



May 4, 2017

## PARKER CARIBOU RANGE

# Parker Range Restoration: Zone 2 Implementation Plan

**Submitted to:**

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REPORT



**Report Number: 1534276**

**Distribution:**

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### Executive Summary

The loss and fragmentation of boreal caribou (*Rangifer tarandus caribou*) habitat resulting from anthropogenic disturbances, and the subsequent increase in predator and primary prey populations in early seral habitats, has been identified as the main limiting factor to caribou populations by both the British Columbia (BC) provincial government (Culling & Cichowski 2017) and the federal government (EC 2012). Restoration of linear corridors is a management lever to help create larger contiguous patches of preferred caribou habitat than currently exist within fragmented ranges.

A Parker Range Pilot Restoration Program Plan (the Program Plan) was developed in 2015/2016 (Golder 2016) as the first plan to propose application of habitat restoration techniques over an entire boreal caribou range in Canada. Oil and gas and forestry activities within the Parker Range are expected to be low over the coming decade, providing the opportunity to apply and monitor, with minimal expectation of human disturbance, the effectiveness of habitat restoration techniques over a caribou-range scale in relation to caribou population metrics. The overall objective of the Program Plan is to transition low quality boreal caribou habitat into higher quality habitat by reducing the benefits predators and their primary prey gain through linear corridor use, and establish a vegetation trajectory on these corridors that will in the long term increase boreal caribou habitat intactness. The Program Plan is designed to be implemented over a multi-year period, completing desktop disturbance mapping and implementation planning, implementing restoration treatments, and conducting post-treatment monitoring.

This Zone 2 Implementation Plan (the Plan) outlines the process to plan and complete a macro-scale habitat restoration project within Zone 2, which was delineated in the Program Plan as the second area to be treated within the Parker caribou range. Implementation of a macro-scale habitat restoration project within Zone 1 was completed in winter 2016/17.

Contained within the Plan are a list of caribou habitat restoration objectives and strategies, a work-plan to complete the field implementation, detailed summaries of the authorizations and amendments required prior to the implementation of the restoration treatments, a monitoring strategy, the primary access preparation strategy, and two options for work-plan activities and schedule; one for winter 2017/18 implementation and one for winter 2018/19 implementation.



## ZONE 2 IMPLEMENTATION PLAN

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### Acknowledgements

This project was recommended by the Research and Effectiveness Monitoring Board (REMB) of the British Columbia Government's Boreal Caribou Implementation Plan (BCIP) initiative. Funding for the project was provided by the BC Oil and Gas Research and Innovation Society (BC OGRIS).

Logistical support for access planning was provided by Wayne Wheeler of the Fort Nelson Snowmobile Club and Marty Wells, local business owner and trapper. Technical advice was provided by Tim Vinge, Landscape Restoration Ecologist with Alberta Environment and Parks. Field work was completed by Golder Associates Ltd. with support from Highland Helicopters. This report was prepared by Golder Associates Ltd. with contributions from Brian Coupal, Caitlin Parker, Heather Rudd, James Emerson, and Paula Bentham.



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## ZONE 2 IMPLEMENTATION PLAN

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Habitat Restoration Sign



## ZONE 2 IMPLEMENTATION PLAN

### 1.0 INTRODUCTION

The Boreal Caribou (Parker Range) Habitat Restoration Pilot Program Plan (the Program Plan) was initiated in April 2015 by the Research and Effectiveness Monitoring Board (REMB) of the BCIP initiative, with funding for the Program Plan provided by the BC Oil and Gas Research and Innovation Society (BC OGRIS). The Program Plan<sup>1</sup> (Golder 2016) is the first plan to propose application of restoration techniques over an entire boreal caribou range in Canada. The Program Plan was developed to guide a multi-year, range scale, restoration program, with field implementation beginning in Zone 1 in January 2017 (Golder 2016). The Program Plan is designed to guide the implementation of habitat restoration treatments along treatment areas identified during the desktop linear classification exercise and confirmed through ground-truthing, throughout the entire Parker Range.

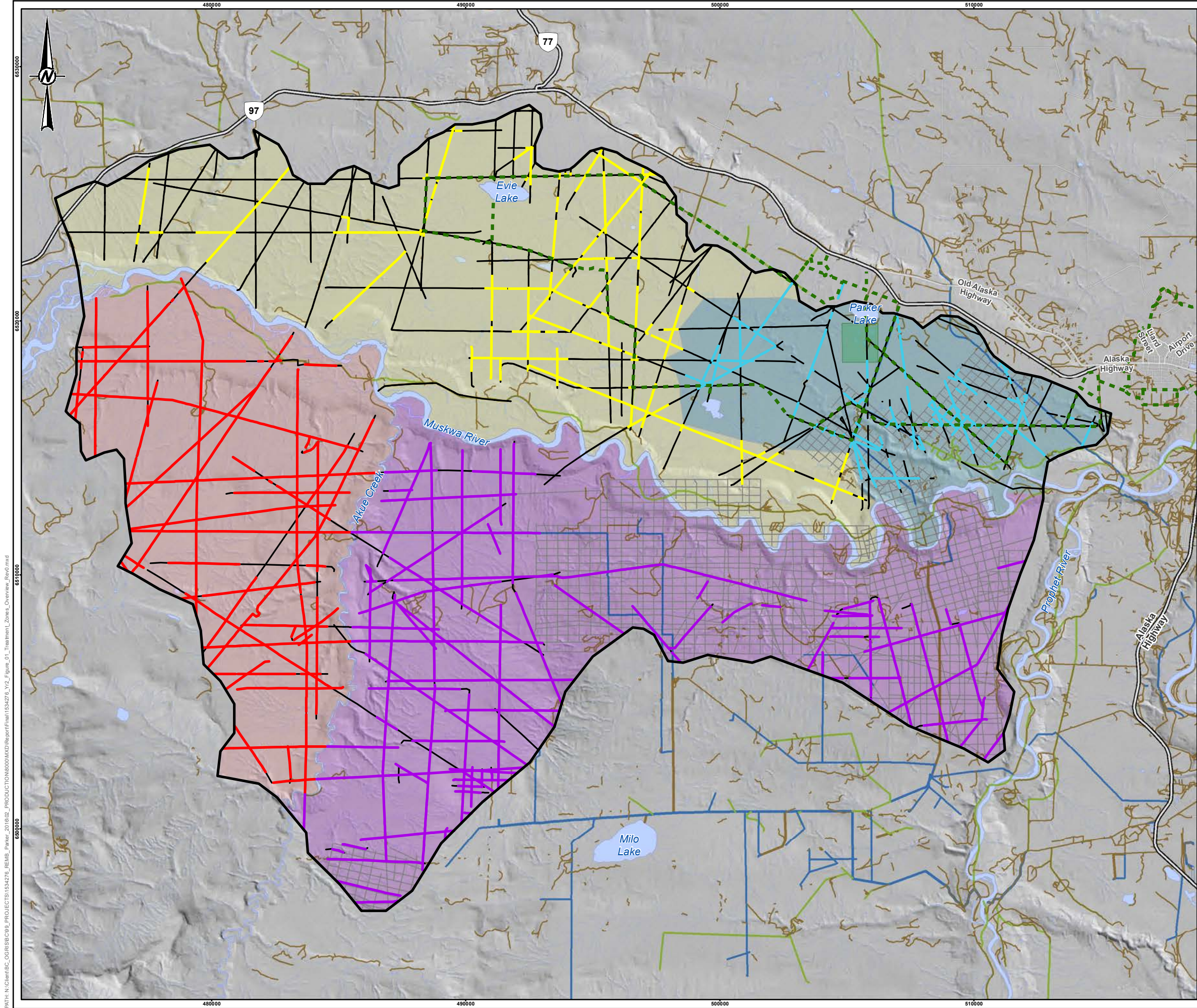
A high-level tactical plan has been included within the Program Plan to apply restoration treatments within the Parker Range. The tactical plan is based on treatment of zones within the Parker Range, numbered one to four, which have been created and prioritized based on ecological and logistical considerations associated with each zone. This Zone 2 Implementation Plan has been developed to focus on treating specific areas throughout Zone 2 of the four Zones identified in the Parker Range Program Plan (Figure 1).

Zone 2 is an area approximately 22,986 hectares in size, containing approximately 324 kilometers (km) of traditional seismic line. This Zone 2 implementation plan incorporated both the Program Plan's approach to treatment design, as well as one year of before-treatment wildlife use remote camera data. Site specific locations and type of treatment are identified. Approximately 34 km of seismic or road is considered as No Treatment because it is a recreational trail, resource road, or forestry service road, 104 km are designated for treatment and the remaining 186 km will be left for natural vegetation regeneration.

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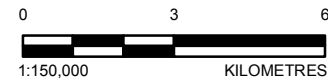
<sup>1</sup> <http://www.bcofris.ca/sites/default/files/bcip-2016-04-parker-range-program-plan-finalreduced-1.pdf>





LEGEND

- PARKER CARIBOU RANGE
- TREATMENT SITE**
  - ZONE 1 (EAST)
  - ZONE 2 (NORTH)
- TREATMENT CANDIDATE SITE**
  - ZONE 3 (SOUTH)
  - ZONE 4 (WEST)
- OTHER**
  - LINEAR DISTURBANCE - NO TREATMENT REQUIRED
  - OGC IDENTIFIED LOW IMPACT SEISMIC: REQUIRES GROUNDTRUTHING
  - PARKER LAKE ECOLOGICAL RESERVE
  - WATERBODY
  - WATERCOURSE
  - TOWN
- TRANSPORTATION**
  - HIGHWAY
  - MAJOR ROAD
  - LOCAL ROAD
  - RESOURCE ROAD
  - UNCLASSIFIED ROAD
  - BC OGC PETROLEUM DEVELOPMENT ROAD
  - BC OGC PETROLEUM ACCESS ROAD
  - FORESTRY SERVICE ROAD / ROAD PERMIT
  - RECREATIONAL TRAIL DESIGNATION



REFERENCES

- 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
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- ROAD/ACCESS OBTAINED FROM DIGITAL ROAD ATLAS.
- BC OGC PETROLEUM ACCESS AND DEVELOPMENT ROAD OBTAINED FROM THE BC OIL AND GAS COMMISSION.
- PARKER CARIBOU RANGE, RECREATIONAL TRAIL, ECOLOGICAL RESERVE AND HILLSHADE OBTAINED FROM B.C. GOV. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT

PARKER RANGE RESTORATION:  
ZONE 2 IMPLEMENTATION PLAN

TITLE

TACTICAL PLAN TREATMENT ZONES

CONSULTANT



YYYY-MM-DD 2017-05-01

DESIGNED BC

PREPARED JE

REVIEWED BC

APPROVED PB

PROJECT NO.  
1534276

CONTROL  
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REV.  
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FIGURE  
1





## 2.0 CARIBOU HABITAT RESTORATION OBJECTIVES AND STRATEGIES

Caribou-related research suggests that predators and primary prey are utilizing linear corridors for their own benefits, resulting in detriments for caribou. Research has demonstrated that linear access corridors facilitate wolf travel and hunting behaviour within caribou range (James 1999; Dickie 2016). In response to this research, the focus for caribou habitat restoration has been to establish treatments that will reduce or eliminate benefits that linear disturbances provide to predators and primary prey. These treatments include access control that is effective in the short term, while setting the vegetation response on a trajectory to restore the site to the equivalent pre-disturbed habitat. Functional habitat, in regard to habitat restoration of historical linear disturbances, has been defined by the Canadian Association of Petroleum Producers (Wilson 2015) as: "The application of techniques on anthropogenic disturbances that deter the interaction between caribou and their predators in the near term, and supports habitat recovery in the long-term". Based on this definition, the objectives of the habitat restoration treatments are:

- Access control targeting human and predator access along linear disturbance features; and
- Directly restore habitat by promoting the rate of recovery of naturally occurring and introduced vegetation, which may require tree/shrub seedling planting or seeding.

### 2.1 Habitat Restoration Treatment Options

The REMB has identified restoration techniques designed to speed the recovery of existing linear features and other non-linear features that are not re-vegetating well naturally, that are outlined in the Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia (Golder 2015a). Refer to the table in Appendix A for a detailed list of the restoration techniques identified for treatment of linear features in the Parker Range, all of which are seismic lines.



### 3.0 ZONE 2 TREATMENT AREA

Zone 2 was chosen as a priority focus area for implementation under the Program Plan for a number of reasons including:

- restoring seismic line corridors in an area that has documented high caribou use;
- restoring seismic line corridors in an area of predicted caribou calving use;
- restoring seismic line corridors in an area that has known wolf use;
- Zone 2 is close to the Alaska highway, reducing the impact any planning or field related constraints will have on costs by:
  - requiring less winter access than Zones 3 and 4;
  - reducing the number of road use agreements; and
  - no major watercourse crossings are required.

Within the Zone 2 treatment area, all linear disturbances have been mapped and interpreted for the following variables for each linear segment along the linear footprints:

- site type;
- dominant tree species;
- vegetation height;
- vegetation cover;
- line width;
- presence or absence of a game trail; and
- before-treatment wildlife use data within the Zone 2 area (one year, remote camera).

Treatment sites were chosen for treatment based on the results of an inventory of the linear disturbances within Zone 2 (Figure 2) and a ground-truthing field visit completed May 30 and 31, 2016. The ground-truthing field visit was used to confirm vegetation and game trail attributes obtained during the Program Plan (Golder 2016) and denote key access points for treatment implementation. Candidate sites from the linear inventory were reviewed during the ground-truthing field visit by a low level helicopter fly-over, to confirm the results of the desk top exercise and the treatment prescription.

Areas that have been determined to be high potential habitat for calving purposes (DeMars and Boutin 2015) were removed from consideration as treatment candidates to avoid sensory disturbance to caribou during the late winter period when treatments would be implemented (Figure 2). Treatments will still occur on the outside edges of these areas, focusing on inhibiting human and wildlife access into the high potential areas.

#### 3.1 Before-Treatment Wildlife Use

The lack of long-term habitat restoration monitoring in Canada has led to a degree of uncertainty regarding the long-term success of restoration treatments. Habitat restoration is a relatively new science, and thus projects to



## ZONE 2 IMPLEMENTATION PLAN

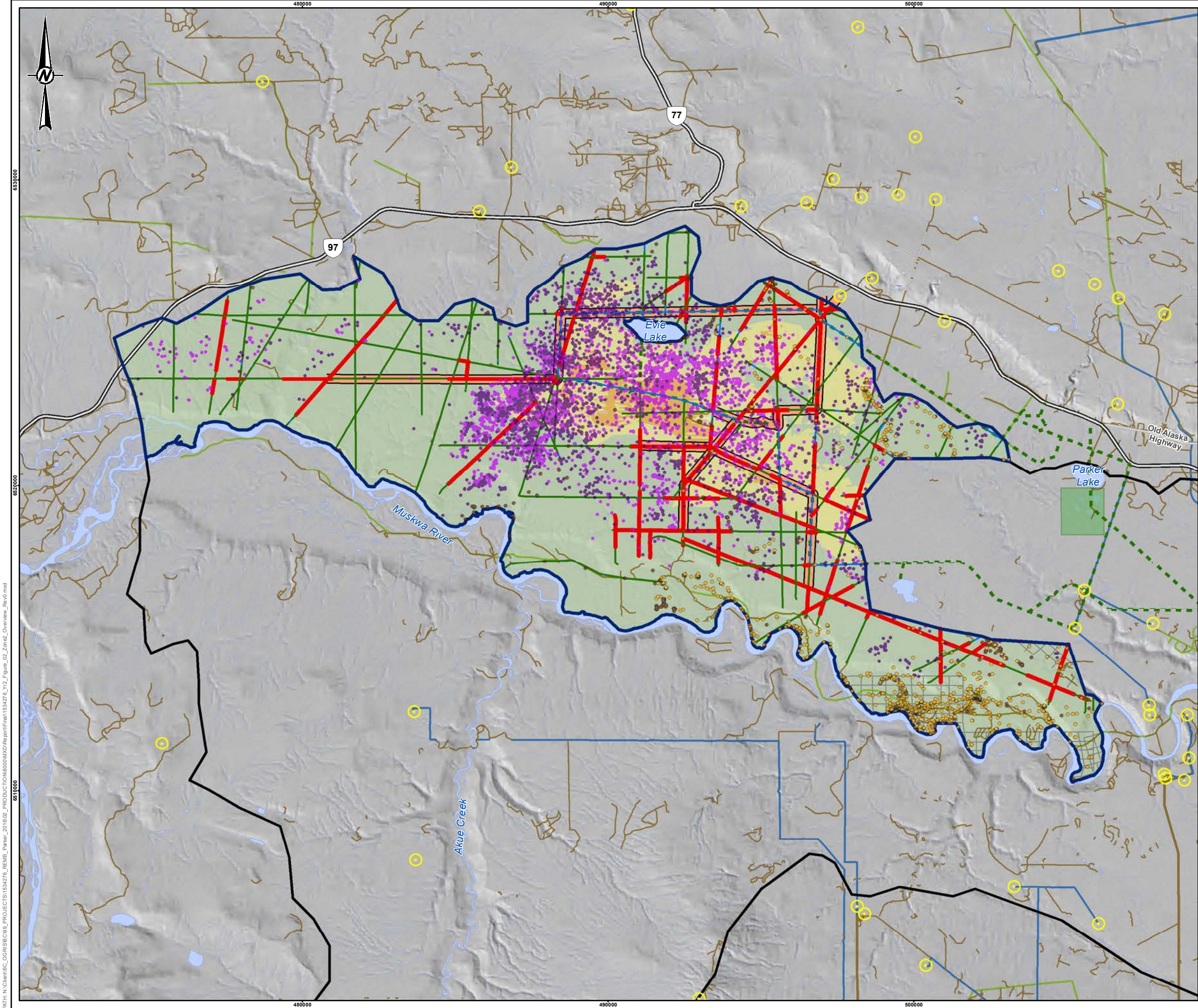
date have been implemented with a large number of assumptions. Adaptive management at the Program-level will require an investigation of the treatment results in both the short and long term to assess whether implementation of treatments are more effective at slowing or altering predator movements within the Parker range in the short term, as well as accelerating vegetation re-establishment on linear disturbance features compared to natural revegetation processes. To both support the location and type of treatments for implementation, as well as to determine the effectiveness of restoration treatments at slowing or altering predator movements, a collaborative approach was taken to link the Program Plan to a Before-After-Control-Impact (BACI) treatment study on wildlife use within the Parker Range (Matrix 2017).

A meeting to discuss preliminary results of the study was held on March 16, 2017. The following key learnings were discussed:

- using the best model, the four zones within the Parker Range do not influence treatment priority areas;
- wolf use is high on provincially designated recreational trails (these are considered as 'No Treatment' based on Provincial designation for recreational use);
- snow, snow packing, snow depth and habitat types drive all wildlife use with Zone 1 and Zone 2 having highest caribou and wolf use, likely related to packed recreational trails; and
- preliminary results indicated that Golder's treatment plans overlap well with wildlife use, with the exception of recreational lines which cannot be prescribed for treatment.

None of the preliminary results impact the methodology used for determining treatment type or location for Zone 2. A final report was issued by Matrix Solutions Inc. in April 2017 outlining the results of their study.





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**PRELIMINARY RESTORATION RECOMMENDATION**

TREATMENT SITE

NO TREATMENT - LEAVE FOR NATURAL REGENERATION

NO TREATMENT - NON TREATABLE

**RADIO-COLLAR DATA**

CARIBOU GPS RADIO-COLLAR LOCATION (2011 - 2012) <sup>1</sup>

CARIBOU GPS RADIO-COLLAR LOCATION (2013 - 2016) <sup>2</sup>

WOLF GPS RADIO-COLLAR LOCATION (2012 - 2013) <sup>1</sup>

WOLF GPS RADIO-COLLAR LOCATION (2013 - 2014) <sup>3</sup>

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WATERCOURSE

OGC IDENTIFIED LOW IMPACT SEISMIC: REQUIRES GROUNDTRUTHING

SURFACE WELL (INACTIVE)

**TRANSPORTATION**

HIGHWAY

MAJOR ROAD

LOCAL ROAD

RESOURCE ROAD

UNCLASSIFIED ROAD

BC OGC PETROLEUM DEVELOPMENT ROAD

BC OGC PETROLEUM ACCESS ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION

PROPOSED PRIMARY WINTER ACCESS

RATH:N:\Client\BC\_OGRI\BCOGRI\PROJECTS\1534276\_REMB\_Parker\_2016\02\_PRODUCTION\6000\MXD\BentFinal\1534276\_V12\_Figure\_02\_Zone2\_Overview\_Rev0.mxd

**REFERENCES**

1. CARIBOU (2011-2012) AND WOLF (2012-2013) GPS RADIO-COLLAR LOCATIONS OBTAINED FROM C.DEMARS, UNIVERSITY OF ALBERTA (2015).

2. CARIBOU (2013-2016) GPS RADIO-COLLAR LOCATIONS OBTAINED FROM BC OGRIS REMB BOREAL CARIBOU RADIO-COLLARING PROGRAM, AVAILABLE ONLINE AT [HTTP://WWW.BCOGRIS.CA/BOREAL-CARIBOU/PROJECTS/ACTIVE](http://www.bcogris.ca/boreal-caribou/projects/active) (01 SEPTEMBER 2016)

3. WOLF (2013-2014) GPS RADIO-COLLAR LOCATIONS OBTAINED FROM FROM B.C. MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS.

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7. PARKER AND MUSKWA CARIBOU RANGE, RECREATIONAL TRAIL, ECOLOGICAL RESERVE AND HILLSHADE OBTAINED FROM B.C. GOV. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

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PROJECT

PARKER RANGE RESTORATION:  
ZONE 2 IMPLEMENTATION PLAN

TITLE

TACTICAL PLAN TREATMENT ZONE 2 OVERVIEW  
CARIBOU HABITAT RESTORATION TREATMENT SITES

CONSULTANT

YYYY-MM-DD  
DESIGNED  
PREPARED  
REVIEWED  
APPROVED

2017-05-01  
BC  
JE  
BC  
PB

PROJECT NO.  
1534276

CONTROL  
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FIGURE  
2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 28mm





## ZONE 2 IMPLEMENTATION PLAN

Based on the results of the mapping, ground-truthing exercises, as well as incorporation of the preliminary before-treatment remote camera wildlife data, each linear disturbance segment received a final classification as either:

- **No-treatment (34 km):** These disturbances constitute any linear disturbance that has an active disposition or protective notation, such as a lease road or provincially designated recreational trail.
- **Leave for Natural (186 km):** Recommended when percent cover and height classification of vegetation along a linear disturbance are above the threshold for recommending vegetation introduction or access control.
- **Restoration Treatment Site (104 km):** Recommended when percent cover and height classification of vegetation along a linear disturbance are below the thresholds recommending vegetation introduction or access control.

Treatment sites may include sites that are consistently vegetated up to 3 m in height, but still have a well-defined game trail.

The decision support flow chart located in Appendix C illustrates in more detail the process used to determine the treatment type for each line segment. Treatment type was further refined following ground-truthing and incorporation of the BACI wildlife use data and analysis.

Based on the ground-truthing of the Oil and Gas Commission seismic line data set identified as Low Impact Seismic (LIS) in Zone 1, the LIS in the SE corner of Zone 2 will be ground-truthed prior to, or during, the Zone 2 Implementation Plan field work (Golder 2017b). The majority of the LIS lines in Zone 1 were field truthed to not represent low impact seismic line attributes based on width, lack of vegetation recovery and the amount of active predator use. Therefore, these lines required treatment because they had relatively little vegetation growing, or had a game trail. Any treatments applied to the LIS in the SE corner of Zone 2 will require an update to the treatment plan. The update is expected to occur during field implementation. Any updates will require Ministry of Forests, Lands, and Natural Resource Operations (FLNRO) approval based on the site information to add these sites to the Zone 2 Implementation Plan. FLNRO will consult with Fort Nelson First Nation prior to issuing approval.

### 3.2 Zone 2 Workplan

The restoration treatment prescriptions identified for Zone 2 are summarized in Table 1. Treatment sites are all located on crown land with no active dispositions. Treatment prescriptions fall into one of four treatment types based on the site specific treatment segments vegetation attributes and wildlife use.

**Table 1: Treatment Type and Total Sites**

Treatment Type	Number of Sites	Length (km)
Tree Felling	60	33
Mounding / Tree Felling / Seedling Planting	128	67
Spread Woody Debris (Other)	7	4
<b>Grand Total</b>	<b>195</b>	<b>104</b>

Upland sites scheduled for mounding will have the surfaced ripped / scraped to create micro-sites for seed or seedling planting except at intersections with well used access corridors and high potential archeology areas. Access corridor intersections will be mounded. Mounding for access control will generally be for approximately





## ZONE 2 IMPLEMENTATION PLAN

100 m treatment lengths. High potential archeology areas are mitigated by having no ground disturbance in these areas.

There are a total of approximately 104 km of linear features that are scheduled for treatment, encompassing an area of approximately 72 ha, spread out over 195 treatment segments (Table 1). More linear features may be added to the schedule for treatment, based on the ground-truthing results of the OGC identified LIS lines.

Treatment sites will be planted with a total of 56,009 black spruce (Sb) and tamarack (Lt).

Table 2 includes the Figure number (see Appendix D Mapbook), legal location, restoration recommendation, treatment segment length and width, and recommended seedlings (species, number) required to plant the site (if required).



## ZONE 2 IMPLEMENTATION PLAN

**Table 2: Restoration Treatment Locations and Recommendations**

Figure Number	SITE ID	BC_Site_Series_Code (BEC Zone Code BWBS)	Game_Trail	Recommended Treatment	Corridor Width (m)	Treatable Corridor Length (m)	Treatable Area (m <sup>2</sup> )	Vegetation treatment: Seedlings Required
								Sb and/or Lt
A-30	1	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	71	425	51
A-30	2	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	203	1,218	146
A-30	3	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	409	2,452	294
A-30	4	Wb - Wetland bog	Yes	Tree Felling Only	6	249	1,495	0
A-30	5	Wb - Wetland bog	Yes	Tree Felling Only	6	952	5,713	0
A-30	6	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	505	3,535	424
A-30	7	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	435	3,046	365
A-30	8	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	573	4,586	550
A-30	9	102 - PI – Kinnikinnick – Lingonberry	Yes	Tree Felling Only	7	244	1,705	0
A-29	10	Wb - Wetland bog	Yes	Tree Felling Only	8	1,105	8,838	0
A-29	11	Wb - Wetland bog	Yes	Tree Felling Only	7	501	3,510	0
A-29	12	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	435	3,483	418
A-29	13	Wb - Wetland bog	Yes	Tree Felling Only	7	321	2,245	0
A-29	14	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	629	5,034	604
A-29	15	Wb - Wetland bog	Yes	Tree Felling Only	8	327	2,619	0
A-29	16	Wb - Wetland bog	Yes	Tree Felling Only	8	318	2,546	0
A-29	17	Wb - Wetland bog	Yes	Tree Felling Only	8	863	6,906	0
A-29	18	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	2,491	19,928	2,391
A-28	19	Wb - Wetland bog	Yes	Tree Felling Only	6	160	963	0
A-28	20	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	204	1,227	147
A-28	21	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	169	1,349	162
A-27, A-28	22	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	689	5,512	661
A-25, A-26	23	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	645	7,100	852
A-27 , A-28	24	Wb - Wetland bog	Yes	Tree Felling Only	5	706	3,529	0
A-26	25	Wb - Wetland bog	Yes	Tree Felling Only	6	34	203	0
A-22, A-26	26	Wb - Wetland bog	Yes	Tree Felling Only	11	559	6,150	0
A-26	27	Wb - Wetland bog	Yes	Tree Felling Only	6	533	3,198	0
A-21,A-25,A-26	28	Wb - Wetland bog	Yes	Tree Felling Only	6	1,011	6,065	0
A-22	29	Wb - Wetland bog	Yes	Tree Felling Only	6.5	307	1,996	0
A-22	30	Wb - Wetland bog	Yes	Tree Felling Only	6.5	185	1,201	0
A-22	31	Wb - Wetland bog	Yes	Tree Felling Only	11	933	10,266	0
A-22	32	Wb - Wetland bog	Yes	Tree Felling Only	6	346	2,078	0
A-27	33	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	604	4,832	580
A-25, A-27	34	Wb - Wetland bog	Yes	Tree Felling Only	10	1,013	10,131	0
A-27	35	Wb - Wetland bog	Yes	Tree Felling Only	10	36	360	0
A-27	36	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	8	606	4,852	0
A-27	37	Wb - Wetland bog	Yes	Spread Coarse Woody Debris	5	725	3,624	0
A-27	38	Wb - Wetland bog	Yes	Tree Felling Only	8	564	4,512	0
A-27	39	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	9	90	811	0
A-27	40	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	9	249	2,242	0
A-27	41	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	386	3,855	463
A-27	42	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	8	418	3,346	0



## ZONE 2 IMPLEMENTATION PLAN

**Table 2: Restoration Treatment Locations and Recommendations**

Figure Number	SITE ID	BC_Site_Series_Code (BEC Zone Code BWBS)	Game_Trail	Recommended Treatment	Corridor Width (m)	Treatable Corridor Length (m)	Treatable Area (m²)	Vegetation treatment: Seedlings Required
								Sb and/or Lt
A-25, A-27	43	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	8	516	4,125	0
A-25	44	101 - Sw - Lingonberry - Step moss	Yes	Mounding / Tree Felling / Seedling Planting	10	175	1,747	0
A-25	45	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	244	1,461	175
A-25	46	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4	130	519	62
A-25	47	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	9	142	1,277	153
A-25	48	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	178	889	107
A-25	49	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4.5	165	743	89
A-24, A-25	50	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	952	7,614	914
A-20, A-24,A-25	51	Wb - Wetland bog	Yes	Tree Felling Only	6	1,164	6,987	0
A-25	52	Wb - Wetland bog	Yes	Tree Felling Only	7	294	2,056	0
A-25	53	Wb - Wetland bog	Yes	Tree Felling Only	7	546	3,821	0
A-25	54	103 - SwPI – Soopolallie – Toadflax	Yes	Spread Coarse Woody Debris	7	394	2,757	0
A-21, A-25	55	Wb - Wetland bog	Yes	Tree Felling Only	7	1,133	7,931	0
A-21	56	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	219	1,533	184
A-21	57	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	288	1,730	208
A-20, A-21	58	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	737	4,421	530
A-21	59	Wb - Wetland bog	Yes	Tree Felling Only	9	432	3,888	0
A-21	60	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	299	3,288	395
A-21	61	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	929	10,222	1,227
A-21	62	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	445	4,893	587
A-17	63	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	419	4,192	503
A-17	64	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4.5	271	1,218	146
A-17	65	Wb - Wetland bog	No	Mounding / Tree Felling / Seedling Planting	11	1,903	20,930	2,512
A-9, A-17	66	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	2,191	10,956	1,315
A-9, A-17	67	Wb - Wetland bog	No	Mounding / Tree Felling / Seedling Planting	7	1,997	13,979	1,677
A-17	68	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	181	907	109
A-17	69	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	5	224	1,119	134
A-16, A-17	70	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	913	5,476	657
A-17	71	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	248	1,736	208
A-17	72	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4.5	291	1,310	157
A-17	73	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	7	559	3,914	470
A-16, A-17	74	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4.5	646	2,908	349
A-9	75	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	180	1,262	151
A-9	76	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	170	1,874	225
A-9	77	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	895	9,846	1,181
A-9	78	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	412	2,885	346
A-9	79	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	312	2,183	262
A-9	80	Wb - Wetland bog	Yes	Tree Felling Only	6	368	2,207	0
A-9	81	Wb - Wetland bog	Yes	Tree Felling Only	5.5	196	1,075	0
A-9	82	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	11	363	3,996	479
A-3	83	Wb - Wetland bog	Yes	Tree Felling Only	7	2,061	14,427	0
A-3, A-8, A-9	84	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	455	2,733	328



## ZONE 2 IMPLEMENTATION PLAN

**Table 2: Restoration Treatment Locations and Recommendations**

Figure Number	SITE ID	BC_Site_Series_Code (BEC Zone Code BWBS)	Game_Trail	Recommended Treatment	Corridor Width (m)	Treatable Corridor Length (m)	Treatable Area (m <sup>2</sup> )	Vegetation treatment: Seedlings Required
								Sb and/or Lt
A-3	85	Wb - Wetland bog	Yes	Tree Felling Only	6	268	1,610	0
A-24	86	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	214	1,282	154
A-24	87	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,032	6,193	743
A-24	88	103 - SwPI – Soopolallie – Toadflax	Yes	Spread Coarse Woody Debris	5	371	1,853	0
A-24	89	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	688	3,441	413
A-24	90	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	449	2,247	270
A-24	91	104a - Sb – Labrador tea – Step moss, freely drained phase	Yes	Tree Felling Only	6	381	2,284	274
A-24	92	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,133	6,800	816
A-24	93	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling / Seedling Planting	6	97	581	0
A-24	94	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	642	3,849	462
A-24	95	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	6	423	2,535	0
A-24	96	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	6	57	340	0
A-24	97	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	6	171	1,026	0
A-24	98	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	670	4,020	482
A-20, A-24	99	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	359	2,156	259
A-23, A-24	100	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,399	8,396	1,008
A-20	101	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	639	3,514	422
A-20	102	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	294	1,762	211
A-20	103	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	173	953	114
A-20	104	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	460	2,529	303
A-20	105	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,699	10,193	1,223
A-20	106	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	73	439	53
A-20	107	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	867	8,670	1,040
A-16, A-20	108	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	635	3,177	381
A-20	109	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	52	259	31
A-20	110	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	126	628	75
A-20	111	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	123	739	89
A-20	112	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	133	1,330	160
A-20	113	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	488	2,927	351
A-20	114	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	300	1,800	216
A-20	115	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	289	1,734	208
A-20	116	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	200	1,202	144
A-20	117	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,615	9,692	1,163
A-20	118	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	178	1,070	128
A-20	119	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	1,237	7,422	891
A-16, A-20	120	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	950	5,703	684
A-19, A-20	121	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	1,425	14,252	1,710
A-20	122	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	125	750	90
A-16	123	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	373	2,240	269
A-16	124	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	4.5	261	1,174	141
A-16	125	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	5	616	3,079	369
A-16	126	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	377	2,262	271



ZONE 2 IMPLEMENTATION PLAN

Table 2: Restoration Treatment Locations and Recommendations

Figure Number	SITE ID	BC_Site_Series_Code (BEC Zone Code BWBS)	Game_Trail	Recommended Treatment	Corridor Width (m)	Treatable Corridor Length (m)	Treatable Area (m²)	Vegetation treatment: Seedlings Required
								Sb and/or Lt
A-8, A-16	127	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	536	3,215	386
A-8	128	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6.5	123	801	96
A-8	129	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	5	132	658	79
A-8	130	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6.5	124	807	97
A-8	131	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	10	149	1,494	179
A-8	132	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	8	187	1,494	179
A-8	133	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	5.5	657	3,612	433
A-8	134	Wf - Wetland fen	No	Mounding / Tree Felling / Seedling Planting	5.5	548	3,014	362
A-8	135	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	676	4,055	487
A-2,A- 8	136	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	1,136	9,090	1,091
A-8	137	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	350	2,797	336
A-2	138	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	831	4,154	498
A-2	139	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	200	1,102	132
A-2	140	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	48	266	32
A-2	141	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	76	608	73
A-2	142	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5.5	165	907	109
A-19, A-23	143	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	1,043	7,300	876
A-23	144	Wb - Wetland bog	Yes	Tree Felling Only	9	847	7,625	0
A-23	145	Wb - Wetland bog	Yes	Tree Felling Only	6	767	4,603	0
A-23	146	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	481	3,370	404
A-23	147	Wb - Wetland bog	Yes	Tree Felling Only	6	546	3,279	0
A-23	148	Wb - Wetland bog	Yes	Tree Felling Only	6	901	5,407	0
A-15, A-19	149	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7.5	508	3,809	457
A-19	150	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7.5	380	2,853	342
A-19	151	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	893	4,464	536
A-19	152	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	194	1,360	163
A-19	153	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	10	310	3,100	372
A-1, A-7	154	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6.5	2,224	14,458	1,735
A-1	155	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	7	310	2,169	260
A-14	156	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	9	107	965	116
A-14	157	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	9	162	1,462	175
A-14	158	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	133	1,063	128
A-13, A-14	159	Wb - Wetland bog	Yes	Tree Felling Only	6	1,442	8,651	0
A-14	160	Wb - Wetland bog	Yes	Tree Felling Only	6	1,104	6,622	0
A-14	161	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	88	530	64
A-14	162	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	68	340	41
A-14	163	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	88	616	74
A-13, A-14	164	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	5	756	3,779	454
A-7	165	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	184	1,469	176
A-7	166	101 - Sw - Lingonberry - Step moss	Yes	Mounding / Tree Felling / Seedling Planting	8	187	1,494	179
A-7, A-14	167	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	777	6,213	746
A-7	168	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6.5	615	4,000	480





## ZONE 2 IMPLEMENTATION PLAN

Table 2: Restoration Treatment Locations and Recommendations

Figure Number	SITE ID	BC_Site_Series_Code (BEC Zone Code BWBS)	Game_Trail	Recommended Treatment	Corridor Width (m)	Treatable Corridor Length (m)	Treatable Area (m²)	Vegetation treatment: Seedlings Required
								Sb and/or Lt
A-18	169	103 - SwPI – Soopolallie – Toadflax	Yes	Spread Coarse Woody Debris	7	1,285	8,998	0
A-18	170	103 - SwPI – Soopolallie – Toadflax	Yes	Spread Coarse Woody Debris	6	231	1,383	0
A-18	171	103 - SwPI – Soopolallie – Toadflax	Yes	Spread Coarse Woody Debris	5	326	1,631	0
A-13, A-18	172	Wb - Wetland bog	Yes	Tree Felling Only	7	562	3935	0
A-13	173	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	122	731	88
A-13	174	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	94	661	79
A-13	175	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	8	246	1,968	236
A-13	176	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	823	5,760	691
A-13	177	Wb - Wetland bog	Yes	Tree Felling Only	10	223	2,230	0
A-6, A-13	178	Wb - Wetland bog	Yes	Tree Felling Only	9	356	3,201	0
A-6	179	103 - SwPI – Soopolallie – Toadflax	Yes	Tree Felling Only	10	308	3,082	0
A-5, A-11, A-12	180	Wb - Wetland bog	Yes	Tree Felling Only	6	1,350	8,099	0
A-5	181	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	249	1,491	179
A-5	182	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	697	4,184	502
A-5	183	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	7	222	1,556	187
A-5	184	Wb - Wetland bog	Yes	Mounding / Tree Felling / Seedling Planting	6	255	1,533	184
A-5	185	Wb - Wetland bog	Yes	Tree Felling Only	6	466	2,798	0
A-5	186	Wb - Wetland bog	Yes	Tree Felling Only	7	162	1,137	0
A-11	187	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	6	1,587	9,524	1,143
A-11	188	Wf - Wetland fen	Yes	Mounding / Tree Felling / Seedling Planting	7	954	6,678	801
A-11	189	101 - Sw - Lingonberry - Step moss	Yes	Tree Felling Only	8	256	2,046	0
A-11	190	101 - Sw - Lingonberry - Step moss	Yes	Tree Felling Only	7	186	1,302	0
A-10	191	Wb - Wetland bog	Yes	Tree Felling Only	6	443	2,655	0
A-10	192	Wb - Wetland bog	Yes	Tree Felling Only	10	93	928	0
A-10	193	Wb - Wetland bog	Yes	Spread Coarse Woody Debris	6	414	2,482	0
A-4, A-10	194	Wb - Wetland bog	Yes	Tree Felling Only	6	1,822	10,930	0
A-4	195	Wb - Wetland bog	Yes	Tree Felling Only	6	467	2,801	0
					<b>Total</b>	<b>104</b>	<b>72</b>	<b>56,009</b>
						<b>KM</b>	<b>Ha</b>	<b>Sb/Lt</b>

**Note:**

- <sup>1</sup> Figures are located in Appendix D.
- <sup>2</sup> The Treatment Matrix for BWBSmk is located in Appendix B.
- <sup>3</sup> See the Treatment Flowchart in Appendix C for an illustration of how treatment recommendations were determined.
- <sup>4</sup> Upland sites with mounding recommendation will be scrapped up to create micro-sites except in areas with high potential archeology sites.
- <sup>5</sup> Seedlings will be 412 stock (4 cm in diameter and 12 cm in length) 1 + 0 (1 year in nursery containers, 0 years in beds).
- <sup>6</sup> All sites will be planted to a minimum average of 1200 seedlings/hectare.
- <sup>7</sup> Sb = black spruce; Lt = Tamarack
- <sup>8</sup> Moist Cool Boreal White and Black Spruce.



## ZONE 2 IMPLEMENTATION PLAN

### 4.0 SEED AND SEEDLING SOURCING

Site type, treatment type, and seedlings required for Zone 2 are summarized in Table 3.

**Table 3: Summary of the treatment type, and seedlings required, based on site type**

Site Type	Treatment Type	Total Seedlings
Lowland / Wetland (Mineral and Organic)	Mounding / Tree Felling / Seedling Planting	56,009
Upland / Transitional	Tree-felling and Spread Coarse Woody Debris	0
<b>Total</b>		<b>56,009</b>

Due to the uncertainty in timeline and financial resources available to implement the Zone 2 Implementation Plan, seed was not been sourced that would have been available for January 2018 planting. The earliest seedlings could be planted is summer (July 16 – August 10) 2018. If winter planting during field implementation is preferable, the next opportunity would be in January to March 2019.

The species selected for planting at each site was determined by comparing the site-type and dominant species in the adjacent site to the Treatment Matrix for BWBSmk sites (Appendix B). Tamarack (Lt) will be planted at sites where it grows naturally since it is a relatively fast growing species compared to black spruce (Golder 2017a). All sites are considered low disturbance. Wetland areas require mounding prior to seedling planting.

There is enough black spruce (Sb) seed remaining from the Sb seed sourced for Zone 1, to grow the seedlings for Zone 2. According to the BC Forest Service, Tolko Industries has Lt seed that can be grown into seedlings for this area, and it is available from Tolko upon request. Twins Sisters Native Plant Nursery, located in Moberly Lake, has the space to grow these seedling for summer 2018, or winter 2019 planting.

All of the treated sites will have signs placed at the intersection with the recreational trails and resource roads advising users of the trails that treatments have occurred on the seismic line. The sign will contain wording outlining the line is designated as a habitat restoration site and the type of treatment(s) that may have been implemented on the line.

The sign will be bolted to a heavy duty steel post and will be 16" by 24" in size. A blueprint of the sign to be used is located in Appendix E. It is estimated there will be approximately 65 signs and posts required. Signs will be maintained as part of the monitoring program to be implemented as part of the Zone 2 Implementation Plan.

### 5.0 MONITORING DESIGN

Monitoring plots will be established at the time of treatment implementation to confirm that vegetation (both natural ingress of species plus any planting treatments) on disturbances is growing and moving towards being considered functional habitat for boreal caribou herds in the long term. The monitoring design for restoration treatment monitoring in the Parker Range follows the guidance provided for Program-level monitoring in the REMB Boreal Caribou Habitat Restoration Monitoring Framework (Golder 2015b).

Paired reference and treatment plots will be established at least 500 m apart from each other for each distinct treatment type. Ideally, the monitored portion of the Program's area should be evenly distributed over the entire treatment area and in all restoration unit types (upland, lowland, transitional) so that monitoring results are representative of the disturbance features in the project. For the Parker Program Plan monitoring design, a focus is to shift more monitoring plots to Zones 1 and 2 for ease of access, earlier timeline for monitoring results over



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## ZONE 2 IMPLEMENTATION PLAN

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the multi-year program and cost efficiencies of the monitoring program. Monitoring plot numbers will be increased with each additional restoration treatment type.

The paired reference and treatment plots will be established side by side, on the same linear disturbance feature, with a minimum of 25 m of the reference plot left untreated (Figure 3, Golder 2015b).

The Program Plan monitoring program is designed for the mounded and seedling planting sites only. Monitoring site location will be determined at the time of field implementation, based on predicted summer accessibility by either ground or air (i.e., suitable/natural helicopter landing location in proximity to monitoring plot).

A minimum of 180 paired monitoring plots are recommended for the entire Program Plan area. Twenty five monitoring plots were established within Zone 1 (Golder 2017b) during the Zone 1 Implementation Plan field work. Due to the uncertainty regarding future field work beyond Zone 2 planning, it is recommended to establish an additional 60 plots in Zone 2, leaving 95 plots for Zone 3 and 4. Monitoring plot design, data collection, data storage, and other methods will follow the procedures laid out in the Boreal Caribou Habitat Restoration Monitoring Framework (Golder 2015b). Recommended monitoring frequency will follow the first, fifth, tenth and 15<sup>th</sup> growing season after restoration treatments are implemented.





## ZONE 2 IMPLEMENTATION PLAN

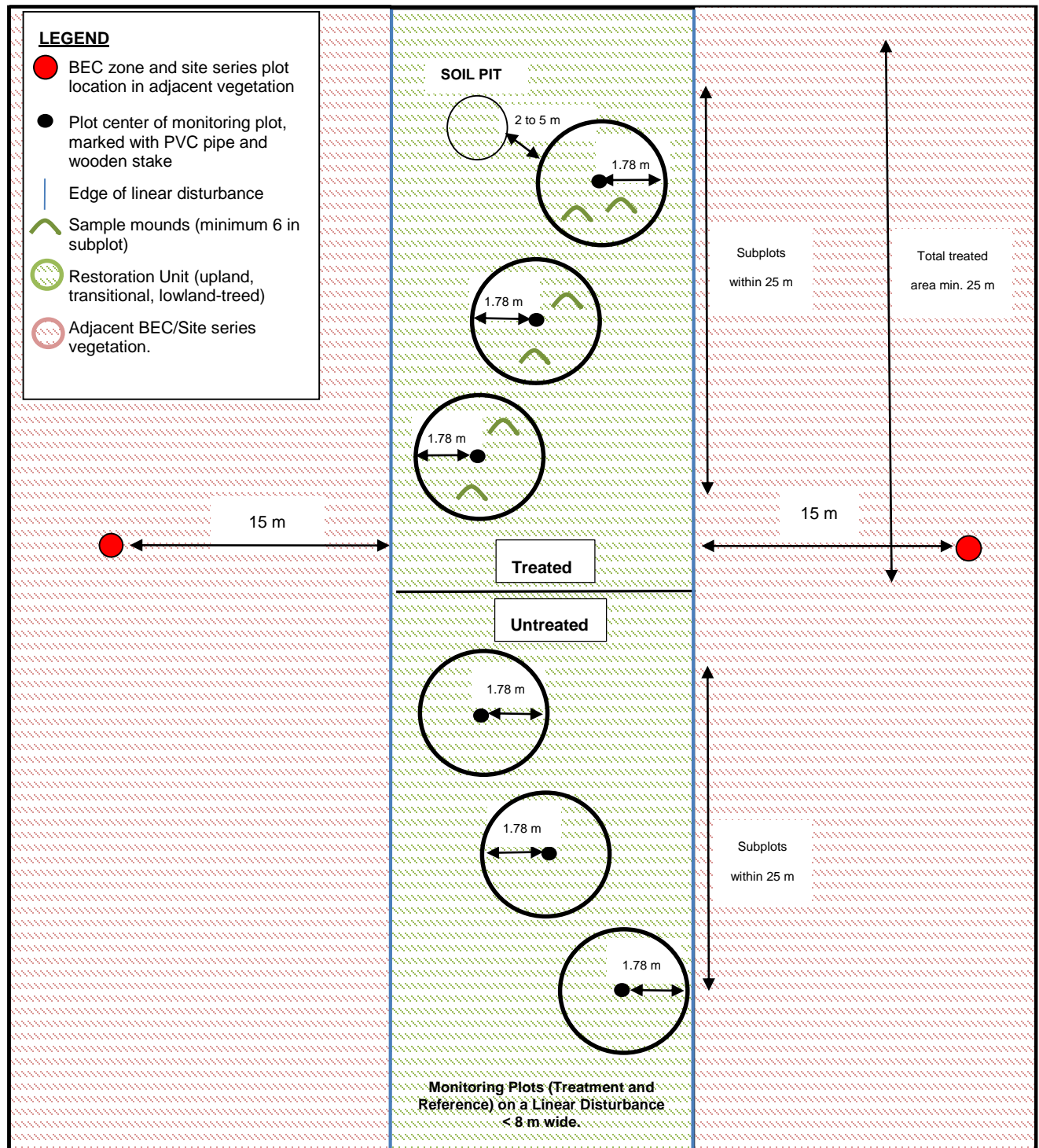


Figure 3. Paired treatment and reference plot layout on the same linear disturbance, < 8 m wide. Subplots are 1.78 m fixed radius subplots. Minimum of 6 mounds should be sampled within the group of subplots, in an area of 25m width maximum. .



### 6.0 PRIMARY ACCESS PREPARATION

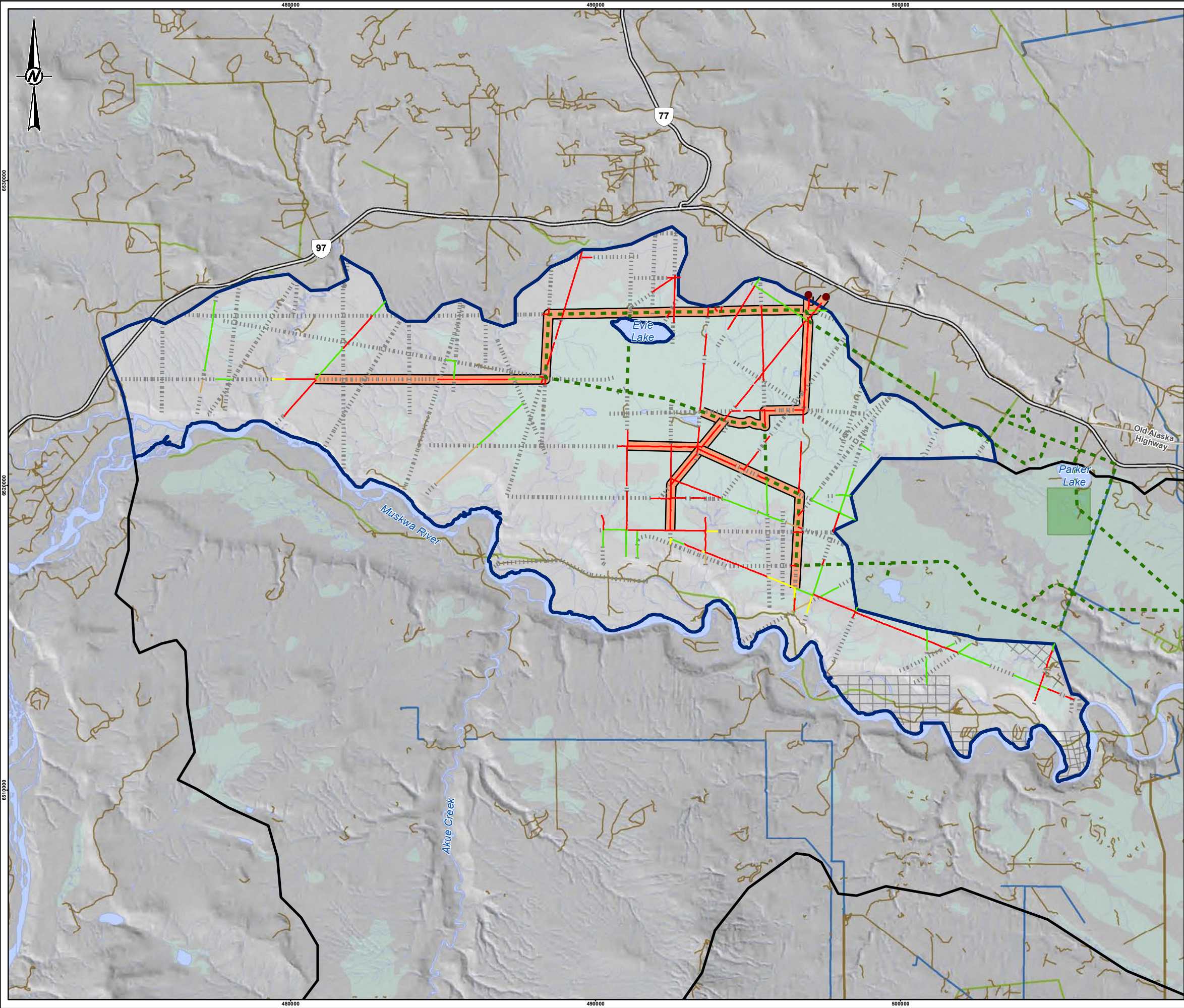
A primary winter access route will be established in the treatment area to transport the heavy machinery required to complete the treatments. Preference for the route was given by focusing on using provincially designated recreational trails and resource roads within the area to minimize any further access creation and, where possible, minimize watercourse crossings, drainages, mineral wetland crossings, and avoiding well-vegetated seismic lines. The total kilometers of winter access route that will likely need to be frozen-in prior to access the treatment sites by both truck and heavy machinery is estimated to be 40 kilometers. There are a number of watercourses, mineral wetlands, and well-vegetated areas that should be noted during the treatment implementation; these sites are highlighted on the treatment implementation figures in Appendix D as water obstacles. Figure 4 illustrates the preliminary primary winter access route.

The winter access route will be subject to stakeholder consultation which is suggested to begin at least 6 months prior to implementation (e.g., end of Q2 of 2017 for winter 2018 implementation), and a field survey should occur as soon as ground conditions are frozen prior to the planned treatment implementation start-up. Stakeholders for Zone 2 include Fort Nelson First Nation, registered trappers, the local snowmobile and dog sled clubs, and provincial land managers.

The area highlighted in Figure 4 will be frozen-in, where required, beginning at least two weeks prior to the planned treatment implementation start-up. The entire route will not need to be frozen-in; only areas considered hazardous for heavy machinery will be frozen-in, including: watercourses, drainages, and mineral wetland crossings. Other access routes may include resource access roads and 3-D seismic lines.

Modifications may occur to the planned heavy machinery access routes during the treatment implementation, as required, based on site conditions and weather. Zone 2 has limited access opportunities into the furthest remote locations (e.g., Mapsheets A-10 to A-14). To reach these remote locations, the proposed preliminary access route follows existing seismic lines, but in some cases these seismic lines have naturally recovering vegetation of heights which are greater than 3 m as interpreted from desktop review of Vieworx imagery. These lines may cause damage to equipment moving into the area, or the heavy equipment may cause damage to the natural vegetation recovery rate. Field level decisions will have to be made in some areas of Zone 2 to determine if access through these overgrown lines will be used. The current plan outlines only access to the far west over some areas determined during the desktop review to have consistent density of at least 3 m tall trees.





**LEGEND**

POTENTIAL STAGING SITE

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

HIGHWAY

MAJOR ROAD

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

**SECONDARY WINTER ACCESS OPTIONS**

OGC IDENTIFIED LOW IMPACT SEISMIC: REQUIRES GROUNDTRUTHING

LOCAL ROAD

RESOURCE ROAD

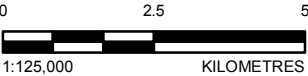
UNCLASSIFIED ROAD

BC OGC PETROLEUM DEVELOPMENT ROAD

BC OGC PETROLEUM ACCESS ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION



- REFERENCES**
1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, AND ROADS OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

2. 2D SEISMIC AND LIS CUTLINES AND BC OGC PETROLEUM ACCESS, DEVELOPMENT ROADS AND SURFACE WELL SITES OBTAINED FROM BC OIL AND GAS COMMISSION.

3. ROAD/ACCESS OBTAINED FROM DIGITAL ROAD ATLAS.

4. PARKER AND MUSKWA CARIBOU RANGE, RECREATIONAL TRAIL, ECOLOGICAL RESERVE AND HILLSHADE OBTAINED FROM B.C. GOV. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.
- COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT

PARKER RANGE RESTORATION:  
ZONE 2 IMPLEMENTATION PLAN

TITLE

PROPOSED PRIMARY WINTER ACCESS TO TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-01
	DESIGNED	BC
	PREPARED	HR
	REVIEWED	BC
	APPROVED	PB







## 7.0 2017 WORK PLAN ACTIVITIES AND SCHEDULE

### 7.1 Regulatory Authorization Process

#### Land Use Permitting

Restoration treatments on legacy disturbance footprint within the Parker Range not under an existing permit of another Ministry or the Oil and Gas Commission (OGC) will require authorization by the Ministry of Forests, Lands, and Natural Resource Operations (FLNRO) under the *Forest and Range Practices Act*. The restoration treatments, and associated obligation to the treatment activities, will be identified and tracked by FLNRO as a Forestry Licence to Cut. Identification of a 'licensee' who will be carrying out the on the ground activities must be provided. It is expected that authorization will be on a yearly basis during the multi-year Program Plan, specific to the area of restoration treatment. This allows consultation to be led by FLNRO on the specific treatment area, activities and access.

Authorization application targeted submission date of the Zone 2 Implementation Plan should be 6 to 7 months ahead of plan implementation start. For example, if treatments are funded and planned to begin in the winter 2018, then this Zone 2 Implementation Plan submission to FLNRO for the Forestry Licence to Cut should be May 30, 2017. Authorization timeline will allow for Indigenous community consultation led by FLNRO. The Indigenous community consultation and referral process will be led by FLNRO and completed according to the respective consultation process agreements (e.g., Crown Land Management Agreement, Treaty 8 Economic Benefits Agreement, etc.) (J. Hudson, pers. comm. November 16, 2015). Feedback received during the consultation phase and from the FLNRO from Zone 1, has been incorporated into this Zone 2 Implementation Plan.

To meet the anticipated requirements of the application for authorization under the *Forest and Range Practices Act*, this Zone 2 Implementation Plan includes the following:

- identification of a land base (Figure 1);
- identification of an area (Figure 2);
- boundary for activities on the ground, and details of those activities (Table 2, Appendix D); and
- providing both hard copy documents and shapefiles for area and activity identification for FLNRO tracking (refer to Appendix D: Mapbook).

Authorization will be needed for any cutting of Crown timber for the use of tree-felling treatments.

Regulatory applications for land use are anticipated to be submitted to FLNRO by June 30, 2017, if the Parker Pilot Project receives further funding or support (note: at the time of report preparation, the BC draft Implementation Plan and MOU for caribou priorities and subsequent funding is unknown).

#### Watercourse Crossing Plan

During the implementation of the restoration treatments, access will be required into the Parker Range during the winter in areas without high grade roads or bridges. At least part of the main access route described in Section 5.0 will need to be frozen-in prior to bringing heavy machinery into the area. For the main access routes, when watercourses are present, crossings will need to be established in the form of either temporary bridges or ice bridges/snow fills. Once machinery has been transported into a treatment zone, watercourse crossings may need



## ZONE 2 IMPLEMENTATION PLAN

to be established where heavy machinery needs to cross a watercourse to access treatment areas, again in the form of either temporary bridges or ice bridges/snow fills. The necessity for a crossing structure will depend on, but is not limited to, the presence/absence of water, frost levels, and snow depths. The type of crossing structure that may be required will depend on the size of the watercourse and presence/absence of flowing water.

There are a potential total of 6 watercourses/waterbodies and 16 mineral wetlands that may be crossed during the treatment implementation in Zone 2. The potential watercourses/waterbodies crossings locations are outlined in Table 4. They are also highlighted on the treatment implementation figures in Appendix D.

**Table 4: Water Feature Types and Potential Issues in Zone 2**

Unique ID	Water Feature Type	Figure Number	Crossing Potential	Water Flow (Y/N)	Banks (Y/N)	Affected Corridor Length (m) <sup>(a)</sup>	Comments
1	stream	A-9	minor	yes	no	13.19	n/a
2	stream	A-30	minor	yes	yes	23.50	n/a
3	stream	A-25	minor	yes	no	32.88	n/a
4	wetland/drainage	A-7	minor	yes	no	41.17	n/a
5	Creek	A-10	Possible	No	No	47.56	Damed creek by beavers - now looks like shallow open water
6	stream	A-13	minor	yes	no	49.12	n/a
7	wetland	A-20	minor	no	no	54.05	some open water
8	open water	A-20	minor	yes	no	57.63	n/a
9	wetland	A-9	minor	yes	no	80.74	n/a
10	wetland	A-19	major	no	no	82.31	n/a
11	wetland	A-17	major	yes	no	89.76	n/a
12	wetland	A-17	major	no	no	144.20	n/a
13	wetland	A-16	major	no	no	159.10	n/a
14	wetland	A-14, A-7	no	no	no	190.48	n/a
15	wetland/open water	A-17	major	yes	no	206.52	n/a
16	wetland/open water	A-16	major	yes	no	210.83	n/a
17	wetland	A-29	major	yes	no	236.78	n/a
18	wetland/open water	A-17	major	yes	no	332.71	n/a
19	open water/wetland	A-8	major	yes	no	388.08	n/a
20	wetland	A-22	major	yes	no	445.07	n/a
21	wetland complex	A-21, A-17	major	yes	no	561.49	n/a
22	wetland complex	A-15	major	no	no	701.70	n/a

<sup>(a)</sup> The affected corridor length is the length of area that is affected by the water feature and is considered a sensitive area.

The watercourse crossing plan will form the basis for a notification package that must be sent to FrontCounterBC at least 45 days prior to the establishment of any required crossing structures, as required under the BC *Water Act*. Field watercourse crossing assessments are not required prior to establishing a crossing structure if there will be no disturbance to the watercourse or the riparian area. Due to the nature of establishing crossing structures in the winter using temporary bridges or ice bridges/snow-fills, it is not anticipated there will be disturbance to any of



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the watercourses or riparian areas. A desktop review, using available Vieworx 360 imagery, will be sufficient to complete the Watercourse Crossing Plan.

### **Water Use**

A water use permit will be required to remove water from a local waterbody if there is any freezing-in of access for rubber tired vehicle use. The permit is obtained from FLNRO, submitted through FrontCounterBC, at least 140 days prior to the removal of water from a waterbody. A water source location has not been identified at this time and may require ground-truthing to confirm accessibility.

### **Archeological Overview Assessment**

Based on the process taken for the Zone 1 Implementation Plan (Golder 2015c), notification of Archeological Overview Assessment (AOA) for Zone 2 will be provided to the Fort Nelson First Nation; other First Nations to notify would be determined by FLNRO at the time of notification. Upon completion of the AOA, an application will be submitted to the BC Archaeological Branch (FLNRO) for a Heritage Inspection Permit pursuant to Section 14 of the *Heritage Conservation Act*.

High potential archeology areas will be identified in an Archeological Overview Assessment, which will need to be completed prior to Zone 2 field implementation. Any high potential archeology areas will not be treated with ground disturbance, but may still be treated with tree-felling. A chance find permit would be applied for in the event that there is an impact to an unknown site during implementation.

A 45 day review period should be provided to First Nations for comment on the AOA. To meet a winter 2018 Implementation schedule, it is recommended to submit the AOA to FLNRO for distribution to affected First Nations by September 30, 2017.

### **Local Community Engagement Plan**

A referral package outlining the Zone 2 Implementation Plan and associated potential contracting opportunities will be distributed by FLNRO to the appropriate Indigenous communities as identified by FLNRO for Zone 2. Based on the consultation process for the Zone 1 Implementation Plan, it is anticipated Fort Nelson First Nation will receive the packages for Zone 2; other Indigenous communities to receive referral packages would be determined by FLNRO at the time of referral. Each package will contain specific details regarding the Zone 2 Implementation Plan, and key contact information. Following the distribution of the referral packages, an invitation for face-to-face meetings will be extended to Fort Nelson First Nation and other applicable groups. Contracting needs will be discussed for Zone 2 including heavy equipment operators, rentals, observers and field technicians. Following the meetings, procurement and employment opportunities will be issued in a transparent process for all groups who have been identified and choose to participate. The process will start with Statement of Interest requests, followed by a Request for Proposal process.

If contracting opportunities cannot be sourced by local indigenous community businesses, sourcing of contractors, rentals and materials would occur within the local community of Fort Nelson and local businesses, to the extent possible.

The financial value of local community contracting and procurement opportunities will be tracked during implementation of Zone 2.



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## ZONE 2 IMPLEMENTATION PLAN

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### ***Stakeholder Consultation***

Stakeholder consultation for the Zone 2 Implementation Plan area will occur with affected parties, ideally beginning in Q2 of 2017, and continue up until treatment application. Stakeholders will be identified by FLNRO through the Licence to Cut application and are anticipated to include indigenous communities, trappers and local recreational users.

Consultation with stakeholders will be directed by FLNRO. An Open House session will be held in Fort Nelson, ideally several months before field work begins. Ads will be placed in local newspapers seeking input from the public regarding the Zone 2 Implementation Plan.

### ***Road Use or Pipeline Agreements***

There are no roads under disposition to any oil and gas companies, nor are there any pipelines to cross in Zone 2 that would require a pipeline crossing agreement or line locates.



### 7.2 Seedling Requirements

There are a total of 56,009 seedlings required to meet the treatment plan targets, as outlined in Table 2. Ideally seed is grown into seedlings for winter planting, each seedling individually wrapped for ease of planting in winter conditions, and put in cold storage until planting in January/February the year of Project implementation. Due to uncertainty and lack of funding for when the Zone 2 Plan will be implemented, it was not possible to purchase seed and seedling space in the nursery by the end of December 2016. As a result of the uncertainty in Zone 2 implementation timelines, two options are presented to account for seed and seedling sourcing:

- 1) Seed source and seedlings are secured prior to December 2017 for summer planting in 2018; or
- 2) Seed source and seedlings are ordered prior to December 2017, for winter planting in winter 2018/2019.

Trade-offs occur under both scenarios. Summer plantings of seedlings incur higher planting costs due to implementation occurring over both a winter season to access and site prep areas with heavy equipment and returning in the summer season by helicopter to plant the seedlings. This option 1 will need to consider clearing helicopter landing spots in the winter months for health and safety purposes for summer planting, as well as capture helicopter costs to fly the seedlings and planters into the sites in the summer.

Option 2 is a more economical option, but delays implementation by 6 months.

Alternate options could be considered such as using an amphibious excavator for treatment during the summer of 2018, and the seedlings planted at the same time, reducing or eliminating the need for helicopter support. Further investigation into the costs associated with using this machine in the summer, as well as its effectiveness in accessing remote areas under frost free condition, would need to be completed before considering this method.

### 7.3 Schedule

As a result of the uncertainty in Zone 2 implementation timelines and funding, two options are presented to account for authorizations, funding securement, and seedling sourcing:

- Option 1) Winter 2017/2018 site preparation with summer planting in 2018; or
- Option 2) Implementation in winter 2019 using winter tree planting.

Tables 5 and 6 outline schedules for the two options. A list of activities and schedule for completion are provided. The schedule for completion considers application timelines which factor in FLNRO stakeholder consultation, BC FrontCounter timelines, seed and seedling sourcing timelines; all of which affect the implementation schedule. Table 5 (Option 1) considers winter 2018 field implementation followed by summer 2018 seedling planting, and Table 6 (Option 2) considers winter 2019 field implementation with frozen seedling planting completed at the same time.

A detailed schedule should be developed once funding sources and implementation timelines are determined.





## ZONE 2 IMPLEMENTATION PLAN

**Table 5: Proposed Zone 2 Implementation Plan Activities and Schedule: Option 1**

Activity	To be Submitted by	Completion Dates
Regulatory Applications for Land Use (Forestry Licence to Cut)	May 30, 2017	May 30, 2017
Heritage Inspection Permit Application	May 30, 2017	May 30, 2017
Water Permit for Freezing-in Access Obtained	July 15, 2017	July 15, 2017
Watercourse Crossing Plan	September 15, 2017	September 15, 2017
Archeological Overview Assessment	September 30, 2017	May 30 - September 30, 2017
Secure Contractors for January to March 2018 Field Work	-	October - November 30, 2017
Road Use Agreements	October 30, 2017	October 30, 2017
Seed Collection (if required)	-	September - October 30, 2017
Reserve Seedling Space for July 2018 Summer Planting	-	November 30, 2017
Scout Winter Access in the Field	-	December 2017
Site Preparation and Tree felling Implementation	-	January 4 to late-March 2018
Install Signs on Completed Sites, Clear Helicopter Landing Locations	-	January 4 to late-March 2018
Summer Seedling Planting / Monitoring Plot Establishment	-	July 16 - August 10, 2018
Monitoring Plot Field Survey: 1 Growing Season	-	September 15, 2019

Note: These dates are preliminary and are dependent on the Draft BC Boreal Caribou Recovery and Implementation Plan priorities and funding. Document can be found online here: <https://engage.gov.bc.ca/app/uploads/sites/121/2017/03/Draft-Boreal-Caribou-Recovery-Implementation-Plan-2017-2.pdf>

**Table 6: Proposed Zone 2 Implementation Plan Activities and Schedule: Option 2**

Activity	To be Submitted by	Completion Dates
Seed Collection (if required)	October 30, 2017	September - October 30, 2017
Reserve Seedling Space for January 2019 Winter Planting	-	December 15, 2017
Regulatory Applications for Land Use (Forestry Licence to Cut)	March 30, 2018	March 30, 2018
Heritage Inspection Permit Obtained	May 30, 2018	May 30, 2018
Water Permit for Freezing-in Access Obtained	July 15, 2018	July 15, 2018
Watercourse Crossing Plan	September 15, 2018	September 15, 2018
Archeological Overview Assessment Submitted to FLNRO	September 30, 2018	May 30 – September 30, 2018
Secure Contractors for January to March 2019 Field Work	-	October - November 30, 2018
Road Use Agreements	-	October 30, 2018
Scout Winter Access in the Field	-	December 2018
Treatment Implementation	-	January 4 to late-March 2019
Monitoring Plot Establishment	-	January 4 to late-March 2019
Install Signs on Completed Sites	-	January 4 to late-March 2019
Monitoring Plot Field Survey: 1 Growing Season	-	August 10 - September 15, 2019

Note These dates are preliminary and are dependent on the Draft Implementation Plan priorities and funding.



## ZONE 2 IMPLEMENTATION PLAN

### 8.0 CLOSURE

We trust that the Zone 2 Implementation Plan as described meets the REMB's requirements to guide the field implementation component of the Parker Caribou Range Boreal Caribou Restoration Pilot Program Plan. Given the uncertainty for the schedule for Zone 2 Implementation, or for a funding source to complete the Zone 2 Implementation Plan, two options are presented to account for authorizations, funding securement, and seedling sourcing. For the Zone 2 Implementation Plan to proceed with a winter 2017/18 program, applications, authorizations, and consultation would need to begin by the end of May 2017.

Please contact Brian Coupal at (403) 532-5715 or Paula Bentham at (780) 930-8661 with any questions or comments.

**GOLDER ASSOCIATES LTD.**

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BC/PB/kpl/rp

CC: Steve Wilson, Jeanine Hudson, Megan Watters, Ben Rauscher, Brian Thomson

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## ZONE 2 IMPLEMENTATION PLAN

### 9.0 REFERENCES

- AENV (Alberta Environment). 2010. Guidelines for Reclamation to Forest Vegetation in the Athabasca Oil Sands Region, 2nd Edition. Prepared by the Terrestrial Subgroup of the Reclamation Working Group of the Cumulative Environmental Management Association, Fort McMurray, Alberta. December 2009.
- AENV. 2011. 2010 Reclamation Criteria for Wellsites and Associated Facilities for Forested Lands. Updated June 2011. Alberta Environment, Edmonton, Alberta. 99 pp.
- Archuleta, J.G. and E.S. Baxter. 2008. Subsoiling Promotes Native Plant Establishment on Compacted Forest Sites. *Native Plants*. 9: 117-122.
- BC MFLNRO (BC Ministry of Forests, Lands, and Natural Resource Operations). 2012. A guide to fuel hazard assessment and abatement in British Columbia. Wildfire Management Branch. Available at: [http://bcwildfire.ca/Industry\\_Stakeholders/Industry/Hazard%20Assess%20%20Abate%20Guidance%20Doc%20FINAL%20with%20all%20Links%20April%202012.pdf](http://bcwildfire.ca/Industry_Stakeholders/Industry/Hazard%20Assess%20%20Abate%20Guidance%20Doc%20FINAL%20with%20all%20Links%20April%202012.pdf). Accessed: September 15 2014.
- BC MFLNRO. 2017. Draft Boreal Caribou Recovery Implementation Plan. March 30, 2017.
- BC MFR (BC Ministry of Forests and Range). 1998. Provincial Seedling Stock Type Selection and Ordering Guidelines. BC Ministry of Forests, Forest Practices Branch. Available at: <http://www.for.gov.bc.ca/hfp/publications/00078/>. Accessed: February 27, 2014.
- BC MFR. 2014. Microsite Planting Presentations. Available at: <http://www.for.gov.bc.ca/hfp/training/00009/microsite.htm>. Accessed: February 27, 2014.
- BC MOF (BC Ministry of Forests). 2000. Extension Note: Opportunities for Improvements to Reforestation Success. Prepared by Marek J. Krasowski, Research Branch, British Columbia Ministry of Forests, and Ronald J.F. Elder, R.J.F. Elder Forestry Consulting. January 2000. 15 pp.
- BCFS (British Columbia Forest Service). 1998. Silviculture Note 16 - Forest Floor Planting: a Discussion of Issues As They Relate to Various Site-Limiting Factors. Forest Site Management Section, Forest Practices Branch. March 25, 1998. Victoria, BC. 11 pp.
- Cenovus (Cenovus Energy). 2013. Woodland Caribou Mitigation and Monitoring Plan: Cenovus FCCL Ltd. Christina Lake Thermal Project (Approval 48522-01-00). February 22, 2013.
- Cody, M. 2013. Restoration Efforts in Northern Alberta: Knowledge Sharing. Cenovus Linear Deactivation (LiDEA) Projects Update. Golder Restoration Update Workshop, Edmonton AB, June 6, 2013.
- CRRP. 2007. Caribou Range Restoration Project: Guidelines for Planning and Implementation. Unpublished document created for the West Central Alberta Petroleum Producers Group, Canadian Association of Petroleum Producers and Environment Canada. September 19, 2007.
- Culling, D., and Cichowski, D. 2017. Boreal Caribou (*Rangifer tarandus*) in British Columbia: 2017 Science Review. Prepared for B.C. Oil and Gas Research Innovation Society, Victoria, B.C. March 20, 2017.
- DeMars, C.A. and Boutin, S. 2015. Assessing spatial factors affecting predation risk to boreal caribou calves: Implications for management. Final report prepared for the Science, Community and Environmental Knowledge fund, Victoria, BC. 157p. December 2015 Update to the original 2014 report.



## ZONE 2 IMPLEMENTATION PLAN

- Dickie, Melanie. 2016. Presentation entitled 'The Big Bad Wolf's Perspective'. Proceedings of the 2016 Thunder Bay North American Caribou Workshop, May 16 to 20, 2016.
- DES (Diversified Environmental Services). 2004. Canadian Natural Resources Ltd. Ladyfern Pipeline d-87-H/94-H-1, British Columbia to NE Section 20- Township 94-Range 12 W6M, Alberta: Revegetation Monitoring Report Year 2 (2003). Prepared for Canadian Natural Resources Ltd. 18 pp. + Appendices.
- Enbridge (Enbridge Pipelines (Athabasca) Inc.). 2010. Waupisoo Pipeline Project: 2010 Green Area Post-Construction Reclamation Assessment. Submitted to Alberta Sustainable Resource Development.
- EC (Environment Canada). 2012. Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. xi + 138 pp.
- Golder (Golder Associates Ltd.). 2005. Firebag Project 2004 Seismic Line Reclamation Study Annual Report. Submitted to: Suncor Firebag Inc.
- Golder. 2010. Canadian Natural Resources Limited: Primrose and Wolf Lake: Wildlife Habitat Enhancement Program Development and Implementation. Submitted to Canadian Natural Resources Ltd, Calgary, AB.
- Golder. 2011. Waupisoo Pipeline 2011 Seedling Monitoring Plot Summary. Submitted to Enbridge Pipelines (Athabasca) Inc.
- Golder. 2012a. Interconnect Pipeline 2011 Seedling Monitoring Plot Summary. Memo submitted to Canadian Natural February 23, 2012.
- Golder. 2012b. Waupisoo Pipeline Project: Seedling Planting and Monitoring Final Report. Submitted to Enbridge Pipelines (Athabasca) Inc.
- Golder. 2015a. Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia. Prepared for BC Science and Community Environmental Knowledge Fund's Research and Effectiveness Monitoring Board. Report number 1313720037. Available at: <http://scek.ca/sites/default/files/bcip-2015-05-restoration-toolkit-28final29-jan-2115.pdf>. Accessed July 6, 2015.
- Golder. 2015b. Boreal Caribou Habitat Restoration Monitoring Framework. Submitted to the British Columbia Oil and Gas Research and Innovation Society's Research and Environmental Monitoring Board. December 31, 2015.
- Golder. 2015c. Parker Caribou Range: Parker Range Restoration: Zone 1 Implementation Plan. Plan prepared by Golder and submitted to BC OGRIS REMB. December 31, 2015.
- Golder. 2015d. 9 to 13 Year Follow-up Monitoring in the Little Smoky Caribou Range 15-ERPC-07: Caribou Range Restoration Treatment Sites. Submitted to Petroleum Technology Alliance of Canada, Foothills Land Management Forum, and the Government of Alberta. November 2015.
- Golder. 2015e. Summary of 2015 Habitat Enhancement Program Seedling Monitoring. Technical Memo prepared by Golder for Canadian Natural Resources Ltd (PAW). December 18, 2015.



## ZONE 2 IMPLEMENTATION PLAN

- Golder. 2016. Parker Caribou Range: Boreal Caribou Restoration Pilot Program Plan. Submitted to the British Columbia Oil and Gas Research and Innovation Society's Research and Environmental Monitoring Board. January, 2016.
- Golder. 2017a. CNRL Kirby 2016 Seedling Monitoring Report. Memo from Christine Robichaud (Golder Associates Ltd.) to Kale Bromley (CNRL). January 2017. Pp. 7 + Appendices.
- Golder. 2017b. Pilot Boreal Caribou Habitat Restoration Program Year 1 (2017) Implementation Report. Submitted to the British Columbia Oil and Gas Research and Innovation Society's Research and Environmental Monitoring Board. April 2017.
- Government of Alberta. 2013. Integrated Standards and Guidelines – Enhanced Approval Process. Version 2. 85 pp. Available at: <http://esrd.alberta.ca/forms-maps-services/enhanced-approval-process/eap-manuals-guides/documents/EAP-IntegratedStandardsGuide-Dec01-2013.pdf>.
- Hudson, Jeanine. BC FLNRO Senior First Nations Advisor, Fort Nelson. BC OGRIS Caribou habitat restoration project meeting, November 16, 2015 with Shauna Huculak, Hayley Vickers-Redhead and Paula Bentham of Golder Associates.
- James, A.R.C. 1999. Effects of Industrial Development on the Predator-Prey Relationship Between Wolves and Caribou in Northeastern Alberta. Ph.D. Thesis Submitted to the University of Alberta. Edmonton, AB.
- Keim, J.L., P.D. DeWitt, T. Shopik, J. Fitzpatrick and S.R. Lele. 2014. Understanding and mitigating the effects of linear features and snow condition on caribou predator-prey overlap in the Alberta Oil Sands. 15<sup>th</sup> North American Caribou Workshop, Whitehorse, Yukon, May 14 2014. Oral presentation.
- Macadam, A. and L. Bedford. 1998. Mounding in the Sub-boreal Spruce Zone of West-Central British Columbia: 8-year Results. *The Forestry Chronicle* 74: 421-427.
- MacIsaac, D.A., G.R. Hillman and P.A. Hurdle. 2004. Alternative Silvicultural Systems for Harvesting and Regenerating Spruce-Dominated Boreal Mineral Wetlands. Canadian Forest Service, Northern Forestry Centre, Information Report Nor-X-399.
- Matrix. 2017. Developing and Monitoring the Efficacy of Functional Restoration of Linear Features for Boreal Woodland Caribou – 1-Year Summary of Monitoring Data: Parker Caribou Range. Report Prepared for BC OGRIS REMB. April 2017.
- MEG (MEG Energy). 2014. MEG Energy Christina Lake Regional Project: Linear Deactivation Trial. March 2014.
- Neufeld, L. 2006. Spatial Dynamics of Wolves and Woodland Caribou in an Industrial Forest Landscape in West-Central Alberta. Department of Renewable Resources, University of Alberta.
- Nexen (Nexen Energy). 2013. Algar caribou habitat restoration program, 2012/13 Phase 2 & 3 areas. Draft report prepared for Canada's Oil Sands Innovation Alliance (COSIA). Calgary, AB. 109 pp.
- NEIPC (Northeast Invasive Plant Committee). 2010. Peace – Liard Re-Vegetation Manual. Approved by the NEIPC Membership on April 28, 2010. Available at: [http://prrd.bc.ca/services/environmental/weed\\_control/documents/NEIPC\\_Reveg\\_manual\\_PeaceLiard\\_April2010.pdf](http://prrd.bc.ca/services/environmental/weed_control/documents/NEIPC_Reveg_manual_PeaceLiard_April2010.pdf). Accessed November 2014.



## ZONE 2 IMPLEMENTATION PLAN

- Osko, T. and M. Glasgow. 2010. Removing the wellsite footprint: recommended practices for construction and reclamation of wellsites on upland forests in Boreal Alberta. University of Alberta, Edmonton, Alberta. 72 pp. Available at: [http://www.biology.ualberta.ca/faculty/stan\\_boutin/ilm/uploads/footprint/Upland%20Recommendations%20-%20Final%20Revised%20-%20Small%20File.pdf](http://www.biology.ualberta.ca/faculty/stan_boutin/ilm/uploads/footprint/Upland%20Recommendations%20-%20Final%20Revised%20-%20Small%20File.pdf). Accessed July 2014.
- OSLI (Oil Sands Leadership Initiative). 2012a. Algar caribou habitat restoration program, field operations: phase 1 area. Report. Calgary, AB. 76 pp.
- OSLI. 2012b. Algar caribou habitat restoration program: area 1 – re-measurement 1. Report. Calgary, AB. 91 pp.
- Pyper, M. and T. Vinge. 2012. A visual guide to handling woody materials for forested land reclamation. Oil Sands Research and Information Network, University of Alberta, School of Energy and the Environment, Edmonton, Alberta Report No. TR-31. 10 pp.
- Roy, V., P.Y. Bernier, A.P. Plamondon and J.C. Ruel. 1999. Effect of Drainage and Microtopography in Forested Wetlands on the Microenvironments and Growth of Planted Black Spruce Seedlings. Canadian Journal of Forest Research, 29: 563 -- 574.
- USDA (United States Department of Agriculture). 2009. Multipurpose Subsoiling Excavator Attachments. Prepared by Bob Monk, Forester. U.S. Department of Agriculture, Forest Service National Technology and Development Program. Revised June 2009. 21 pp.
- Vinge, T. and M. Pyper. 2012. Managing woody materials on industrial sites: Meeting economic, ecological, and forest health goals through a collaborative approach. Department of Renewable Resources, University of Alberta, Edmonton, Alberta. 32 pp.
- Wilson, S. F. 2015. Role of Functional Restoration in Woodland Caribou Recovery. Report prepared for Canadian Association of Petroleum Producers. Report #266452. 6 pp.



# **APPENDIX A**

## **Habitat Restoration Prescription Types**





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**Table A-1: Habitat Restoration Prescription Types (Restoration Techniques) for Seismic Lines**

Type of Mitigation Prescription	Objective(s)	Specifications	Positive Experiences with this Technique	Considerations to take into account	Ideal Timing for Treatment	References
Mechanical site preparation: Mounding and/or ripping using an excavator	<ul style="list-style-type: none"><li>Create microsites in areas where it is deemed to be effective for enhanced survival and growth of planted seed and seedlings, and natural regrowth of woody species</li><li>Access control</li></ul>	<ul style="list-style-type: none"><li>For access control purposes, mounds should be created using an excavator. The holes left behind by the mounds should generally be approximately 0.75 m deep, if feasible. The excavated material is positioned right beside the hole, creating the mounds.</li><li>Ripping should focus on upland sites where excessive moisture is not a concern.</li><li>Troughs created by ripping should be positioned to reduce erosion potential.</li><li>Target density of mounding for this plan is 1200 mounds/hectare (Appendix A)</li><li>When completing in synergy with seedling planting, seedlings are generally planted near the hinge of the mound:<ul style="list-style-type: none"><li>On top of the mound for lowland and transitional sites</li><li>At or slightly lower than the hinge for upland sites</li></ul></li></ul>	<ul style="list-style-type: none"><li>For the purposes of enhancing microsites for planted seedlings, mounding is a well-researched site preparation technique in the silviculture industry. It is commonly used in wetter, low-lying areas to create higher, better-drained microsites for seedlings</li><li>Mounding treed fen and bog areas can enhance a site to promote natural revegetation over time, as higher, drier spots are created that seed can eventually settle into and germinate</li><li>Mounding has been used as an access control measure on decommissioned roads, seismic lines, and pipelines to discourage off-road vehicle activity. It is effective immediately following implementation</li><li>Ripping is a standard site preparation method that has been modified in this case for tighter workspaces</li></ul>	<ul style="list-style-type: none"><li>Sufficient frost is required to access sites in the winter when crossing lowland areas: This varies from winter to winter</li><li>Research regarding machines that can operate in lowlands during non-frozen conditions is underway in NE Alberta</li></ul>	Winter (frozen ground conditions)	<ul style="list-style-type: none"><li>Macadam and Bedford 1998</li><li>Roy <i>et al.</i> 1999</li><li>MacIsaac <i>et al.</i> 2004</li><li>Golder 2010, 2015d, 2015e</li><li>OSLI 2012a, 2012b</li><li>Nexen 2013</li><li>CRRP 2007</li><li>Archuleta and Baxter 2008</li><li>USDA 2009</li><li>BC MFR 2014a</li><li>BC Forest Service 1998</li><li>BC MOF 2000</li><li>BC MFR 1998</li></ul>
Tree/shrub seedling planting and/or seeding	<ul style="list-style-type: none"><li>access control</li><li>erosion control</li><li>reduce line-of-sight</li><li>restore habitat</li></ul>	<ul style="list-style-type: none"><li>Tree/shrub species are determined based on the treatment table located in the Operational Toolkit (Appendix A)</li><li>Coniferous tree species (Spruce sp., Pine sp.) are recommended to meet caribou habitat needs. Considerations for the use of shrubs:<ul style="list-style-type: none"><li>Alder is generally planted because it forms an effective access control and line of sight break in a relatively quick period of time</li><li>Alder has a similar palatability rating for ungulates as conifer species (CRRP 2007)</li><li>Willow is avoided due to the high palatability rating for ungulates (CRRP 2007)</li></ul></li><li>Shrub and tree seedlings are often planted together, depending on site conditions and anticipated natural revegetation of both species</li></ul>	<ul style="list-style-type: none"><li>Seedling planting is considered a long-term restoration treatment due to the length of time it takes to establish effective hiding cover and access deterrents</li><li>Seedlings should ideally be sourced at least six months prior to planned planting dates</li><li>Seedlings and/or seed for growing seedlings may not be available for every species prescribed and therefore seed may need to be collected and grown in the nursery</li><li>Seedling planting during winter is generally restricted to lowland and transitional sites with organic soil that have been treated with mechanical site preparation immediately prior to planting, although trials are underway to plant upland sites using a drill.</li><li>Seedling planting density is based on the treatment table from the Operational Toolkit (Appendix A).</li><li>For this plan all sites scheduled for seedling planting will be planted to 1200 stems/hectare and some upland sites will be seeded to lodgepole pine, as required.</li></ul>	<ul style="list-style-type: none"><li>Use of frozen seedlings needs to consider preparation of nursery stock, storage, planting temperature, and use of snow packing following planting to avoid winter freeze/thaw seedling mortality</li></ul>	<ul style="list-style-type: none"><li>Seedlings can be planted on frozen sites in the winter (OSLI 2012; MEG 2014; Cenovus 2013; Golder 2015d)</li><li>Non-frozen stock are generally planted as summer stock (July 15 to early August) in consideration of the Least Risk Timing Windows for caribou</li></ul>	<ul style="list-style-type: none"><li>AENV 2010, 2011</li><li>BC MFR 1998</li><li>Cenovus 2013</li><li>CRRP 2007</li><li>DES 2004</li><li>Golder 2005, 2010, 2011, 2012a, 2012b, 2015a</li><li>MEG 2014</li><li>OSLI 2012a, 2012b</li><li>Nexen 2013</li><li>NEIPC 2010</li></ul>
Spreading of woody material	<ul style="list-style-type: none"><li>control of human access during snow free periods</li><li>erosion control</li><li>protect planted seedlings from extreme weather, wildlife trampling, and damage from ATVs</li><li>provide site nutrients when the wood decomposes</li><li>provide microsites for natural seed ingress</li></ul>	<ul style="list-style-type: none"><li>Spread woody material evenly across the entire corridor</li><li>Ensure woody material is consistently dense enough on the ground to discourage ATV and wildlife use</li><li>The Guide to Fuel Hazard Assessment and Abatement in British Columbia (2012) recommends woody loads do not exceed 99 tonnes/ha (~175 m<sup>3</sup>/ha). An exemption may be allowed for larger volumes from the local fire centre under Section 25 or 26 of the Wildfire Regulation.</li><li>Vinge and Pyper recommend applying between 60 to 100 m<sup>3</sup>/ha of woody material to reclaimed sites to mimic the natural range of variability for woody material in the forest</li><li>Implement at sites left for natural recovery when woody material is available as well as sites that are planted with seedlings</li></ul>	<ul style="list-style-type: none"><li>The length of a treated segment is dependent on sufficient quantities of woody material available. Longer segments are a more effective treatment at controlling human access since ATV riders will be less inclined to attempt to travel through the woody material or traverse around it in adjacent forest stands if the woody material continues for an extended distance. There are no guidelines or research to suggest the optimal distance for woody debris placement for wildlife and human access control purposes.</li><li>Woody material can also conserve soil moisture, moderate soil temperatures, provide nutrients after it decomposes, prevent soil erosion, provide a source of seed for natural revegetation, provide microsites for seed germination and protection for introduced tree seedlings, and protect seedlings from wildlife trampling and browsing</li><li>Spreading of woody material is effective as an access control immediately following implementation</li><li>Woody material can be brought to a site from another location that has identical tree species</li></ul>	<ul style="list-style-type: none"><li>Potential for fuel loading is a concern. The BC FLNRO specifies acceptable levels of woody material while considering fire management objectives. Consultation with the local fire centre is recommended prior to treatment (stay under 99 tonnes/ha)</li><li>Storage and use of woody materials may be compromised if bark beetle is a concern in the area and would be discussed with the local forest officer</li><li>Storage of woody material for extended periods without increasing fire hazard can be challenging and should be discussed with district fire managers as part of the planning process when using woody materials</li></ul>	Winter (frozen-ground conditions)	<ul style="list-style-type: none"><li>CRRP 2007</li><li>Enbridge 2010</li><li>Osko and Glasgow 2010</li><li>Golder 2010, 2011</li><li>Government of Alberta 2013</li><li>OSLI 2012a, 2012b</li><li>BC MFLNRO 2012</li><li>Pyper and Vinge 2012</li><li>Vinge and Pyper 2012</li></ul>





ZONE 2 IMPLEMENTATION PLAN

Table A-1: Habitat Restoration Prescription Types (Restoration Techniques) for Seismic Lines

Type of Mitigation Prescription	Objective(s)	Specifications	Positive Experiences with this Technique	Considerations to take into account	Ideal Timing for Treatment	References
Tree-felling/ Tree Bending	<ul style="list-style-type: none"><li>access control</li><li>reduce line-of-sight</li><li>reduce shade effect</li></ul>	<ul style="list-style-type: none"><li>Bend (hinge) mature trees partially across the line with an excavator while treating the features for mounding purposes or spreading woody material</li><li>Fell mature trees across the line on upland and transitional sites (e.g., white spruce, pine, aspen, and black spruce)<ul style="list-style-type: none"><li>An excavator is preferred for felling trees by pushing them over, if site conditions are suitable for excavator access</li><li>Trees can be felled with a chain saw if site access is suitable to address safety concerns</li></ul></li><li>Trees are to be felled perpendicular to the line. Trees are not to be felled parallel to the line to reduce a fire hazard</li><li>Treatment locations to occur approximately every 20 m on lowland and upland sites</li><li>At each treatment location, 2 or more trees to be felled, from opposite sides of the line, to create an access control and line of sight break<ul style="list-style-type: none"><li>Treatment locations should occur where sufficient sized timber is present. Before using merchantable timber, consultation between the province of BC's FLNRO and the local forestry company would need to occur to decide approval process and tracking method for species and number cut</li><li>Treatment locations should be as frequent as possible to discourage wildlife use, understanding that locations will be variable depending on forest stand adjacent to line</li><li>More trees to be felled near access points and intersections to restrict access and predator movement. Additional trees can be felled along identified lines where the adjacent trees are of suitable height (depends on width of line, need to cover across entire corridor)</li></ul></li></ul>	<ul style="list-style-type: none"><li>Tree-felling and tree bending across the line is mimicking natural processes that occur in the forest.</li><li>Tree-felling from the adjacent eco-site can reduce the shade effect on the corridor, leading to more sunlight and warmer soils, creating an enhanced environment for plant growth</li></ul>	<ul style="list-style-type: none"><li>Tree-felling will result in tree mortality.</li><li>Potential for fuel loading is a concern. The BC FLNRO specifies acceptable levels of woody material while considering fire management objectives. Consultation with the local fire centre is recommended prior to treatment.</li><li>Felling and bending is difficult to implement using hand fallers due to difficulties with access, and safety considerations. Mechanical equipment and site safety supervision should be considered</li><li>A permit from FLNRO will be required to fall trees</li></ul>	<ul style="list-style-type: none"><li>Winter (frozen-ground conditions)</li></ul>	<ul style="list-style-type: none"><li>Cody 2013</li><li>Cenovus 2013</li><li>CRRP 2007</li><li>Neufeld 2006</li><li>MEG 2014</li><li>Keim et al. 2014</li></ul>



# **APPENDIX B**

## **Treatment Matrix Table: Site BWBSmk**



**APPENDIX B**  
**BC Treatment Matrix Tables**

**Treatment Matrix for Linear Restoration - MOIST COOL BOREAL WHITE AND BLACK SPRUCE**

Site Type	BWBSmk Site Series (a)	Site Series name (a)	Moisture Regime (a)	Nutrient Regime (a)	Limiting Factors (a)	Disturbance Level	CWD Level	Siteprep	Mound density/ha	Planting Density	Final Minimum Stem Density	Stocksize	Vegetation Treatment	Target Species	Vegetation Coverage	Number of Species
Moderately Dry	102	PI – Kinnikinnick – Lingonberry	xeric to subxeric	very poor to medium	Productivity limited by growing season drought; removal of LFH will further limit productivity	High - No LFH	75 to 100 m³/ha	none	none	none	2000	none	natural or applied seed	Lodgepole pine	25% woody or herbaceous	Combined 3 species
Moderately Dry	102	PI – Kinnikinnick – Lingonberry	xeric to subxeric	very poor to medium		Low - LFH present	75 to 100 m³/ha	light surface	none	none	2000	none	natural or applied seed	Lodgepole pine	25% woody or herbaceous	Combined 3 species
Slightly Dry	103	SwPI – Soopolallie – Wildrye	submesic to mesic	medium to rich	Drought may limit productivity during dry growing seasons	High - No LFH	75 to 100 m³/ha	none	none	none	2000	none	natural or applied seed	Lodgepole pine or White spruce	25% woody or herbaceous	Combined 3 species
Slightly Dry	103	SwPI – Soopolallie – Wildrye	submesic to mesic	medium to rich		Low - LFH present	75 to 100 m³/ha	light surface	none	none	2000	none	natural or applied seed	Lodgepole pine or White spruce	25% woody or herbaceous	Combined 3 species
Slightly Dry to Fresh	104a	Sb – Labrador tea – Step moss, freely drained phase	submesic to mesic	very poor to poor	Lack of soil nutrients	High - No LFH	150 m³/ha	mound	500	none	2000	none	natural or applied seed	Black spruce or Lodgepole pine	25% woody or herbaceous	Combined 3 species
Slightly Dry to Fresh	104a	Sb – Labrador tea – Step moss, freely drained phase	submesic to mesic	very poor to poor	Lack of soil nutrients; cold soil temperatures where thick insulating moss layers exist	Low - LFH present	75 to 100 m³/ha	mound	1200	Sb 800 SPH PI 400 SPH	1000	small	plant/ natural seed	Black spruce or Lodgepole pine	25% woody or herbaceous	Combined 5 species
Slightly Dry to Fresh	101	Sw – Lingonberry – Step moss	submesic to mesic	medium to rich	Few limiting factors; fine textured soils may limit soil aeration and rooting depth	High - No LFH	150 m³/ha	mound	500	none	1000	none	natural or applied seed	White spruce	25% woody or herbaceous	combined 5 species
Slightly Dry to Fresh	101	Sw – Lingonberry – Step moss	submesic to mesic	medium to rich		Low - LFH present	75 m³/ha	mound	1200	Sw 1200 SPH	1000	large	plant/ natural seed	White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	104b	Sb – Labrador tea – Step moss, imperfectly/poorly drained phase	subhygic to hygic	very poor to poor	Lack of soil nutrients; high water tables limit soil aeration and thus root development	High - No LFH	150 m³/ha	mound	500	none	2000	none	natural or applied seed	Black spruce	25% woody or herbaceous	Combined 3 species
Moist to Very Moist	104b	Sb – Labrador tea – Step moss, imperfectly/poorly drained phase	subhygic to hygic	very poor to poor	Lack of soil nutrients; cold soil temperatures where thick insulating moss layers exist; high water tables limit soil aeration and thus root development	Low - LFH present	75 to 100 m³/ha	mound	1200	Sb 1200 SPH	1000	small	plant/ natural seed	Black spruce	25% woody or herbaceous	Combined 5 species
Moist to Very Moist	110	Sw – Currant – Horsetail	subhygic to hygic	medium to rich	Water table may rise with removal of trees, reducing suitable planting microsites.	High - No LFH	150 m³/ha	mound	500	none	1000	none	natural or applied seed	White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	110	Sw – Currant – Horsetail	subhygic to hygic	medium to rich	Water table may rise with removal of trees, reducing suitable planting microsites. Sites with deep LFH (> 10 cm) have reduced rooting availability in mineral soil; increases windthrow hazard and limits productivity	Low - LFH present	75 m³/ha	mound	1200	Sw 1200 SPH	1000	large	plant/ natural seed	White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	111	Sw – Mountain alder – Horsetail	subhygic to hygic	rich to very rich	Water table may rise with removal of trees, reducing suitable planting microsites.	High - No LFH	150 m³/ha	mound	500	none	1000	none	natural or applied seed	White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	111	Sw – Mountain alder – Horsetail	subhygic to hygic	rich to very rich	Water table may rise with removal of trees, reducing suitable planting microsites. Sites with deep LFH (> 10 cm) have reduced rooting availability in mineral soil; increases windthrow hazard and limits productivity	Low - LFH present	75 m³/ha	mound	1200	Sw 1200 SPH	1000	large	plant/ natural seed	White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	112 (Fm02)	AcbSw – Mountain alder – Dogwood	subhygic to hygic	rich to very rich	Periodic flooding and very high vegetation competition may limit Sw establishment.	High - No LFH	150 m³/ha	mound	500	none	1000	none	natural or applied seed	Balsam poplar or White spruce	25% woody or herbaceous	combined 5 species
Moist to Very Moist	112 (Fm02)	AcbSw – Mountain alder – Dogwood	subhygic to hygic	rich to very rich		Low - LFH present	75 m³/ha	mound	1200	Acb 1200 SPH or Sw 1200 SPH	1000	large	plant/ natural seed	Balsam poplar or White spruce	25% woody or herbaceous	combined 5 species
Wetland	Wb	Wetland bog	hygic to subhydic	very poor to poor	Soil temperature, drainage and nutrients	Same Low/High	10 to 50 m³/ha	mound	1200	Sb 1200 SPH	1000	medium	plant/ natural seed	Black spruce	25% woody or herbaceous	Combined 3 species
Wetland	Wf	Wetland fen	subhydic	poor to rich	Soil temperature and drainage	Same Low/High	10 to 50 m³/ha	mound	1200	Sb 1200 SPH or Lt 1200 SPH	1000	medium	plant/ natural seed	Black spruce or Tamarack	25% woody or herbaceous	Combined 3 species

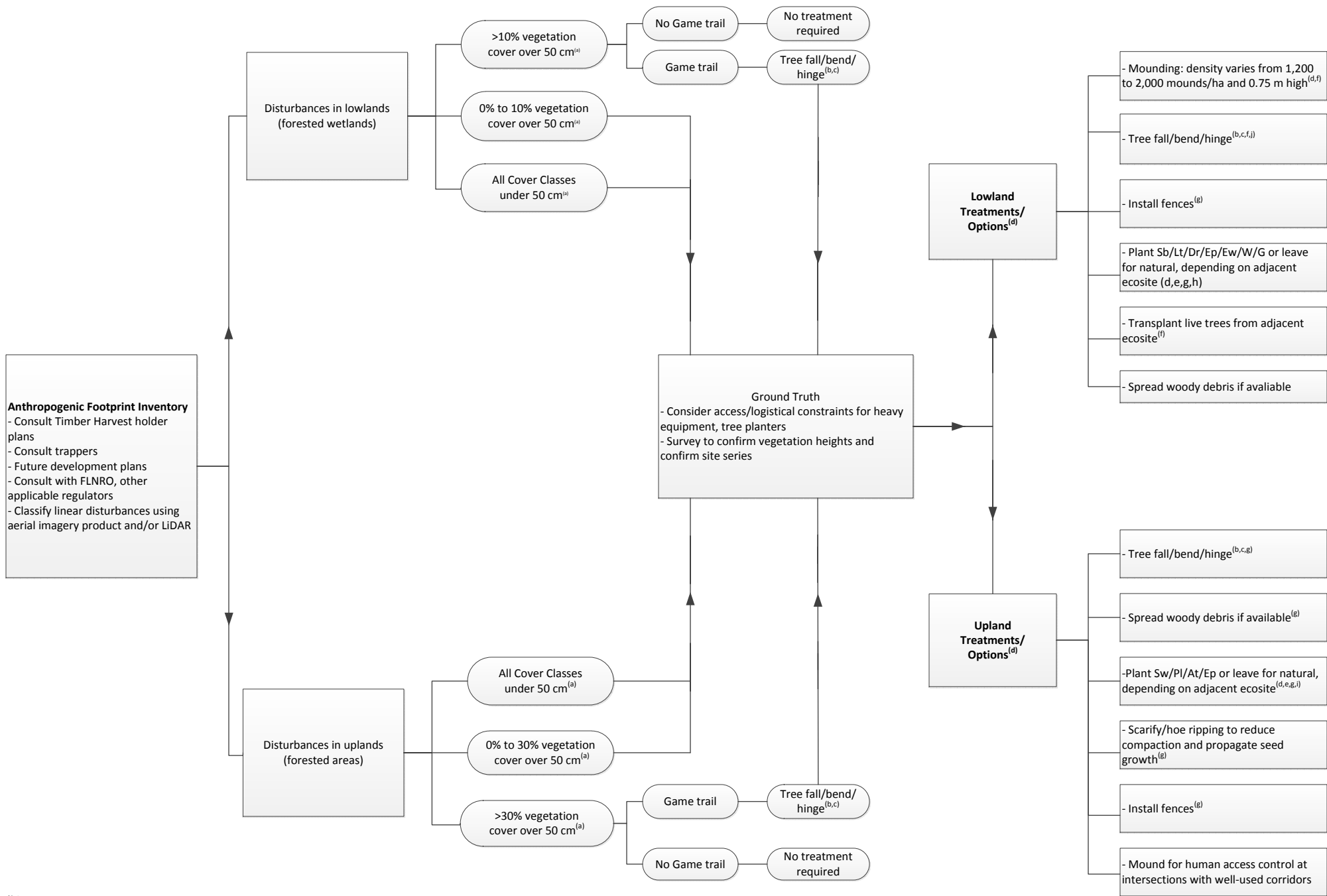
(a) DeLong, C., A. Banner, W. H. MacKenzie, B. J. Rogers, and B. Kaytor. 2011. A field guide to ecosystem identification for the Boreal White and Black Spruce Zone of British Columbia. B.C. Min. For. Range, For. Sci. Prog., Victoria, B.C. Land Manag. Handb. No. 65. [www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh65.htm](http://www.for.gov.bc.ca/hfd/pubs/Docs/Lmh/Lmh65.htm)





# **APPENDIX C**

## **Flowchart: Treatment Recommendation Flow Chart**



**Notes:**

(a) 50 cm is used as a cut-off since it is difficult to accurately determine vegetation heights to a smaller variance. If a site has consistent vegetation over 50 cm it won't require additional vegetation treatment. If a site has less than 50 cm cover it should be ground-truthed for greater accuracy.

(b) For sites with less than 3 m vegetation heights use an excavator. For sites over 3 m vegetation heights use a hand faller.

(c) Tree felling/bending/hinging is only successful if trees used are sufficient size to alter line of sight or prevent access control

(d) Refer to Treatment matrix from Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia (Golder 2015b) regarding treatment type and planting recommendations.

(e) Planting densities will vary depending on species present in adjacent ecosite. Refer to the Boreal Caribou Habitat Restoration Operational Toolkit for British Columbia (Golder 2015b) regarding treatment type and planting recommendations

(f) Winter operation

(g) Summer or winter operation

(h) Sb = black spruce; Lt = tamarack; Dr = red alder; Ep = paper birch; Ew = water birch; W = willow; G = dogwood

(i) Sb = black spruce; Sw = white spruce; Pl = lodge pole; At = trembling aspen; Ep = paper birch

(j) Will require a permit from FLNRO

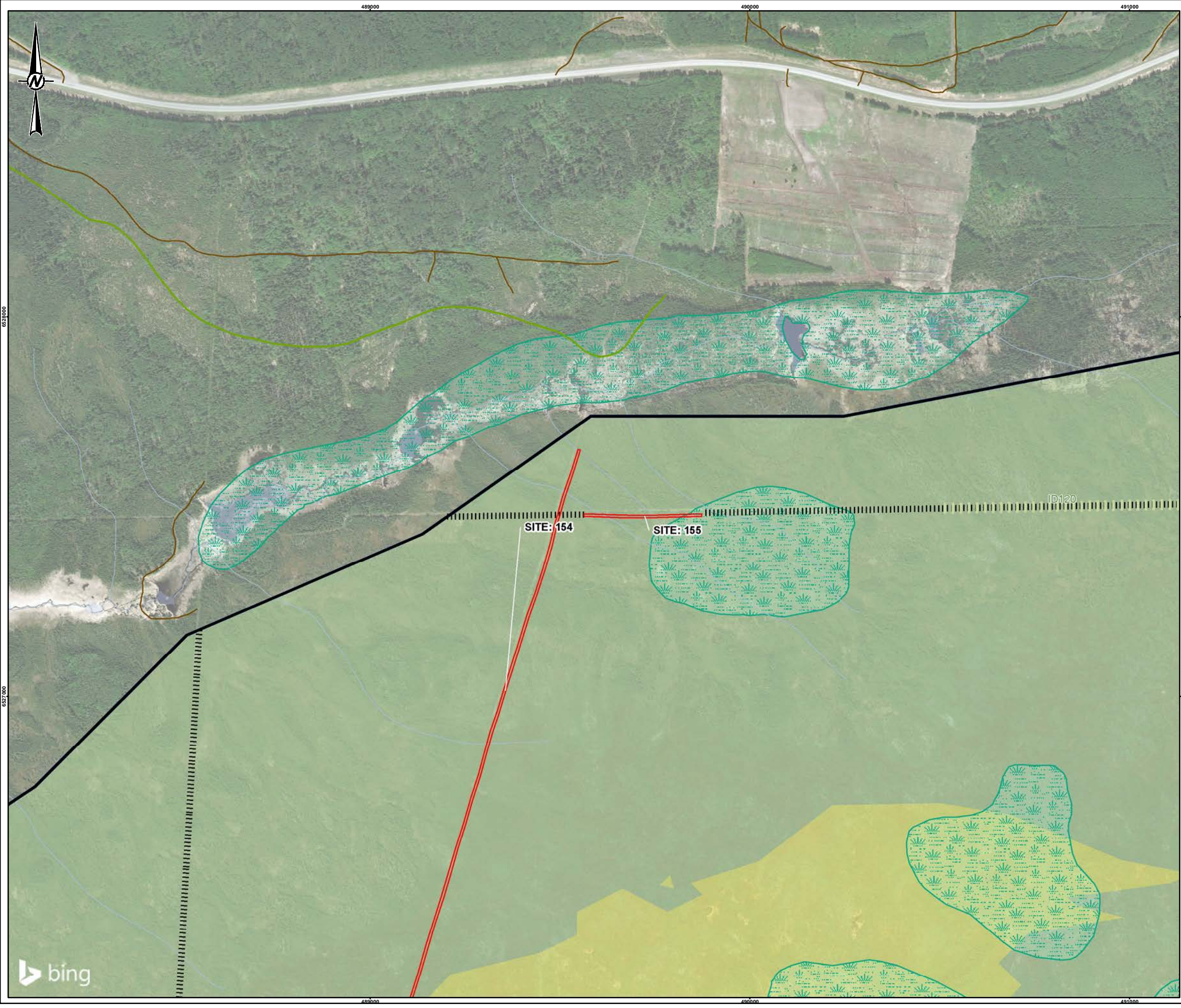




# **APPENDIX D**

## **Mapbook: Site Restoration Recommendations**





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

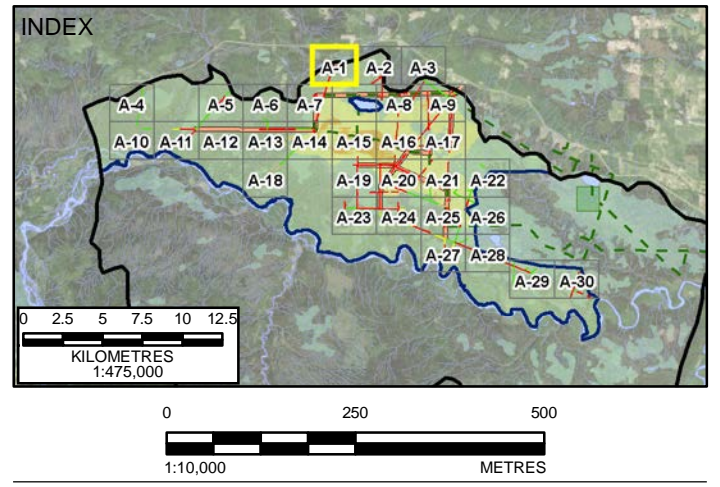
**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

2. 2D SEISMIC AND LIS CUTLINES, BC OGC PETROLEUM ACCESS ROAD, BC OGC PETROLEUM ACCESS, DEVELOPMENT ROAD AND SURFACE WELL SITES OBTAINED FROM BC OIL AND GAS COMMISSION.

3. ROAD/ACCESS OBTAINED FROM DIGITAL ROAD ATLAS.

4. PARKER CARIBOU RANGE, RECREATIONAL TRAIL, ECOLOGICAL RESERVE AND HILLSHADE OBTAINED FROM B.C. GOV. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.

5. IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009. DATE: MAY 2011.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT

PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN

TITLE

RESTORATION TREATMENT SITES

CONSULTANT

YYYY-MM-DD

2017-05-04

DESIGNED

BC

PREPARED

HR

REVIEWED

BC

APPROVED

PB

PROJECT NO.

1534276

CONTROL

8000

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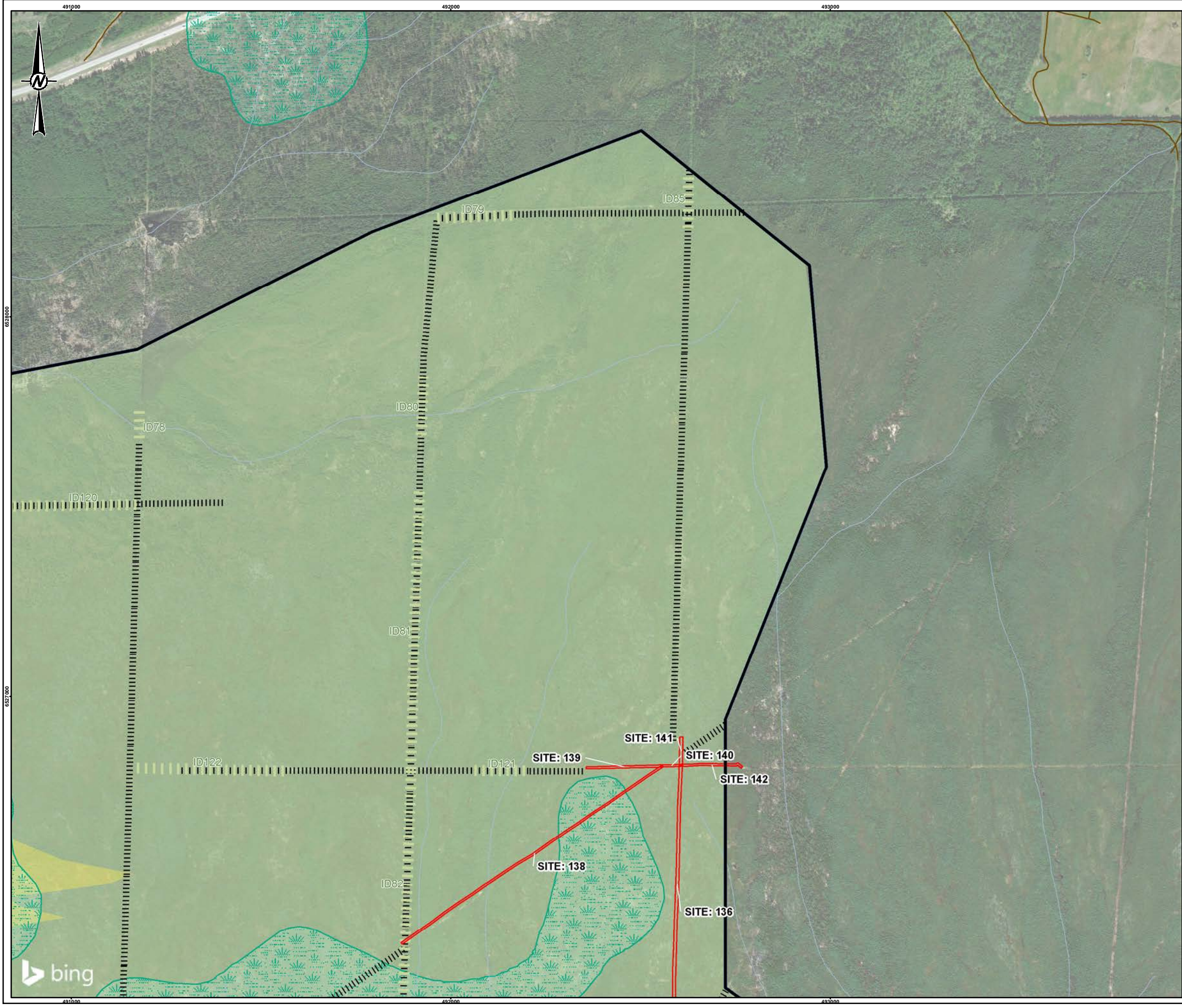
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D - 1

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

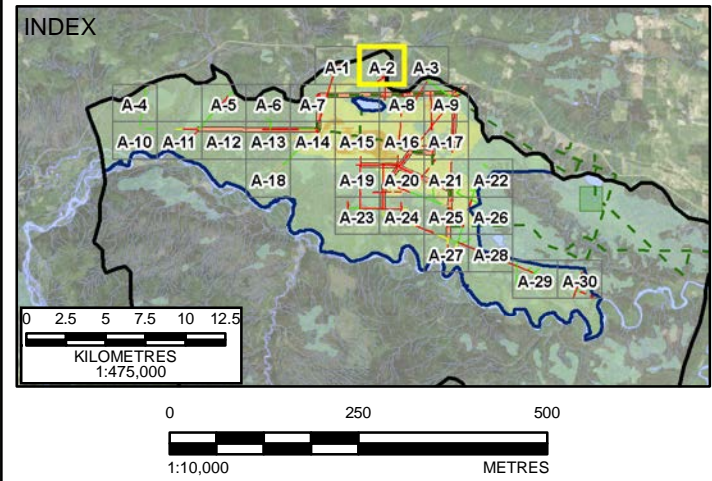
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

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4. PARKER CARIBOU RANGE, RECREATIONAL TRAIL, ECOLOGICAL RESERVE AND HILLSHADE OBTAINED FROM B.C. GOV. CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.

5. IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009. DATE: MAY 2011.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT		
BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY		
PROJECT		
PARKER CARIBOU RANGE		
ZONE 2 IMPLEMENTATION PLAN		
TITLE		
RESTORATION TREATMENT SITES		
CONSULTANT		
YYYY-MM-DD 2017-05-04		
DESIGNED BC		
PREPARED HR		
REVIEWED BC		
APPROVED PB		
PROJECT NO. 1534276		
CONTROL 8000		
REV. 0		
FIGURE D - 2		





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

|||||

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

|||

NATURAL REVEGETATION (>3m) : NO ACCESS

///

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION

**INDEX**

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5. IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009. DATE: MAY 2011.

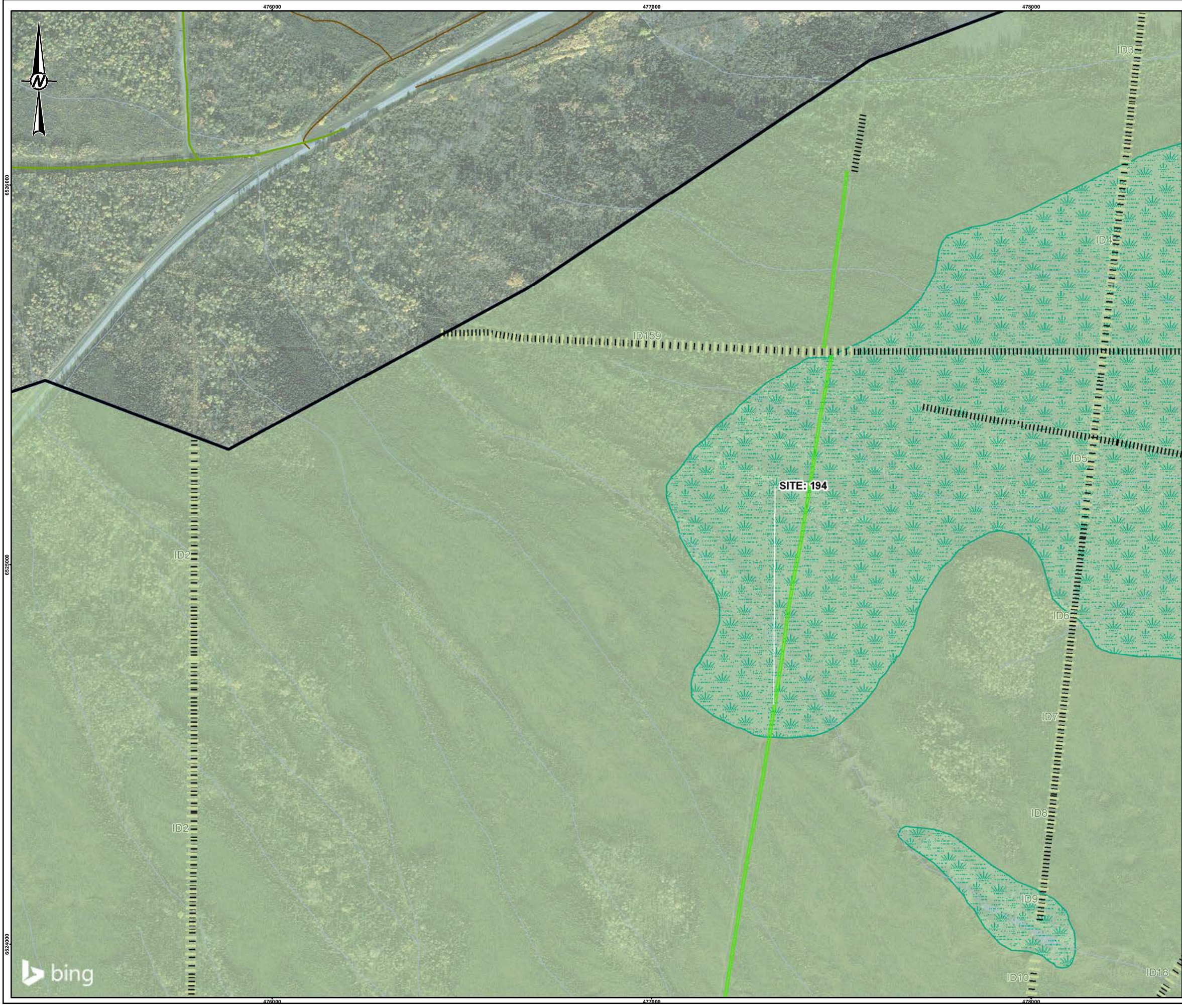
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT			
BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY			
PROJECT			
PARKER CARIBOU RANGE			
ZONE 2 IMPLEMENTATION PLAN			
TITLE			
RESTORATION TREATMENT SITES			
CONSULTANT			
YYYY-MM-DD		2017-05-04	
DESIGNED		BC	
PREPARED		HR	
REVIEWED		BC	
APPROVED		PB	
PROJECT NO.		CONTROL	REV.
1534276		8000	0
FIGURE			D - 3

R:\BTH\N:\Client\BC\_OGRI\BGS\92\_PROJECTS\1534276\_REMB\_Parker\_2016\02\_PRODUCTION\6000\MXD\Report\Final\1534276\_V02\_Appendix\_Figure\_Restoration\_Recommendations\_by\_Site\_Rev0.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B 29mm





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION

**INDEX**

0250500

0250000

0245000

0

250

500

1:10,000

METRES

**REFERENCES**

1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

**CLIENT**

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

**PROJECT**

PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN


**TITLE**

RESTORATION TREATMENT SITES

CONSULTANT

YYYY-MM-DD

2017-05-04



DESIGNED

BC

PREPARED

HR

REVIEWED

BC

APPROVED

PB

PROJECT NO.

1534276

CONTROL

8000

REV.

0

FIGURE

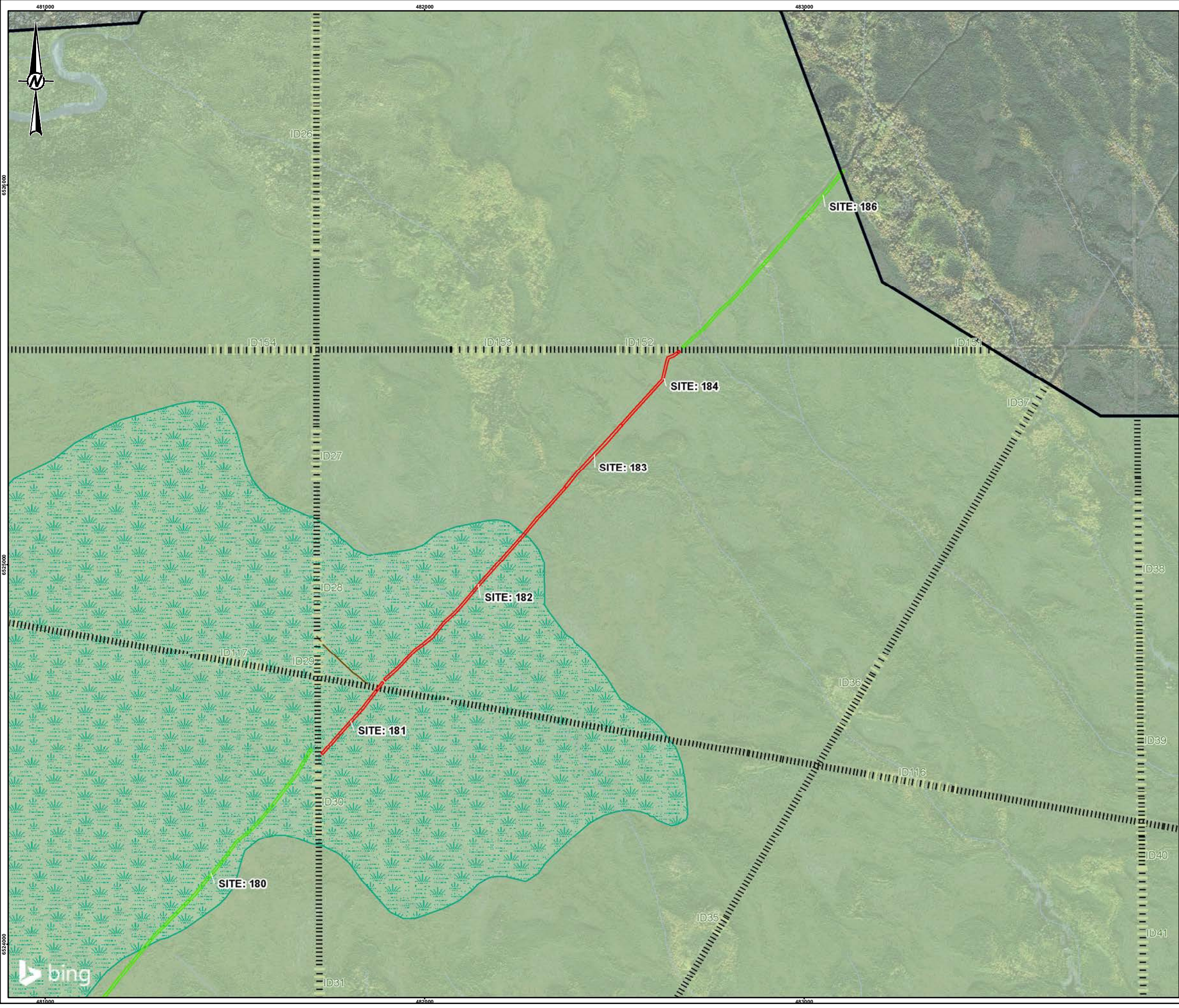
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION

**INDEX**

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COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

**CLIENT**

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

**PROJECT**

PARKER CARIBOU RANGE  
ZONE 2 IMPLEMENTATION PLAN

**TITLE**

RESTORATION TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-04
DESIGNED	BC	
PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	

**PROJECT NO.**

1534276

**CONTROL**

8000

**REV.**

0

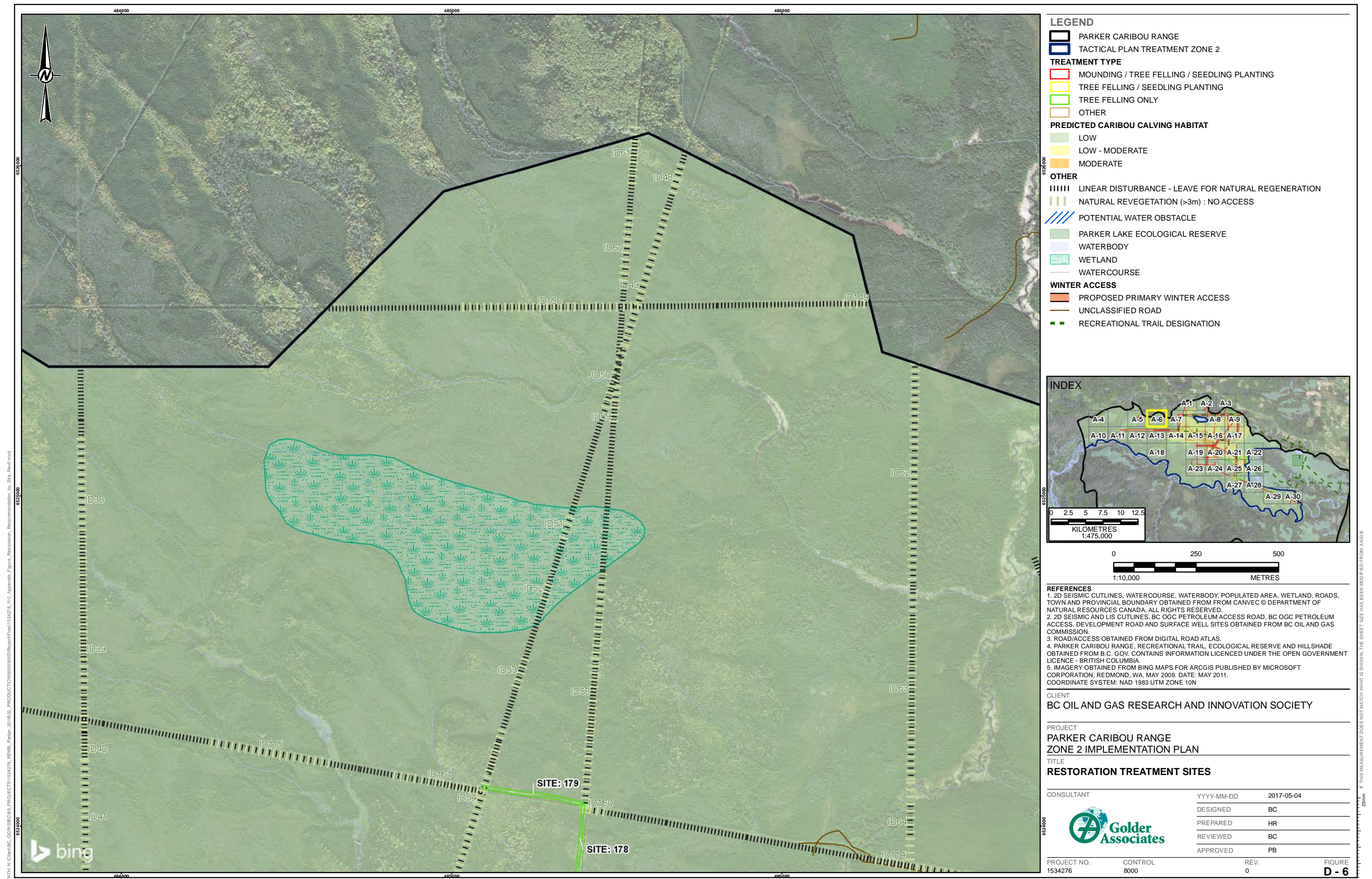
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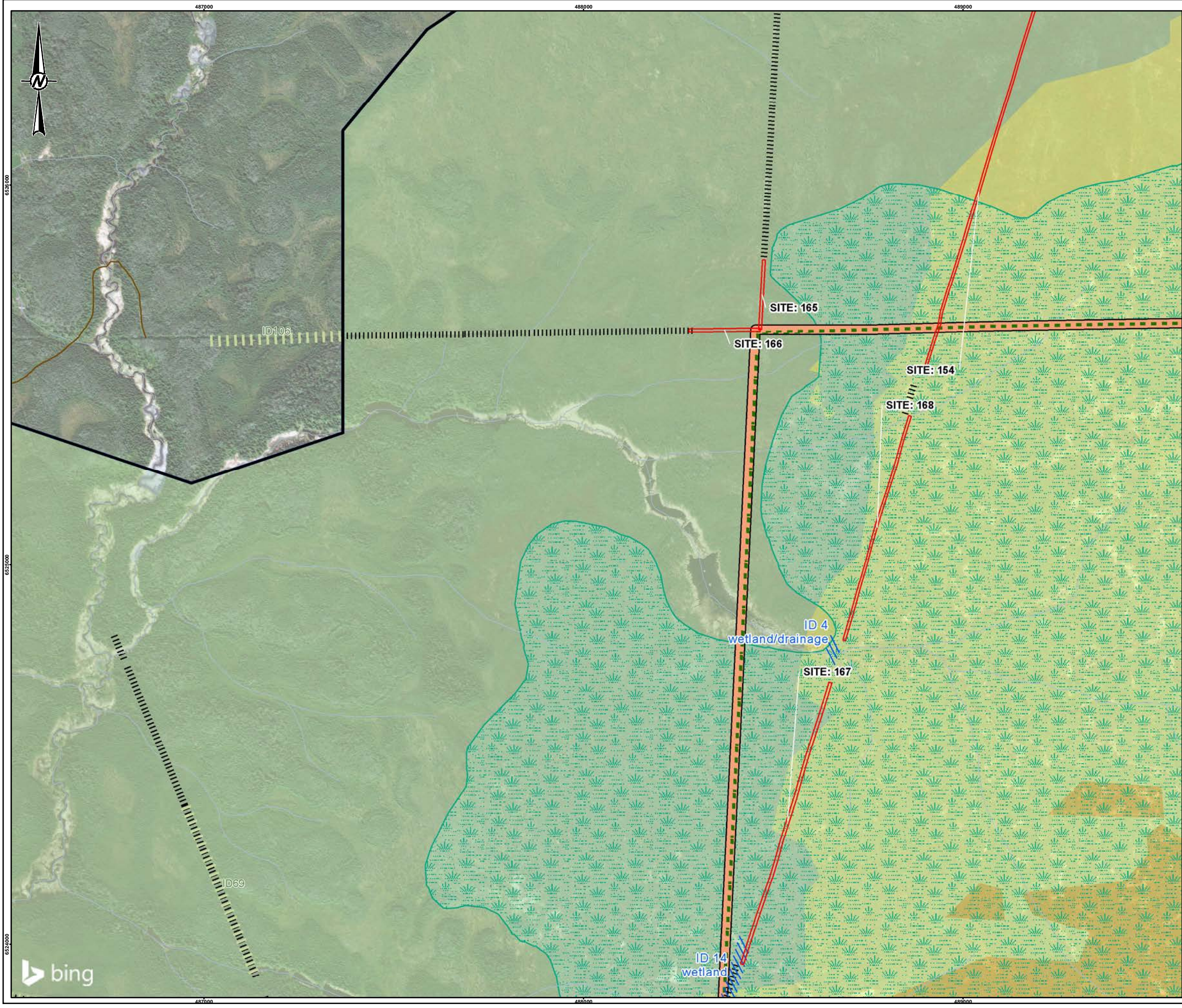
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B









**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

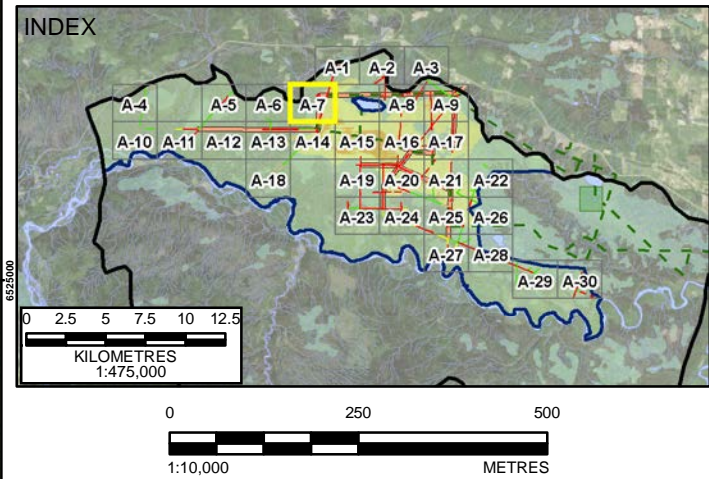
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

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COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

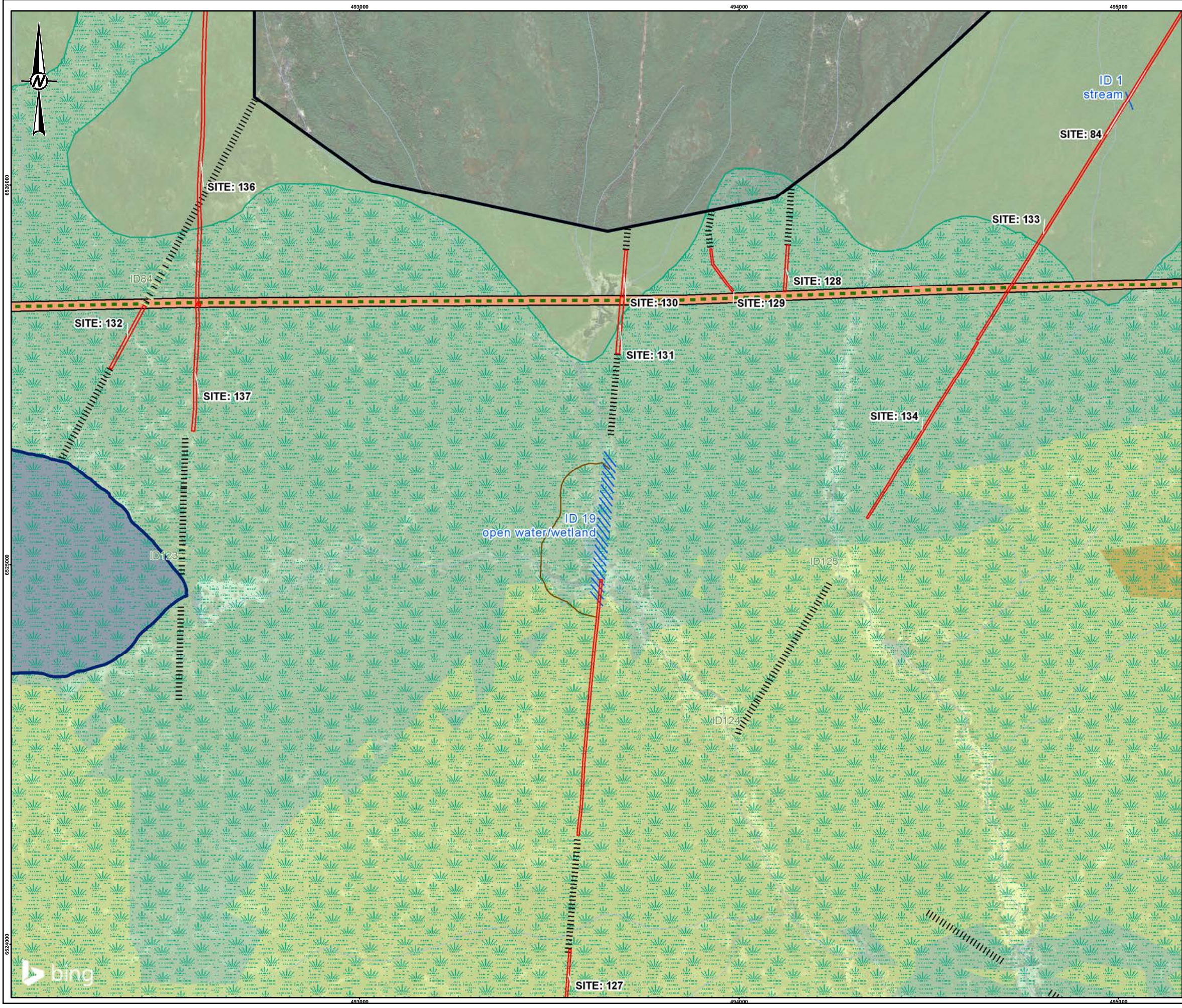
PROJECT  
PARKER CARIBOU RANGE  
ZONE 2 IMPLEMENTATION PLAN

TITLE  
RESTORATION TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-04
DESIGNED	BC	
PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	

PROJECT NO. 1534276	CONTROL 8000	REV. 0	FIGURE D - 7
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION

**INDEX**

0 2.5 5 7.5 10 12.5

KILOMETRES

1:475,000

0 250 500

1:10,000 METRES

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BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

**PROJECT**

PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN

**TITLE**

RESTORATION TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-04
DESIGNED	BC	
PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	

PROJECT NO.  
1534276

CONTROL  
8000

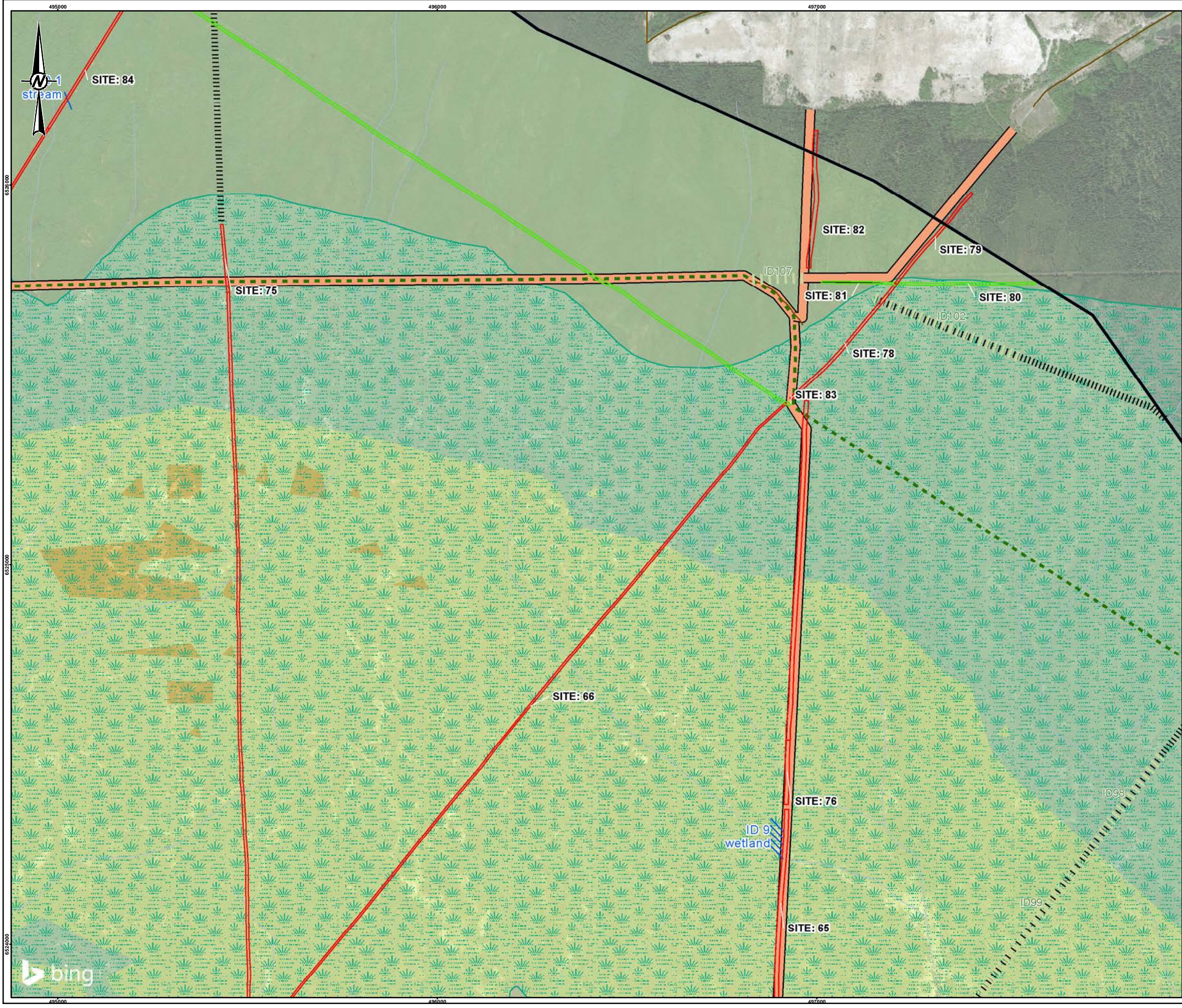
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FIGURE  
D - 8

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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

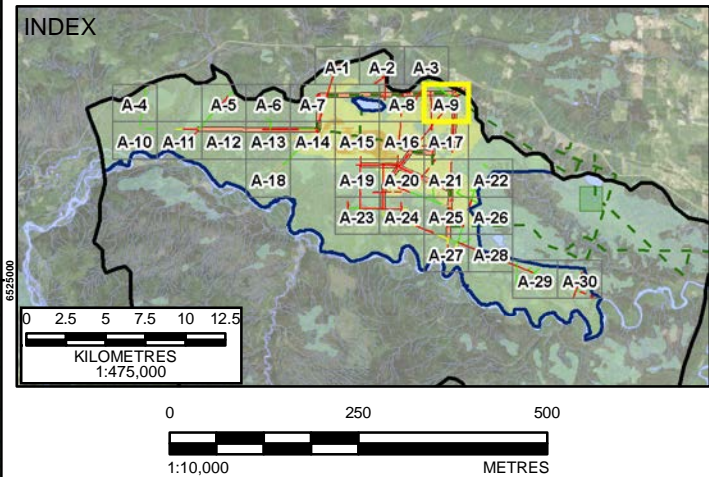
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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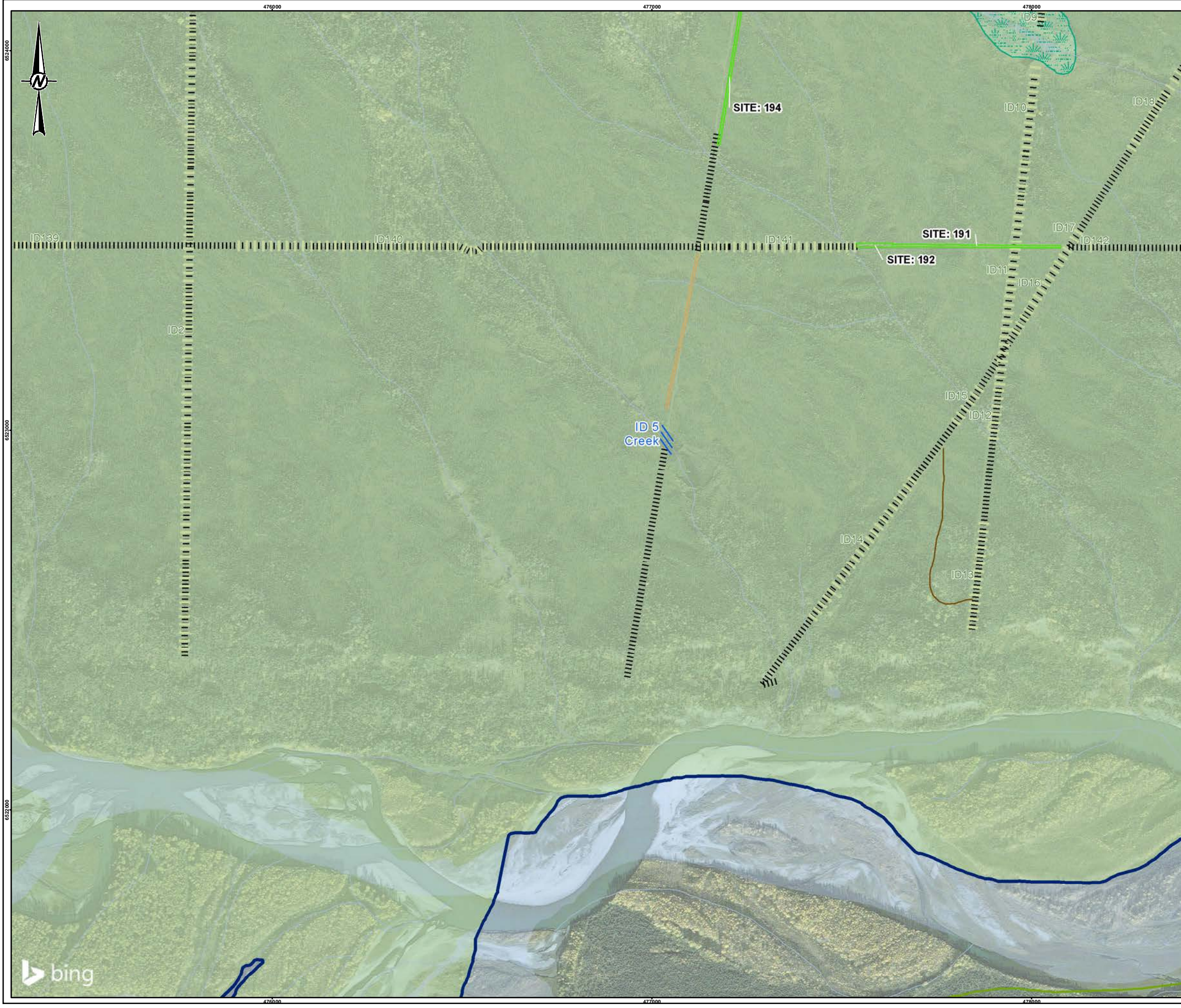
CLIENT  
BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT  
PARKER CARIBOU RANGE  
ZONE 2 IMPLEMENTATION PLAN

TITLE  
RESTORATION TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-04
DESIGNED	BC	
PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION

**INDEX**

0 2.5 5 7.5 10 12.5

KILOMETRES

1:475,000

0 250 500

1:10,000 METRES

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CLIENT

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT

PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN

TITLE

RESTORATION TREATMENT SITES

CONSULTANT

YYYY-MM-DD

2017-05-04

DESIGNED

BC

PREPARED

HR

REVIEWED

BC

APPROVED

PB

PROJECT NO.

1534276

CONTROL

8000

REV.

0

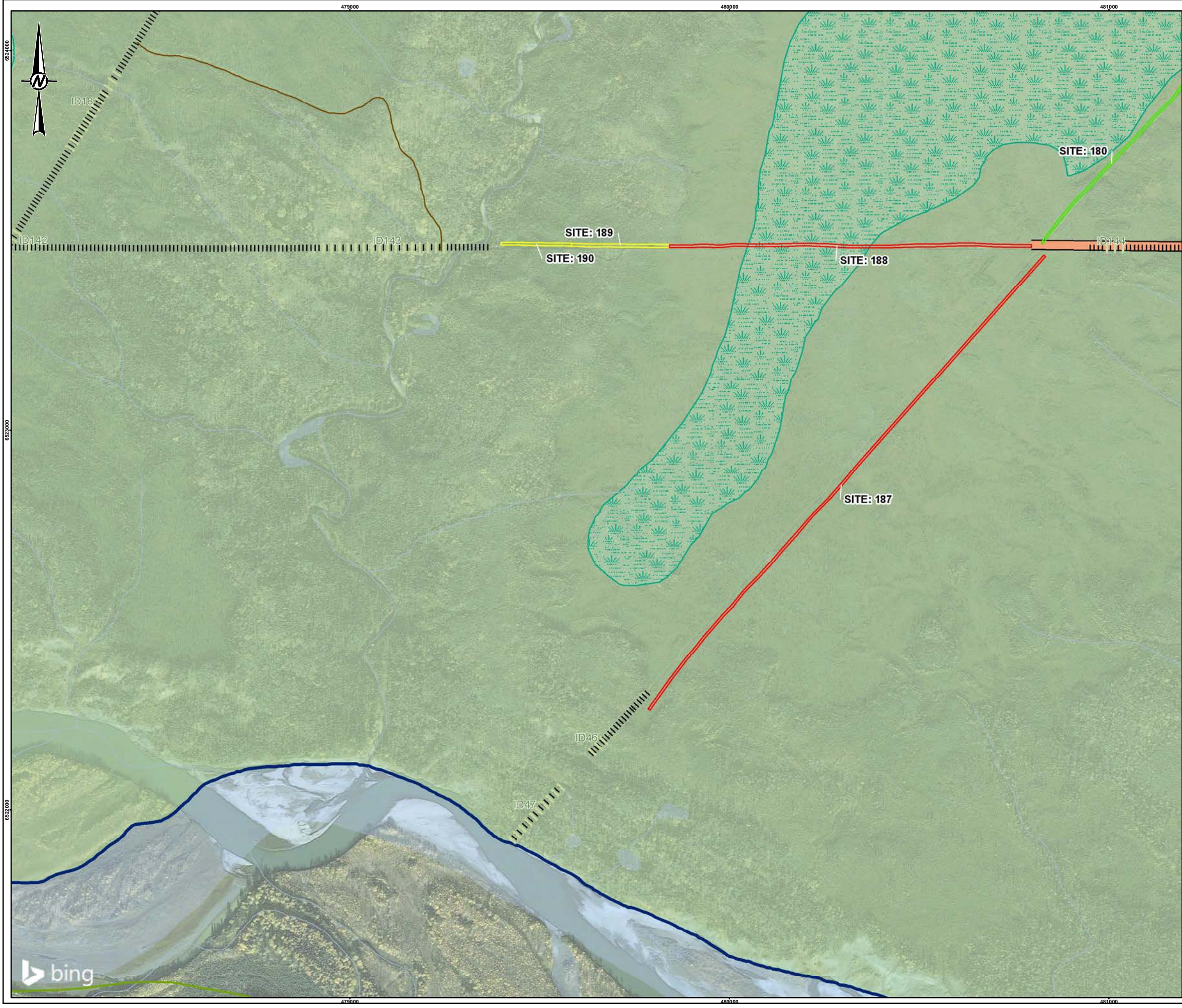
FIGURE

D - 10

25mm

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

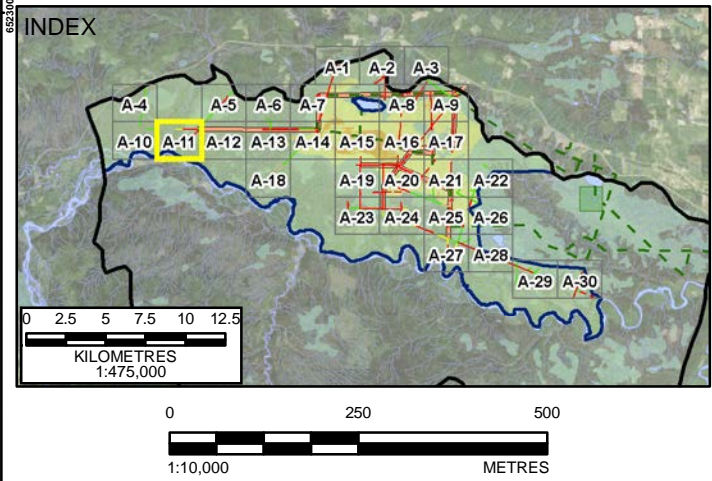
**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION



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CLIENT

BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

PROJECT

PARKER CARIBOU RANGE

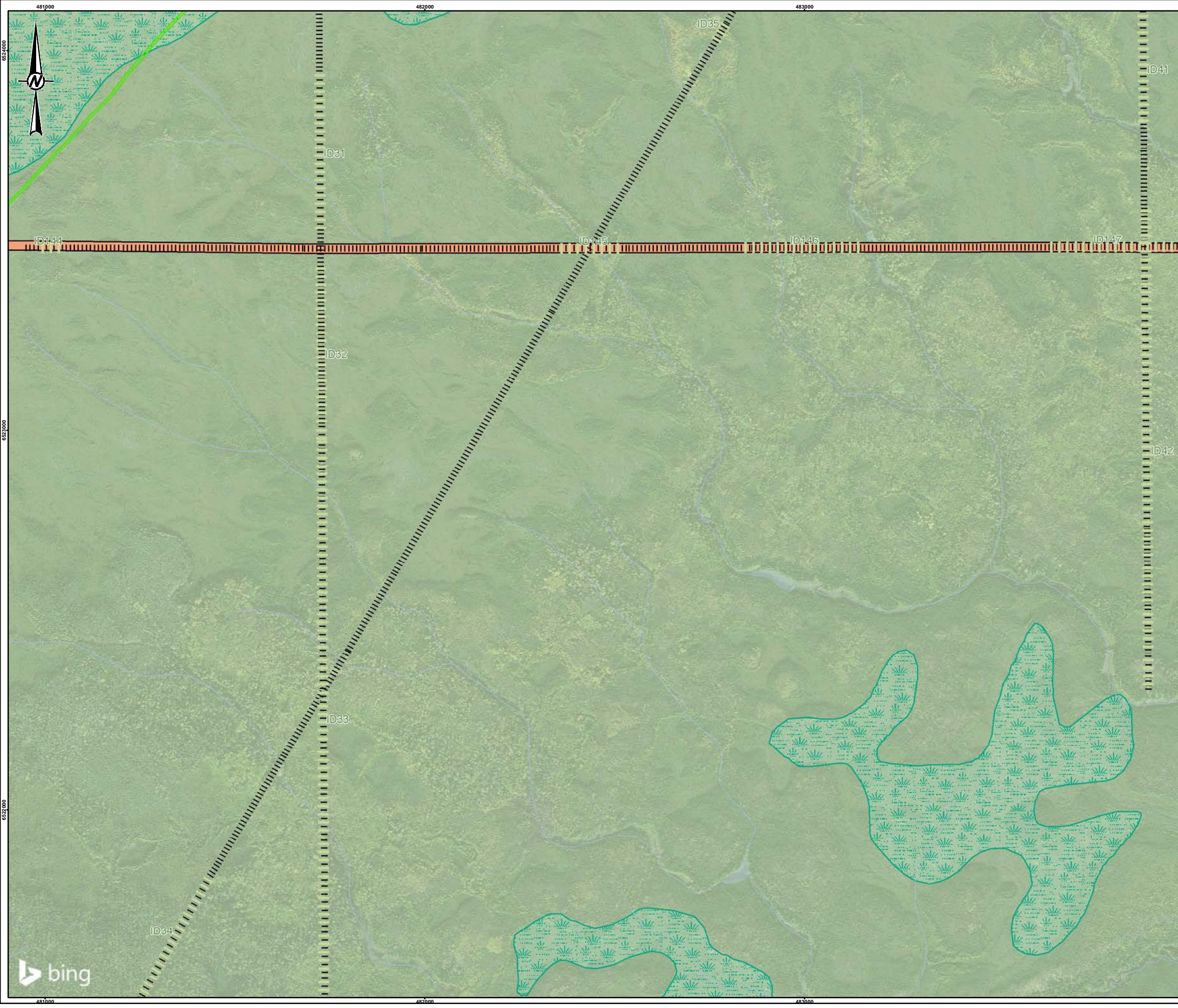
ZONE 2 IMPLEMENTATION PLAN

TITLE

RESTORATION TREATMENT SITES

CONSULTANT	YYYY-MM-DD	2017-05-04
	DESIGNED	BC
	PREPARED	HR
	REVIEWED	BC
	APPROVED	PB





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

RECREATIONAL TRAIL DESIGNATION

**INDEX**

0 2.5 5 7.5 10 12.5

KILOMETRES

1:475,000

0 250 500

METRES

1:10,000

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PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN

TITLE

RESTORATION TREATMENT SITES

CONSULTANT

YYYY-MM-DD

2017-05-04

DESIGNED

BC

PREPARED

HR

REVIEWED

BC

APPROVED

PB

PROJECT NO.

1534276

CONTROL

8000

REV.

0

FIGURE

D - 12

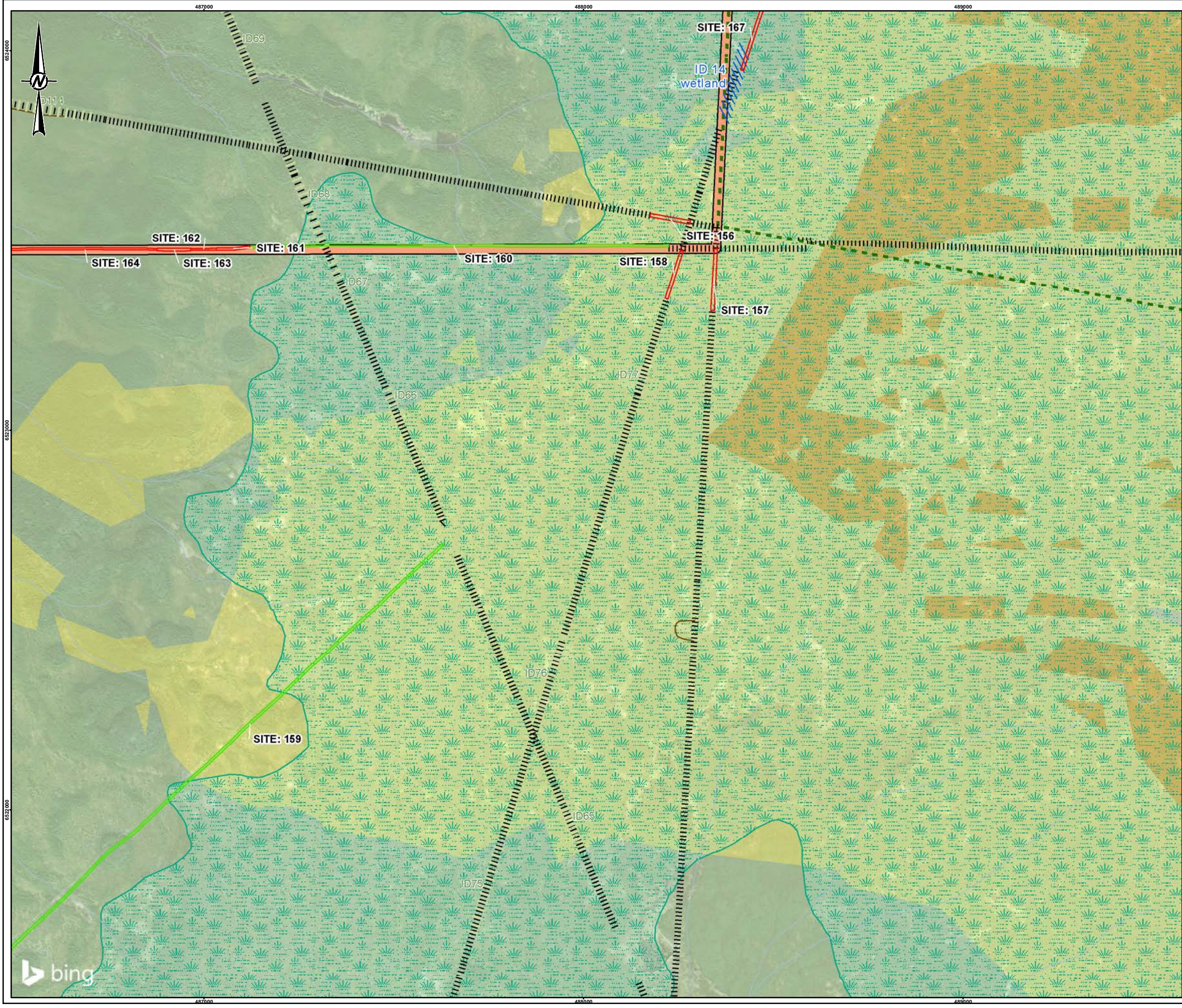
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B









**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

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**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

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RECREATIONAL TRAIL DESIGNATION

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BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

**PROJECT**

PARKER CARIBOU RANGE  
ZONE 2 IMPLEMENTATION PLAN

**TITLE**

RESTORATION TREATMENT SITES

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REVIEWED	BC	
APPROVED	PB	

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8000

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FIGURE  
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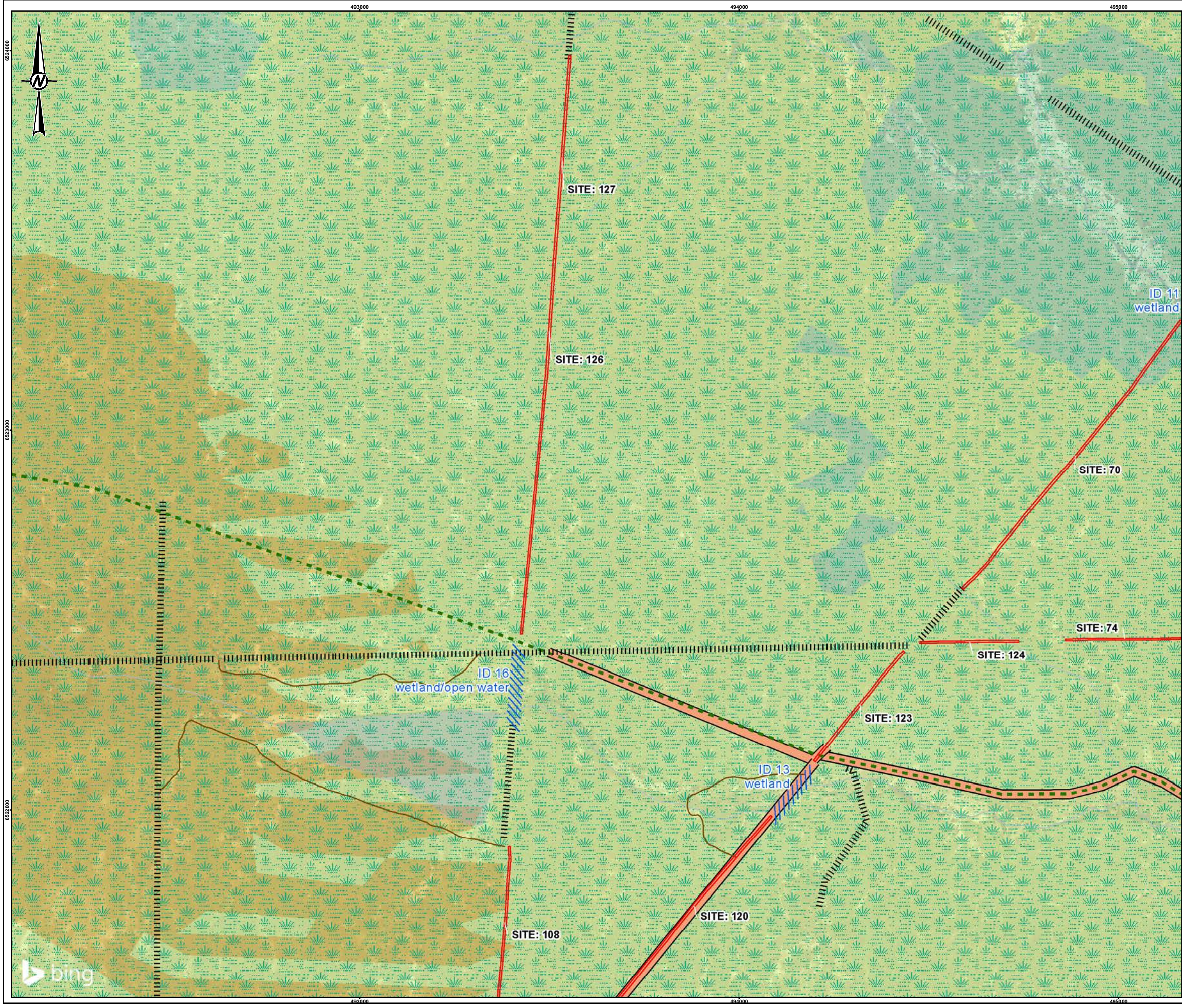
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B









**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

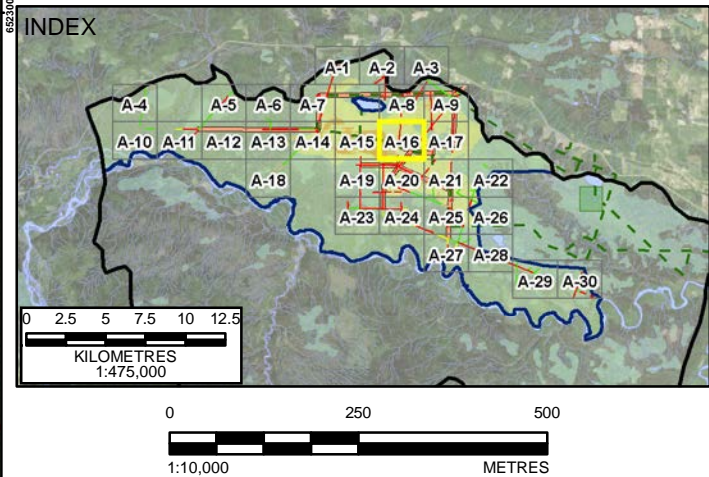
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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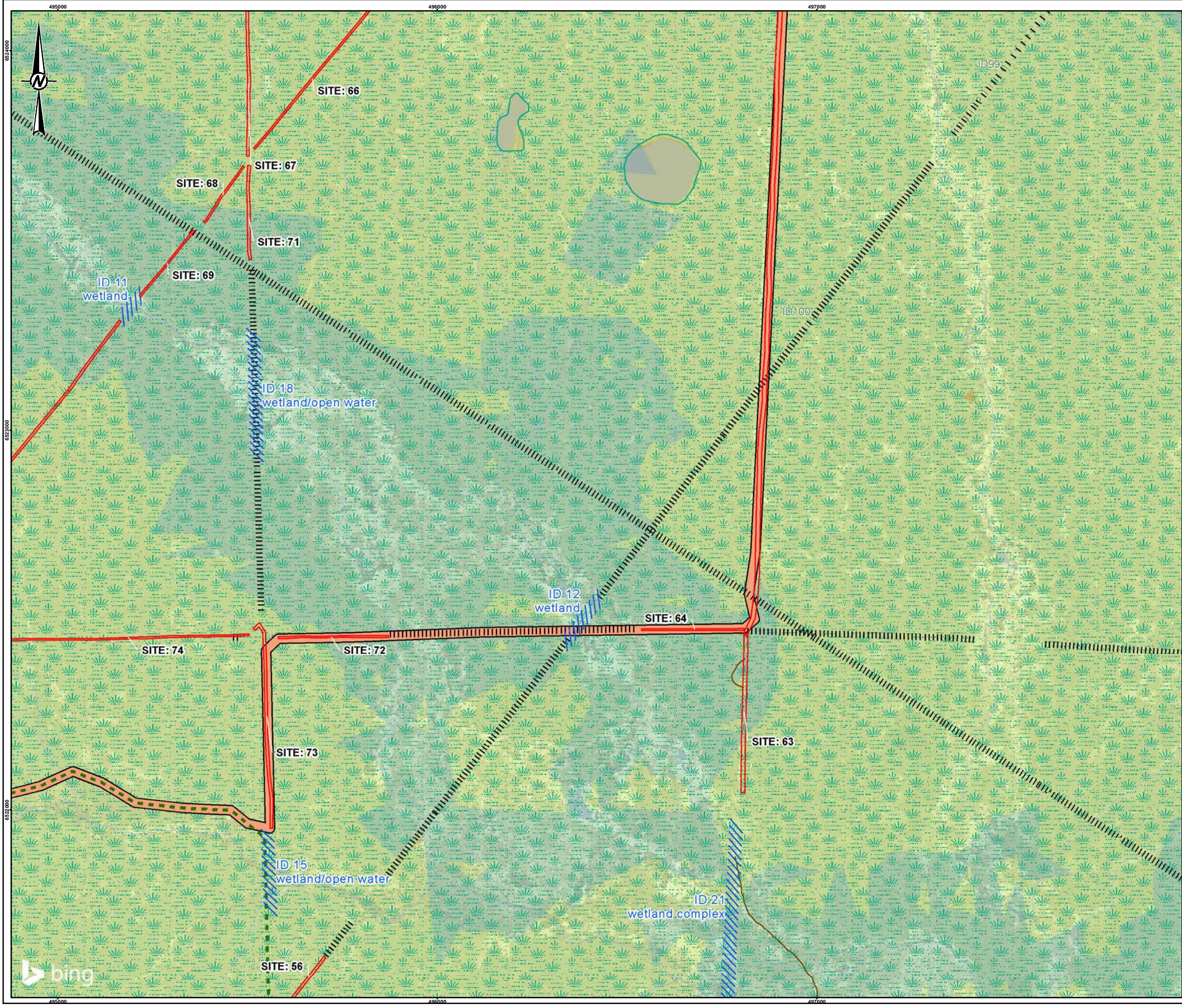
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5. IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009. DATE: MAY 2011.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

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BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY			
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PARKER CARIBOU RANGE			
ZONE 2 IMPLEMENTATION PLAN			
TITLE			
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CONSULTANT			
		YYYY-MM-DD	2017-05-04
		DESIGNED	BC
		PREPARED	HR
		REVIEWED	BC
		APPROVED	PB
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION

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1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY

**PROJECT**

PARKER CARIBOU RANGE  
ZONE 2 IMPLEMENTATION PLAN

**TITLE**

RESTORATION TREATMENT SITES

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REVIEWED	BC	
APPROVED	PB	

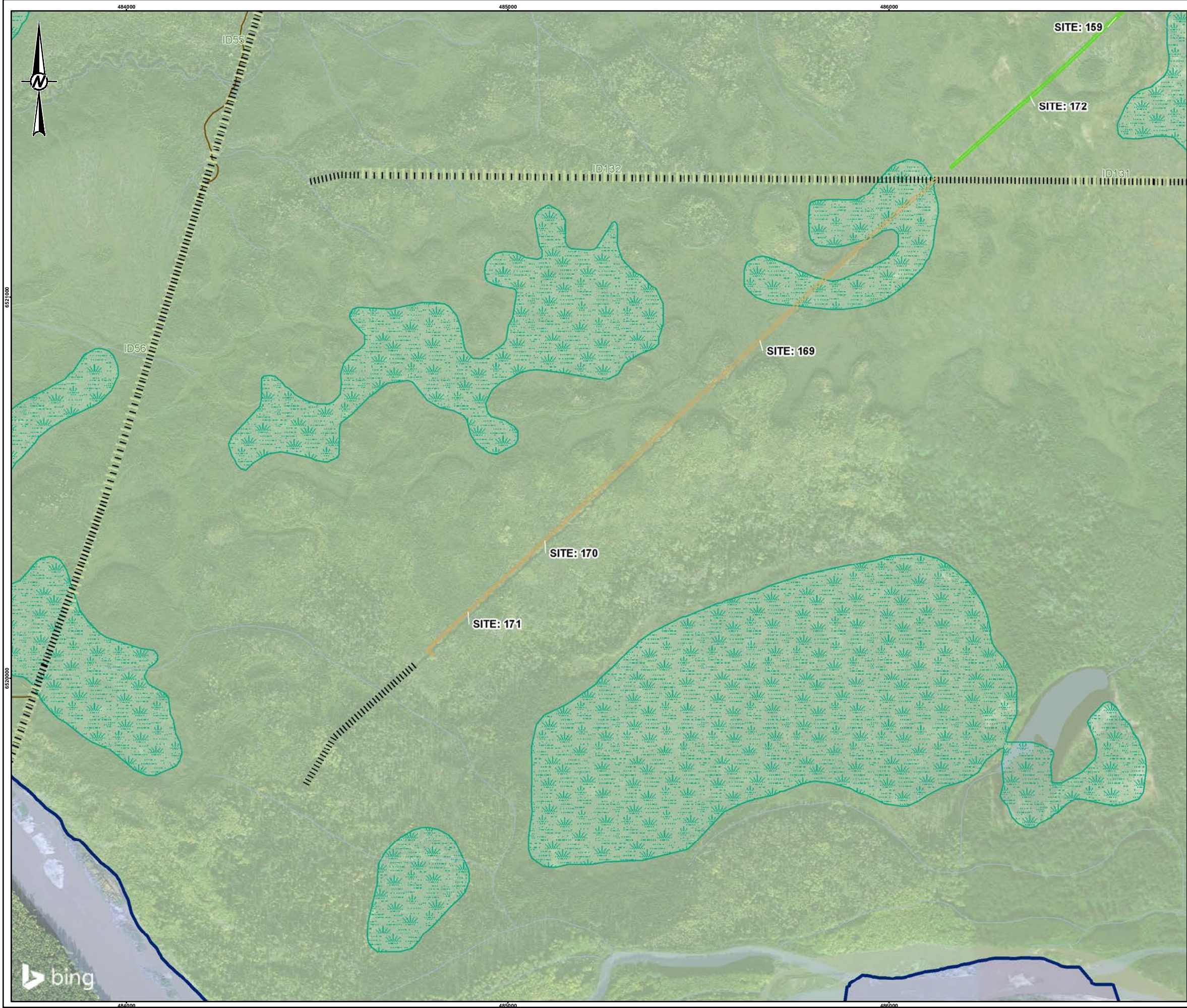
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

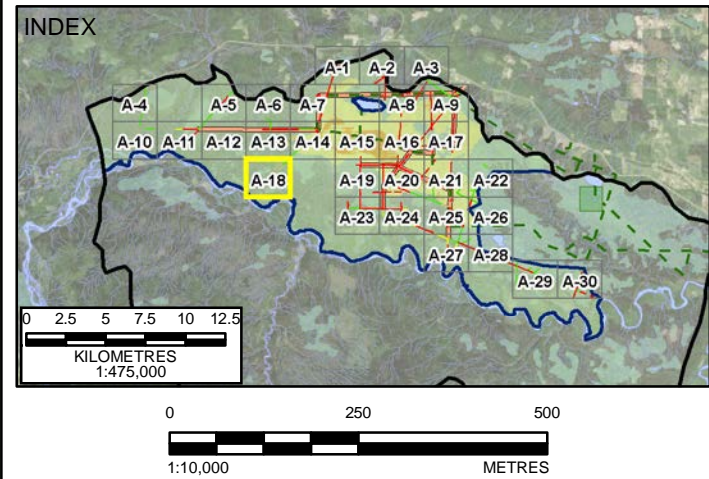
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



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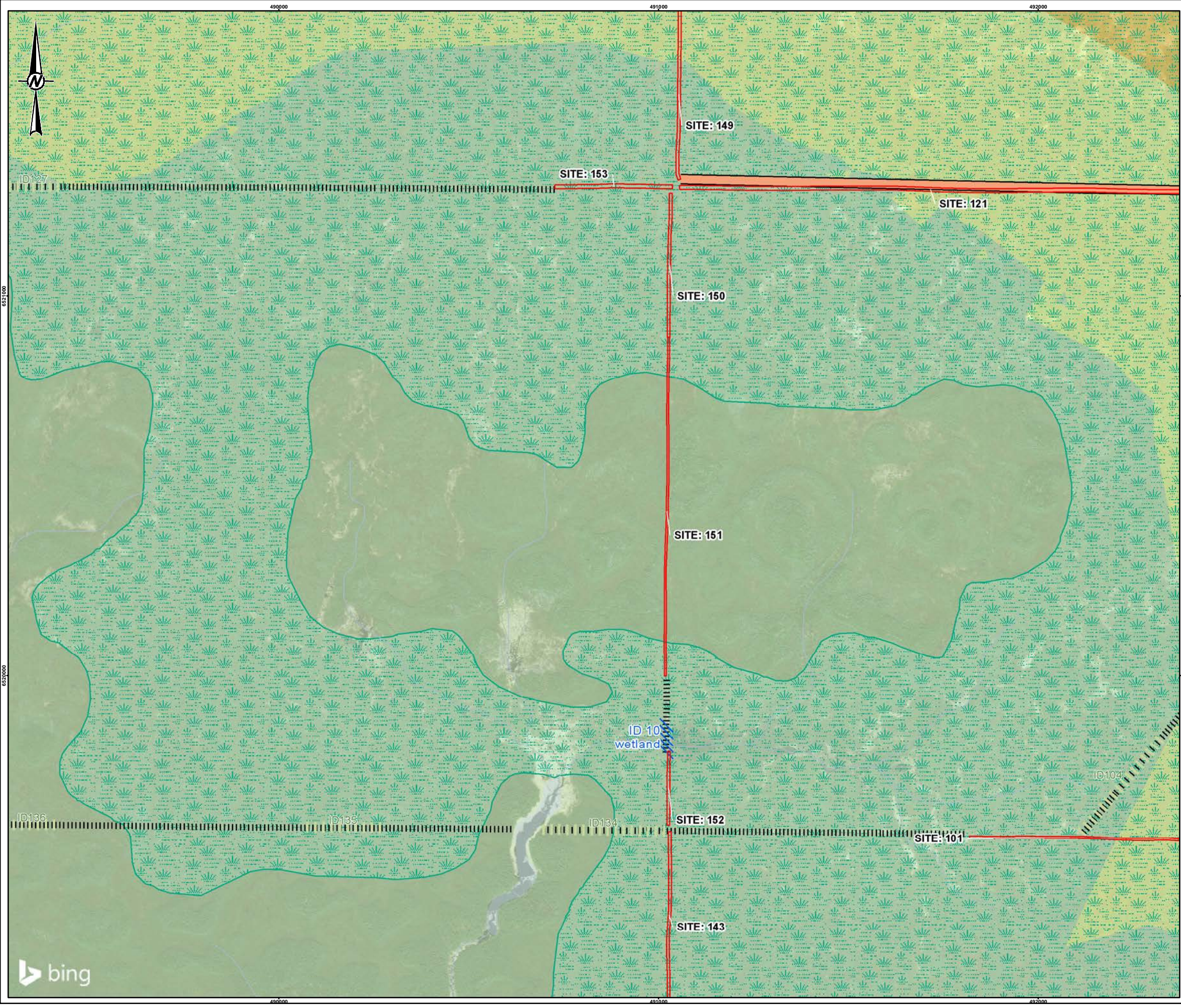
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CONSULTANT		
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PREPARED HR		
REVIEWED BC		
APPROVED PB		
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

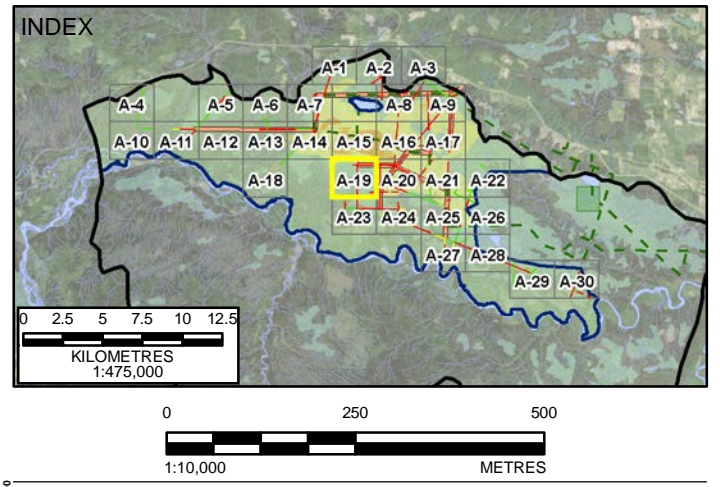
WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

RECREATIONAL TRAIL DESIGNATION



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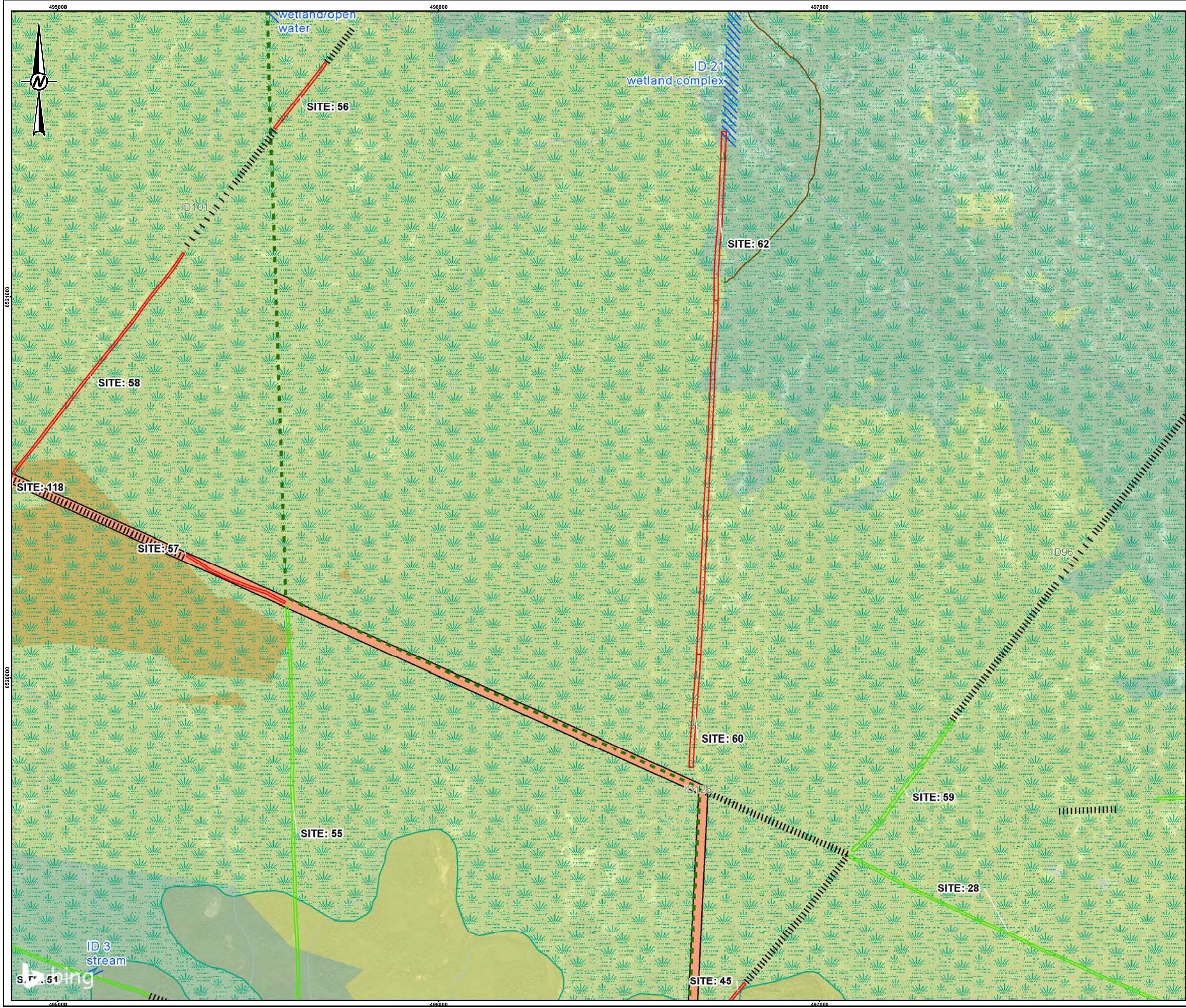
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PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	









**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

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OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

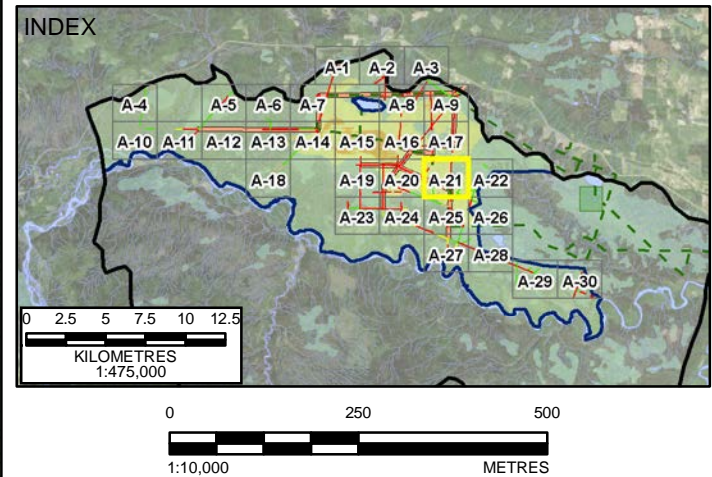
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



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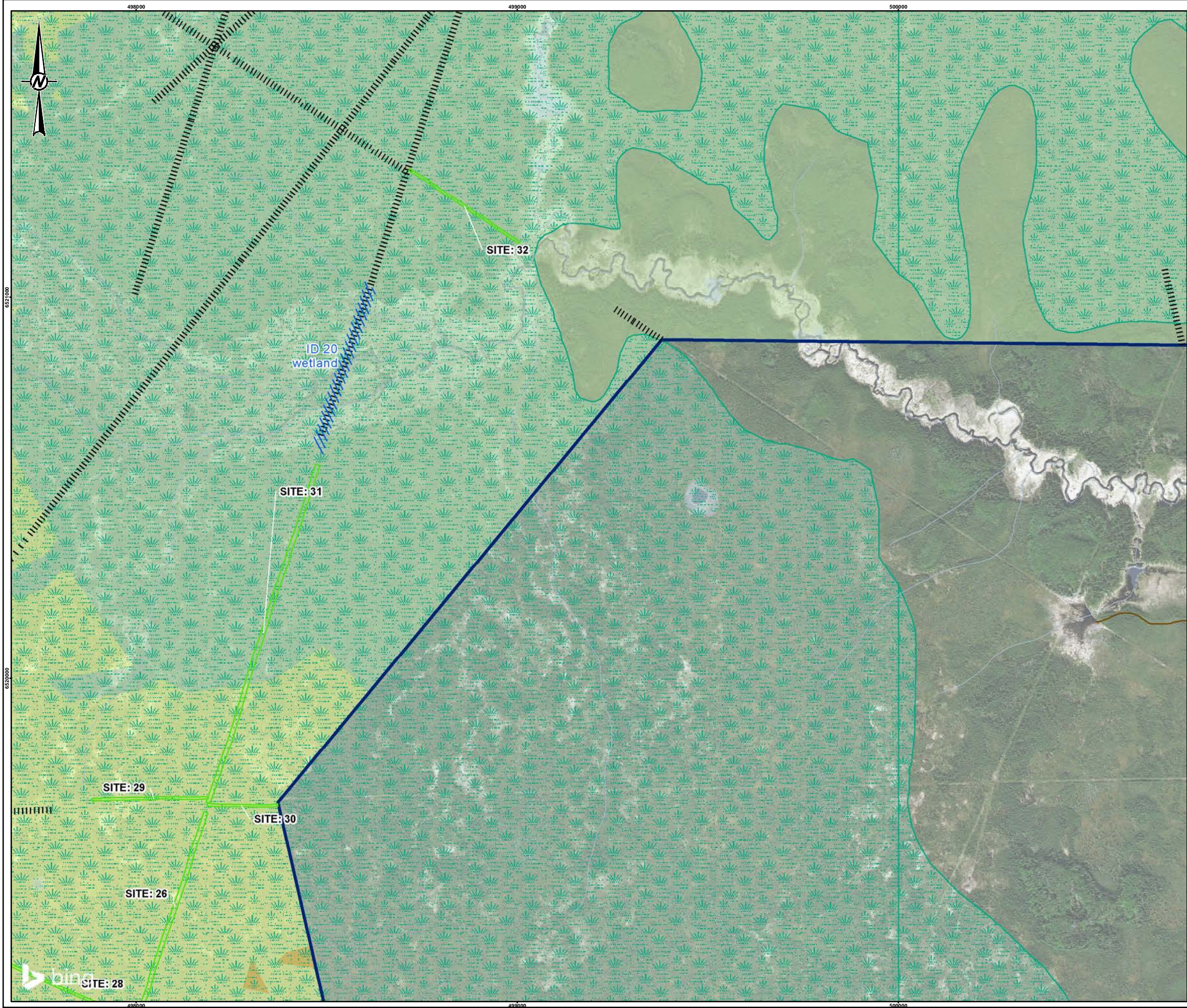
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APPROVED	PB	





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

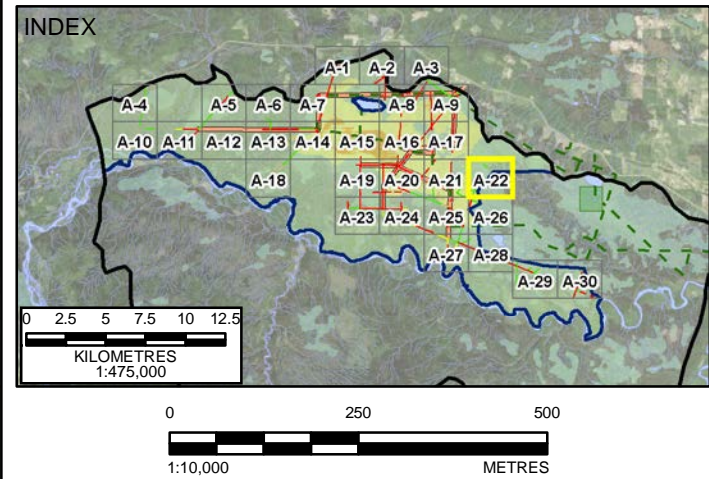
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



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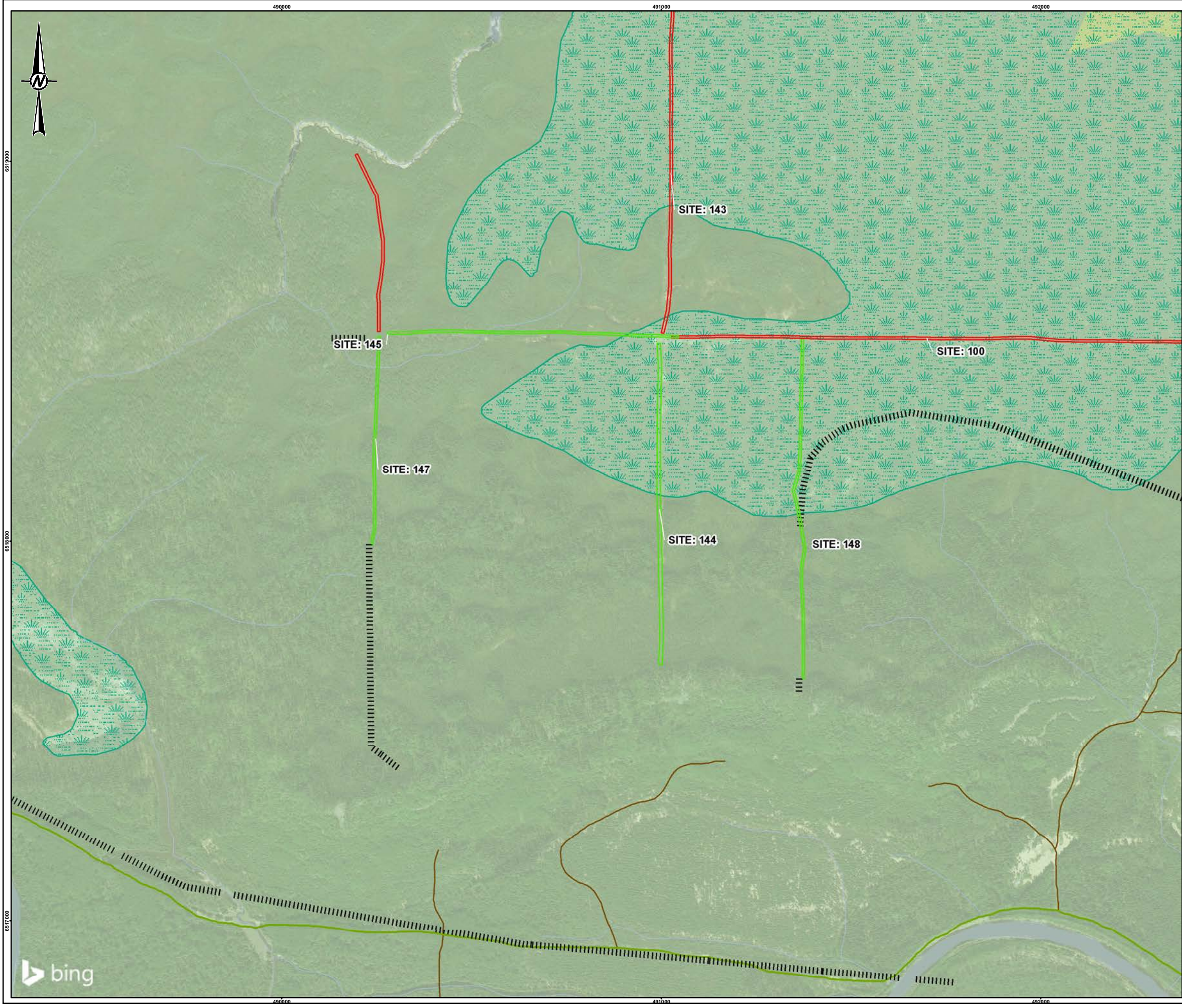
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APPROVED	PB	





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION

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**REFERENCES**

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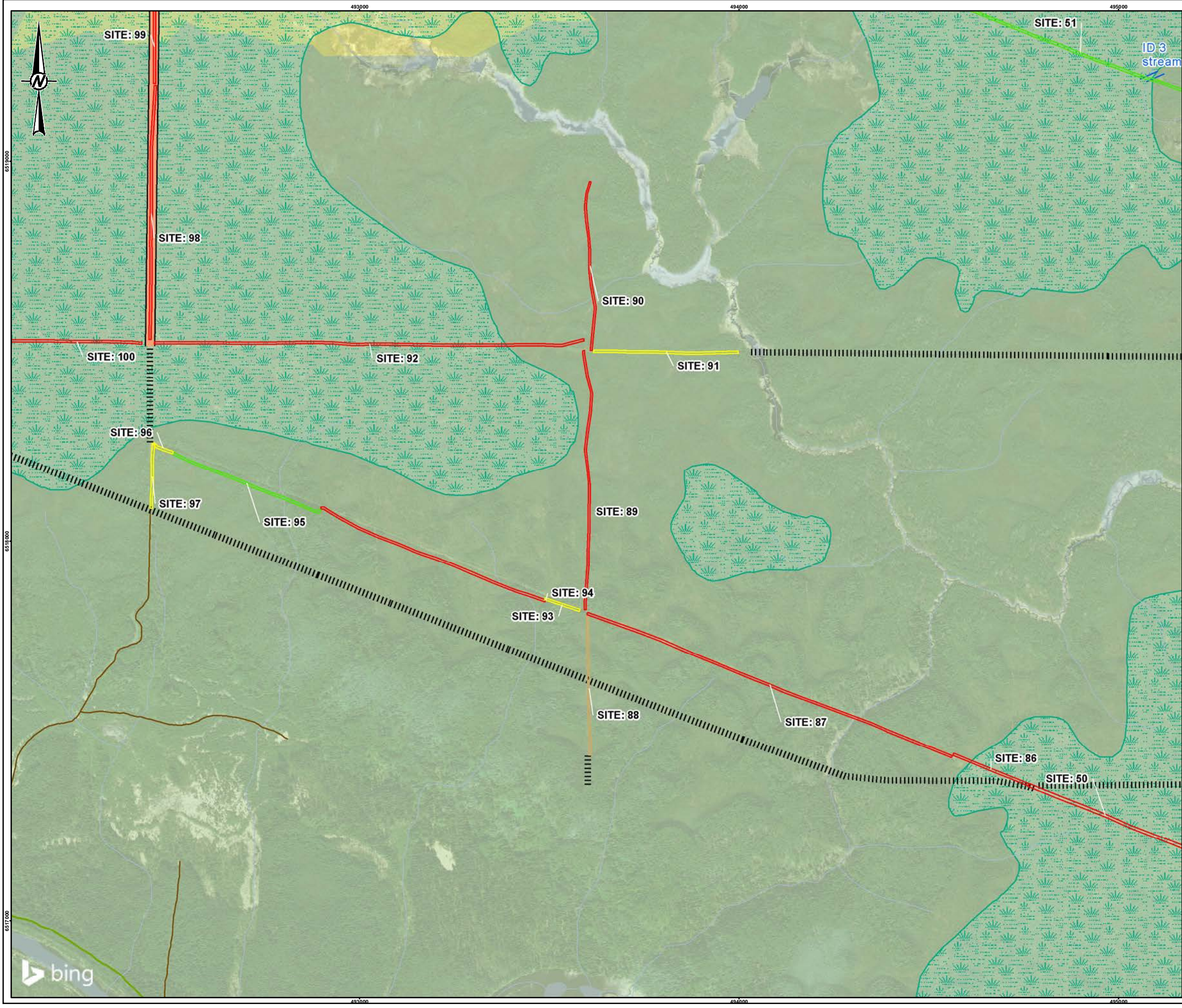
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

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POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

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WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

FORESTRY SERVICE ROAD / ROAD PERMIT

RECREATIONAL TRAIL DESIGNATION

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0 2.5 5 7.5 10 12.5

KILOMETRES

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0 250 500

METRES

1:10,000

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1. 2D SEISMIC CUTLINES, WATERCOURSE, WATERBODY, POPULATED AREA, WETLAND, ROADS, TOWN AND PROVINCIAL BOUNDARY OBTAINED FROM FROM CANVEC © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

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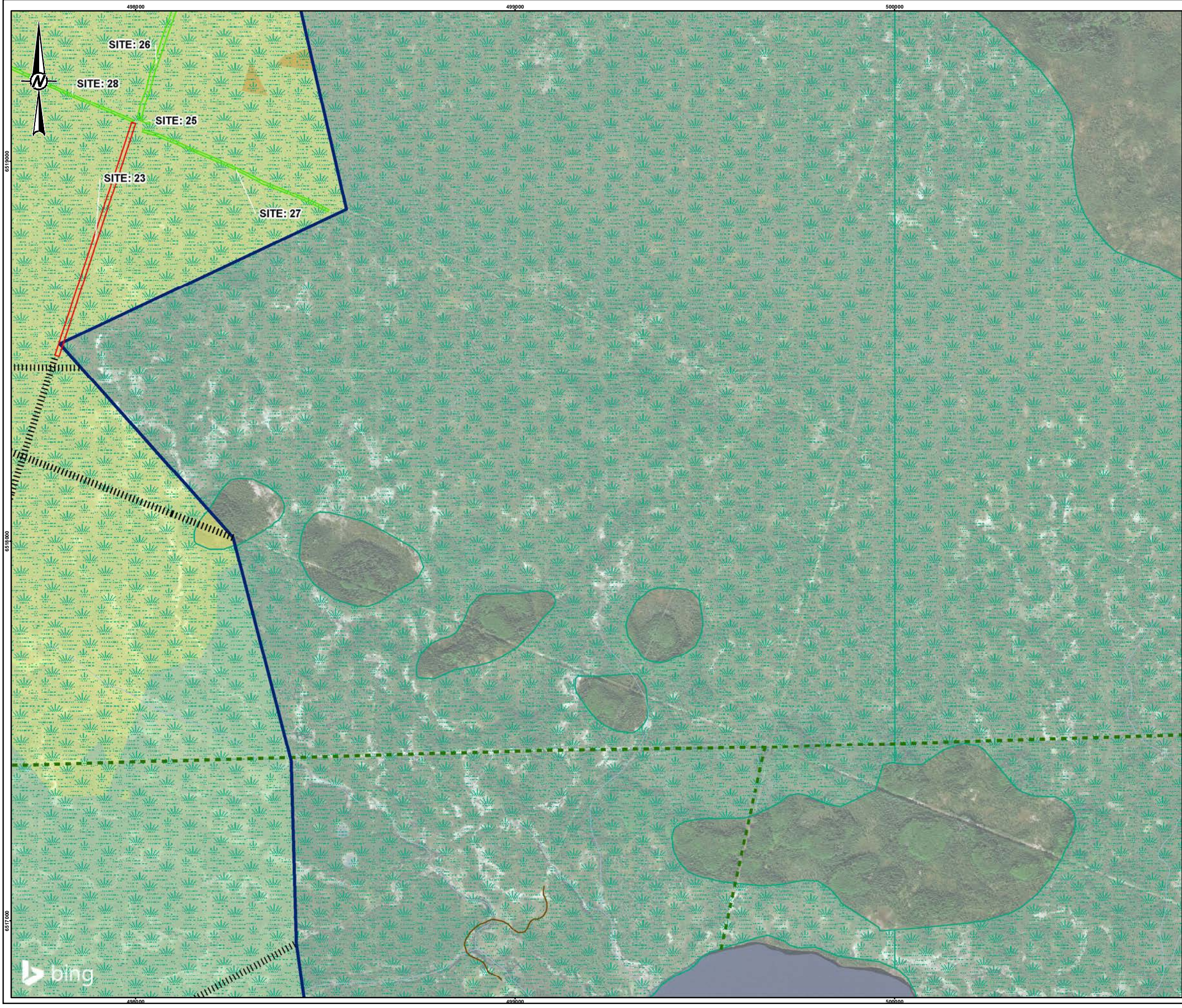
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**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

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LOW - MODERATE

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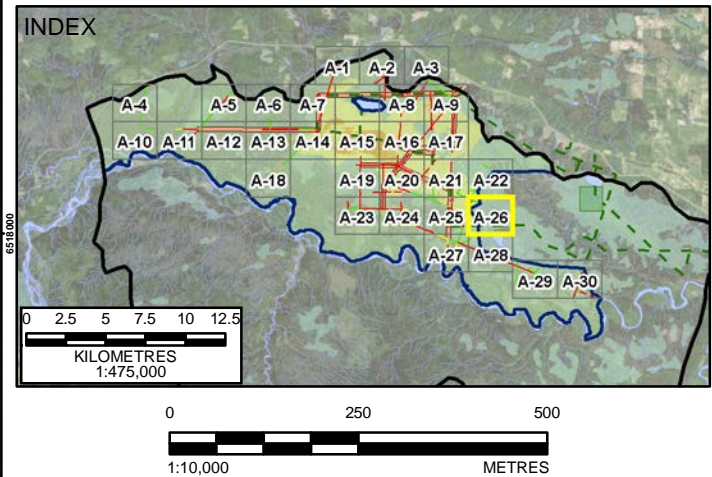
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

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MODERATE

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POTENTIAL WATER OBSTACLE

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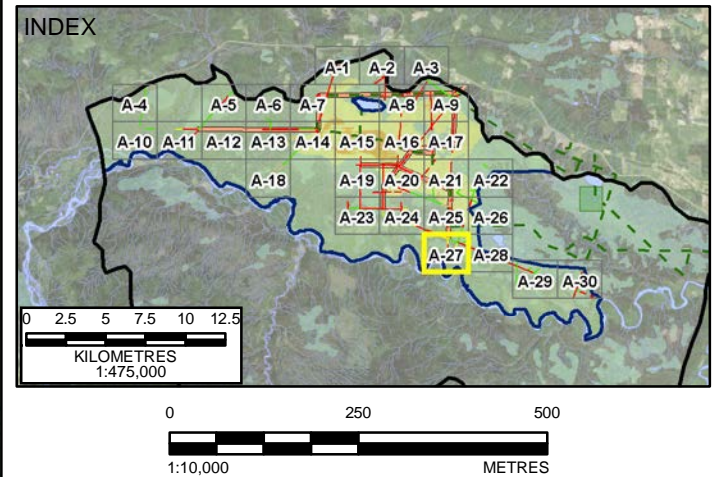
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PROPOSED PRIMARY WINTER ACCESS

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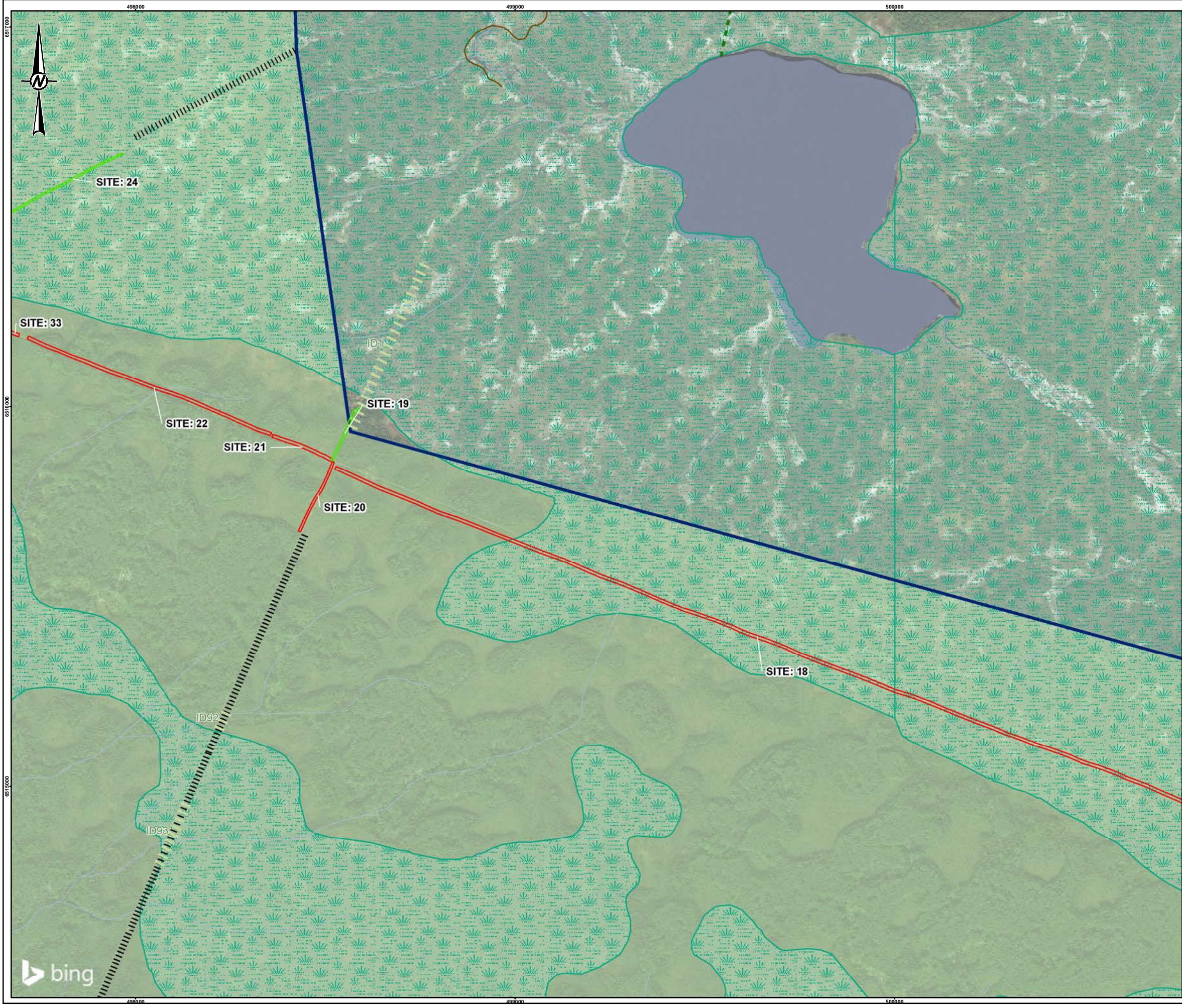
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5. IMAGERY OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, MAY 2009. DATE: MAY 2011.  
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

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BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY			
PROJECT			
PARKER CARIBOU RANGE			
ZONE 2 IMPLEMENTATION PLAN			
TITLE			
RESTORATION TREATMENT SITES			
CONSULTANT			
		YYYY-MM-DD	2017-05-04
		DESIGNED	BC
		PREPARED	HR
		REVIEWED	BC
		APPROVED	PB
PROJECT NO.	CONTROL	REV.	FIGURE
1534276	8000	0	D - 27





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

LOW

LOW - MODERATE

MODERATE

**OTHER**

LINEAR DISTURBANCE - LEAVE FOR NATURAL REGENERATION

NATURAL REVEGETATION (>3m) : NO ACCESS

POTENTIAL WATER OBSTACLE

PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

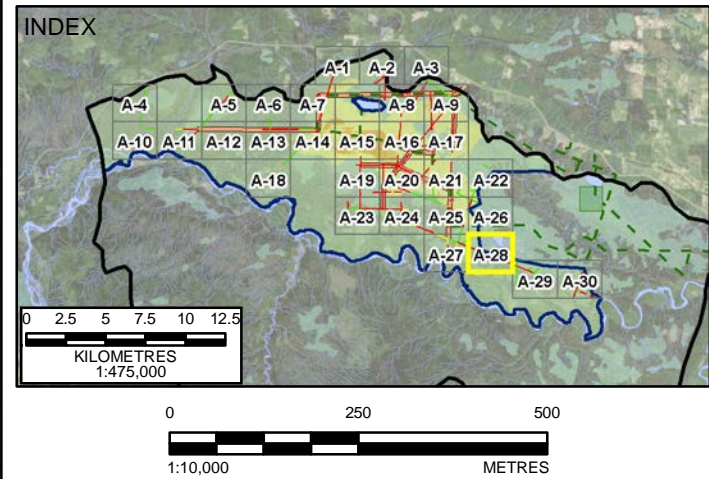
WATERCOURSE

**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



**REFERENCES**

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PARKER CARIBOU RANGE

ZONE 2 IMPLEMENTATION PLAN

TITLE

RESTORATION TREATMENT SITES

CONSULTANT

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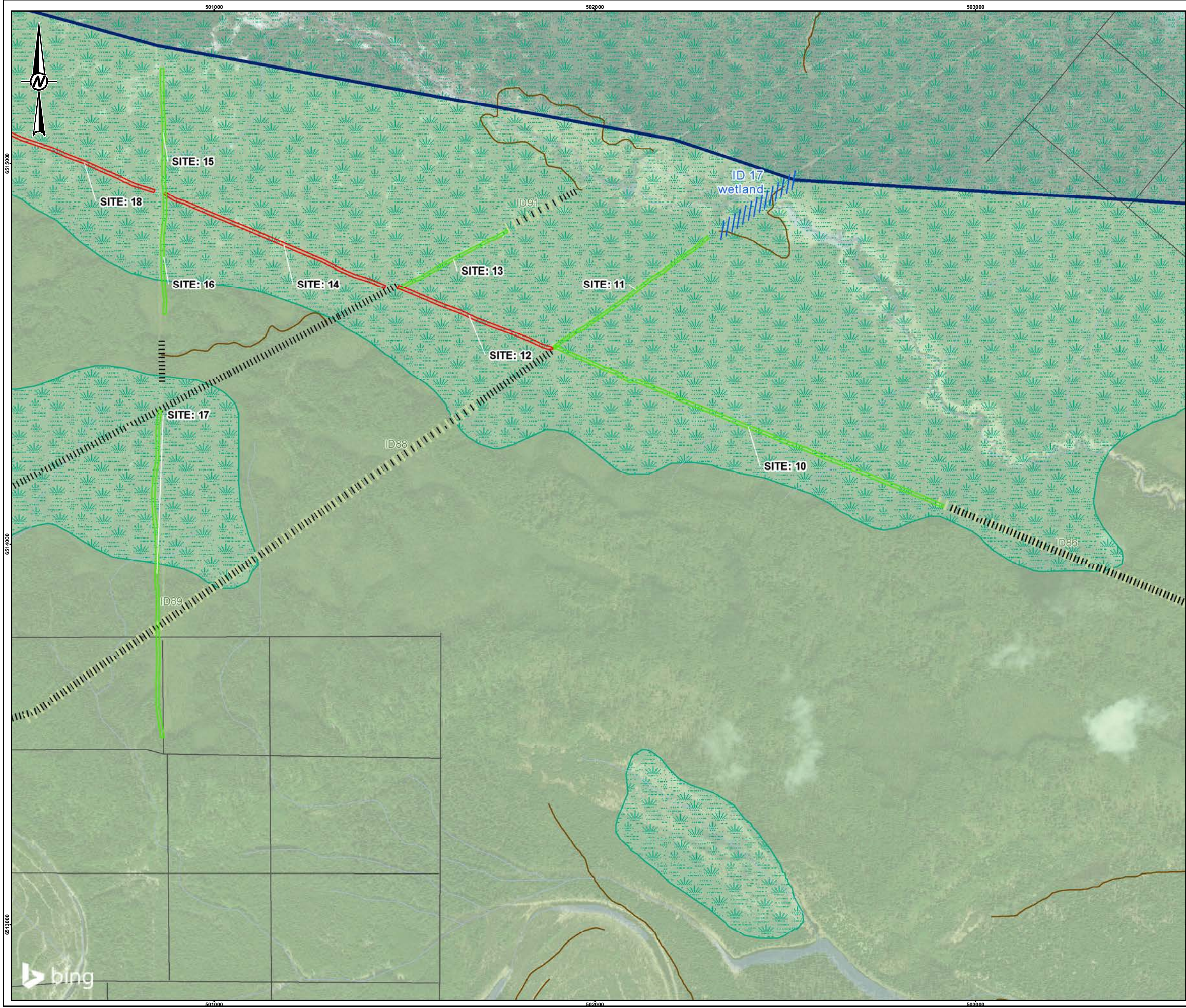
REV.

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FIGURE

D - 28





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

**PREDICTED CARIBOU CALVING HABITAT**

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LOW - MODERATE

MODERATE

**OTHER**

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PARKER LAKE ECOLOGICAL RESERVE

WATERBODY

WETLAND

WATERCOURSE

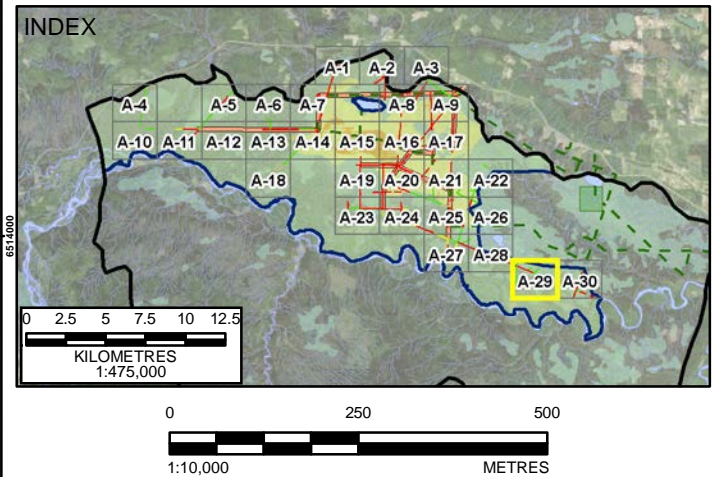
**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

OGC IDENTIFIED LOW IMPACT SEISMIC: REQUIRES GROUNDTRUTHING

UNCLASSIFIED ROAD

RECREATIONAL TRAIL DESIGNATION



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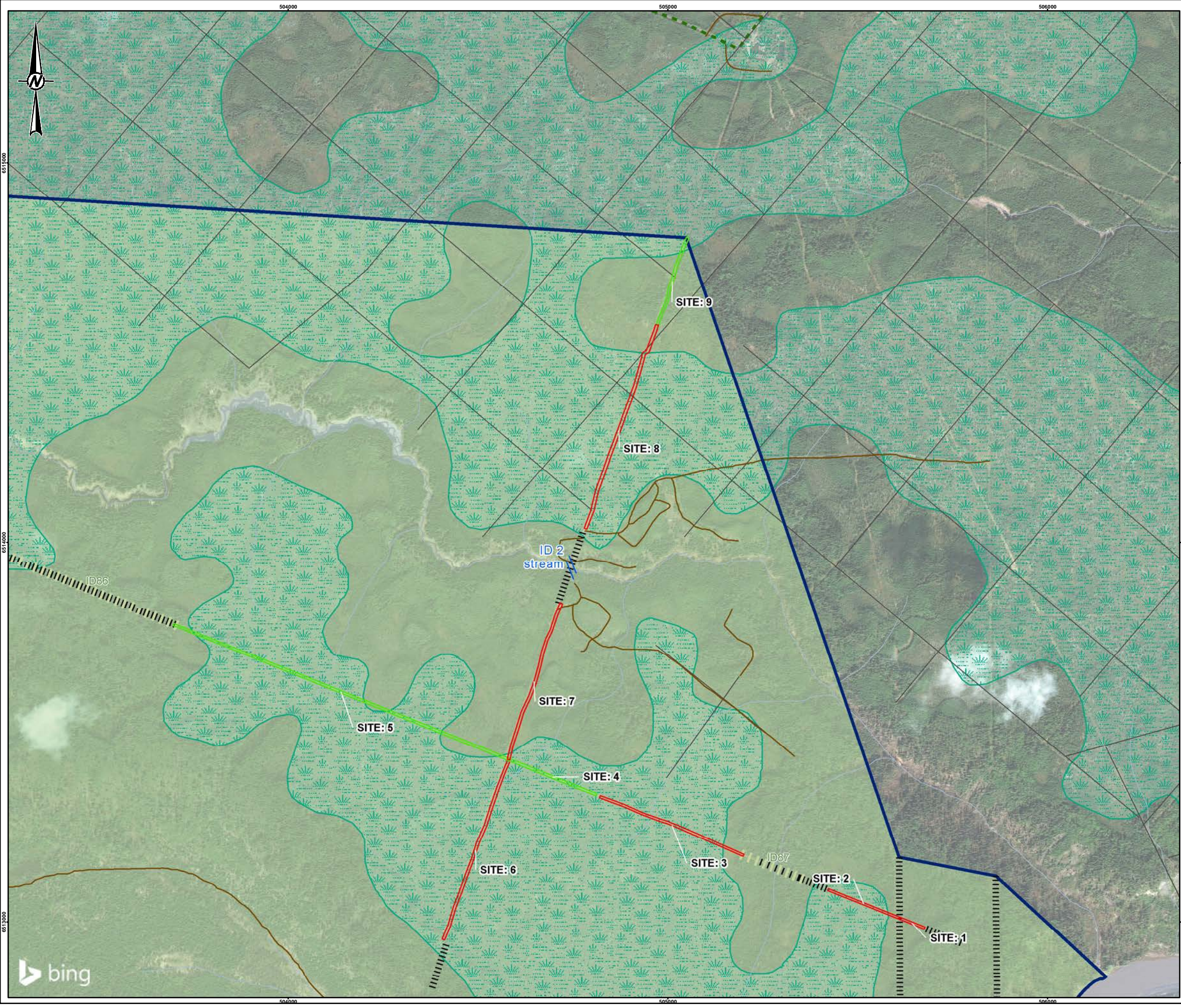
COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

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PROJECT		
PARKER CARIBOU RANGE		
ZONE 2 IMPLEMENTATION PLAN		
TITLE		
RESTORATION TREATMENT SITES		
CONSULTANT		
YYYY-MM-DD	2017-05-04	
DESIGNED	BC	
PREPARED	HR	
REVIEWED	BC	
APPROVED	PB	
PROJECT NO.	CONTROL	REV.
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FIGURE		D - 29

R:\BTH\N\Chen\BC\_OGRI\B\CS99\_PROJECTS\1534276\_REMB\_Parker\_2016\02\_PRODUCTION\6000\XDO\Report\Final\1534276\_V02\_Appendix\_Figure\_Restoration\_Recommendations\_by\_Site\_Rev0.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B





**LEGEND**

PARKER CARIBOU RANGE

TACTICAL PLAN TREATMENT ZONE 2

**TREATMENT TYPE**

MOUNDING / TREE FELLING / SEEDLING PLANTING

TREE FELLING / SEEDLING PLANTING

TREE FELLING ONLY

OTHER

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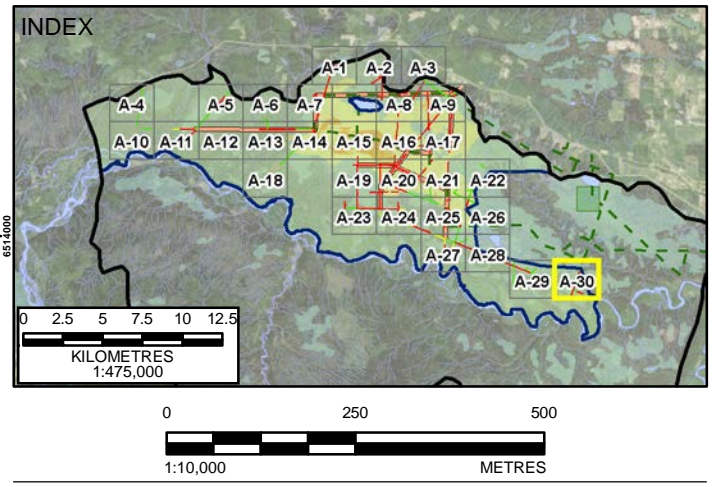
**WINTER ACCESS**

PROPOSED PRIMARY WINTER ACCESS

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CONSULTANT	YYYY-MM-DD	2017-05-04
	DESIGNED	BC
	PREPARED	HR
	REVIEWED	BC
	APPROVED	PB





# **APPENDIX E**

## **Habitat Restoration Sign**



# HABITAT ENHANCEMENT SITE

THIS SITE WAS TREATED WITH ONE OR MORE OF THE  
FOLLOWING METHODS:

- \* EXCAVATOR MOUNDING \*
- \* SLASH ROLLBACK \*
- \* SEEDLING PLANTING \*
- \* TREE-FELLING / BENDING \*

DO NOT DISTURB IN EITHER SUMMER OR WINTER



Ministry of Forests, Lands and Natural Resource Operations

***Contact FrontCounter BC in Fort Nelson at  
1-877-855-3222 for more information.***



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