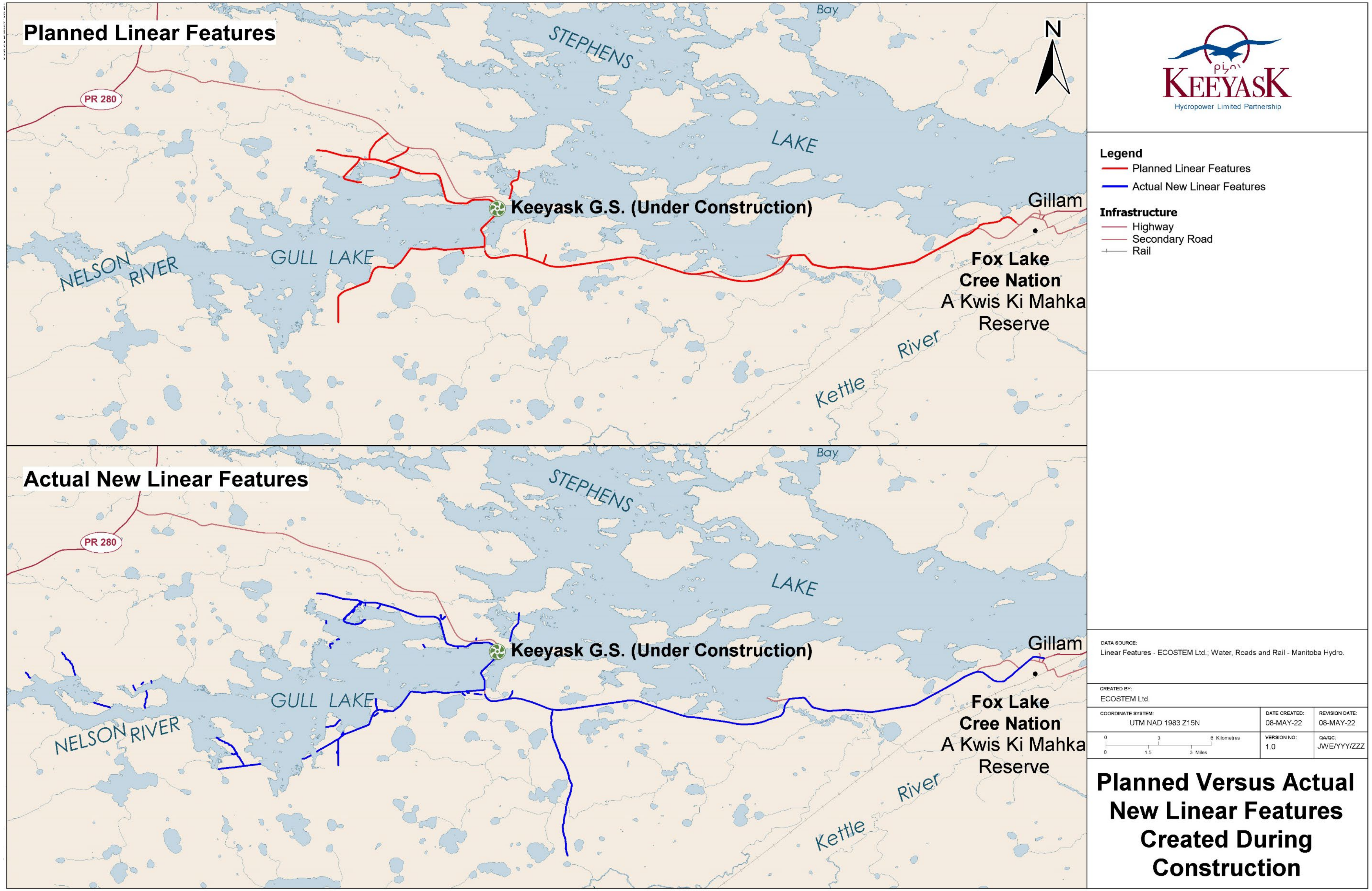
Photo 3-1: New trail added to access reservoir clearing areas on the south side of the Nelson River.



a)

b)

Figure 3-1: Photos of the same portion of the trail to Ellis Esker in 2019 (a) and 2021 (b)



Map 3-1: **Planned versus actual new linear features created by the Project during construction.**

3.2 CORE AREA

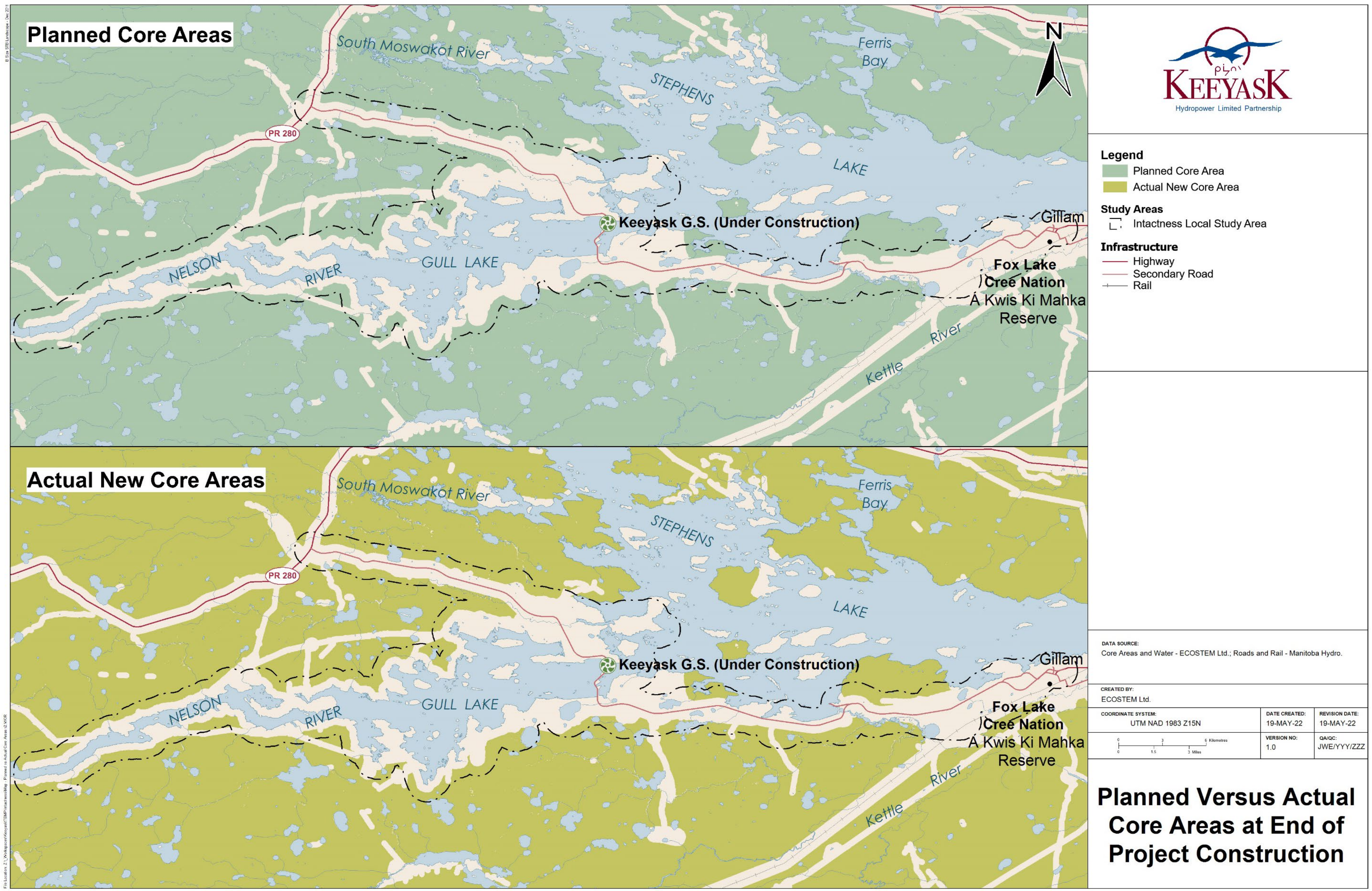
Project construction removed one core area that was slightly larger than 1,000 ha and two core areas that were between 200 ha and 1,000 ha in size (Table 3-2). Additionally, several larger core areas on the north and south sides of the Nelson River became smaller. While a few core areas larger than 200 ha were completely removed, the total number of core areas in the RSA remained at 111 because several other core areas were fragmented into smaller blocks.

The specific core areas affected were the same as predicted by the EIS, with one exception. The exception was the largest core area (270,769 ha) in the RSA, which had its core area reduced by 0.1% (184 ha).

Table 3-2. Predicted and actual number and size (ha) of core areas in the Regional Study Area as of the end of Project construction, by minimum size, and core area as a percentage of land area

Core Area Minimum Size	Before or After Project Construction	Numb er	Total Area (ha)	Core Area Percentage of RSA
1,000 ha	Before	57	1,022,169	83
	After	56	1,011,655	82
	Difference	-1	-10,514	-1
200 ha[1]	Before	111	1,046,097	84
	After	111	1,036,044	84
	Difference	0	-10,053	-1

[1]Notes: The values for “200 ha” show the increases that result from reducing the minimum core area size from 1,000 ha to 200 ha.



Map 3-2: Planned versus actual core areas at the end of Project construction.

4.0 COMPARISON WITH PREDICTED EFFECTS

4.1 PREDICTED EFFECTS

The *Keeyask Generation Project Response to EIS Guidelines* (KHLP 2012b) included predictions as to how the Project was expected to affect intactness in the Keeyask region. After considering mitigation and the effects of other past and existing human features, residual Project effects on regional intactness during construction were expected to include slight positive changes to linear feature density and slight adverse changes to core area percentage. Total linear feature density was predicted to decline slightly. It was anticipated that total linear feature density would be reduced because cutlines would be replaced by Project features such as borrow areas and reservoir clearing. Most of the roads used by the Project during construction are either already existing or would be built on existing cutlines.

Specifically, the EIS predicted that Project construction would:

1. Reduce total linear feature density in the LSA from 1.49 km/km^2 to 0.95 km/km^2.
2. Increase local transportation density from 0.13 km/km^2 to 0.17 km/km^2, primarily due to temporary access roads to borrow areas and excavated material placement areas.
3. One core area slightly larger than 1,000 ha and two core areas between 200 ha and 1,000 ha would be removed. In addition, several larger core areas on the north and south sides of the Nelson River would become smaller.
4. For the LSA:
    a. The number of core areas at least 200 ha in size that overlap it (not including the 270,800 core area north of PR 280) would decline from 13 to 12; and,
    b. Their combined area would decline by from 115,308 ha to 106,754 ha.
5. For the RSA:
    a. The percentage of land area in core areas larger 1,000 ha would be reduced by 1% from approximately 83% to 82%;
    b. The total number of core areas in the larger than 200 ha would remain at 111 because, although a few core areas are completely removed, several other core areas are fragmented into smaller blocks; and,
    c. The total number of core areas larger than 1,000 ha would be reduced by one. None of the very large core areas would be lost.

A moderately high level of certainty was associated with these predictions because: existing human infrastructure could be mapped with high accuracy; the spatial extent of Project-related physical terrestrial loss as a percentage of the RSA could be predicted with relatively high accuracy; however, while the risk of access-related effects such as a large and severe burn was low, such effects could be relatively large if they occurred.

4.2 MITIGATION

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

1. Clearing and disturbance within the Project Footprint will be minimized to the extent practicable;
2. Disturbance of areas adjacent to the Project Footprint will be avoided to the extent practicable; and,
3. A rehabilitation plan will be developed that gives preference to rehabilitating the most affected priority habitat types using approaches that “go with nature”; and,
4. Except for existing resource-use trails, 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.

Mitigation Items 1 and 2

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. This study concluded that these mitigation measures were implemented effectively and they contributed to lower than predicted Project effects on the terrestrial habitats (ECOSTEM 2022b).

Mitigation Item 3

ECOSTEM (2022c) documents actual rehabilitation efforts to September, 2021. Habitat rehabilitation efforts are being implemented as construction areas are decommissioned. Work completed to date that is relevant for effects on intactness includes the initial efforts to revegetate some of the borrow areas used for the Project and for the Keeyask Infrastructure Project.

Mitigation Item 4

Cutline and trail blocking were not implemented as originally planned (ECOSTEM 2022c). Two trails were blocked in 2017 with piled soil and vegetation. Obstructions were not placed in the remaining trails and cutlines as they were effectively blocked by dense vegetation regeneration following the 2013 wildfire (ECOSTEM 2018a). This regeneration made many of the trails and cutlines nearly indistinguishable from the surrounding area (see Photo 5-1).

Photo 5-1: Trail regenerating after the 2013 wildfire.

4.3 ACTUAL RESIDUAL EFFECTS

Direct Project effects on intactness during the construction phase were evaluated by using the Project linear feature, clearing and physical disturbance mapping completed for the Terrestrial Habitat Clearing, Disturbance and Indirect Effects study. These maps were used to locate and quantify actual Project effects on intactness during construction, which were then compared with the EIS predictions. Section 1.0 provides results for actual effects during construction. This section compares actual with predicted effects.

Monitoring has shown that Project effects on intactness during the construction phase were consistent with the EIS predictions. The majority of effects were either lower or the same as was predicted. For those metrics with higher effects, the differences between the predicted and actual values were relatively small. All of the values for the RSA, which is the comparison area used to evaluate the ecological significance of adverse effects, were the same as predicted.

Post-Project total linear density in the LSA was slightly higher than predicted (1.00 versus 0.95 km/km^2; Table 5-1) predominantly due to the creation of new trails to access the reservoir clearing areas and the Ellis Esker borrow area (Section 2.2). Consequently, the Project-related reduction in total linear feature density in the LSA was not as large as predicted (prediction # 1 in Section 5.1). The higher than predicted Project-related increase in the total length of linear features was too small to change linear feature density for the RSA (Table 5-1).

Table 5-1. Predicted and actual linear feature length and density in the Local and Regional Study Area at the end of construction

Study Area	Total Length (km)			Linear Density (km/km^2)	
	EIS	Actual	Difference	EIS	Actual
Local Study Area	402	425	23	0.95	1.00
Regional Study Area	5,481	5,504	23	0.44	0.44

With the exception of the cutline/trail component class of linear features, all other linear densities remained the same for the LSA (Table 5-2). Thus, the Project-related increase in local transportation density was the same as predicted (prediction # 2).

Table 5-2. Predicted and actual linear feature density in the Local and Regional Study Area at the end of construction, by linear feature type

Linear Feature Type	Local Study Area		Regional Study Area	
	Predicted	Actual	Predicted	Actual
Highway	0.04	0.05	0.03	0.03
Road	0.12	0.12	0.02	0.02
Winter road	0.00	0.00	0.01	0.01
Railway	0.00	0.00	0.01	0.01
Sub-total for transportation	**0.17**	**0.17**	**0.07**	**0.07**
Transmission line	0.01	0.01	0.06	0.06
Dike	0.07	0.07	0.00	0.00
Path	0.05	0.05	0.02	0.02
Sub-total for lower impact except cutline/ trail	**0.13**	**0.13**	**0.08**	**0.08**
Cutline or trail	**0.65**	**0.70**	**0.29**	**0.29**
All linear features	**0.95**	**1.00**	**0.44**	**0.44**

The specific core areas affected were the same as predicted by the EIS, with one exception (predictions # 3, 4a and 5b). The exception was that the largest core area (270,769 ha) was impacted and had its core area reduced by 0.1%.

In the LSA, the reduction in total area of core areas at least 200 ha in size was slightly more than predicted, having been reduced from 115,308 ha to 106,563 rather than 106,754 (prediction # 4b).

As of the end of construction, the values for all of the core area metrics for the RSA were the same as predicted (prediction # 5) with one exception (Table 5-3). The actual percentage of land area included in core areas larger than 1,000 ha was 82% compared with a predicted value of 83%. This difference was due to the trails created to access reservoir clearing areas. This difference was not considered to be ecologically significant because: the magnitude was very low; trails and cutlines have lower adverse effects on intactness compared with many other linear feature types (KHLP 2012b, Section 2.4.2.4); and, the core area percentage was still considerably above the 65% benchmark value for the transition from small to moderate magnitude adverse effects.

Table 5-3. Predicted and actual number and size (ha) of core areas in the Regional Study Area as of the end of Project construction, by minimum size, and core area as a percentage of land area

Core Area Minimum Size	Predicted or Actual	Number	Total Area (ha)	Core Area Percentage of RSA
1,000 ha	EIS	56	1,022,169	83
	Actual	56	1,011,655	82
	Difference	0	-10,514	-1
200 ha[1]	EIS	111	1,046,097	84
	Actual	111	1,036,044	84
	Difference	0	-10,053	0

[1]Notes: The values for “200 ha” show the increases that result from reducing the minimum core area size from 1,000 ha to 200 ha.

5.0 SUMMARY AND CONCLUSIONS

As of September 2021, when construction clearing and disturbance was in large part completed, Project construction had created 91.7 km of linear features in addition to those that were already there. The total length of new linear features was 22.8 km higher than assumed for the EIS. The predominant reason for this increase was that additional trails were created to access the reservoir clearing areas and to access the Ellis Esker borrow area. Based on what has been observed for old trails elsewhere in the Keeyask region, it is expected that natural revegetation will eventually become so dense that portions of these trails will become unusable as travel corridors, which will increase intactness.

Even though Project construction created new linear features, total linear feature density in the LSA still declined from 1.49 km/km^2 to 1.00 km/km^2. This occurred because: existing cutlines were replaced by Project features such as borrow areas and reservoir clearing; and, most of the roads used by the Project were either built on existing cutlines or were already there before the Project (e.g., Butnau Road; the North Access Road).

Project construction removed one core area that was slightly larger than 1,000 ha and two core areas that were between 200 ha and 1,000 ha in size. Additionally, several larger core areas on the north and south sides of the Nelson River became smaller. While a few core areas larger than 200 ha were completely removed, the total number of core areas in the RSA remained at 111 because several other core areas were fragmented into smaller blocks.

Construction monitoring did not identify any unanticipated Project effects on intactness.

Monitoring has shown that actual Project effects on intactness during construction were quite consistent with what was predicted. The majority of effects were either lower or the same as was predicted. For those metrics with higher effects, the differences between the predicted and actual values were relatively small. All of the values for the RSA, which is the comparison area used to evaluate the ecological significance of adverse effects, were the same as predicted with one exception that was minor. The exception was that the actual percentage of land area included in core areas larger than 1,000 ha was 82% compared with a predicted value of 83%. This difference was considered to be minor as it was relatively small (1%) and the core area percentage (82%) was still considerably above the 65% benchmark value for the transition from small to moderate magnitude adverse effects.

Construction monitoring for intactness has now concluded. Intactness monitoring will be continued during Project operation, with the first evaluation occurring in 2026.

6.0 LITERATURE CITED

ECOSTEM Ltd. 2018a. Keeyask Generation Project Terrestrial Effects Monitoring Plan Report #TEMP-2018-06: Habitat Rehabilitation Implementation and Success Monitoring. A report prepared for Manitoba Hydro by ECOSTEM Ltd., June 2018.

ECOSTEM Ltd. 2022a. Keeyask Generation Project Terrestrial Effects Monitoring Plan Report #TEMP-2022-01: Habitat Loss and Disturbance Monitoring. A report prepared for Manitoba Hydro by ECOSTEM Ltd., June 2022.

ECOSTEM Ltd. 2022b. Keeyask Generation Project Terrestrial Effects Monitoring Plan Report #TEMP-2022-02: Priority Habitats Monitoring. A report prepared for Manitoba Hydro by ECOSTEM Ltd., June 2022.

ECOSTEM Ltd. 2022c. Keeyask Generation Project Terrestrial Effects Monitoring Plan Report #TEMP-2022-XX: Habitat Rehabilitation Implementation and Success Monitoring Report. A report prepared for Manitoba Hydro by ECOSTEM Ltd., June 2022.

Keeyask Hydropower Limited Partnership (KHLP). 2012a. Keeyask Generation Project Environmental Impact Statement: Response to EIS Guidelines, Winnipeg, Manitoba. June 2012.

Keeyask Hydropower Limited Partnership (KHLP). 2012b. Keeyask Generation Project Environmental Impact Statement: Terrestrial Environment Supporting Volume, Winnipeg, Manitoba. June 2012.

Keeyask Hydropower Limited Partnership (KHLP). 2015. Keeyask Generation Project Terrestrial Effects Monitoring Plan. Winnipeg, Manitoba. December 2015.