Grand Rapids
Pipeline Project

December 2, 2016

Hearing Services
Alberta Energy Regulator
Suite 1000, 250 – 5th Street S.W.
Calgary, Alberta T2P 0R4

To Whom It May Concern,

RE: Grand Rapids Pipeline GP Ltd. Grand Rapids Pipeline Project
Decision 2014 ABAER 012
Condition Compliance Update – Condition 24

Grand Rapids Pipeline GP Ltd. (Grand Rapids), in accordance with Condition 24 of Decision 2014 ABAER 012 (Decision) submitted the Caribou Habitat Restoration Plan (CHRP) to the Alberta Energy Regulator (AER) on August 31, 2016. Following discussions with AER staff in the Fort McMurray Field Office, Grand Rapids has revised Section 3.1 of the CHRP regarding vegetation control during operations. Therefore, as per Condition 24, Grand Rapids is providing an updated copy of the CHRP.

Please refer to Appendix 1: Caribou Habitat Restoration Plan, for more information.

If you have any questions please contact the undersigned.

Sincerely,

Victoria Szakaly
Regulatory Project Manager
Grand Rapids Pipeline GP Ltd.

Appendix 1: Caribou Habitat Restoration Plan

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

November 2016
8395

Prepared for:

Grand Rapids Pipeline Project

Grand Rapids Pipeline GP Ltd.
in its capacity as general partner on behalf of
Grand Rapids Pipeline Limited Partnership

Prepared by:

CH2MHILL®

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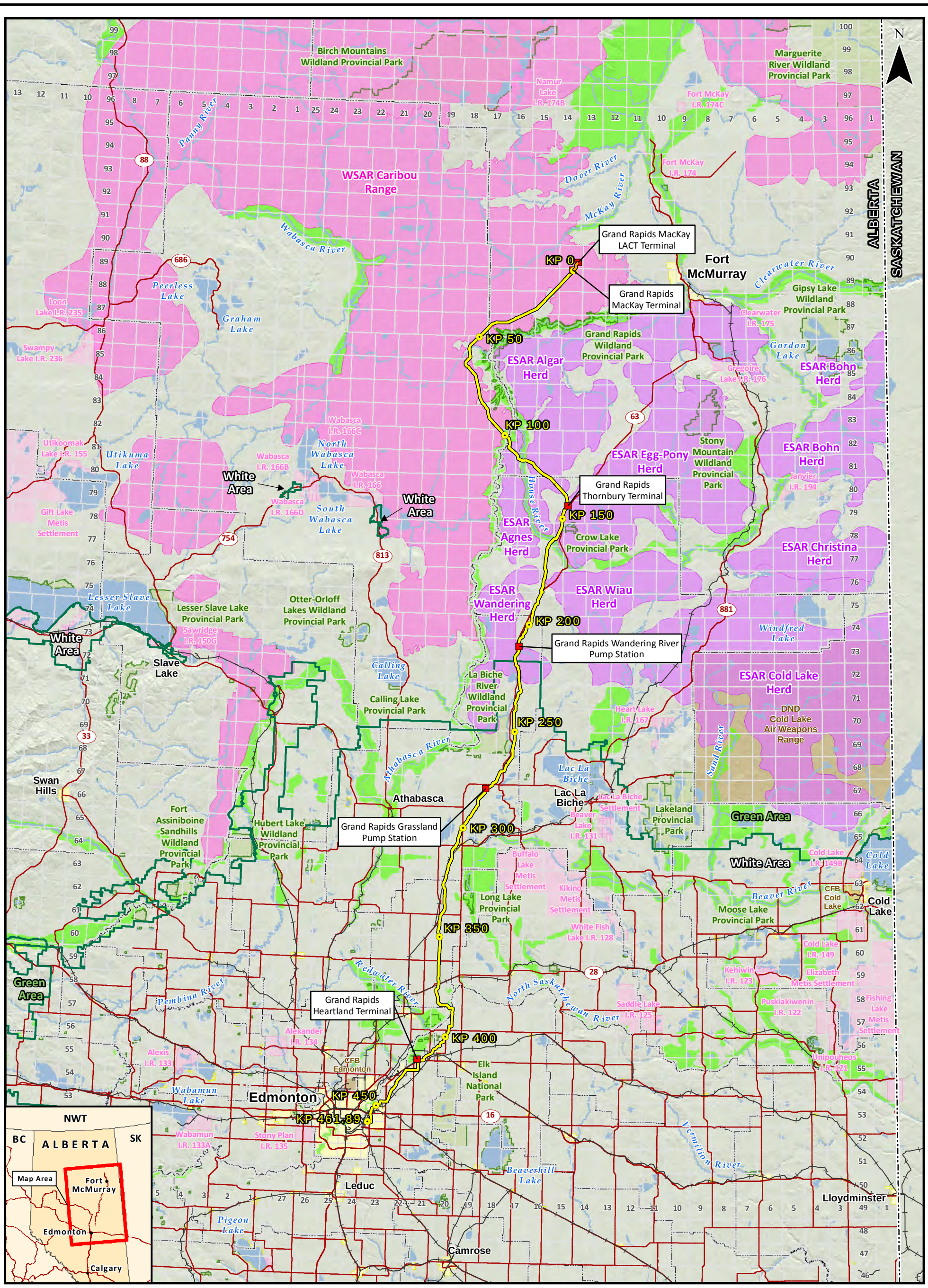
1.0 INTRODUCTION AND ORGANIZATION

1.1 INTRODUCTION

Grand Rapids Pipeline GP Ltd. (GRP), in its capacity as general partner on behalf of Grand Rapids Pipeline Limited Partnership, has applied to the Alberta Energy Regulator (AER) pursuant to Part 4 of the Pipeline Act to construct and operate pipelines and associated installations, collectively named the Grand Rapids Pipeline Project (the Project). The AER issued Decision 2014 ABAER 012 on October 9, 2014 granting approval for select Project applications subject to the conditions outlined in Appendix 1 of Decision 2014 ABAER 012. TransCanada will operate GRP and apply its operating procedures for the lifetime of the pipeline.

This Caribou Habitat Restoration Plan (CHRP) was prepared for the Project pursuant to AER Decision 2014 ABAER 012 Condition 24 and outlines GRP's plan to restore caribou habitat. This document incorporates feedback received from regulators and technical experts, lessons learned from field experience, industry experience and ongoing literature review.

The goal of the CHRP will be to minimize the impacts of the Project on caribou habitat after mitigation is applied. Tailored to site-specific conditions, mitigation measures related to the disturbance of caribou habitat were implemented on the Project footprint throughout the pre-construction and construction phases and will be implemented during post-construction phases of the Project. The CHRP details the location and type of restoration planned for implementation along the Project right-of-way (ROW).



Facility
Kilometre Post
Grand Rapids Pipeline Route
MacKay Lateral Route
63 Highway
Railway
Hydrology

Waterbody
Populated Area
Military
Indian Reserve
Park/Protected Area
Green/White Area

Municipal Boundary
Provincial Boundary
Key Wildlife and Biodiversity Zone

Caribou Range

East Side of the Athabasca River (ESAR)
West Side of the Athabasca River (WSAR)

Grand Rapids Pipeline Project

SCALE: 1:1,500,000

0 10 20 30 40 km

(All Locations Approximate)

FIGURE 1-1

REGIONAL LOCATION

CARIBOU HABITAT RESTORATION PLAN

GRAND RAPIDS PIPELINE GP LTD.
GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N
KP, Routing, Facility: TCPL 2014-2016; Road, Highway: IHS Inc. 2016; Railway: NRCan 2012; Hydrology: IHS Inc. 2004;
Populated Area, Municipal Boundary: AltaLIS 2016; Military: IHS Inc. 2015; Indian Reserve: Government of Canada 2016, IHS Inc. 2015; Park/Protected Area: ATPR 2012; Green/White Area: AltaLIS 2010;
Provincial Boundary: AltaLIS 2009; Key Wildlife and Biodiversity Zone, Caribou Range: AEP, GOA 2015; Hillshade: TERA Environmental Consultants 2008.

November 2016	496826
Mapped By: RM	Checked By: SC

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1.2 ORGANIZATION OF THE CHRP

This CHRP is organized in five sections, as follows:

Section 1: introduces the Project and requirements for the CHRP.

Section 2: introduces the goal and objectives.

Section 3: describes the habitat restoration strategies and measures that GRP is implementing, the rationale used to select mitigative actions considering typical site factors that could constrain implementation, and the schedule of construction and habitat restoration implementation. This section demonstrates how the CHRP actions support the objectives of the Government of Alberta's and Canada's recovery strategies and plans.

Section 4: describes how field innovations, consultation, ongoing literature review and experience have been incorporated.

Appendix A: provides maps showing the locations of the habitat restoration measures in caribou range.

The CHRP is organized to meet the requirements of AER Decision 2014 ABAER 012 Condition 24.

2.0 OUTCOME, OBJECTIVE AND GOALS

This section identifies GRP's strategic outcome, as well as the objective and goals for the measures discussed throughout the CHRP. These elements have been refined with experience gained across TransCanada pipeline projects and will be used to assess the performance and effectiveness of GRP's caribou habitat restoration.

2.1 STRATEGIC OUTCOME

Combined with the collective habitat restoration and recovery efforts implemented by other industry and government parties, GRP's caribou habitat restoration measures contribute meaningfully to the conservation and recovery of woodland caribou in Canada.

2.2 OBJECTIVE

GRP's caribou habitat restoration investments reduce Project impacts in a manner that minimize potential impacts to caribou habitat and supports the objectives of the Government of Alberta's and Canada's recovery strategies and plans.

2.3 GOALS

Goal (G1) GRP's caribou habitat restoration measures are ecologically relevant, and practically located to minimize potential for predisturbance by human activity.

Goal (G2) GRP's caribou habitat restoration measures establish self-sustaining and ecologically appropriate vegetation communities that are on trajectory to, and compatible with the surrounding landscape.

The objective and goals of the CHRP are intended to guide GRP in the selection and implementation of caribou habitat restoration, driven by a commitment to continuous improvement.

3.0 THE RESTORATION IMPLEMENTATION PLAN

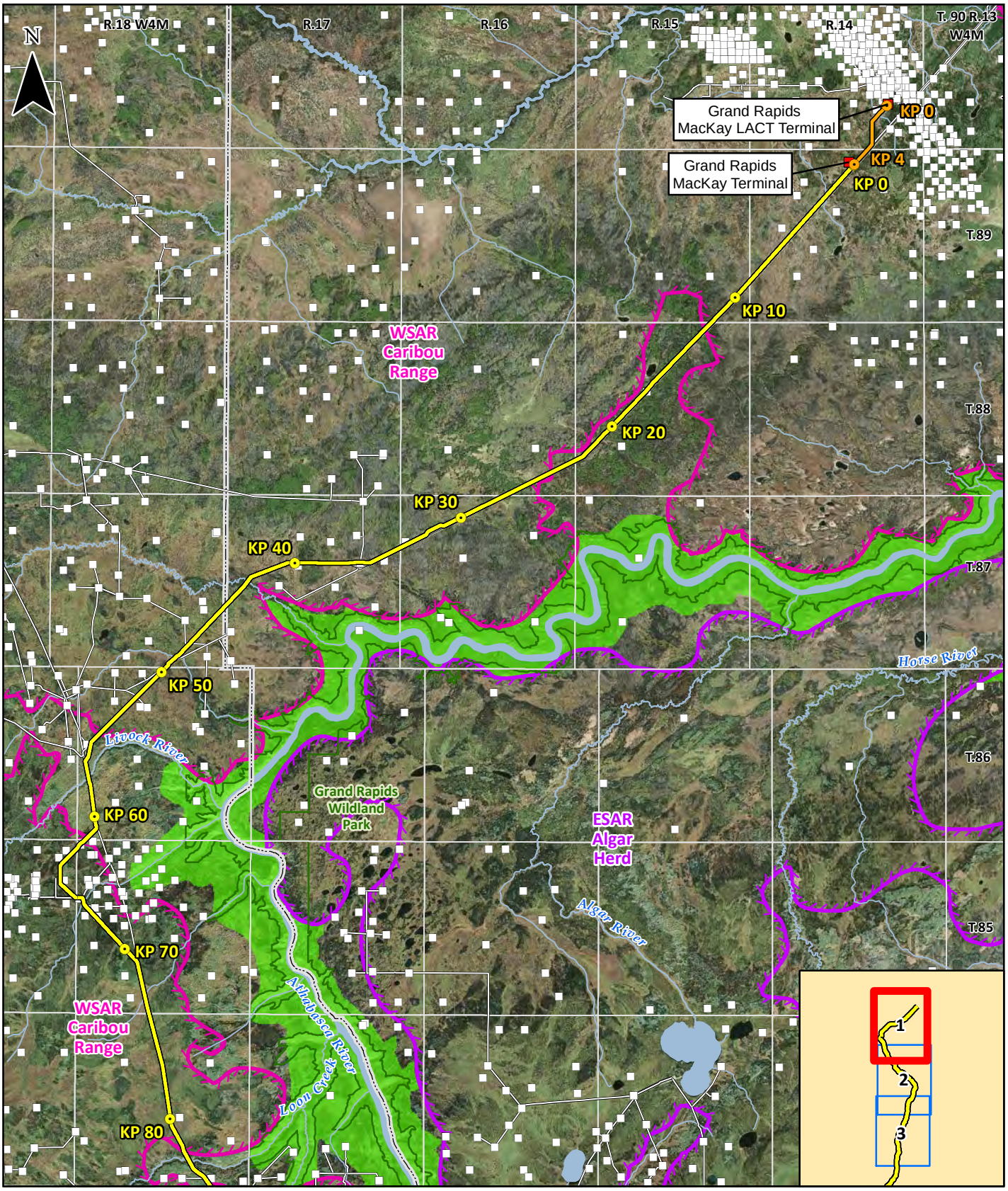
This section provides a summary of Project impacts to affected boreal woodland caribou habitat. Strategies to minimize Project impacts to caribou habitat are described. The caribou habitat restoration strategies and measures that GRP is implementing to achieve the overarching objective of the CHRP are the focus of this section.

The actions in this plan will support the objectives of federal and provincial recovery strategies and plans for boreal woodland caribou. The CHRP measures will minimize Project impacts to caribou habitat, restore habitat in the Project footprint, and manage recreational access. These measures are consistent with the Woodland Caribou Policy for Alberta (Government of Alberta 2011), the federal recovery strategy (Environment Canada 2012), and Alberta's Caribou Action Plan (Government of Alberta 2016). Together, these federal and provincial initiatives lay the foundation of future caribou range plans in Alberta in habitat restoration, reduction of development footprint, integrated land management and recreational access management.

3.1 MINIMIZE PROJECT IMPACTS TO CARIBOU HABITAT

Portions of the Project are located within the West Side of the Athabasca River (WSAR) and East Side of the Athabasca River (ESAR) caribou ranges as shown on Figures 3-1, 3-2 and 3-3. The ESAR caribou range is further divided into caribou herds. The pipeline route crosses the Agnes, Algar, Egg-Pony, Wiau and Wandering caribou herds.

Several Project facilities are also located within caribou range. The Grand Rapids MacKay Terminal and Grand Rapids MacKay LACT Terminal are located within the WSAR caribou range (Figure 3-1). The Grand Rapids Thornbury Terminal is located in the ESAR (Egg-Pony) caribou range (Figure 3-2) and the Grand Rapids Wandering River Pump Station is located in the ESAR (Wandering) caribou range (Figure 3-3).



Facility
Kilometre Post (KP) - Grand Rapids Pipeline
Kilometre Post (KP) - MacKay Lateral
Grand Rapids Pipeline
MacKay Lateral Route

Existing Well
Existing Pipeline
Road
Hydrology
Waterbody
Park/Protected Area

Municipal Boundary
Key Wildlife and Biodiversity Zone

Caribou Range
West Side of the Athabasca River (WSAR)
East Side of the Athabasca River (ESAR)

FIGURE 3-1

CARIBOU RANGE: KP 0 TO KP 85

CARIBOU HABITAT RESTORATION PLAN

GRAND RAPIDS PIPELINE GP LTD.
GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
KP, Routing, Facility: TCPL 2014-2016; Existing Well, Existing Pipeline, Road: IHS Inc. 2016; Hydrology:IHS Inc. 2004; Park/Protected Area: ATPR 2012; Municipal Boundary: AltaLIS 2016; Key Wildlife Biodiversity Zone, Caribou Range: AEP GOA 2015.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Grand Rapids Pipeline Project

SCALE: 1:300,000
0 4 8 km
(All Locations Approximate)

November 2016	496826
Mapped By: AJ	Checked By: SC

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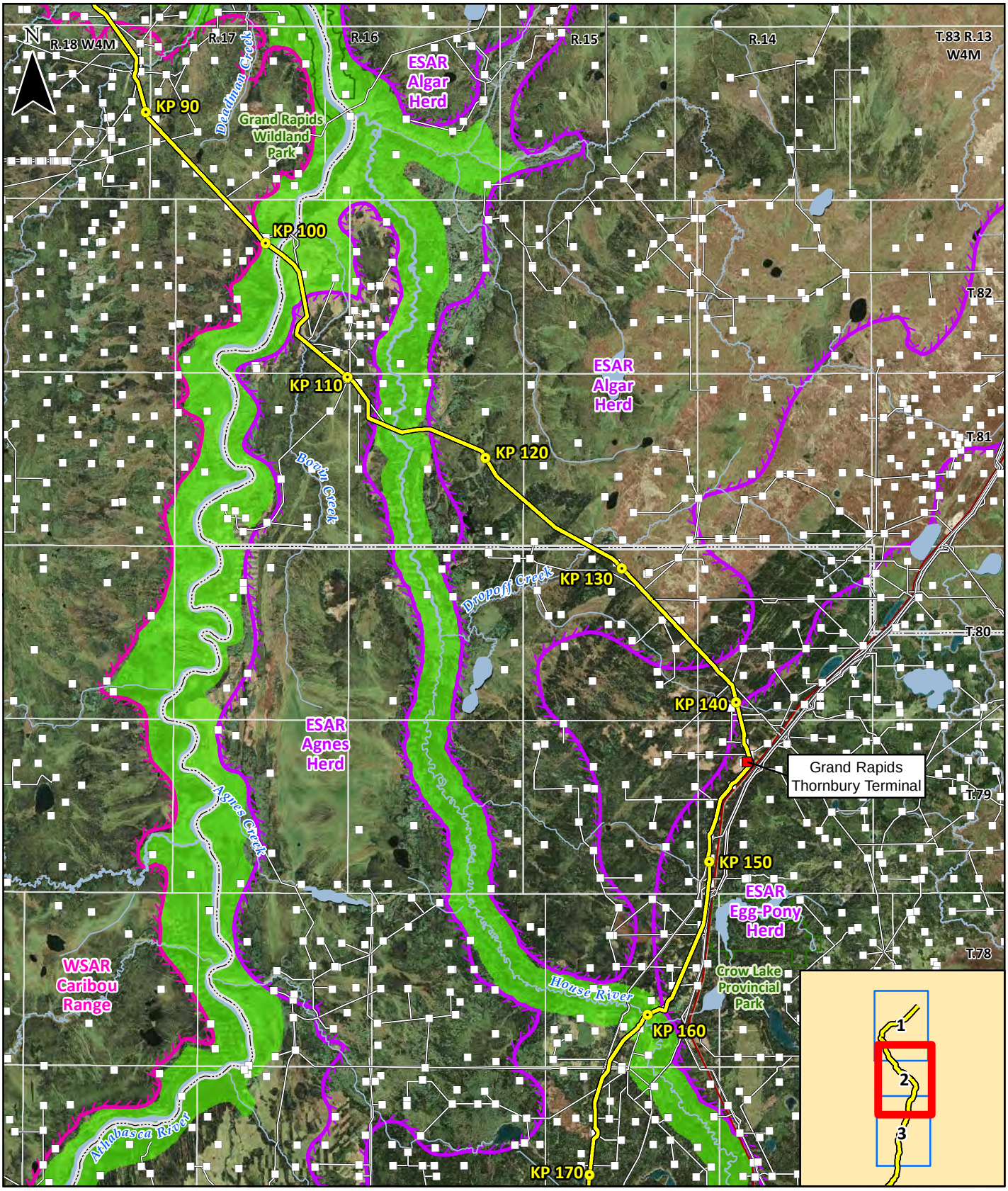

Facility
Kilometre Post (KP) - Grand Rapids Pipeline
Kilometre Post (KP) - MacKay Lateral
Grand Rapids Pipeline
MacKay Lateral Route
Existing Well
Existing Pipeline
Road
Hydrology
Waterbody
Park/Protected Area
Municipal Boundary
Key Wildlife and Biodiversity Zone

Caribou Range

West Side of the Athabasca River (WSAR)
East Side of the Athabasca River (ESAR)

FIGURE 3-2

CARIBOU RANGE: KP 85 TO KP 170

CARIBOU HABITAT RESTORATION PLAN

GRAND RAPIDS PIPELINE GP LTD.
GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
KP, Routing, Facility: TCPL 2014-2016; Existing Well, Existing Pipeline, Road: IHS Inc. 2016;
Hydrology:IHS Inc. 2004; Park/Protected Area: ATPR 2012; Municipal Boundary: AltaLIS 2016;
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Grand Rapids Pipeline Project

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November 2016	496826
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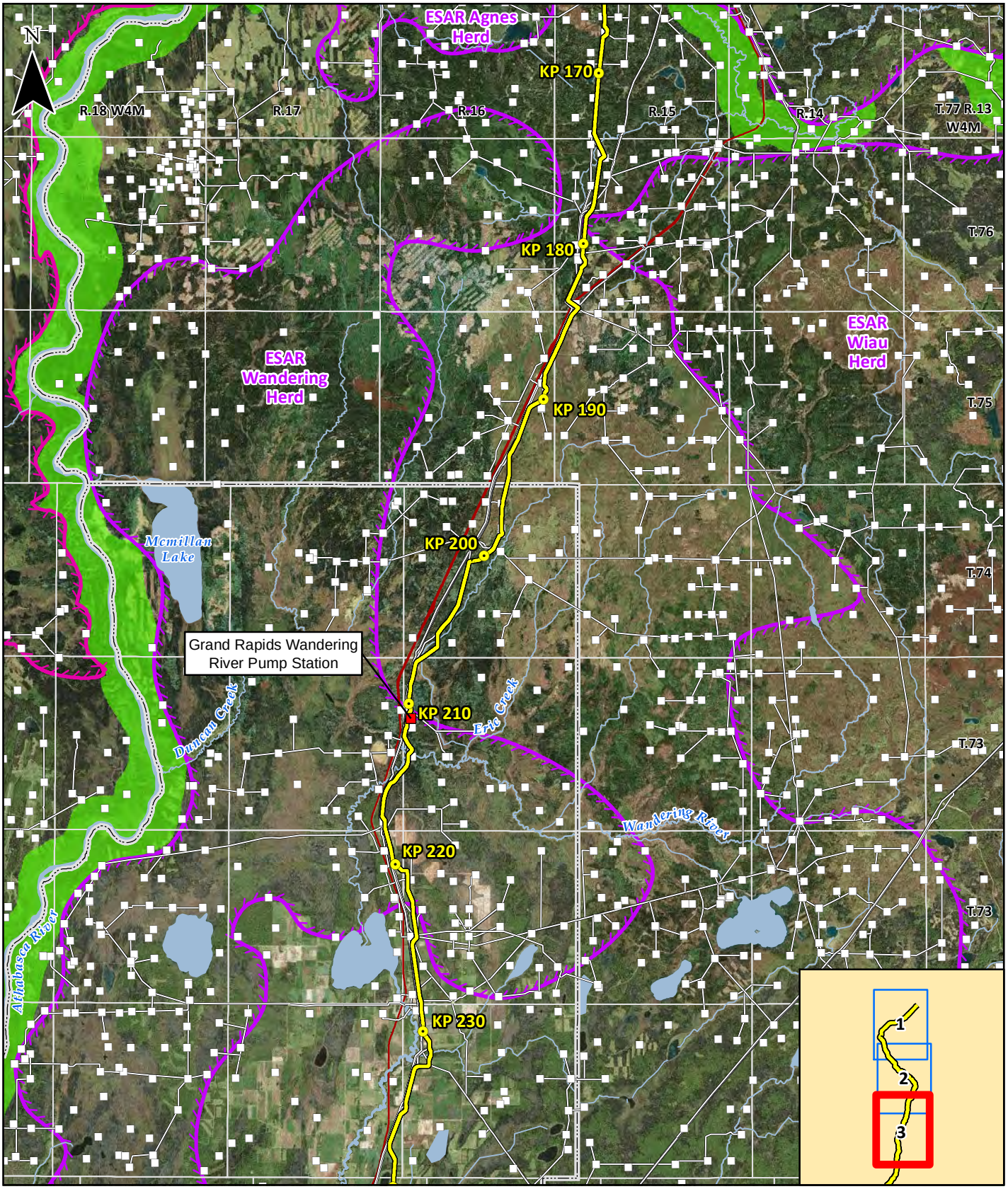

Facility
Kilometre Post (KP) - Grand Rapids Pipeline
Kilometre Post (KP) - MacKay Lateral
Grand Rapids Pipeline
MacKay Lateral Route
Existing Well
Existing Pipeline
Road
Hydrology
Waterbody
Park/Protected Area
Municipal Boundary
Key Wildlife and Biodiversity Zone

Caribou Range

West Side of the Athabasca River (WSAR)
East Side of the Athabasca River (ESAR)

FIGURE 3-3

CARIBOU RANGE: KP 170 TO KP 230

CARIBOU HABITAT RESTORATION PLAN

GRAND RAPIDS PIPELINE GP LTD.
GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
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SCALE: 1:300,000

0 4 8 km

(All Locations Approximate)

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t8395_WILDLIFE_CHRP_Figure3s_CaribouRange_Rev1.mxd

3.1.1 Strategies to Minimize Caribou Habitat Disturbance

Pre-Construction

GRP has implemented integrated land management principles to minimize habitat disturbance and fragmentation within caribou range, consistent with provincial guidelines and plans (e.g., Government of Alberta 2010, 2012, 2016). Complete avoidance of caribou ranges cannot be practically achieved, however, pipeline routing minimizes the Project disturbance in caribou ranges by paralleling existing roads and ROWs for most (95.3%) of its length (Table 3-1). Other strategies to minimize habitat disturbance and fragmentation include co-locating the MacKay LACT Terminal and facility access roads to overlap existing dispositions (Table 3-2), as well as sharing access with other industry operators and using shared temporary workspace for construction.

Table 3-1: Caribou Ranges that Interact with the Pipeline Project

Caribou Range [Herd]	Status Designation & Population Trend	Length (km) in Caribou Range	Length (km) Parallels Linear Disturbance [%]	Length (km) New Linear Disturbance [%]
WSAR	Threatened[1,2,3] Declining[4]	82.5	77.6 [94.1%]	4.9 [5.9%]
ESAR [Agnes]	Threatened[1,2,3] Declining[4]	9.1	9.1 [100%]	0 [0%]
ESAR [Algar]		20.9	20.9 [100%]	0 [0%]
ESAR [Egg–Pony]		18.5	17.1 [92.4%]	1.4 [7.6%]
ESAR [Wiau]		0.5	0.5 [100%]	0 [0%]
ESAR [Wandering]		12.4	12.0 [96.8%]	0.4 [3.2%]
ESAR [Total]		61.4	59.6 [97.1%]	1.8 [2.9%]
Total WSAR and ESAR Caribou Ranges Combined		143.9	137.2 [95.3%]	6.7 [4.7%]

Note:
1 Alberta provincial status designation under the Wildlife Act (AESRD 2014a).
2 Status designation under Schedule 1 of the Species at Risk Act (SARA) (Environment Canada 2016).
3 Status designation by COSEWIC 2015.
4 Population trend reported by Environment Canada 2012.

Table 3-2: Project Facilities within Caribou Ranges

Facility	Caribou Range	Legal Location (W4M)	Facility Area (ha)	Access Roads
MacKay LACT Terminal	WSAR	NE 11-90-14	1.8 (overlaps existing disposition)	391 m (existing MSL disposition)
MacKay Terminal		NW 34-89-14	36.0	530 m (partially overlaps existing powerline and pipeline ROWs)
Thornbury Terminal	ESAR, Egg–Pony	NE 29-79-14	15.4	197 m (partially overlaps existing powerline and pipeline ROWs)
Wandering River Pump Station	ESAR, Wandering	NW 19-73-16	10.5	383 m (partially overlaps existing utility and pipeline ROWs)
Note: Areas are approximate.				

Construction

During construction, GRP used a trenchless method (horizontal directional drill) for pipeline installation at two watercourse crossing locations within caribou range: Loon Creek (KP 87.2) and Boivin Creek (KP 106.9). For each of these crossings, existing access was used for construction vehicles and equipment. As a result, GRP avoided clearing within the Project footprint for a total ROW length of approximately 1.1 km.

Post-Construction

During operations, GRP will periodically control vegetation along the ROW according to regulatory approval conditions and requirements while ensuring the ability to visually assess and access the ROW for operational activities in accordance with Canadian Standards Association (CSA) Z662-15 (CSA 2015; Government of Alberta 2005). Over the long term, the vegetation community composition and structure is expected to reach a stage that will provide functional caribou habitat.

3.2 HABITAT RESTORATION MEASURES

The main restoration measures selected for the Project are:

- Minimal surface disturbance
- Access control (e.g., woody debris rollback)
- Tree planting and bioengineering

The Project may also consider using signs that advise the public of access closures on the ROW, and link the closure to the sensitivity of caribou and GRP's work to contribute to caribou recovery through habitat restoration. Mounding may also be applied in areas where ground conditions allow.

3.2.1 Construction – Minimal Surface Disturbance

GRP has implemented minimal surface disturbance (MSD) construction techniques to facilitate natural regeneration and restore habitat along the ROW. Minimal surface disturbance procedures relate to the removal of vegetation, work area preparation and clean-up activities associated with construction of the Project. The objective of this construction technique is to minimize impacts on the soils and vegetation substructure, with the goal of allowing the Project footprint to rapidly re-vegetate to a similar pre-construction condition, subject to land-use guidelines specific to the disposition. MSD construction is most suitable for straight pipe installation. This technique is mainly used in forested areas, wetlands and riparian areas, and on portions of the footprint that are not graded, under frozen conditions.

Clearing starts once frost has begun to penetrate the ground. Low ground pressure equipment is used to minimize compaction to the soils (i.e., tracked vehicles or large tires). Once trees are removed, the surface vegetation is mulched without impacting the soil structure. Mulch depths are limited to 5 cm so that vegetation establishment is not restricted in the spring. Non-merchantable timber is burned over ditchline in sloops or disposed of according to provincial regulations. Merchantable timber is stored in log-decks for use as woody debris rollback or sold as per established agreements with Forest Management Agreement (FMA) holders. Frost is pounded into the ground surface by driving progressively heavier equipment over the work side (travel lane) surface, or by spraying layers of water with water trucks where there is not enough snow to freeze in the soil. The soil is removed from the ditchline only, to facilitate pipe installation, and replaced in the reverse order it was removed. All equipment is removed from the project footprint prior to spring thaw to prevent damage to the soil profile and the vegetation substructure. Since the roots, seeds and plant propagules remain intact throughout the construction process, vegetation re-establishes rapidly on the project footprint (see Photos 3.1-3.3).

Photo 3.1 – 2015 Image shows accelerated re-establishment of vegetation in northern Alberta following MSD construction (left of black line; constructed in 2014) compared with no MSD (right of black line; constructed in 1969).

Photo 3.2 –Image of natural vegetation establishing on a ROW constructed using MSD, six months after construction in northern Alberta.

Photo 3.3 – Image showing vegetation regenerating on a ROW in the third year after MSD construction.

During construction, GRP used a snow ramp MSD technique at trenched watercourse crossings within caribou range to retain vegetation screens. This involves using heavy equipment to walk down shrubby riparian vegetation (rather than clearing) and packing over with snow to allow construction access without removal of the vegetation. The technique has been used successfully on other pipeline construction projects to retain vegetation screens that create immediate visual barriers the following growing season.

MSD cannot be implemented where grading is necessary. Stripping of surface soils and grading is required in areas of significant cross-fall of the ROW (i.e., greater than 1.0 m), irregular ground profile along the pipeline, and at tie-in sites (road bores and pipeline crossings). In graded areas, topsoil or the organic layer of soil is salvaged and stockpiled separately and replaced after the pipe has been installed and the grade has been returned to natural contours. The replaced topsoil contains viable roots, seeds and propagules that promote the rapid establishment of native vegetation.

3.2.2 Construction – Access Control Measures

GRP has implemented coarse woody debris rollback as the primary method to deter access on the Project ROW. In addition to rollback, access can be deterred by topography and bends in the ROW, which can create visual barriers. Trenchless pipeline installation across roads and other ROWs also often allow for retention of partial vegetation screens, which helps deter access at intersections with the ROW.

MSD construction (including snow ramping to retain vegetation screens in riparian areas) and bioengineering promote rapid revegetation on the ROW that will deter access over the medium to long term.

Installation of educational signs may be used at strategic locations to inform recreational users and others on the Project ROW about the reasons for access closure, related to GRP's restoration activities that contribute to caribou recovery.

3.2.3 Construction – Bioengineering

Bioengineering uses live vegetation (e.g., transplants; cuttings), often in conjunction with soil stabilization measures (e.g., soil wraps) to stabilize and revegetate a site. GRP used this technique during construction on the banks and riparian areas of trenched watercourse crossings, where recommended by a Qualified Aquatic Environment Specialist or the Environmental Inspector. Species and planting densities used for bioengineering are site dependent. Vegetation cuttings were collected from the footprint or from the adjacent area.

3.2.4 Post-Construction – Tree Planting

Established reclamation and forestry reforestation practices will be applied to promote revegetation where natural regeneration is not the preferred restoration method. Restoration measures that incorporate tree planting techniques will be considered where access is not required (e.g., locations outside of third-party dispositions, traditional or community access, Project operational access), MSD construction was not feasible (i.e., graded areas), and site conditions are suitable (e.g., adequate soil drainage).

Conifer seedlings will be grown in nurseries from seed collected on an adjacent TransCanada ROW, and supplemented by provincial seed stocks if needed. Seedling species will be determined by site-specific ecological characteristics such as site drainage, soil nutrients and adjacent forest stand composition, to maximize seedling survival and establish a trajectory to a community similar to the adjacent undisturbed forest. Upland sites will typically be planted with jackpine or white spruce. Black or white spruce are usually more suited to lowland or transitional ecosystems. Tamarack can also be a suitable species for lowland and transitional sites, although seed availability may be limited. The planting density of seedlings on the ROW will consider natural forest cover and expected seedling mortality. Further information on conifer planting is provided in Section 3.3.

3.3 SELECTION OF RESTORATION MEASURES

Key factors in the selection of the most appropriate restoration measures include:

- natural site characteristics
- existing disturbance and activities

- site-specific construction methods
- regulatory requirements

The restoration methods are affected by variables such as extent of grading, construction method and availability of shared workspace and access.

Table 3-3 outlines the restoration measures being implemented for GRP and the rationale used when selecting them.

A map book illustrating GRP's planned site-specific caribou habitat restoration measures for the Project is presented in Appendix A.

Table 3-3: Habitat Restoration Measures

Restoration Measure	Objectives	Rationale	Comments
Minimal surface disturbance (MSD) construction	Habitat Restoration Access Control Visual barrier	Construction during winter conditions reduces the need for soil salvage and grading, and the width of grubbing is limited to the trench area where grading is required. Reduced disturbance to vegetation and root systems is achieved by cutting, mowing or walking down and mulching shrubs and small diameter trees at ground level. The intact root systems and seed bed with little soil disturbance facilitates rapid regeneration of vegetation. Use of snow/ice padding or matting can limit the need for cutting or mowing shrubs and small trees, thereby speeding regeneration of native vegetation. The extent of MSD is limited by scheduling to avoid the sensitive timing window for caribou (February 15 to July 15) and also by ground topography (i.e., where grading is necessary). Soil conditions limit the applicability of MSD construction methods. Construction in well to moderately drained sites during non-frozen conditions requires grubbing and grading to salvage surface soils so they can be stored separately from subsoils and replaced following construction. This prevents admixing and loss of the productive surface soils that facilitate regeneration of vegetation. **MSD construction methods lead to the rapid regeneration of vegetation, and aid in achieving the goals of habitat restoration and access control, along with providing a visual barrier along the ROW.**	MSD construction is the preferred CHRP measure for the re-establishment of vegetation, and will be implemented where scheduling, soil conditions (e.g., frozen), and topography allow.

Restoration Measure	Objectives	Rationale	Comments
Woody debris rollback	Access control Habitat restoration	Coarse woody debris rollback can be used for access control and to enhance restoration of natural habitat characteristics. Woody debris rollback can enhance revegetation as it can conserve soil moisture, moderate soil temperatures and provide nutrients as debris decomposes, prevent soil erosion, provide microsites for seed germination and protection for introduced tree seedlings (Pyper and Vinge 2012; Vinge and Pyper 2012). Fine woody debris (e.g., chipped or mulched debris) can be detrimental to soil thermal conditions, carbon:nitrogen (C:N) ratios and plant recruitment where the depth of debris is excessive (AENV 2010). Mulch depths less than 3 cm are preferred to avoid limiting natural ingress and vegetation growth (Pyper and Vinge 2012; Vinge and Pyper 2012). Previous TransCanada projects have seen good results with mulch thickness of 5 cm or less. Coarse woody debris should be spread evenly across the entire width of the footprint at a coverage/density that will not restrict ability to plant seedlings or limit planted or natural seedling growth. Woody debris should be applied at a density/volume that does not exceed 400 tonnes/ha to discourage access along a ROW (Osko and Glasgow 2010). Where sufficient material is available, woody debris coverage can range from 60-100 m^3/ha on upland sites and 25-50 m^3/ha on lowland sites, to mimic natural processes (Pyper and Vinge 2012; Vinge and Pyper 2012). Where sufficient material is available, woody debris coverage of 150-250 m^3/ha along ROWs might be appropriate to manage access (Vinge and Pyper 2012). Research presented at the North American Caribou Workshop (2014) suggested that application of high densities (200 m^3/ha) of salvage logs (i.e., rollback) at linear feature intersections reduces human use by 100%, wolf use by 90% and deer use by 50%. TransCanada has found on previous caribou habitat restoration projects that coverage ranging from 200-300 m^3/ha can deter access while allowing sufficient spaces between the debris to allow seedling planting.	Woody debris rollback is a suitable CHRP measure and will be the main access control measure used for the Project.

Restoration Measure	Objectives	Rationale	Comments
Woody debris rollback (cont'd)	See above	Rollback can be effective immediately following implementation, provided adequate material is available and properly applied (Vinge and Pyper 2012). The implementation and length of a rollback segment is dependent on sufficient quantities of coarse woody debris during clearing of new disturbance and the trade-off between its use and the ability/space to store it during construction (Caribou Range Restoration Project [CRRP] 2007a). Caribou habitat is frequently found in treed wetland areas characterized by saturated peatlands that support slow-growing black spruce and tamarack. These peatland areas generally do not yield the volume or type of woody debris rollback needed for successful implementation of multiple rollback locations long a pipeline ROW. **Previous caribou habitat restoration projects indicate that material availability limits the rollback segment length that can be achieved to 50-100 m (75 m on average).** Fire risk is a consideration when using or storing materials for rollback. Fire risk can be minimized through proper storage and placement of materials (Pyper and Vinge 2012).	See above
Conifer seedling planting	Habitat restoration Access control	Species planted are determined based on the biophysical characteristics of the site, adjacent forest stand composition, and restoration objectives (e.g., low palatability for ungulates). Tree seedling planting is considered a long-term restoration treatment (effectiveness is expected to take longer than 10 years). Planting densities for reclamation of forested areas in Canada have been based on forestry standards, ranging from 1,500-2,500 stems/ha (MacDonald et al. 2012). The Government of Alberta (AESRD 2013) Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands is unclear in its recommendations, stating that the expected planting density for sites planted with merchantable species is 2,000 stems/ha and vegetation assessments conducted at least two growing seasons after planting are expected to have a minimum stem density of 2,000 stems/ha. This allows for no seedling mortality. The Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region (AENV 2010) specify ranges of planting densities that vary by the site type and tree species planted. For example, to achieve medium to dense crown closure, the planting density of conifer (pine and white spruce) seedlings in dry, moist poor or moist rich site types is 1,400-2,000 stems/ha. In wet poor sites, the recommended planting density of black spruce is 1,400–2,800 stems/ha.	Conifer seedling planting is a suitable CHRP measure and will be the main planting measure used for the Project where MSD facilitating natural regeneration is not the preferred restoration method.

Restoration Measure	Objectives	Rationale	Comments
Conifer seedling planting (cont'd)	See above	The Reforestation Standard of Alberta (AESRD 2014b) is specific to reforesting cutblocks and defines successful regeneration as having 80% stocking of acceptable trees during establishment surveys conducted 4 to 8 years after harvest (i.e., 80% of sample plots have at least one live conifer tree 30 cm tall or taller, or one live deciduous tree that is at least 130 cm tall). This gives a minimum target stem density of approximately 800 stems/ha. Given the relatively harsh growing conditions inherent to boreal ecosystems, mortality of planted seedlings is anticipated to range from approximately 5% to 20% in most site types (Golder Associates Ltd. [Golder] 2012a,b). A planting density of 2,000–2,500 stems/ha has been recommended for restoration of linear disturbances in boreal caribou ranges in northeastern BC (Golder 2015). A linear restoration matrix developed by AEP recommends a planting density of 1,200 stems/ha in boreal caribou range in Alberta (Vinge unpublished). Given the densities were developed for forestry practices and this project relates to linear ROWs, the planting density might need to be adjusted over time. **Based on the above information and also considering Alberta ecosystems, the following planting prescription has been formulated for this CHRP:** • **minimum live seedling density of 1,600-2,000 stems/ha on upland sites;** • **minimum live seedling density of 1,200-2,000 stems/ha on lowland sites**	See above
Snow ramping	Habitat restoration Access control Visual barrier	Deciduous shrubs are walked down using construction equipment and piled with layers of snow to create a ramp for vehicle traffic, if there is enough snow cover during winter construction. Small coniferous trees can also be walked down, but only in years when there is a higher than normal snow fall. When the snow melts in the spring following construction, the trees and shrubs recover their original shape and provide habitat, create access control and visual barriers.	Snow ramping is a suitable CHRP measure for this project if there is adequate snowfall during winter construction and where there is suitable vegetation for walking down (e.g., small deciduous trees, shrubs).

Restoration Measure	Objectives	Rationale	Comments
Bioengineering – shrub staking	Habitat restoration Access control Visual barrier	Willow and poplar cuttings are collected from adjacent areas during the growing season or during winter. These cuttings are inserted into the soil in a linear and staggered formation that will establish habitat, access control and visual barriers within one or two growing seasons. Species used are based on available material in the adjacent forest stand and are dependent on restoration objectives. Combined plantings of shrub and tree seedlings can be appropriate, depending on site conditions and anticipated natural revegetation of both species. Bioengineering in combination with stabilization measures (e.g., soil wraps) is used at watercourses crossed with an open cut method. The installation of live shrub cuttings is used to stabilize and revegetate slopes and banks; it also provides visual barriers at these locations.	Bioengineering and shrub staking are a suitable CHRP measure where site conditions allow. It requires the correct vegetation to be present in adjacent areas and moist soils. Many shrub species can attract prey species such as moose and deer, which can attract wolves. Its application is generally limited to riparian zones, as these palatable shrub species can have a negative effect on caribou.
Mounding	Access control Habitat restoration (create microsites suitable for seedling establishment)	Mounding has been used as an access control measure on old roads and seismic lines to discourage off-road vehicle activity. It can be effective immediately following implementation. For access control purposes, mounds should be created using an excavator to approximately 0.75 m deep, where site conditions allow (Golder 2012a). The excavated material is placed next to the excavation (Macadam and Bedford 1998) creating a surface that is difficult to traverse with on or off-road vehicles. For the purposes of enhancing microsites for planted seedlings, mounding is a well-researched and popular site-preparation technique in the silviculture industry. It is commonly used in wet, low-lying areas to create better-drained microsites to enhance seedling survival. Mounding treed wetlands (e.g., bogs, fens) can enhance a site to promote natural revegetation over time, as higher, drier spots are created that seed can eventually settle into and germinate (Golder 2012a; Macadam and Bedford 1998). Soil properties (e.g., substrate, drainage) affect the ability of mounds to retain their structure.	Mounding is a suitable CHRP measure that may be used in conjunction with conifer seedling planting for the Project where ground conditions allow and where rollback is not available.

Restoration Measure	Objectives	Rationale	Comments
Mounding (cont'd)	See above	Suggested densities of mounding for access control or microsite creation purposes vary from 1,200-2,000 mounds/ha (AENV 2010; Golder 2012a; Vinge unpublished). Implementation of this mound density may be suitable where specialized equipment is used, and where frost is not driven into the soils to allow heavy equipment access. The mound density that can realistically be achieved on pipeline ROWs is lower since mounding is completed in conjunction with final cleanup. The limitations include scheduling mounding for restoration during final cleanup, which typically requires freezing-in of soils, availability of specialized equipment and minimum spatial separation of 5 m between mounds and the centreline of the operating pipeline. **For previous caribou habitat restoration projects on TransCanada ROWs, the achievable range in mound density was a minimum of 700 mounds/ha.**	See above

3.4 MONITORING AND ADAPTIVE MANAGEMENT

The principles of adaptive management will be applied to ensure the restoration measures implemented by the Project are effect and achieve the objectives of the CHRP. As part of GRP's post construction reclamation monitoring program, periodic inspection and implementation of adaptive measures will ensure restoration measures are functioning as designed.

3.5 SCHEDULE

Reclamation and habitat restoration activities on the construction ROW will be completed in phases as construction progresses. Scheduling and logistical coordination of restoration implementation will consider seasonal access constraints, sensitive timing periods for caribou and other valued components, production of nursery seedlings and appropriate timing for restoration efforts (e.g., season of planting).

Habitat restoration measures that were implemented during construction phases include MSD construction and vegetation retention (snow ramps and trenchless crossings). During clean-up following construction, bioengineering was completed at trenched watercourse crossings, and rollback is installed to deter access. Natural regeneration of the construction ROW begins during the growing season following construction.

Some measures are impractical to complete during the interim periods between construction phases. Restoration measures such as mounding and installing access closure signs, if used, will be implemented during the final clean-up after completion of

the Project. Tree planting will be implemented during the growing season (late July/August) following final clean-up after Project construction.

Table 3-4: Caribou Habitat Restoration Timeline

Restoration Measure	Timeline	Notes
MSD Construction	Construction phase	This measure is completed during pipeline construction.
Vegetation Retention (Snow Ramps and Trenchless Crossings)	Construction phase	This measure is completed during pipeline construction.
Access Control (Rollback)	Construction phase and final clean-up	Rollback is one of the final measures to be implemented as equipment demobilizes from the site following completion of clean-up activities.
Bioengineering	Construction phase and clean-up	Soil stabilization measures used in conjunction with bioengineering are installed during construction and clean-up.
Access Control (Mounding)	Final clean-up	Suitability and locations of this measure will be determined after construction is completed, prior to final clean-up.
Access Control (Signs)	Final clean-up	Suitability and locations of this measure will be determined after construction is completed. If frozen ground conditions restrict ability to install signs during winter final clean-up, their installation will be scheduled during non-frozen conditions, outside the caribou timing window (after July 15).
Tree Seedling Planting	Growing season following final clean-up	Tree planting will be scheduled outside the caribou timing window (late July/August) following final clean-up.

4.0 CONTINUOUS IMPROVEMENT

The measures outlined in this CHRP are derived from ongoing literature assessments, research completed by industry associations, lessons learned from previous projects, continued consultation with regulators and resource managers, and adaptive management practices in the field. Continuous improvement in habitat restoration is the result of the learnings from monitoring programs, applied practice and pure research.

4.1 CARIBOU HABITAT INITIATIVES

Although restoration ecology specific to caribou habitat is a relatively new science, some key oil and gas industry initiatives have identified important lessons learned for developments in caribou range. Common among many of these initiatives are revegetation parameters, the development of effective techniques to promote natural revegetation, and a better understanding of methods to control human access.

These initiatives focused on revegetation and access management, as well as limiting growth and establishment of plant species favourable to primary prey (e.g., CRRP 2007a,b; Golder 2010; Osko and Glasgow 2010). Projects also included tree planting initiatives, coarse woody debris management best practices, habitat enhancement programs and habitat restoration trials in caribou range (CRRP 2007a,b; Enbridge Pipelines [Athabasca] Inc. [Enbridge] 2010; Golder 2010, 2011; Canada's Oil Sands Innovation Alliance [COSIA] 2012). Based on this experience, access management and revegetation have emerged as the most effective practices used on pipeline ROWs.

4.2 INDUSTRY COLLABORATION

COSIA was launched in 2012 to enable responsible and sustainable growth of Canada's oil sands while delivering accelerated improvement in environmental performance through collaborative action and innovation (COSIA 2012).

The organization's four key focus areas are tailings, water, land and greenhouse gases. Part of the land focus area is a caribou habitat restoration initiative with the goal of improving woodland caribou habitat quality and herd survival through restoration of historic linear disturbances.

The Regional Industry Caribou Collaboration (RICC) is part of COSIA, and is a multi-industry partnership focused on restoring caribou habitat through regional, collaborative, range-based efforts. The objectives of RICC are to coordinate habitat restoration in the short term and long term, coordinate future activity, support and lead scientific research, conduct applied trials and align caribou habitat restoration programs with government led Range Plans and Action Plans.

Through TransCanada, Grand Rapids is an active member of RICC. A major RICC research effort is to verify the effectiveness of restoration measures using a multi-scale predator/prey collaring program to address current knowledge gaps in habitat use and function. As new information on habitat restoration becomes available, it will be incorporated in the planning and implementation process for all projects in caribou habitat.

4.3 CONSULTATION

Grand Rapids capitalizes on TransCanada's long history of consultation and working collaboratively with provincial regulators, Aboriginal communities, stakeholders and industry partners for projects in caribou range and will continue to work with provincial and federal regulators to align CHRP measures with provincial and federal policies.

The measures outlined in this CHRP consider the feedback from ongoing consultation for other projects. Through TransCanada and its subsidiaries, Grand Rapids will continue to work with regulators to identify and address caribou-related concerns, and will continue to facilitate open communication for continuous improvement.

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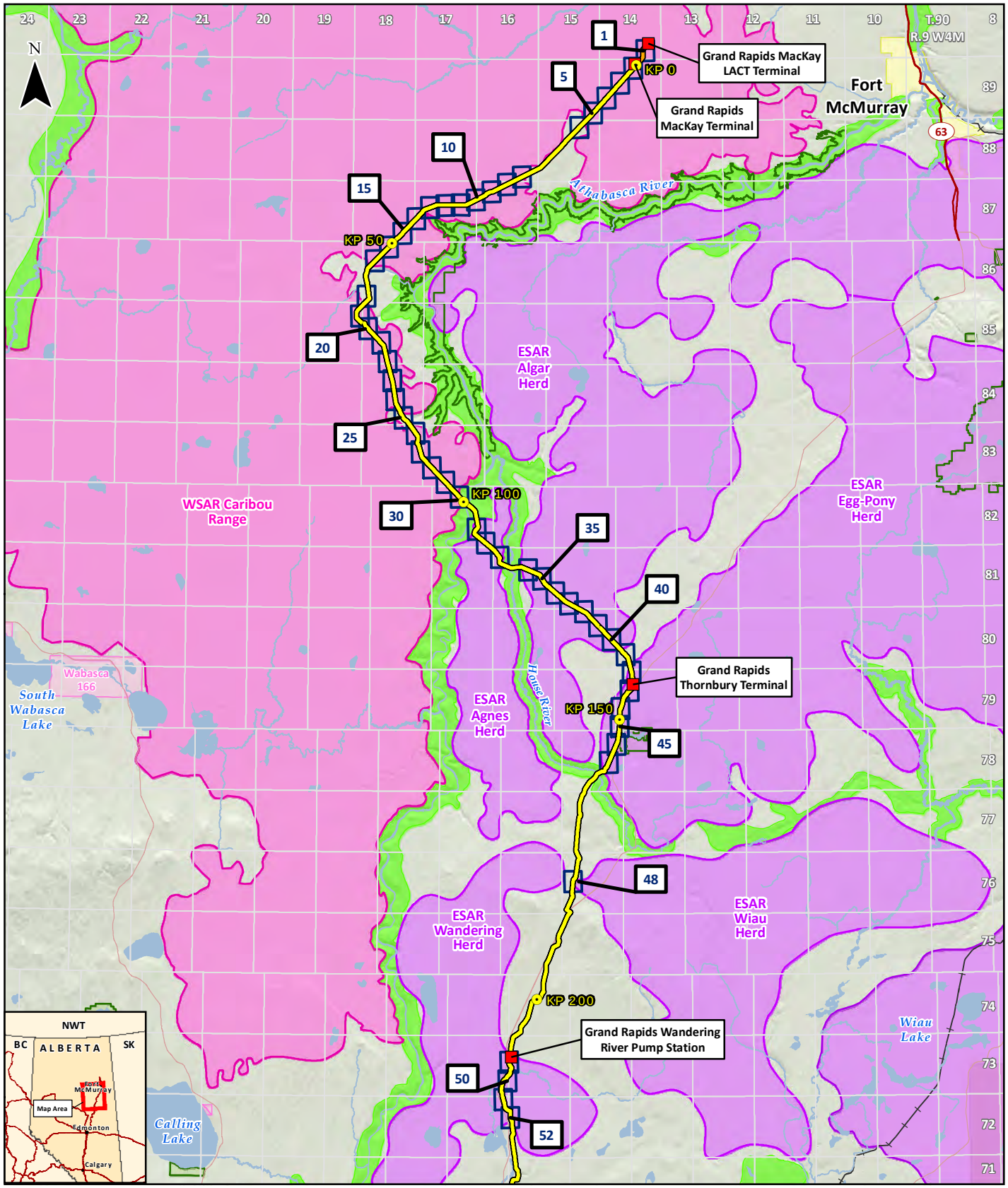
APPENDIX A

CARIBOU HABITAT RESTORATION PLAN MAPBOOK



Facility
Kilometre Post (KP)
Grand Rapids Pipeline Route
Road
Highway
Railway
Hydrology
Waterbody
Populated Area
Indian Reserve
Park/Protected Area
Key Wildlife and Biodiversity Zone

Caribou Range

East Side of the Athabasca River (ESAR)
West Side of the Athabasca River (WSAR)
Sheetframe Extent

APPENDIX A

INDEX MAP

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

UTM Zone 12N

KP, Routing, Facility: TCPL 2014-2015; Road, Highway: IHS Inc. 2016; Railway: NRCan 2012; Hydrology: IHS Inc. 2004; Military: IHS Inc. 2015; Indian Reserve: Government of Canada 2015, IHS Inc. 2015; Park/Protected Area: ATPR 2012; Populated Area, Municipal Boundary: AltaLIS 2016; Green/White Area: AltaLIS 2010; Provincial Boundary: AltaLIS 2009; Caribou Range, Key Wildlife Biodiversity Zone: AEP, GOA 2015; Hillshade: TERA Environmental Consultants 2008.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Grand Rapids Pipeline Project

SCALE: 1:850,000

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(All Locations Approximate)

November 2016	496826
Mapped By: SL	Checked By: SC

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Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility
Habitat Restoration Measures
Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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SPREAD 1

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N
2013 SPOT6 ©2016 CNES, Licensed by BlackBridge Geomatics Corp, www.blackbridge.com, Grand Rapids KP, Routing, Footprint, Facility: TCPL 2014-2015; Road: IHS Inc. 2016; Caribou Range, Key Wildlife and Biodiversity Zone: AEP, GOA 2015; Rollback and planting locations: CH2M 2016; Hydrology: AltaLIS 2014.

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

Grand Rapids Pipeline Project

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(All Locations Approximate)

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MacKay Lateral Kilometre Post (KP)
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Caribou Range
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Grand Rapids Facility
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Minimal Disturbance Construction (MSD)
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SPREAD 1

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

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(All Locations Approximate)

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HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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(All Locations Approximate)

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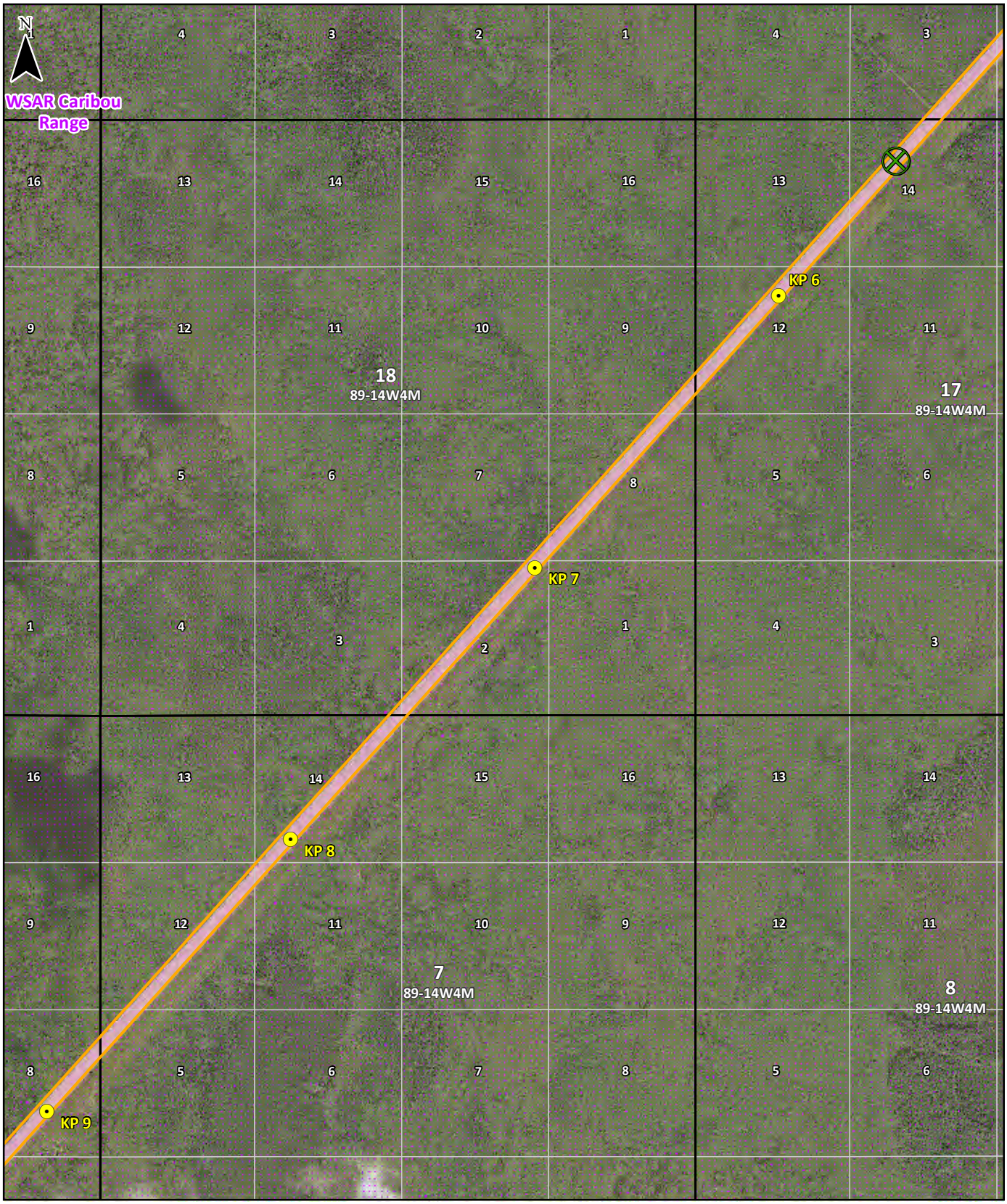

Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

SPREAD 1

SHEET 4 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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(All Locations Approximate)

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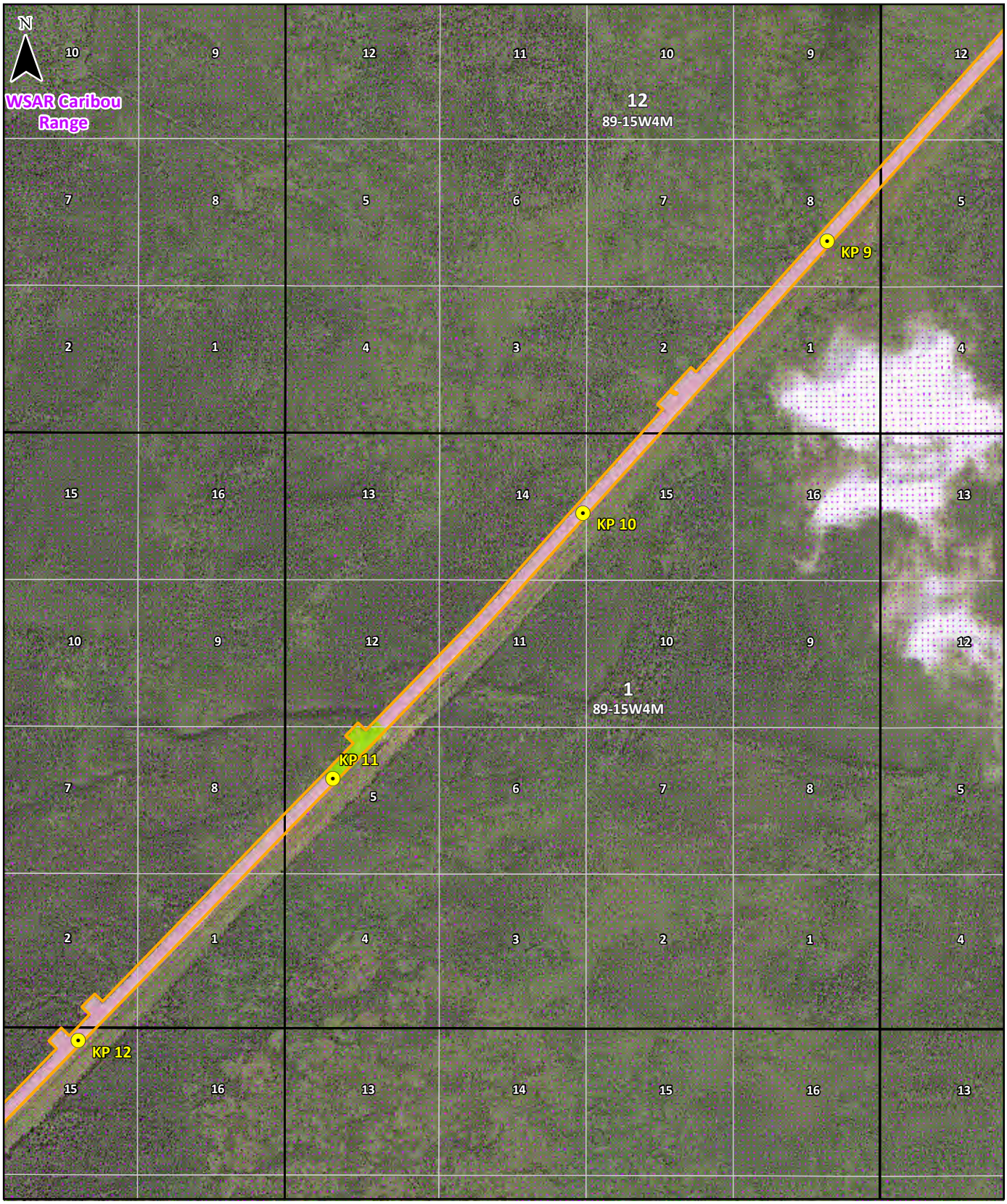

Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

SPREAD 1

SHEET 5 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

0 100 200 300 m

(All Locations Approximate)

November 2016

496826

Mapped By: SL

Checked By: JB

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Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility
Habitat Restoration Measures
Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

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SHEET 6 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N
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Grand Rapids Pipeline Project

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November 2016 | 496826

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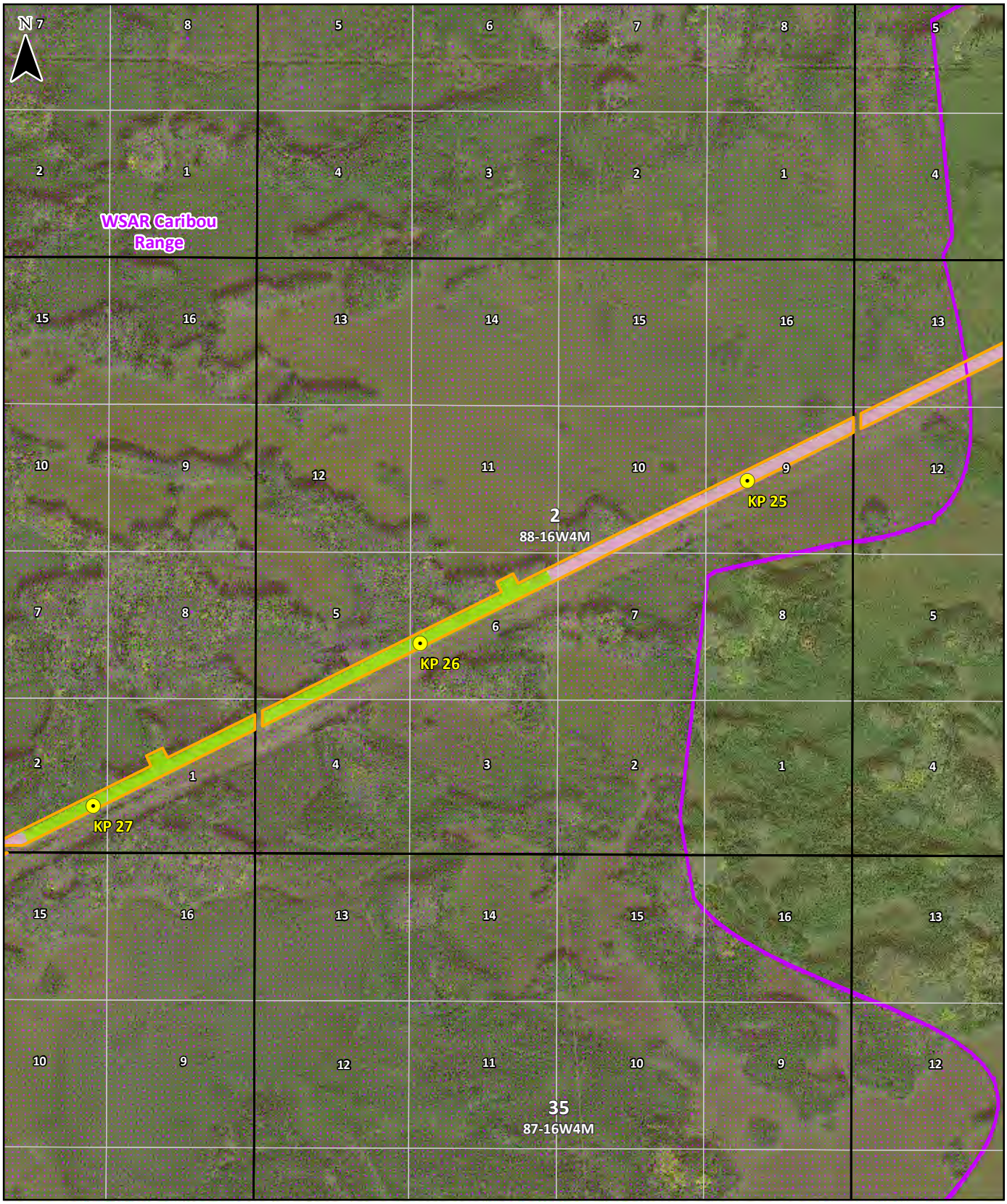

Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility
Habitat Restoration Measures
Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

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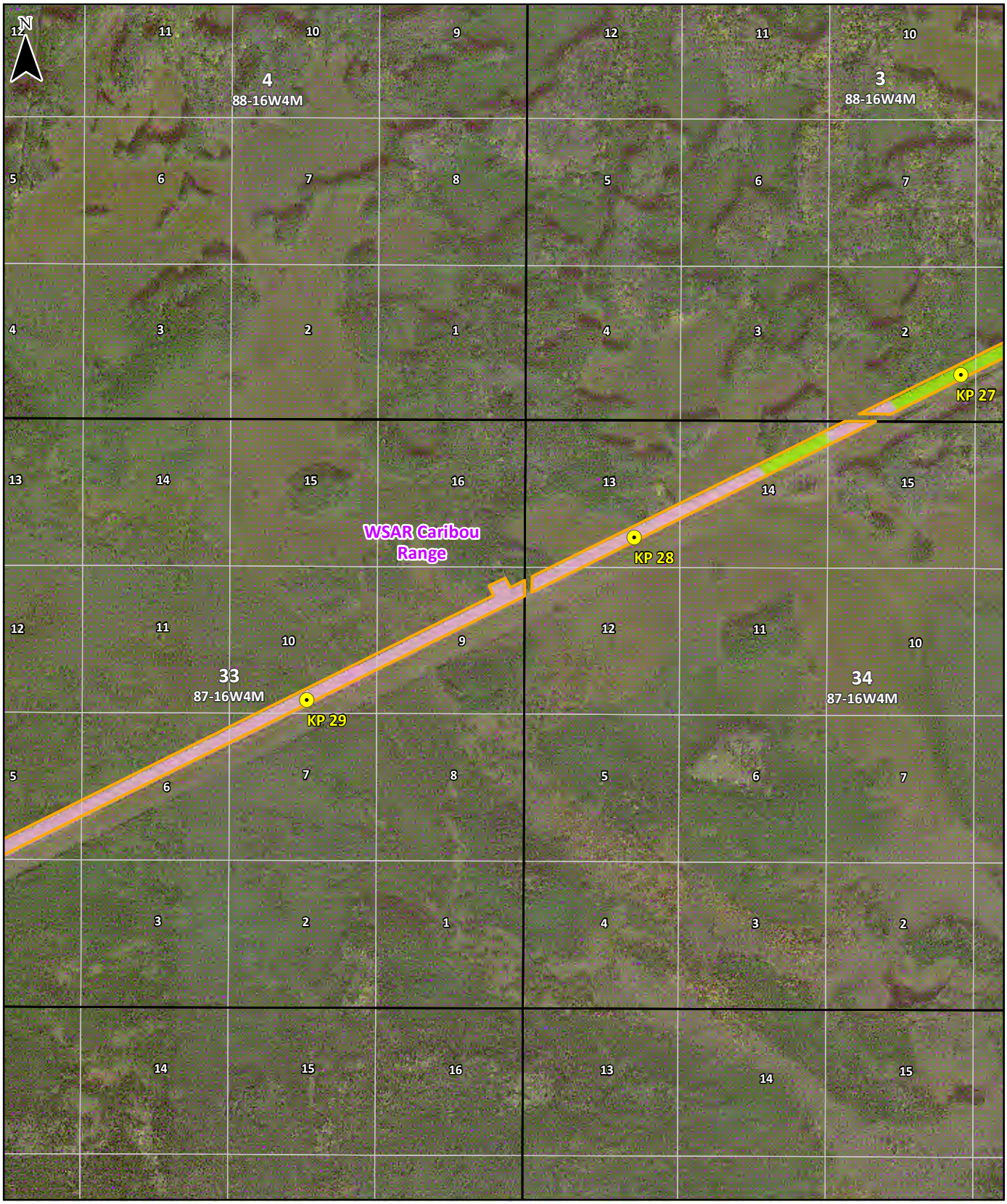

Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

Grand Rapids Pipeline Project

SCALE: 1:15,000
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(All Locations Approximate)

November 2016 | 496826

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Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility
Habitat Restoration Measures
Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N
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Grand Rapids Pipeline Project

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Kilometre Post (KP)
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Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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(All Locations Approximate)

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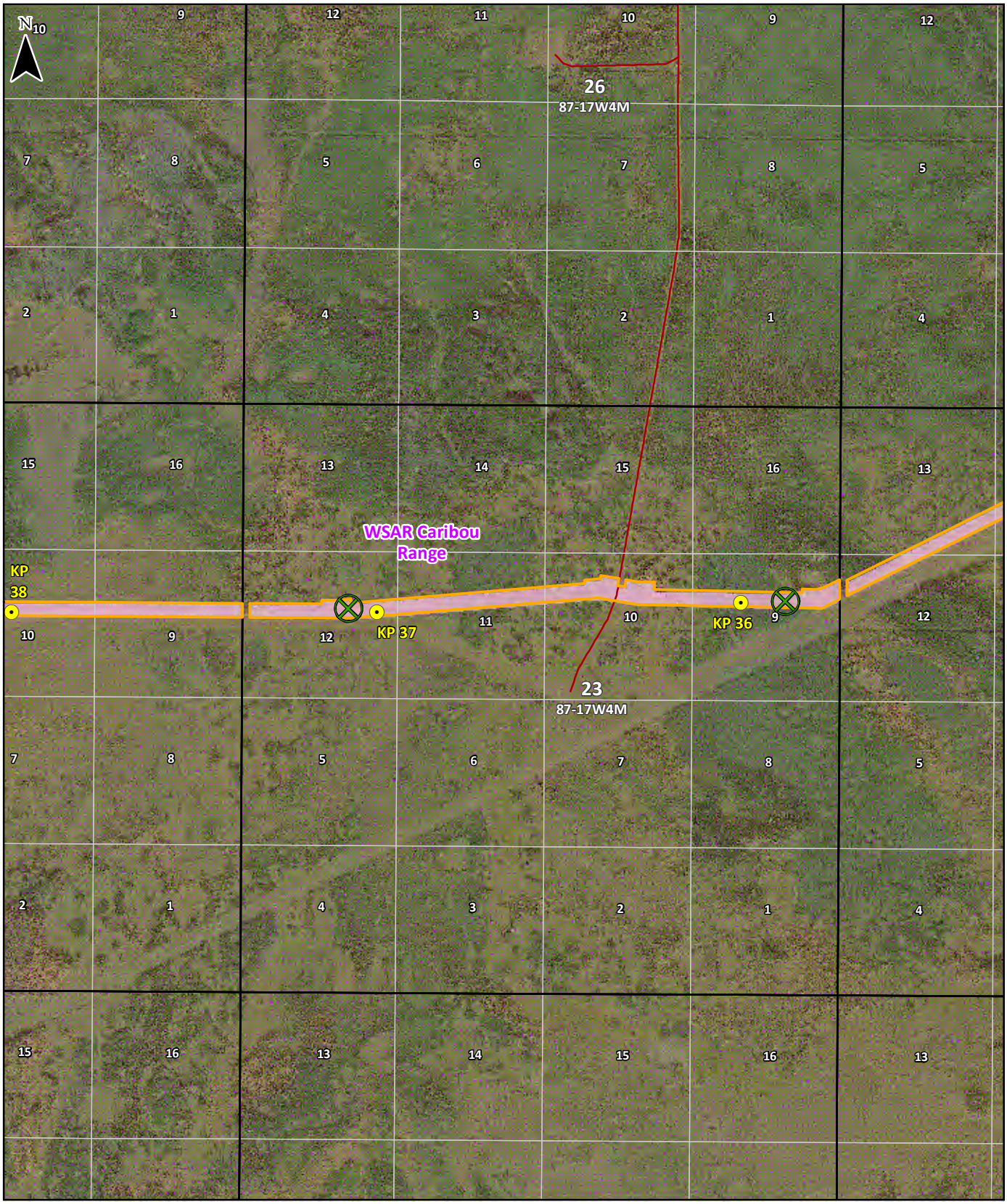

Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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(All Locations Approximate)

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Kilometre Post (KP)
MacKay Lateral Kilometre Post (KP)
Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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(All Locations Approximate)

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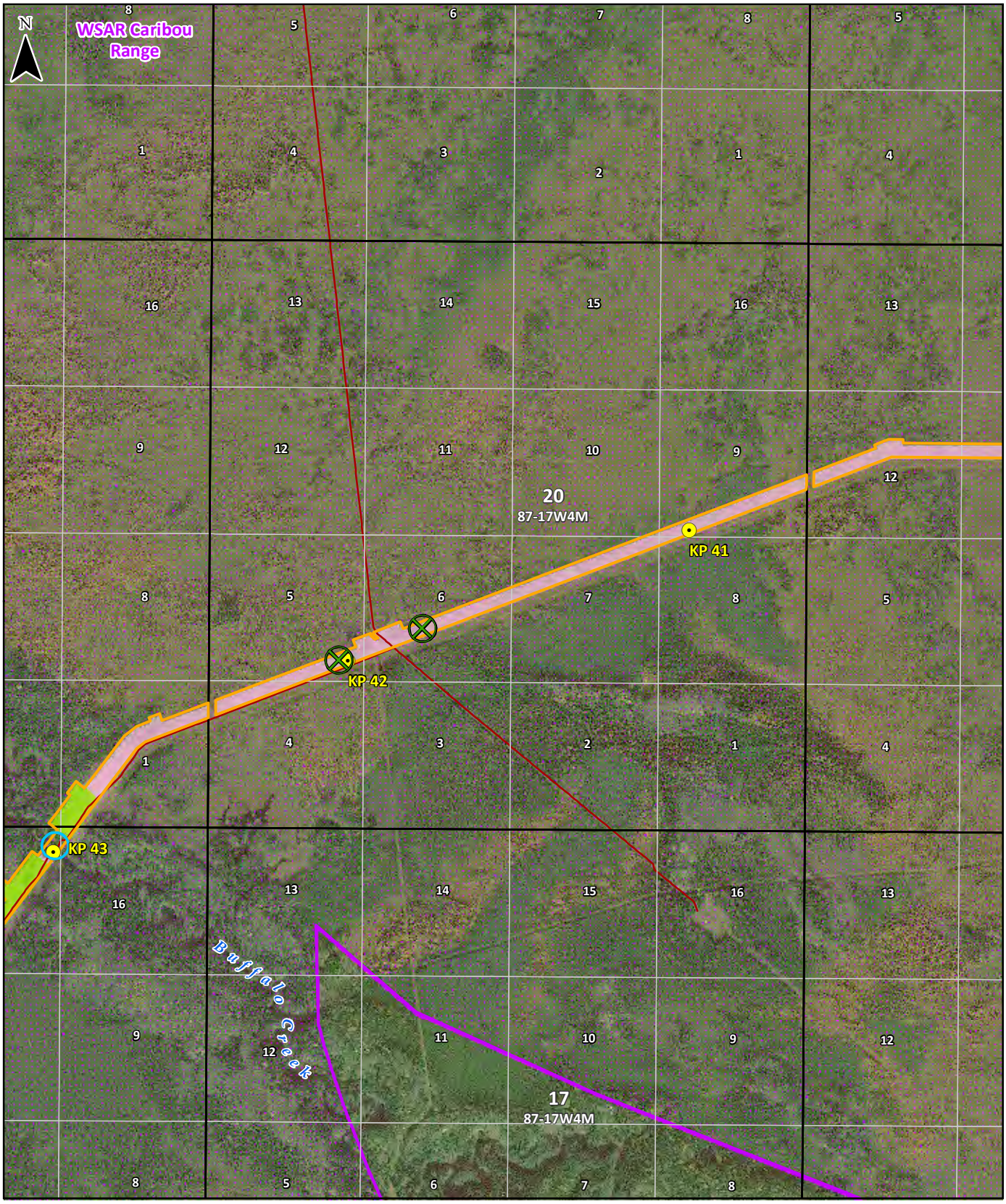

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Road
Caribou Range
Grand Rapids Footprint
MacKay Lateral Footprint
Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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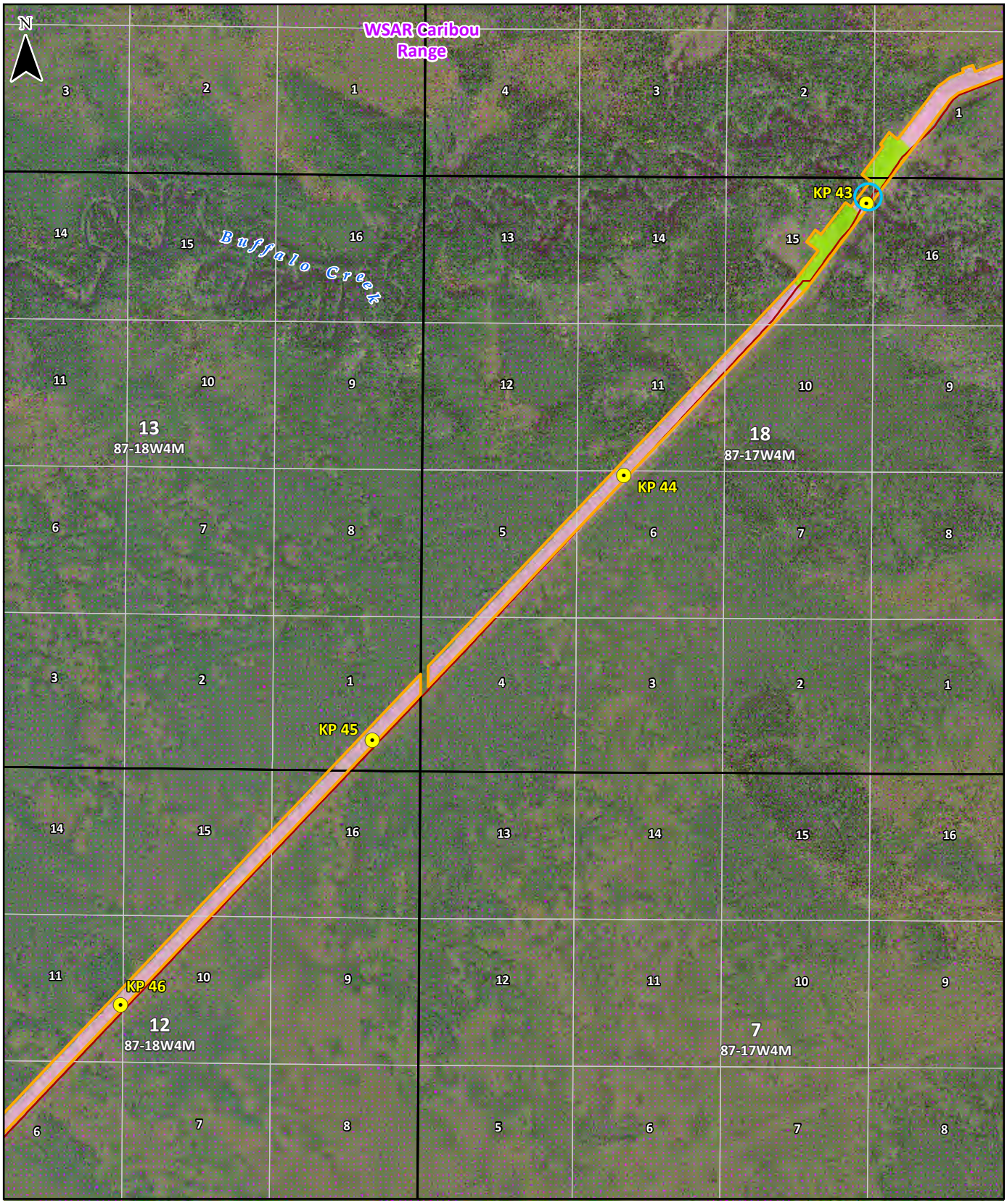

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Road
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Habitat Restoration Measures

Rollback
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Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

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UTM Zone 12N

Grand Rapids Pipeline Project

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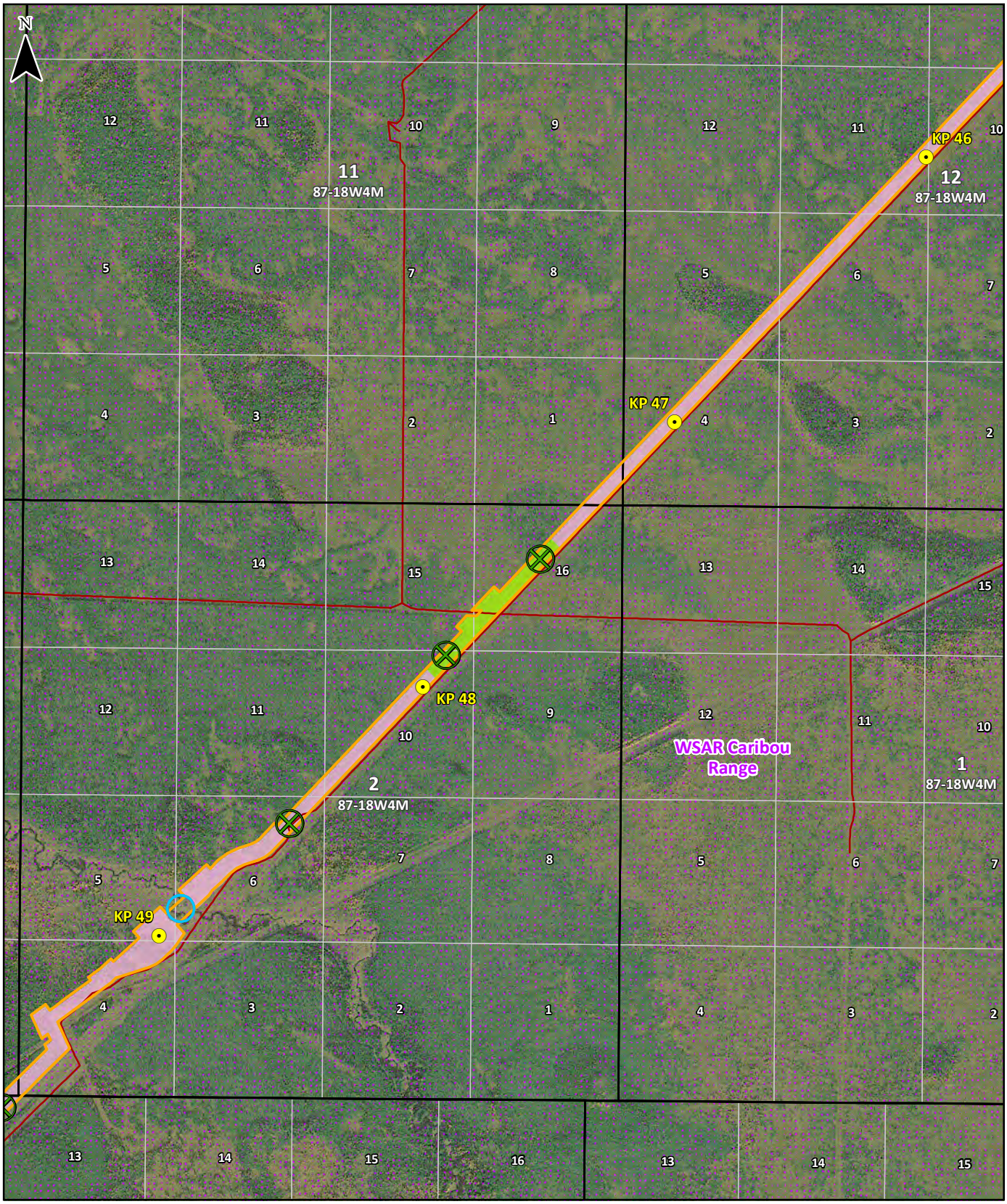

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

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HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

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CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

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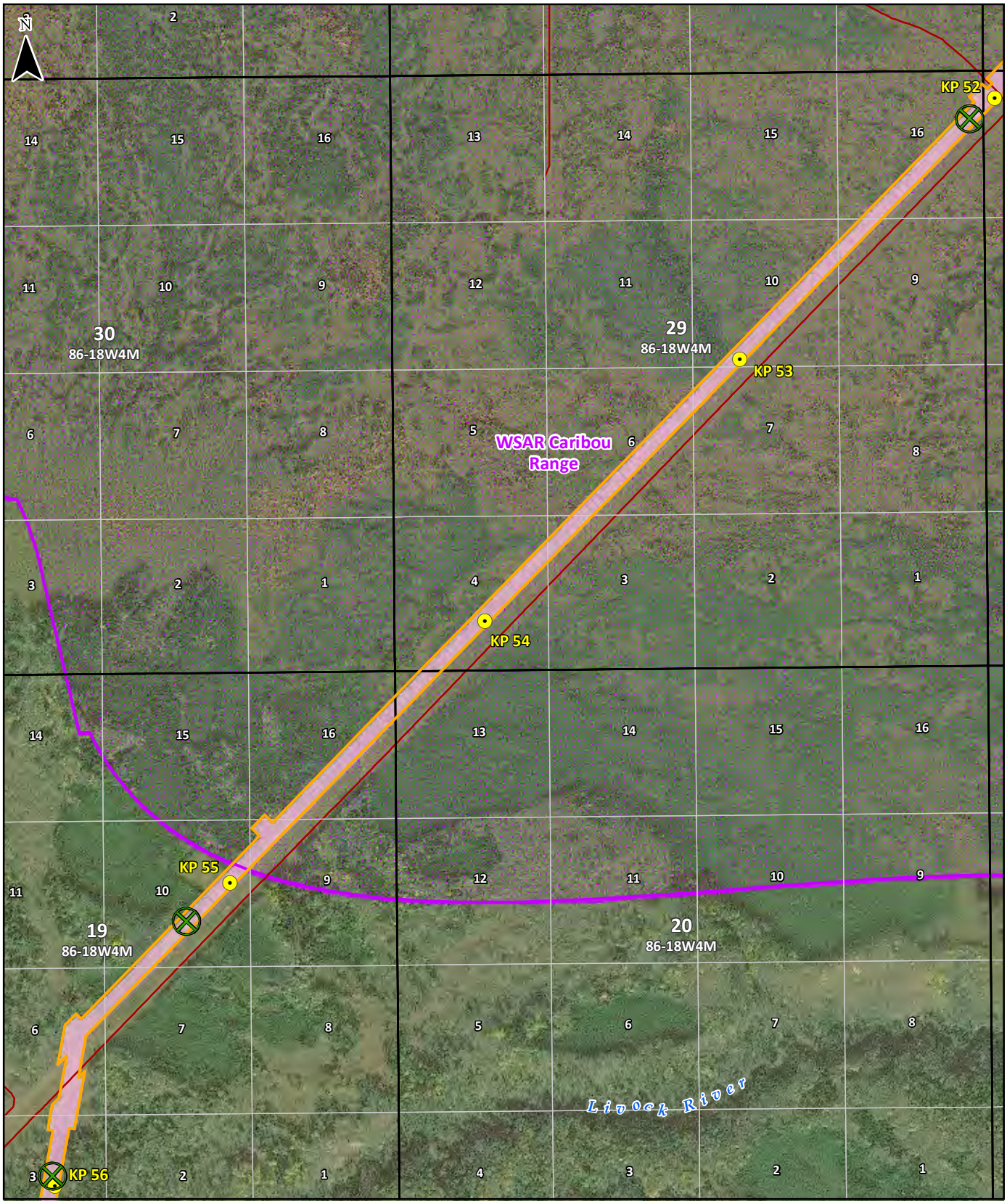

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Habitat Restoration Measures
Rollback
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Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

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SHEET 17 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

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Rollback
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Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

SPREAD 1

SHEET 18 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

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Grand Rapids Pipeline Project

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Planting

APPENDIX A

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SHEET 19 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

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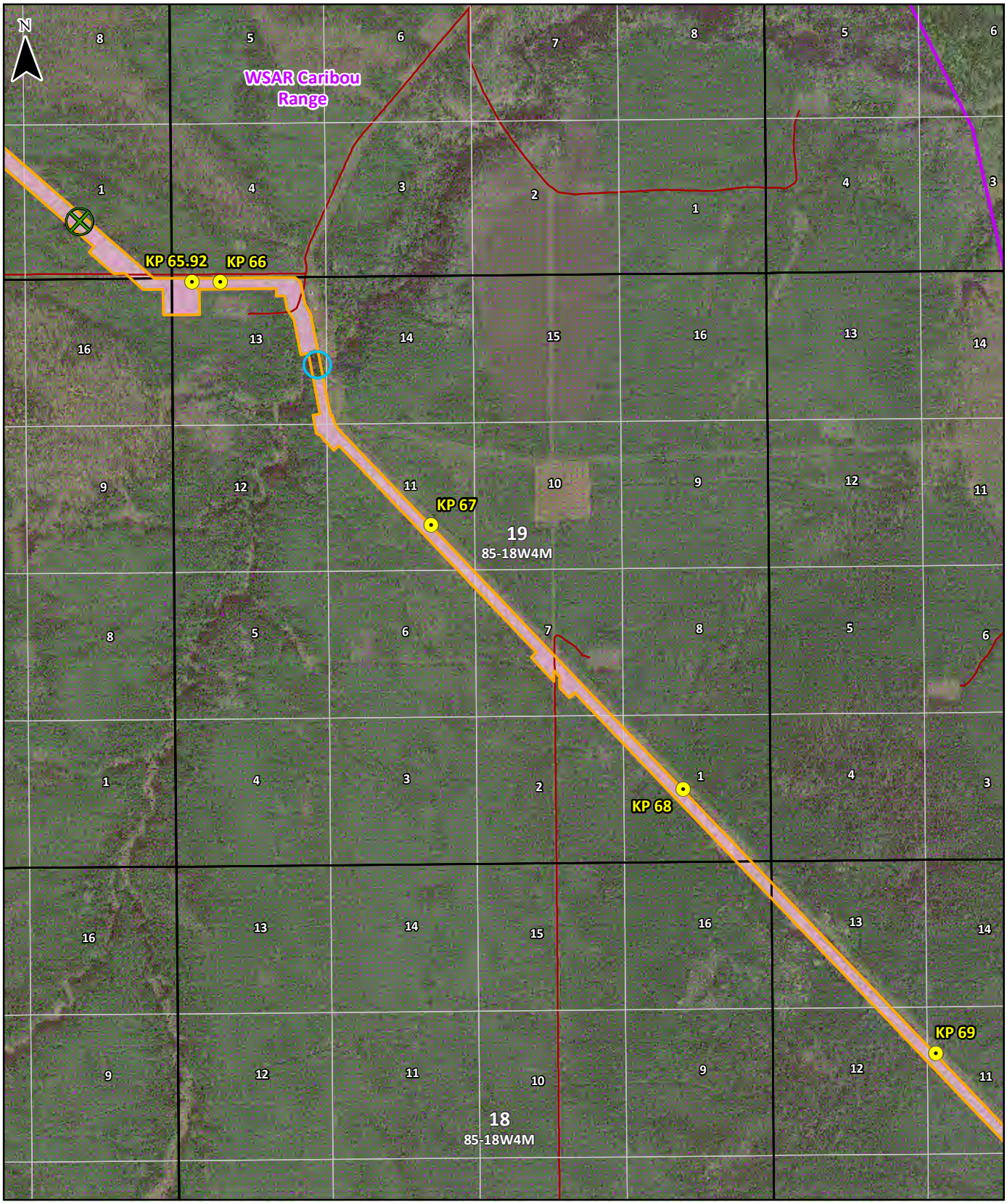

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Grand Rapids Facility

Habitat Restoration Measures

Rollback
Watercourse/Drainage: MSD, Snow Ramp, Bio-engineering
HDD drill path - no clearing
Minimal Disturbance Construction (MSD)
Planting

APPENDIX A

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SHEET 20 OF 52

CARIBOU HABITAT RESTORATION PLAN FOR THE GRAND RAPIDS PIPELINE GP LTD. GRAND RAPIDS PIPELINE PROJECT

ch2m

UTM Zone 12N

Grand Rapids Pipeline Project

SCALE: 1:15,000

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