



Keeyask Infrastructure Project Terrestrial and Aquatic Monitoring Plan

Plants, Habitat and Ecosystems Monitoring Annual Report 2012-2013



KEYASK INFRASTRUCTURE PROJECT

TERRESTRIAL AND AQUATIC MONITORING PLAN

Terrestrial Plants, Habitat and Ecosystems Monitoring: Annual Report 2012 – 2013

Report for

MANITOBA CONSERVATION AND WATER STEWARDSHIP

Prepared on Behalf of the
Keeyask Hydropower Limited Partnership

By

ECOSTEM Ltd.

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EXECUTIVE SUMMARY

The Keeyask Hydropower Limited Partnership is constructing the Keeyask Infrastructure Project (the Project or KIP). The Project is located approximately 40 km southwest of Gillam, extending between Provincial Road (PR) 280 and Gull Rapids on the Nelson River (Map 2-1). The Project includes a start-up camp and associated infrastructure, a 25 km all-weather access road and the first phase of a main camp.

As part of the KIP licensing conditions (Environment Act Licence No. 2952R), the Keeyask Hydropower Limited Partnership is conducting terrestrial effects monitoring during the KIP construction. This annual report covers the period beginning at the start of construction, January 2012, through to March 31, 2013. There were also some pre-construction surveys undertaken in 2011 that are included in this report. Terrestrial habitat, ecosystem and plant monitoring for the KIP conducted during 2011 included pre-construction rare plant surveys and fire effects monitoring, while monitoring during 2012 included clearing and disturbance mapping, fire effects monitoring, rare plant surveys and invasive plant surveys.

Studies were conducted to compare the actual and planned extent of KIP clearing and physical disturbance as outlined in the Environmental Assessment Report, the Environmental Protection Plan and subsequent Project Footprint revisions approved by Manitoba Conservation and Water Stewardship to address the unanticipated shortage of suitable construction materials and to include the addition of wells for the main camp and start-up camp. Potential KIP fire effects were monitored, in order to determine the extent and effects of any fires caused or altered by the project. Pre-clearing rare plant surveys were conducted to verify that S1 or S2 species were not present in the planned borrow areas. Invasive plant surveys were also conducted to determine whether KIP was spreading invasive species, and whether any control or eradication measures were needed.

Clearing and disturbance studies showed that construction activities have been contained within the planned KIP Footprint with the exception of one 0.6 ha area that is part of a borrow area

located approximately 9 km from PR 280. The magnitude of effects on the terrestrial habitat included in this small additional area is within that which was assessed in the EA Report.

No fires in or close to the KIP footprint were reported in 2011 or 2012, and no follow-up studies were required. As was the case for EIS studies, no S1 or S2 species were observed in any of the surveyed areas. No invasive species were observed in the construction zones during low level aerial surveys, or during limited ground surveys.

Terrestrial habitat, ecosystems and plant monitoring results to March 2013 were consistent with EA Report predictions regarding actual KIP footprint clearing, effects on S1 and S2 plant species and the extent to which construction could spread invasive and/or non-native plants. No modifications to monitoring programs, mitigation measures or EnvPP guidelines are recommended. Terrestrial habitat, ecosystem and plant monitoring will continue in 2013.

ACKNOWLEDGEMENTS

ECOSTEM Ltd. would like to thank Sherrie Mason and the on-site Manitoba Hydro staff, including Matt Jurkiewicz and Stephen Jupin, for their support and assistance in planning field activities and access to the sites.

Chiefs and Councils of the Tataskweyak Cree First Nation (TCN), War Lake First Nation (WLCN), 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 Clayton Flett and Douglas Kitchekeesik of TCN for arranging logistic support and providing field staff for studies. Special thanks go to Keith Kitchekeesik and Peter Massan of TCN for their assistance in conducting field studies.

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STUDY TEAM

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Data analysis and report writing were completed by Alanna Sutton and James Ehnes. GIS analysis was primarily completed by James Ehnes and Alanna Sutton. Alex Snitowski conducted GIS analysis and completed the cartography.

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1.0 INTRODUCTION

The Keeyask Hydropower Limited Partnership is constructing the Keeyask Infrastructure Project (the Project or KIP). The Project is located approximately 40 km southwest of Gillam, extending between PR 280 and Gull Rapids on the Nelson River (Map 1-1). The Project includes a start-up camp and associated infrastructure, a 25 km all weather access road and infrastructure for the first phase of a main camp. The start-up camp is located near the intersection of PR 280 and the access road while the first phase of the main camp is located at the end of the access road on the north side of Gull Rapids.

The predicted environmental effects of the KIP were described in the Keeyask Infrastructure Project Environmental Assessment Report (Keeyask Hydropower Limited Partnership 2009; the EA Report). KIP was expected to affect terrestrial ecosystems through the direct and indirect effects of vegetation clearing, overburden excavation, road use and camp operation.

Construction of KIP began in January 2012 and was still ongoing in March 2013. Construction activities within this period included: clearing trees, stripping, grubbing, stockpiling materials, burning slash, setting up the start-up camp, blasting, road construction, installation of culverts, installation of the Looking Back Creek bridge and construction of a security gate.

Monitoring for the effects of KIP on terrestrial plants, habitat and selected broad ecosystem topics addresses two types of situations: implementation compliance and unanticipated events. Implementation compliance monitoring documents the actual extent of the KIP-related clearing and disturbance as well as implementation of mitigation measures. Unanticipated event monitoring focuses on potential low likelihood events or conditions that could substantially alter effects predictions such as accidental fires, finding provincially ranked S1 or S2 plants or substantial spreading of invasive and/or non-native plants.

The KIP Footprint used for the terrestrial monitoring program has undergone a number of alterations since 2009, all of which were approved by Manitoba Conservation and Water Stewardship. The proposed KIP Footprint initially evaluated for the environmental assessment

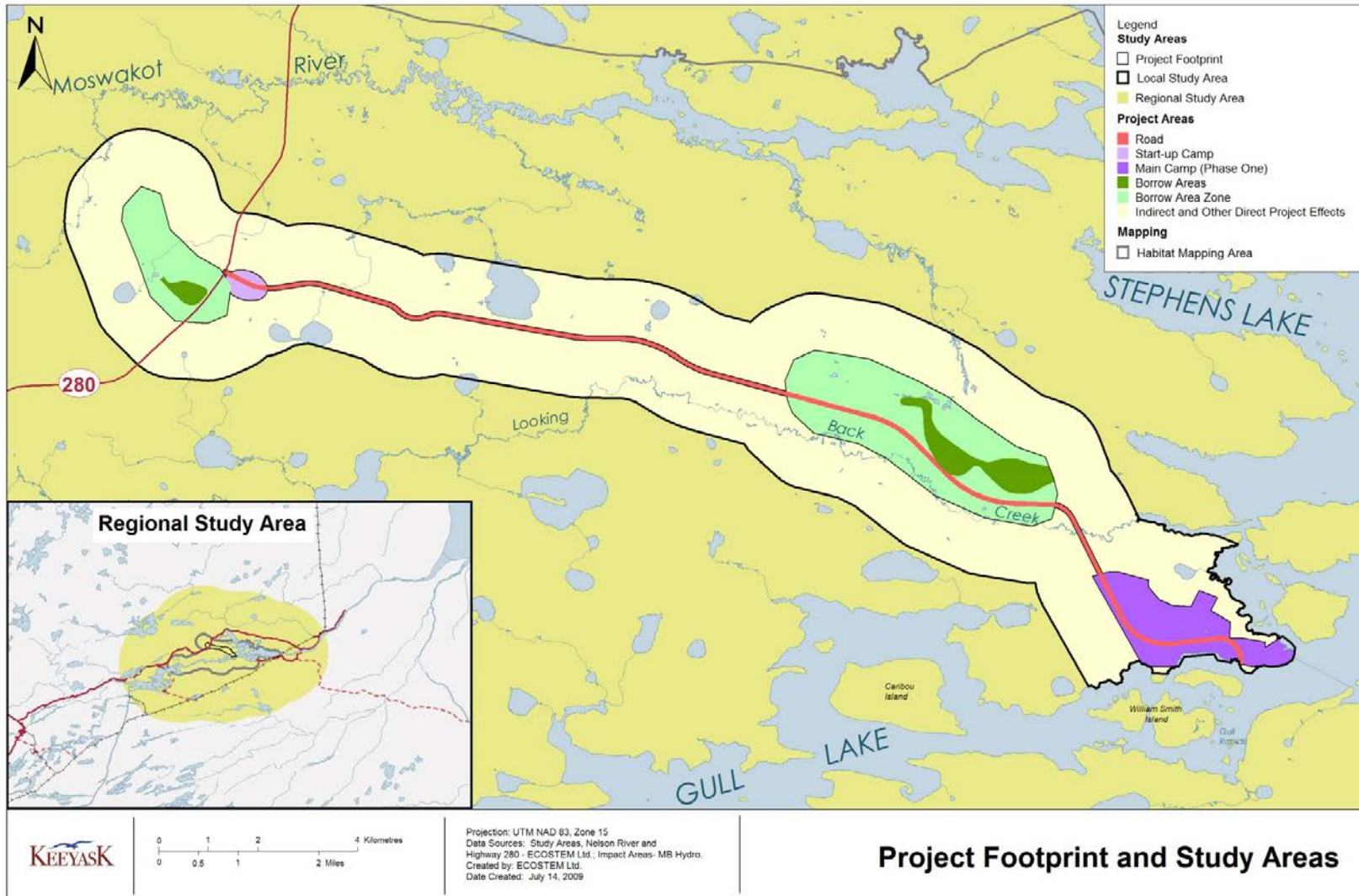
included the road, start-up camp, main camp, borrow areas and borrow area zones shown in Map 1-1. As described in the EA Report, subsequent engineering analysis refined the borrow area boundaries eliminating the broader borrow area zones from the proposed KIP Footprint and, reduced the anticipated borrow area extents to those shown in Map 1-2 (EA Report p. 5-13). The KIP Footprint included in the KIP Construction Environmental Protection Plan included the addition of well access for the main camp and start-up camp (Map1-3). Three alterations to the KIP Footprint were made between March 2012 and March 2013 to address an unanticipated shortage of suitable construction materials. The current version of the KIP Footprint incorporating the alterations and the Local and Regional Study Areas used for the terrestrial environment monitoring program are shown in Map 1-4.

Map 1-5 shows the terrestrial habitat and plants study area, which includes the KIP Footprint as well as a 150 m buffer around it to include the zone of potential indirect effects on habitat and plants. The 150 m buffer also provides for potential KIP related clearing and disturbance that could not be spatially defined prior to construction.

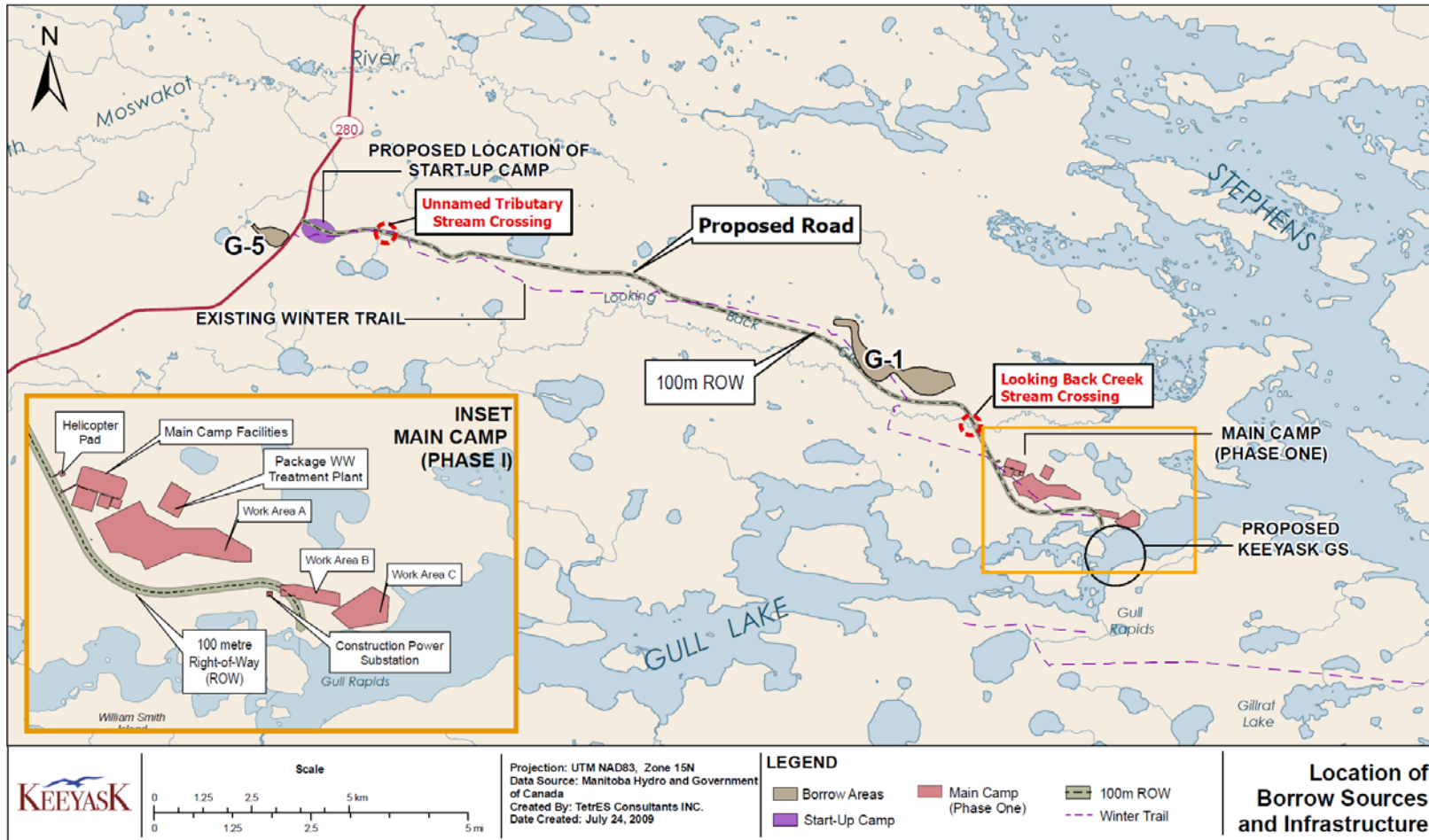
This report covers the period beginning at the start of construction, January 2012, through to March 31, 2013; it describes the terrestrial habitat and plant monitoring conducted during this period, as well as additional rare plant pre-clearing surveys carried out in 2011 (prior to the start of Project construction). This report does not include a section for effects on the fire regime because no fires occurred in the Local Study Area (Map 1-4) in 2011 or 2012.

The report is organized into the following studies:

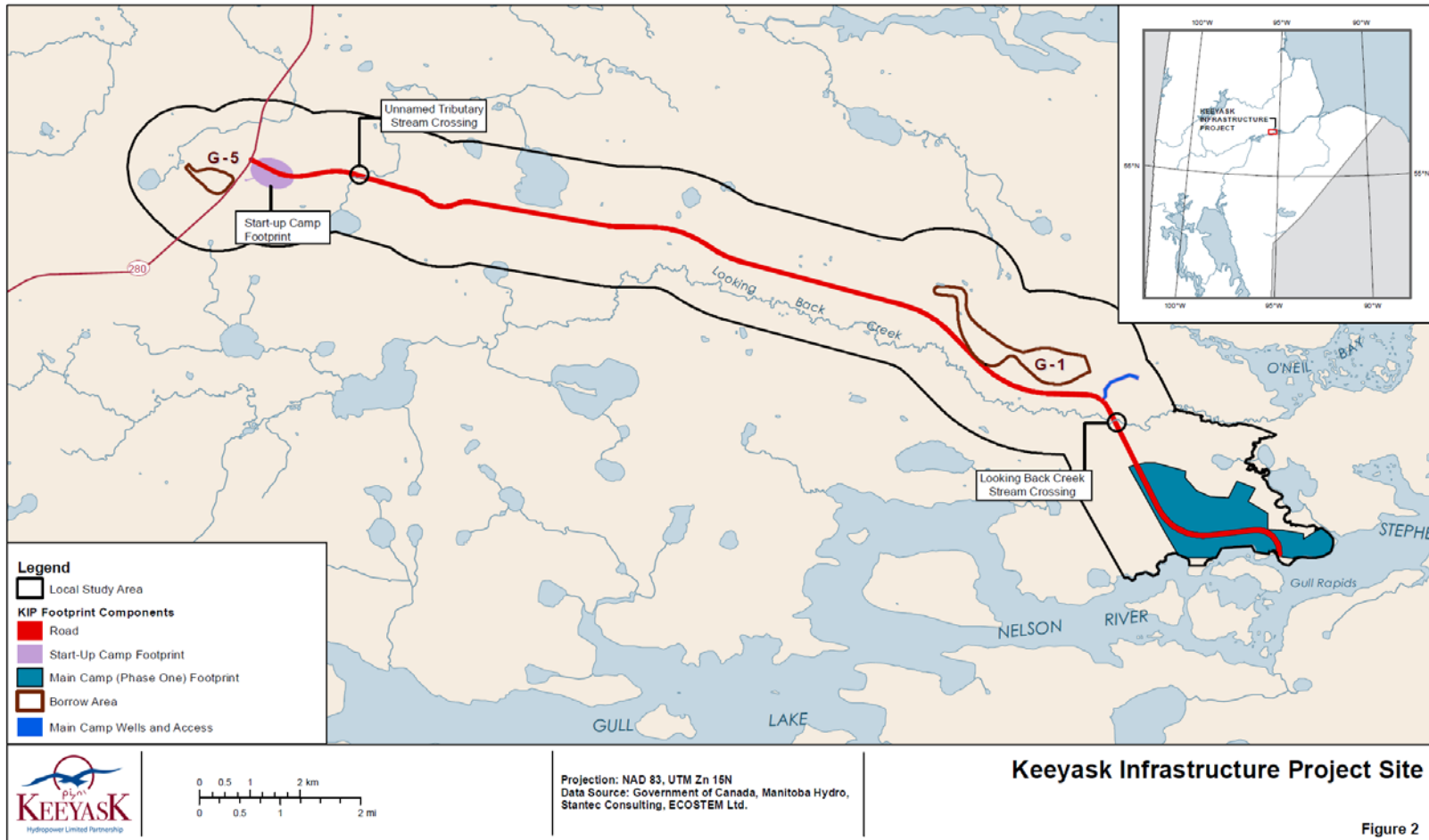
- Construction clearing and disturbance;
- S1 and S2 plant species; and,
- Introduction and spread of invasive and non-native plants



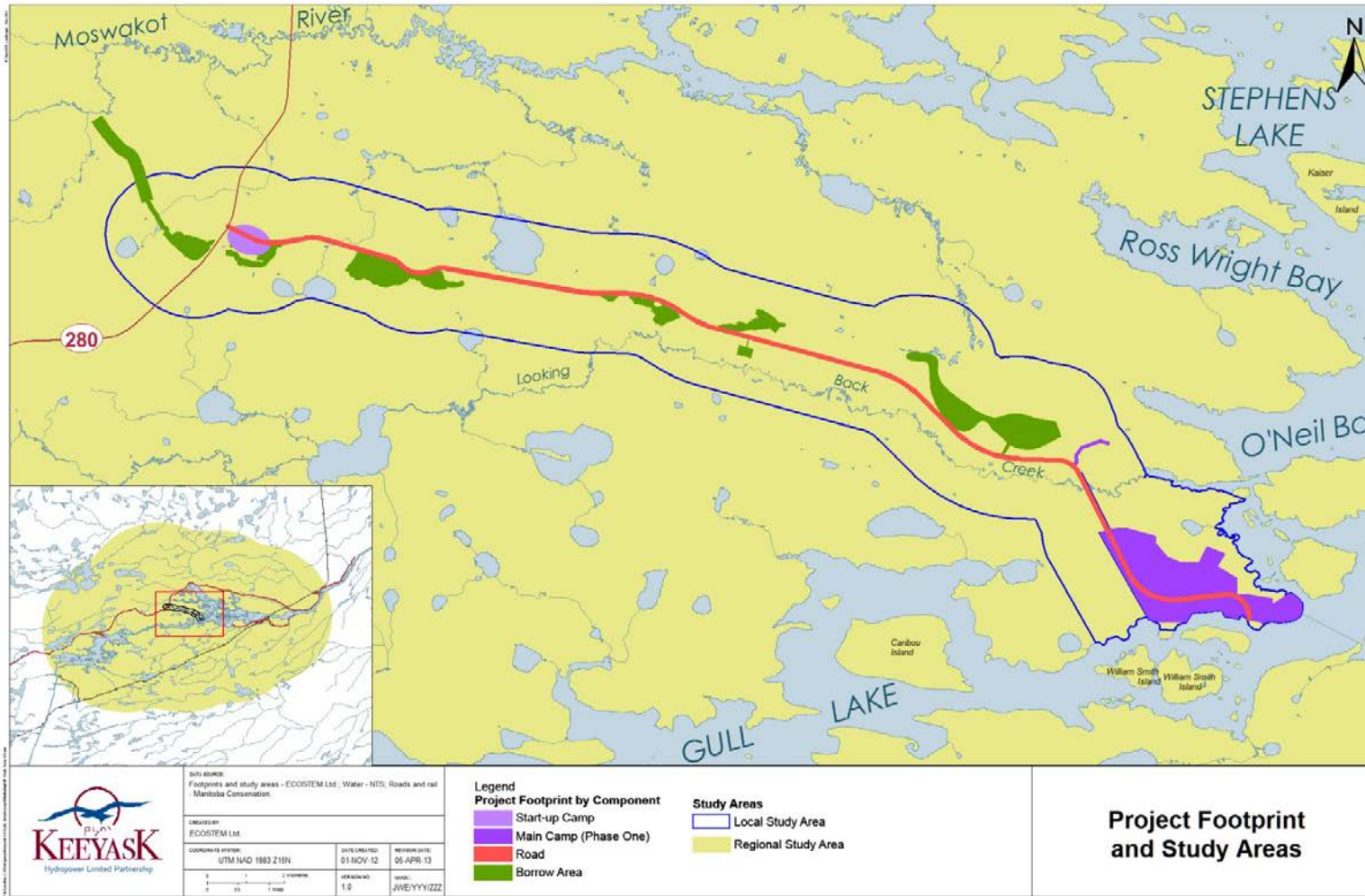
Map 1-1: Proposed KIP Footprint initially evaluated in the environmental assessment report.



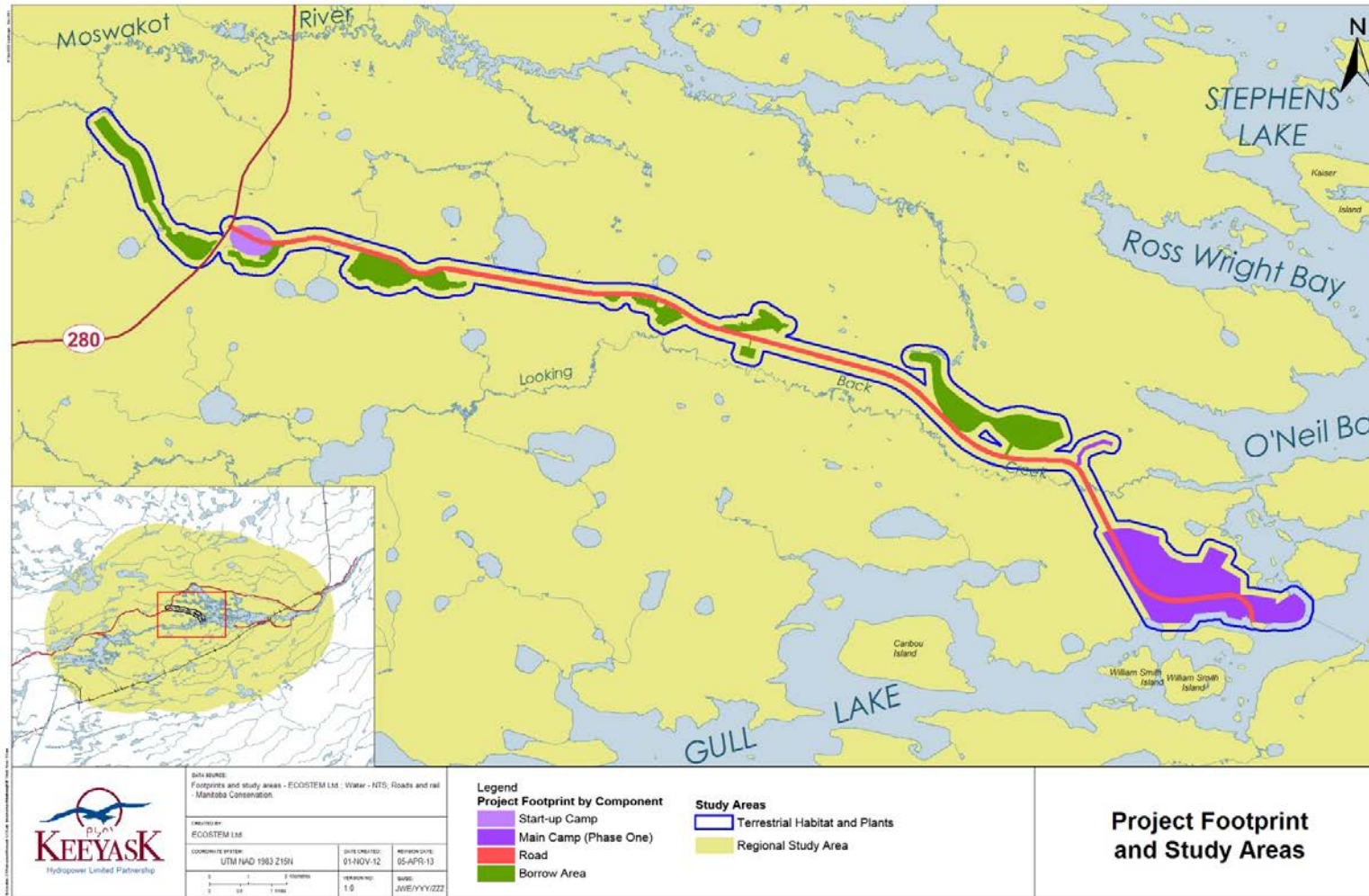
Map 1-2: Proposed KIP Footprint ultimately adopted in the environmental assessment report.



Map 1-3: KIP Footprint established for the Environmental Protection Plan.



Map 1-4: KIP Footprint and the terrestrial environment monitoring program study areas.



Map 1-5: KIP Footprint and the terrestrial habitat, ecosystems and plants study area.

2.0 CONSTRUCTION CLEARING AND DISTURBANCE

2.1 INTRODUCTION

2.1.1 Rationale

Potential KIP effects on terrestrial ecosystems include a reduction in the total number of habitat types, changes in the proportions of the habitat types or reductions in certain types of habitats, as well as possible alterations to habitat composition due to fires. Construction clearing and disturbance monitoring is being used as a keystone indicator for effects on terrestrial plants, habitat and broad ecosystem topics. Terrestrial habitat is fundamental because plants and animals use habitat for survival and reproduction and habitat effects are of interest in themselves. Terrestrial habitat also serves as a proxy for effects on many broader ecosystem attributes such as ecosystem diversity, wetland function and soil quantity and quality. Terrestrial habitat monitoring provides an effective means for identifying anticipated and unexpected effects on the terrestrial environment.

2.1.2 Objectives

The objectives of clearing and disturbance monitoring are to:

- Document the actual extent of clearing and disturbance, which is referred to as the actual KIP Footprint; and
- Assess whether there are substantial differences between the actual and planned KIP Footprint.

If substantial differences between the actual and planned KIP Footprint are detected, then objectives will also include:

- Assess whether these differences substantially change predicted effects and, if they do:
 - Develop additional monitoring studies as needed; and
 - Recommend modifications to mitigation measures and the environmental protection plans (EnvPPs), where appropriate and to the extent feasible with available data.

2.2 METHODS

2.2.1 Design

A combination of remote sensing, aerial surveys, pedestrian surveys and GIS mapping is being used to map KIP related clearing and disturbance (i.e., KIP Footprint mapping). High resolution digital imagery collected at the end of construction will provide additional habitat clearing data and serve as the base reference layer for mapping KIP clearing and disturbance in a Geographic Information System (GIS). All of these data are being used to produce the final *KIP Construction Footprint Map*. To support fragmentation analysis, roads and trails are also being mapped as a component of this study.

2.2.2 Parameters of Concern

Parameters being measured are:

- Area cleared or disturbed by habitat type; and
- Width and lengths of roads and trails by type.

2.2.3 Study Area

The terrestrial habitat and plants study area (Map 1-5) is the study area for monitoring the KIP impacts since this area includes all of the planned clearing and physical disturbance, as well as a buffer to search for unanticipated clearing and physical disturbance.

2.2.4 Sample Locations

Habitat loss and alteration from clearing and disturbance are expected to occur inside the planned KIP Footprint (Map 1-5) and in adjacent areas. KIP related clearing and disturbance that could not be spatially defined prior to construction is not expected to occur outside of the Terrestrial habitat and plant study area since it is a 150 m buffer of the planned KIP Footprint. For this reason, field studies were confined to the terrestrial habitat and plant study area. Ground surveys are being confined to locations where there is potential understorey disturbance.

2.2.5 Sampling Frequency and Schedule

Fieldwork occurred in September 2012 and will continue each summer during construction and during the first summer after construction is complete.

2.2.6 Data Collection

The aerial extent of vegetation and soil clearing and disturbance in 2012 was mapped from helicopter-based aerial surveys and photography. In future years, truck and foot-based ground survey will also be conducted to identify understorey and ground disturbance that is not visible from the air. Cleared and disturbed areas were recorded with field mapping and/or georeferenced photos. Notes on the type, size and severity of clearing and disturbance were taken. High resolution digital imagery collected at the end of construction will provide additional habitat clearing data and serve as the base reference layer for mapping KIP clearing and disturbance.

2.3 RESULTS

Map 2-1 shows the construction areas surveyed by helicopter in September 2012. During the 2012 survey, the entire road length was surveyed by helicopter and photographed. In addition, the start-up camp area and the portions of the main camp area that had already been cleared were also surveyed and photographed, along with borrow pits G-5, G-1, the pit adjacent to the start-up camp area, the pit approximately 3 km from PR 280 and the pit approximately 9 km from PR 280.

2.3.1 Road

At the time of the aerial survey in 2012, the road was graveled up to Looking Back Creek, where construction on the bridge was under way (Figure 2-1). Construction work was being done on the road between PR 280 and the borrow pit approximately 3 km from PR 280. Continuing past Looking Back Creek, the road was mainly cleared but un-graveled. All road clearing was within the planned KIP Footprint boundary.

2.3.2 Start-up Camp and Work Area

The start-up camp and work area were cleared and graveled at the time of the aerial survey (Figure 2-2). The adjacent borrow area was cleared and in use. One large pit and several trailers were present (Figure 2-3). All clearing and construction in this area was within the planned KIP Footprint boundary.

2.3.3 Borrow Areas

Portions of the G-5 borrow area on the north side of PR 280 were being cleared at the time of the aerial survey (Figure 2-4). Geotechnical test sites were observed along a gravelled road at the northern end of the borrow area (Figure 2-5). All construction activities in this area were within the planned KIP Footprint boundary.

The G-1 borrow area on the north side of the road, approximately 15 km from PR 280 was in use at the time of the survey. This borrow area included access road, two cleared areas, several geotechnical test sites and cutlines (Figure 2-6). All construction activities in this area were within the planned KIP Footprint boundary.

A borrow area south of the road, approximately 3 km from PR 280 had been cleared and was in use during aerial surveys (Figure 2-7). Cutlines were observed adjacent to the cleared area. All construction activities in this area were within the planned KIP Footprint boundary.

Approximately 9 km from PR 280, south of the road, a borrow area was cleared and in use (Figure 2-8). This borrow area was inside the planned KIP Footprint except for a 0.6 ha area at the west end of the borrow area. The portion of the borrow area outside of the planned KIP Footprint included a pit with ponded water (upper right corner of Figure 2-8).

Water had ponded in three of the borrow areas when surveys were conducted in 2012. The large pits in the borrow area adjacent to the start-up camp, approximately 3 km from PR 280 and approximately 9 km from PR 280 had filled with water.

2.3.4 Main Camp and Well Areas

Work on the main camp and well areas had not begun at survey time, aside from some clearing at the south end of the main camp area, where the road ends (Figure 2-9). All clearing in this area was within the planned KIP Footprint boundary.

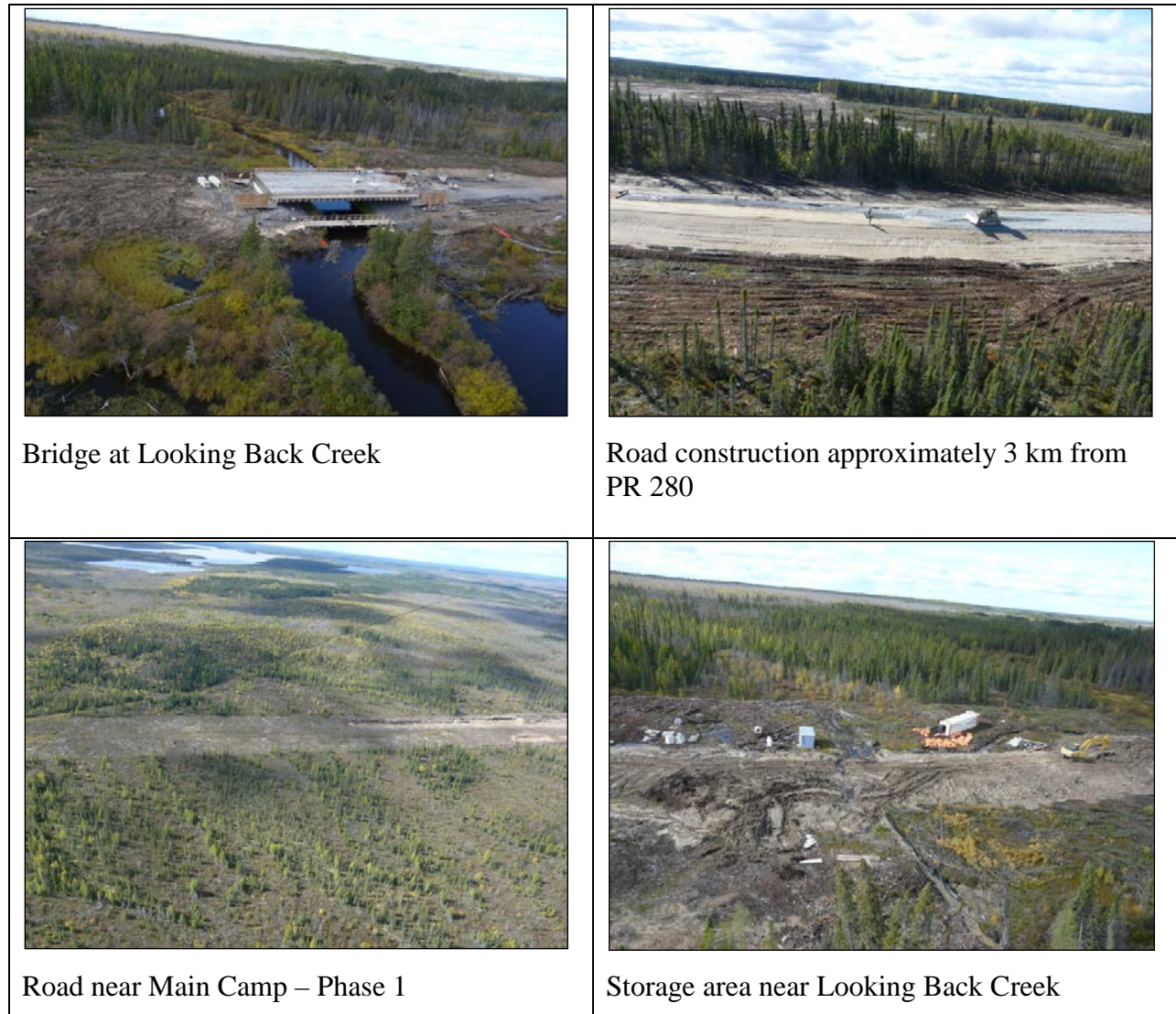


Figure 2-1: Construction areas along the road (September 20, 2012).



Figure 2-2: Start-up camp and work area near PR 280 (September 20, 2012).



Figure 2-3: Borrow area adjacent to the start-up camp and work area (September 20, 2012).



Figure 2-4: Clearing and excavation underway at G-5 borrow area (September 20, 2012).



Figure 2-5: Geotechnical test sites along the road approximately 3 km from PR 280 (September 20, 2012).



Figure 2-6: Clearing and excavation in G-1 borrow area, and nearby geotechnical test sites (September 20, 2012).



Figure 2-7: Clearing and excavation in borrow area approximately 3 km from PR 280 (September 20, 2012).



Figure 2-8: Clearing and excavation in borrow area approximately 9 km from PR 280 (September 20, 2012).



Figure 2-9: Clearing and grading at south end of Main Camp – Phase 1 (September 20, 2012).

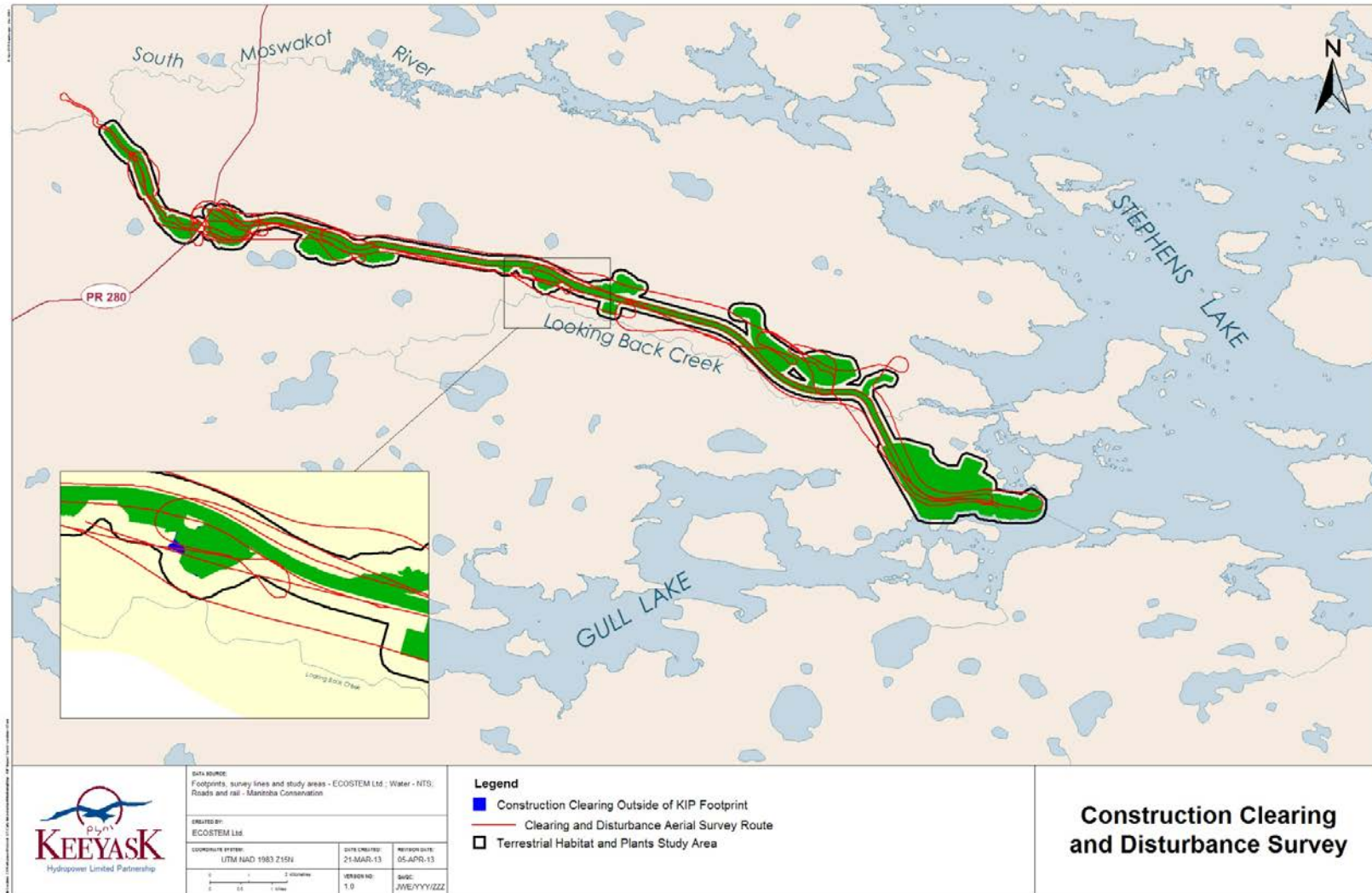
2.4 DISCUSSION

As described in Section 1.0, the KIP Footprint has undergone a number of alterations since 2009, which were approved by Manitoba Conservation and Water Stewardship. The potential effects of these footprint changes on terrestrial habitat were evaluated prior to them being proposed to Manitoba Conservation and Water Stewardship and were determined to be of a lesser magnitude than described in the EA Report. While some new borrow areas were added, their potential effects were offset by the removal of the broader borrow area zones from the KIP Footprint.

With one 0.6 ha exception, all clearing and physical disturbance documented during the 2012 field surveys was within the planned KIP Footprint. The single small exception was located adjacent to a planned borrow pit located 9 km from PR 280. The magnitude of effects on the terrestrial habitat included in this small additional area is within that which was assessed in the EA Report.

Several of the borrow areas had ponded water when the field surveys were conducted. These borrow areas should be investigated for their potential to be rehabilitated as marsh wetlands after construction is complete.

Construction clearing and disturbance monitoring will continue in summer 2013.



Map 2-1: KIP footprint clearing and physical disturbance aerial survey locations in 2012.

3.0 S1 AND S2 RARE PLANT SPECIES

3.1 INTRODUCTION

3.1.1 Rationale

The EA predicted that substantial effects on S1 and S2 plants in the KIP Footprint were not expected since these species had not been previously detected in the terrestrial habitat and plant study area. However, some of these species have the potential to occur in the KIP Footprint area. Rare plant species populations can be highly sensitive to the loss or disturbance of even a few individuals. Consequently, mitigation includes pre-construction rare plant surveys for species ranked S1 and S2 by the Manitoba Conservation Data Centre. In the unlikely event that any patches of S1 or S2 are found within the planned borrow areas, S1 plant patches will be avoided and S2 plant patches will be avoided to the extent practicable. This study includes pre-clearing S1 and S2 plant surveys and, in the event that any patches of such species are found in planned borrow areas, monitoring the avoidance and any alternative mitigation measures employed for these patches.

3.1.2 Objectives

The objective of this study is to monitor effects on S1 and S2 plants if any are discovered in the Terrestrial habitat and plant study area during pre-construction surveys or other terrestrial habitat and plant field studies.

3.2 METHODS

3.2.1 Design

S1 and S2 plant surveys are being conducted in KIP Footprint areas that were not previously surveyed and have the highest potential to include these species. If any S1 and S2 plant patches are discovered during pre-construction surveys or other terrestrial habitat and plant monitoring studies, then ground surveys in and around these patches will be conducted to monitor the extent to which these patches are preserved and whether there are any ongoing effects. Initial plant

patch mapping will occur as soon as possible after the patch is discovered and be coordinated with other field studies, to the extent feasible.

3.2.2 Parameters of concern

Parameters being measured are;

- Locations and sizes of S1 and S2 plant patches by species; and,
- Extent and degree of KIP effects on any identified S1 or S2 plant patches.

3.2.3 Study Area

The terrestrial habitat and plants study area (Map 1-5) is the study area for monitoring S1 and S2 plant species.

3.2.4 Sample Locations

Field studies are confined to the terrestrial habitat and plants study area (Map 1-5) because all of the Project impacts are expected to occur inside this area. Pre-clearing ground surveys are being conducted in KIP Footprint areas that were not previously surveyed and have the highest potential to include these species. If any S1 and S2 plant patches are identified, ground surveys will occur in the immediately adjacent area.

3.2.5 Sampling frequency and schedule

Pre-construction field surveys were conducted during the 2011 and 2012 growing seasons. Additional field surveys will be conducted if and when new clearing is planned. Pre-clearing surveys are being conducted in the areas designated for clearing during the following year that were not previously surveyed and have the highest potential to include S1 and S2 plant species. Additional growing season field studies would be triggered in the unlikely event that patches of S1 or S2 plant species are identified. The exact timing, duration and frequency of fieldwork to monitor avoidance of marked S1 and S2 plant patches will be determined if and when S1 or S2 plant patches are found.

3.2.6 Data Collection

Any areas identified for pre-clearing surveys were searched for S1 and S2 species that have the potential to occur in the terrestrial habitat and plant study area, which includes approximately 40 such species based on species distribution records and past observations and (see Keeyask Hydropower Limited Partnership 2012). Within the Regional Study Area, no S1 species have been previously recorded while four S2 and one S1S2 species have been recorded (elegant hawk's beard, *Crepis elegans* (S1S2); small pondweed, *Potamogeton pusillus* ssp. *tenuissimus* (S2); Robbin's pondweed, *Potamogeton robbinsii* (S2); swamp lousewort, *Pedicularis macrodonta* (S2)). Field botanists searched for all 40 species that could potentially occur in the KIP Footprint.

Searches were conducted along meandering and/or parallel transects located in the most likely habitats for these species, as well as other areas with the potential to support them. Incidental S1 and S2 plant observations were recorded while travelling between study areas, or while conducting other terrestrial habitat and plant fieldwork in the area.

If S1 or S2 plant species are observed in the study area, field studies will consist of documenting the location and patch size of the species. The extent and degree of KIP effects on any identified S1 and S2 plant patches will be documented.

3.3 RESULTS

Pre-clearing surveys were conducted on July 12, 13 and 14, 2011 and on June 26 and 27, 2012 at the locations shown in Map 3-1. The 2011 surveys were conducted in the start-up camp area, the G-1 borrow area and the Main Camp – Phase 1 area. In 2012, surveys were conducted in the G-1 and G-5 borrow areas. The total length of survey transects was 20.7 km in 2011 and 22.8 km in 2012.

In 2011, vegetation clearing was not evident along the transects, aside from older trails and cutlines. In 2012, partial clearing, including some vegetation and surface organic matter removal, was evident in the surveyed areas.

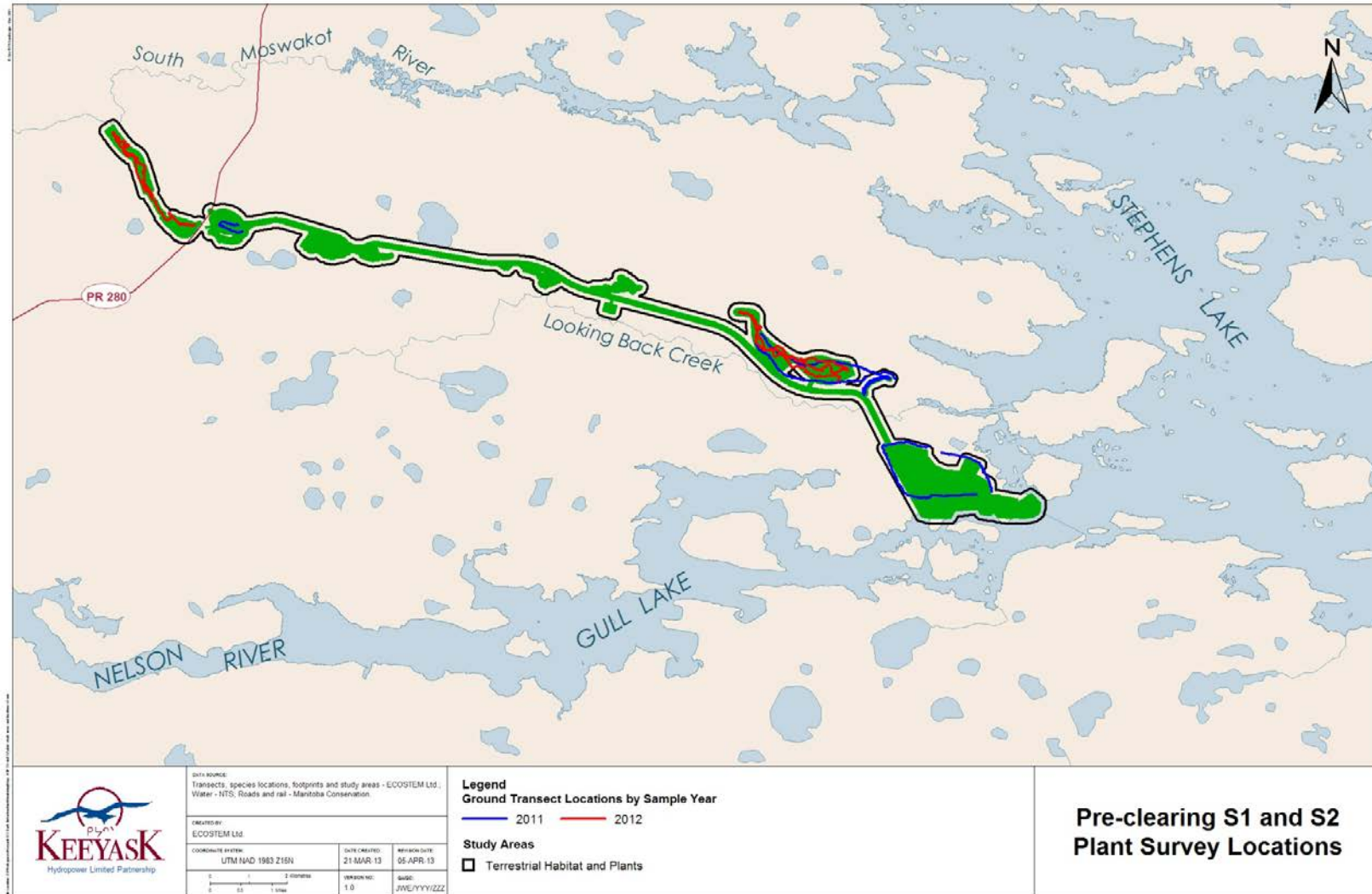
No S1 or S2 species were observed either along any of the transects surveyed in 2011 or 2012 or incidentally during other studies.

Two S3 species were recorded at seven locations during ground surveys in 2011. Shrubby willow (*Salix arbusculoides*) was found at two locations and rock willow (*Salix vestita*) was found at four locations.

3.4 DISCUSSION

Nine pre-clearing S1 and S2 plant survey transects extending for 43.5 km were searched in 2011 and 2012, to further verify the absence of S1 or S2 plants in the KIP Footprint. No S1 or S2 species were observed during these surveys. Additional pre-clearing S1 and S2 plant surveys will occur if new areas are identified for clearing and they have not previously been surveyed for S1 and S2 plants.

Two S3 plant species were observed at six locations during the field studies (shrubby willow, rock willow). These observations support statements in the EA Report that both species are more common in the Regional Study Area than is reflected by their Manitoba S-rank.



Map 3-1: KIP S1 and S2 plant study areas and survey locations.

4.0 INTRODUCTION AND SPREAD OF INVASIVE AND NON-NATIVE PLANTS

4.1 INTRODUCTION

4.1.1 Rationale

Invasive and/or non-native plants are of concern because they can crowd out other plant species and, in extreme cases, change vegetation composition. The EA Report predicted that the KIP was not expected to significantly increase the risk that invasive or non-native plants would crowd out sensitive species or convert habitat. There is a need to document invasive plant spread in and around the KIP Footprint, to determine the degree to which the KIP contributes to any invasive or non-native plant spread and to assess the effectiveness of mitigation measures.

4.1.2 Objectives

The objectives are to:

- Document the degree of invasive and non-native plant introduction and spread; and
- If there is substantial introduction and/or spread, then:
 - Assess how EA predictions should be modified; and
 - Recommend modifications to mitigation measures and EnvPP where appropriate.

4.2 METHODS

4.2.1 Design

Invasive and non-native plant distribution changes are generally being monitored with vehicle and foot-based ground surveys in the KIP Footprint and areas at the edges of clearing and disturbance. Surveys would extend further into undisturbed areas in the event that invasive or non-native plant spread is found at the edges of clearing and disturbance. Incidental observations are also being recorded during other field studies. Invasive and non-native plant patches are being mapped in a GIS.

4.2.2 Parameters of concern

Locations and sizes of invasive or non-native plant species patches by species are being mapped.

4.2.3 Study Area

The terrestrial habitat and plants study area (Map 1-5) is the study area for monitoring the introduction and/or spread of invasive and/or non-native plant species.

4.2.4 Sample Locations

Field studies are confined to the terrestrial habitat and plants study area because all of the KIP activities that could spread invasive or non-native plants are expected to occur inside this area.

4.2.5 Sampling frequency and schedule

Invasive and non-native plant surveys were not conducted in 2011 because clearing and construction had not started. In 2012, because safety concerns along the road prevented ground surveys, a low altitude aerial survey was conducted from a helicopter flying along the road and around borrow areas. Subsequent field surveys will be conducted every summer during construction and during the first summer after construction is complete. If there is evidence of substantial spread occurring, then additional fieldwork may need to be conducted.

4.2.6 Data Collection

During the 2012 low altitude aerial survey, construction and road areas were visually searched by the botanists for any signs of invasive plant presence. If any suspicious areas were spotted, a closer fly-by was done and, if still ambiguous, a ground survey was conducted to map plant patches. This method was capable of detecting large patches of taller herbs.

Growing season invasive and non-native plant surveys during subsequent years will consist of searching cleared and physically disturbed areas to identify species presence/absence. At each invasive and/or non-native plant location, a geo-referenced photo will be taken, maps will be marked and notes on patch size and/or number of individuals will be recorded.

4.3 RESULTS

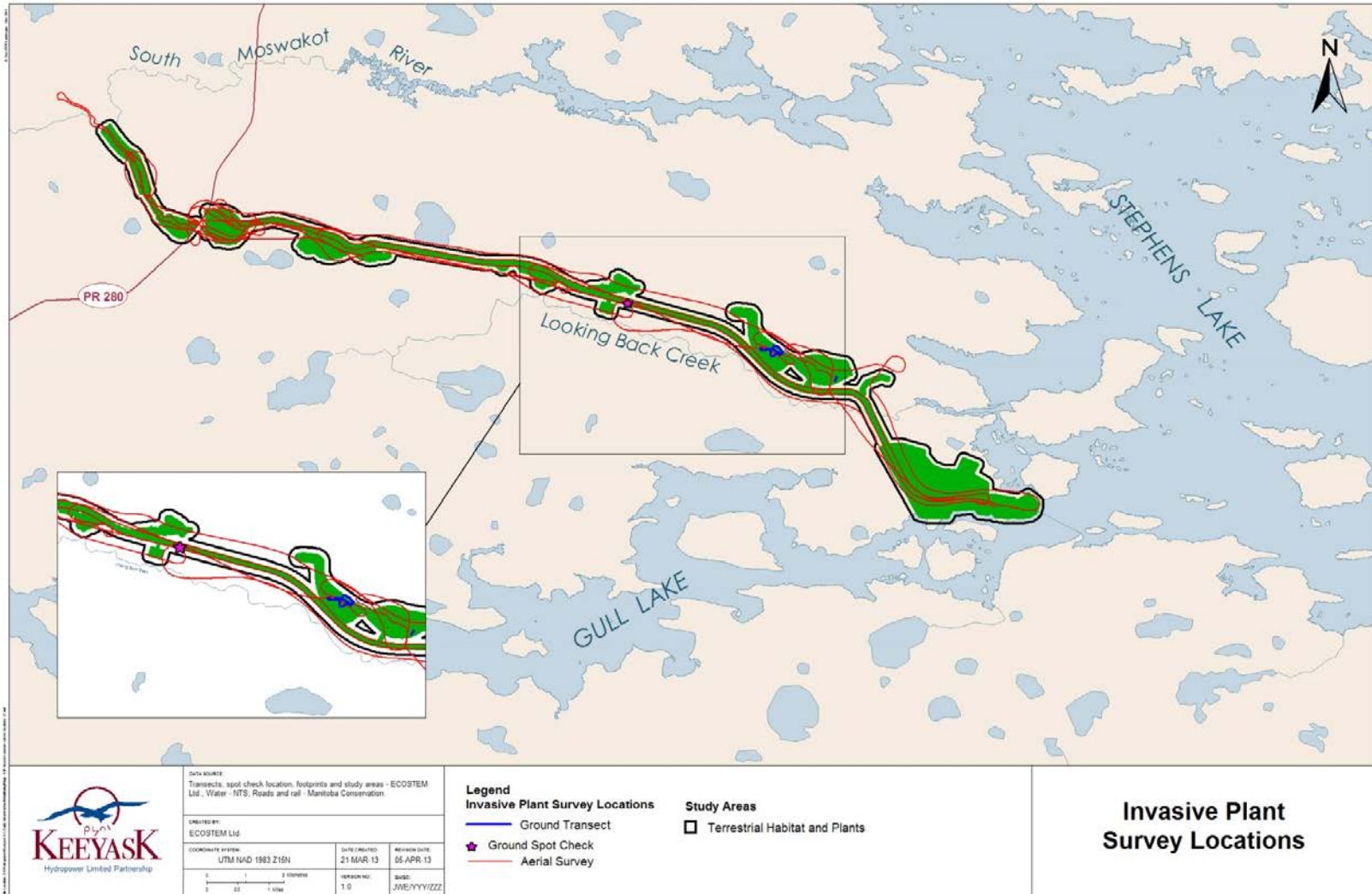
Map 4-1 shows the 2012 areas surveyed by helicopter for invasive and non-native plants. One location was ground surveyed (Map 4-1). No invasive or non-native species were observed from the helicopter, incidentally during S1 and S2 plant surveys, or at the single ground spot check during the helicopter survey (Figure 4-1).



Figure 4-1: Location along the road spot-checked for invasive and non-native plants (September 20, 2012).

4.4 DISCUSSION

Invasive and/or non-native species were not observed in any of the construction areas during aerial surveys. Generally speaking, along much of the construction and road right of way, vegetation was absent or underdeveloped due to recent disturbance. Five invasive plants were identified within the planned main camp area during studies conducted for the EA Report, including common dandelion (*Taraxacum officinale*), narrowleaf hawkbeard (*Crepis tectorum*), oxeye daisy (*Leucanthemum vulgare*), foxtail (*Hordeum jubatum*) and reed-canary-grass (*Phalaris arundinacea*). Continued monitoring surveys will be essential in identifying populations of invasive and/or non-native species and determining whether or not control programs are needed in the future.



Map 4-1: KIP invasive species survey locations.

5.0 CONCLUSIONS

Terrestrial habitat, ecosystems and plant monitoring results to March 2013 were consistent with EA Report predictions regarding actual KIP footprint clearing, effects on S1 and S2 plant species and the extent to which construction could spread invasive and/or non-native plants. No modifications to monitoring programs, mitigation measures or EnvPP guidelines are recommended. Terrestrial habitat, ecosystems and plant monitoring will continue in 2013.

6.0 REFERENCES

Keeyask Hydropower Limited Partnership. 2009. Keeyask Infrastructure Project Environmental Assessment Report.

Keeyask Hydropower Limited Partnership. 2012. Keeyask Generation Project Environmental Impact Statement. Terrestrial Environment Supporting Volume.