



Basic Impact Analysis (BIA)

Highway 10 Pavement Rehabilitation

Riding Mountain National Park

April 2016



Parks
Canada

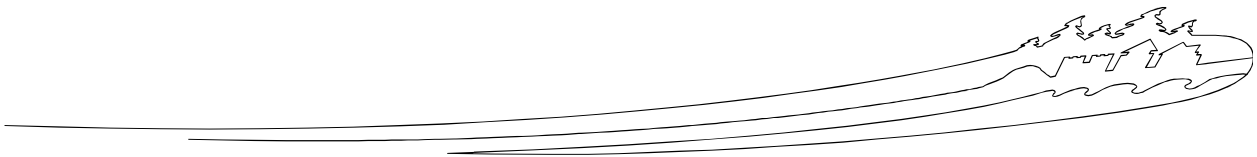
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FIGURES (ATTACHED)

Figure 1 – Project Location

Figure 2 – Overview

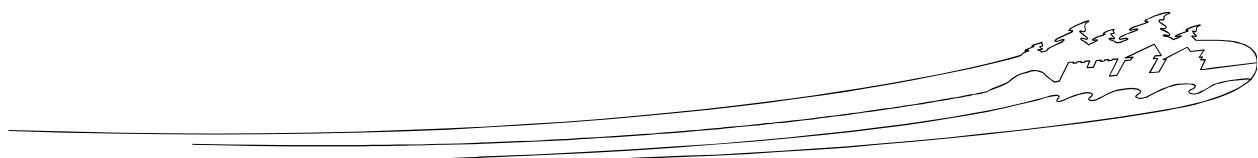
Figure 3 – Land Cover Mapping and Vegetation Assessment Locations

Figure 4 – 2015 Wildlife Results

APPENDICES

Appendix 1 – Environmental Impact Analysis Tools: Effects Identification Matrix

Appendix 2 – Critical Habitat Destruction Analysis Form





Parks Canada Basic Impact Analysis

1. PROJECT TITLE & LOCATION

Highway 10 Pavement Rehabilitation – Riding Mountain National Park Phase II, III & IV

The Project is located along Highway 10 within Riding Mountain National Park.

2. PROPONENT INFORMATION

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3. PROPOSED PROJECT DATES

Location	Planned commencement	Planned completion
Km 0 – 12.5	2016-05-15	2016-10-31
Km 19.5 – 54	2017-04-15	2019-12-31

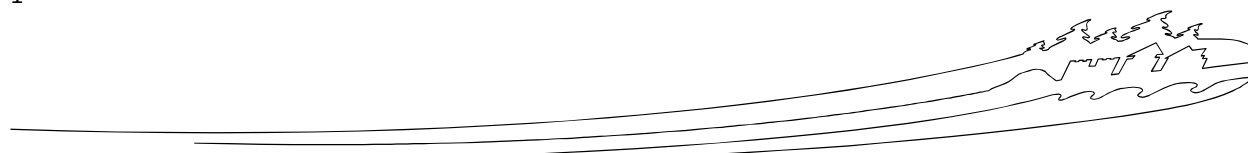
4. INTERNAL PROJECT FILE

RMNP000703

5. PROJECT DESCRIPTION

5.1 Project Objective

The proposed project involves roadway rehabilitation activities (e.g., resurfacing, grading, drainage improvements, and culvert replacement) along Highway 10 within Riding Mountain National Park (RMNP) from km 0 to 54. The majority of the proposed rehabilitation/maintenance works involve repair of existing roadway within the existing right of way. In some specific locations, small sections of tree removal, brushing, and/or ditching is proposed. Highway 10 rehabilitation activities began in 2015, when km 12.5 through 19.5 were completed; the areas proposed for rehabilitation in 2016 include km 0 – 12.5 and km 19.5 – 54 (herein referred to as “the Project”) (Figure 1).





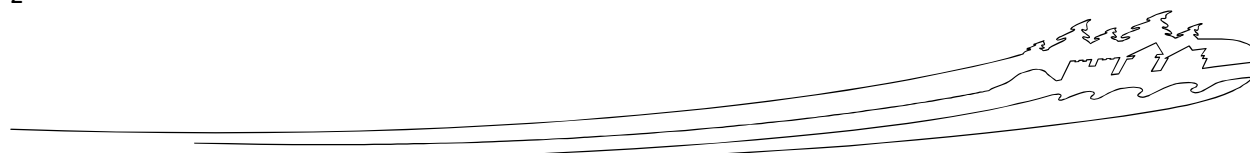
5.2 Project Rationale

Highway 10 is a major travel corridor through RMNP. Currently, there are some issues with road surface conditions, visibility, drainage, and collisions with wildlife. Improvements to infrastructure, including the roadways and ditches, will enhance visitor experience and appeal, improve public safety, and support environmental protection and stewardship.

5.3 Project Phases and Activities

The Project will include the following phases and activities.

Phase and Activities	Details
Staging and Laydown	<ul style="list-style-type: none"> • Worksite Conditions/Staging/Laydown • Equipment storage and refueling • Fuel storage and refueling • Located at Grey Owl Pit (KM 7+350 m), Agassiz Tower (KM 48+100 m), and others as to be determined
Asphalt Production and Handling	<ul style="list-style-type: none"> • Asphalt plant located outside park boundaries (approximately 10 km north of the north boundary) • Asphalt plant operation • Gravel crushing and washing
Concrete Work	<ul style="list-style-type: none"> • Concrete work for first 750 m up to park gate • Concrete washing to occur outside of park boundaries • Onsite concrete management • Waste concrete from curbs disposed of outside the park
Paving, Resurfacing, and Grading	<ul style="list-style-type: none"> • Asphalt removal • Milling existing asphalt • Grading • Paving and resurfacing • Pavement marking and barrier and guardrail reinstatement • Signage installation
Barriers and Guardrails	<ul style="list-style-type: none"> • Repair, replacement and upgrades of barriers and guardrails
Vegetation Removal	<ul style="list-style-type: none"> • Required for drainage improvement • Will involve clearing, grubbing and brushing • Approximate area of clearing = 4.6 ha • Vegetation debris will be mulched and disposed of at Grey Owl Pit or hauled outside of the park • Integrated weed and pest management will be incorporated • Seeding
Drainage	<ul style="list-style-type: none"> • Repair or replacement of drainage structures • Re-grading of ditch areas of concern • Culvert installation, extension and rehabilitation • Installation of beaver deceivers
Waste Disposal	<ul style="list-style-type: none"> • Concrete and asphalt waste hauled outside the park • Soil screening will occur at Grey Owl Pit • Salty Soils (from salt licks) will be disposed of at Grey Owl Pit





Operations Phase

After all phases of construction are complete, Highway 10 will continue to operate as a highway, consistent with the pre-project condition. Operations and maintenance activities will generally remain unchanged and include:

- Pavement surface management,
- Ditch, culvert and drainage management,
- Snow and ice control, and
- Roadside vegetation management.

6. VALUED COMPONENTS LIKELY TO BE AFFECTED

The broad VC categories that were selected for evaluation under this Project include:

- Air and Noise;
- Soil & Landforms;
- Water (including fish and fish habitat);
- Flora (including species at risk);
- Fauna (including species at risk);
- Visitor Experience and
- Cultural Resources;

These potential VCs were evaluated to determine if they met the following criteria:

- Potential interaction with the Project (e.g., present or near the Project Sites); and
- Potential to generate stakeholder (e.g., park visitor) or regulator concern.

Based on results of the June 2015 field assessments, consultation with Parks Canada, publicly available information and the professional judgment of the study team, VCs that met one or both of these criteria were carried forward into the impact analysis of this Project. Following the background review of environmental information, the above-mentioned potential VCs were carried forward for evaluation.

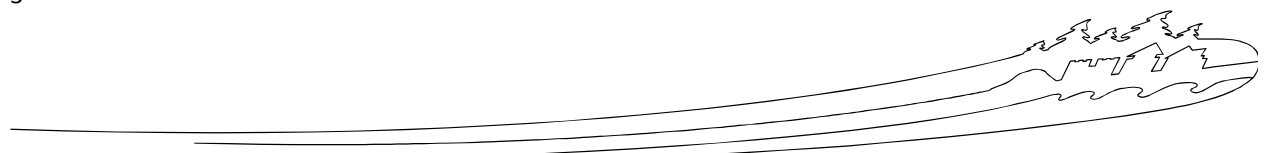
The Effects Identification Matrix (Appendix 1) was used to identify potential interactions between VCs and the Project. Project activities that may interact with VCs are identified by considering the various components of the works that have potential effect pathways to the receiving environment. While some components may have an interaction with the Project, not all are selected as VCs. Components with no significant interaction or did not have a clear pathway of effect were not included as a VC.

For the purpose of the effects assessment, a 100 m buffer was applied to both sides of the highway surface (herein referred to as the Project Area; Figure 2). Evaluation of existing conditions, effects, and mitigation include the 100 m buffer.

Existing Conditions

6.1 Air and Noise

Air quality is typically determined by the concentrations of pollutants in the atmosphere, which in turn are determined by the dispersion of pollutants from emission sources. Health Canada and Environment Canada have developed and maintain the Air Quality Health Index (AQHI) which indicates the level of health risk associated with local air quality. The nearest AQHI monitoring station is located in Brandon,





MB, and is not indicative of the Project area (Government of Canada 2016a). Air quality was evaluated instead based on potential existing inputs, including emission and pollutant sources.

The Project Area is along Highway 10 in RMNP. The closest towns are Wasagaming (near the south boundary of RMNP, at approximately km 0 of Highway 10) and Dauphin (approximately 13 km north of the north boundary of RMNP). Agriculture is the dominant land use surrounding the boundaries of RMNP, including adjacent to the north and south limits of the Project Area; farm equipment and cattle may contribute to greenhouse gas emissions within RMNP. Within the Project Area, the main source of emissions is vehicular traffic. More than 300,000 vehicles are estimated to travel Highway 10 each year (Parks Canada 2014). Some motorized recreational activities (e.g., boating, snowmobiling) occur near the Project Area, such as on Clear Lake and Moon Lake; however, their effects on air quality are likely minimal. Existing noise in the Project Area is also primarily related to vehicular traffic and routine maintenance of the roadway and park facilities.

Potential existing emission and/or noise sources at or near the Project Area include:

- Community sources, including road/highway traffic, off-road traffic (e.g., boats, snowmobiles);
- Agricultural sources from surrounding areas, including presence of cattle, agricultural equipment and vehicles;
- Aviation, including all air traffic (e.g., fixed wing and rotary-wing aircraft); and
- Natural sources, including forest fires.

Air Quality and **Noise** were identified as VCs because construction dust and emissions may affect human health and visitor experience, and deposition of dust may affect vegetation. Construction noise has the potential to affect wildlife and park visitors.

6.2 Soils and Landforms

RMNP has distinct landforms and topography compared to surrounding areas. Geological processes such as glaciation, sedimentation, and water erosion have contributed to the unique landscape including the escarpment, shale bedrock outcrops, gorges, potholes and kettle terrain, meltwater channels, streams, and lakes. The Project Area is distinguished by a varying terrain, including rapid elevation changes in some locations. Elevations within the Project Area range from approximately 300 m to over 700 m (Topographic-map 2016). Soils within the Project Area are variable in drainage, texture, and calcareousness. The upland areas are predominantly Luvisols, whereas wetland areas may include a variety of poorly-drained mineral soils and organic soils. Permafrost is rare within the Mid-Boreal Uplands Ecoregion; however it may possibly occur in some peatlands (Canadian Parks and Wilderness Society 2004).

Soils and Landforms was identified as a VC because construction activities may affect soil quality, compaction, erosion and sedimentation, stability, and potentially aesthetics.

6.3 Water

Numerous waterbodies are present within the Project Area. The aquatic habitat in the Project is typical of the northern reaches of the Southern Boreal Plains and Plateaux of the Interior Plains physiographic region (Parks Canada 2009; CPAWS 2004). Where aspen parkland transitions to mixedwood forests and black spruce muskeg, the water courses reflect fluctuating water tables due to groundwater inputs and poor drainage. Based on a review of satellite imagery, most of the watercourses in the Project Area appear to be connected to larger streams and/or lakes that are likely fish-bearing; while barriers to fish passage may





be present between larger waterbodies and the sample locations, high flows and resident populations may be present. Thus, all waterbodies within the Project Area should be considered as potentially fish-bearing.

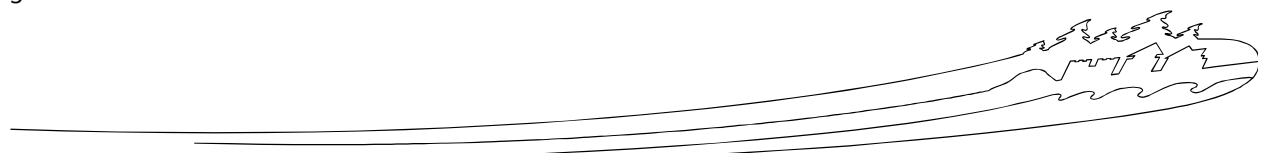
Numerous wetlands are also present within the Project Area, including marshes, swamps, and fens. Wetlands cover approximately 7.5% of the Project Area (Tetra Tech EBA 2015). The most predominant form of wetlands in the Project Area are marshes (shallowly flooded areas on mineral soils dominated by emergent vegetation such as grasses, reeds, sedges and rushes where the water table tends to fluctuate causing periodic inundation and late-season dryness [MacKenzie and Moran 2004]).

Kooyman and Hutchison (1979), Kooyman (1980), Cornelson (2012) and Town (2014) all reported a wide diversity of fish species within the RMNP. Most of the fish species indicated for RMNP were small-body species typical of small, slow stream and boggy wetlands. Sport fish and large-body species, such as White Sucker (*Catostomus commersoni*), Northern Pike (*Esox Lucius*), and Yellow Perch (*Perca flavescens*), have been found in the larger lakes but generally not within the Project Area. Large-body fish have been found in some reaches of Bogey Creek and Edwards Creek, but not necessarily within the Project Area. Introduced species are present in RMNP, including Lake Trout, Rainbow Trout (*Oncorhynchus mykiss*), and Walleye (*Stizostedion vitreum*).

Tetra Tech EBA identified a total of 34 waterbodies in the Project Area, each potentially providing a source of water, food and nutrients, and habitat for fish and wildlife present in the area (Tetra Tech EBA 2015). The observed aquatic habitat appears to be capable of supporting a diverse assemblage of small-body fish species tolerant of transitional temperatures; aquatic habitat characteristics and water quality parameters observed during the June 2015 field assessments were generally similar in all sample locations. Water quality parameters (Temperature, dissolved oxygen, electrical conductivity, total dissolved solids, dissolved oxygen and pH) were mostly within expected natural ranges at all sample locations in the Project Area. However, dissolved oxygen content was often outside the Canadian Council of Ministers of the Environment's (CCME) 2014 Water Quality Guidelines for the Protection of Aquatic Life (Freshwater) Guidelines for Protection of Aquatic Life (Tetra Tech EBA 2015).

Most watercourses within the Project Area are characterized by low gradient, low velocity flow dominated by soft substrates (i.e., fines and organics). They typically have narrow wetted channels within wide "floodplains" dominated by periodically inundated grassy vegetation. However, several locations at the north end of the Project Area have higher gradients (between 3% and 5%) and coarser substrates, characteristics of some streams draining the Manitoba Escarpment. At the time of Tetra Tech EBA's assessment, watercourses encountered were at low flow condition; however, the area is subject to seasonal fluctuations in flow volume and velocity caused by heavy precipitation runoff. Small pools at culvert inlets/outlets were also commonly encountered, likely the result of culverts being installed at or above the original channel grade.

Tetra Tech EBA (2015) confirmed fish presence in 14 of 34 waterbodies sampled. Under the *Fisheries Act* 2012, fish habitat includes areas that fish depend on indirectly to carry out life processes; therefore, protection of non-fish-bearing streams connected to fish-bearing waters is essential. Eleven fish species were captured throughout the Project, totaling 1,312 individuals. Species included Brook Stickleback (*Culaea inconstans*), Finescale Dave (*Phoxinus neogaeus*), Creek Chub (*Semotilus atromaculatus*), Pearl Dace (*Margariscus margarita*), Fathead Minnow (*Pimephales promelas*), White Sucker, Western Blacknose Dace (*Rhinichthys obtusus*), Northern Redbelly Dace (*Phoximux eos*), Iowa Darter (*Etheostoma exile*), Johnny Darter (*Etheostoma nigrum*), and Longnose Dace (*Rhinichthys cataractae*). Species compositions in the Project Area that were sampled in previous studies were generally similar, with some





variability (Kooyman and Hutchison 1979; Cornelson 2012; and Town 2014). At the time of Tetra Tech EBA's assessment, most of the fish captured were small-bodied "minnows" which are typical of the small, shallow waterbodies found in the Project Area. Invasive aquatic species were not observed at the time of the assessment.

Culverts are present at the watercourses in the Project Area to allow for water and fish passage. Some culvert conditions were observed to be barriers to fish passage (Tetra Tech EBA 2015). Culverts at four locations had plunges greater than 20 cm and prohibit fish passage under normal flow conditions. However, fish may be able to navigate the culverts during high water levels if other conditions, such as water velocity, are also suitable for navigation. The culvert at the Edwards Creek East Tributary is large (3,000 mm diameter) with concrete weirs at the both ends. The purpose of the weirs is unknown, though it is possible they are to deflect woody debris in high flows. However, these weirs serve to increase the water velocity within the culvert which can interfere with fish passage.

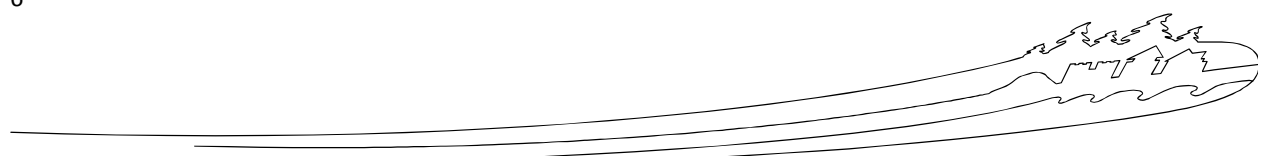
Woody debris blocking culverts at several locations was present and may need to be cleared to maintain flows and fish passage. Some culverts may need further assessment to ensure they are properly embedded and installed to follow the original streambed gradient. Abundant vegetation was noted at some culvert openings but was not completely blocking the openings; woody debris and/or vegetation is not considered a permanent barrier to fish passage and may not be a barrier to small-body fish at all – it is noted as an obstacle to fish passage. No aquatic invasive species are known within RMNP, nor were any observed by Tetra Tech EBA during the 2015 field assessments.

Surface Water Quality and Quantity will be carried forward in the Effects Assessment of the Water VC, since it contributes to the overall aquatic health of the area and may be impacted by the Project. **Fish and Fish Habitat** will also be evaluated in the Effects Assessment since several areas within the Project Area contain known or potential fish habitat as well as fish presence, and works around culverts and watercourses will occur. **Aquatic Invasive Species** will also be carried forward to the Effects Assessment since the RMNP Field Unit has identified that introduction of aquatic invasive species is a concern. Aquatic Invasive Species are not known to occur within RMNP; however, the traffic and equipment associated with construction presents a potential vector for introduction.

6.4 Flora

The unique landscape within RMNP creates many different microclimates for vegetation, which vary based on sunlight received, soil type and drainage, moisture and nutrient availability, and abundance and tolerance of disturbance. Based on existing land cover data and Tetra Tech EBA's field reconnaissance in June 2015, there are eight land cover types within the Project Area: Broadleaf, Coniferous, Mixedwood, Fen, Marsh, Swamp, Open Water, and Open/Disturbed. The majority of the Project Area (including a 100 m buffer) is Mixedwood (65%), with Open/Disturbed covering 18% of the Project Area, other forest types (broadleaf and coniferous) covering 9%, wetlands (fen, marsh, swamp) covering 7.5%, and open water covering 0.5% (Figure 3). Currently within the highway right-of-way, there are ditches and cleared areas of varying sizes/distances on both sides of the highway. These areas are considered part of the "Open/Disturbed" land cover type, and are considered disturbed. The majority of these areas consist of grasses, small shrubs, and often several weed species, including areas with dense weed distributions. The majority of Project works will occur within these previously disturbed areas.

Approximately 669 plant species are known to occur in RMNP (Canadian Parks and Wilderness Society 2004). There are historical occurrences within the Mid-Boreal Uplands Ecoregion of a total of 67 vegetation species of management concern (SOMC; i.e., a species listed under the *Species at Risk Act*





[SARA], evaluated as 'Special Concern', 'Threatened', or 'Endangered' by the Committee on the Status of Endangered Wildlife in Canada [COSEWIC], listed under the *The Endangered Species and Ecosystems Act* [ESEA], or considered a Species of Conservation Concern by the Manitoba Conservation Data Centre [MBCDC] (MBCDC 2013), none of which are protected under ESEA or SARA. According to the Parks Canada Biotics Web Explorer (Parks Canada 2013), no SARA-listed, or COSEWIC-assessed vegetation SOMC have been documented within RMNP. All land cover types within the Project Area are considered to have potential to support vegetation SOMC; however, wetlands and watercourse floodplains are considered to have the highest potential to support vegetation SOMC.

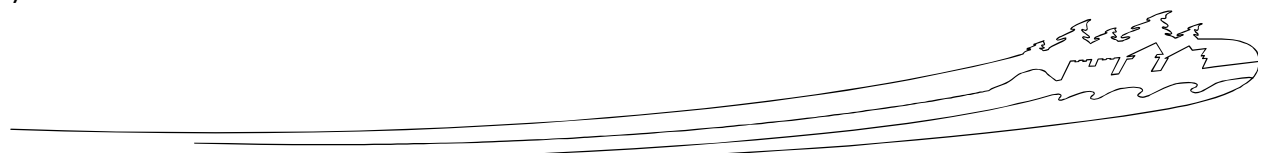
Tetra Tech EBA conducted spot checks in 28 locations in the Project Area in June 2015 (Vegetation Assessment Locations in Figure 3) in order to characterize land cover types and to conduct preliminary searches for species of management concern (SOMC); Tetra Tech EBA identified 136 vegetation species within the Project Area (Tetra Tech EBA 2015). One vegetation SOMC – Iowa Golden-saxifrage (*Chrysosplenium iowense*) – was found in a fen located on the west side of Highway 10, near km 33. Iowa Golden-saxifrage is ranked as "S1?" meaning it is considered to potentially be "Critically Imperilled" in Manitoba, indicating it is "at very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors," but the rank is uncertain or inexact (hence "?"; Natureserve 2015a); this species is not protected under the ESEA or SARA. Iowa Golden-saxifrage is restricted to shaded, cool, moist, nitrogen-rich habitats – usually found in wetlands, or near streambanks. Given that it has specific microsite requirements, it can be sensitive to disturbance including changing water regimes or tree cover (Natureserve 2015b). Within the Project Area, it may potentially be present in other fen or swamp wetland systems.

Removal of vegetation will occur in some areas of the Project Area and will result in long-term loss of vegetation, loss of biodiversity, habitat, and potentially soil stability. Furthermore, vegetation SOMC that have the potential to be supported by the Project Area may be sensitive to vegetation removal and changing water regimes. Therefore, **Vegetation** and **Vegetation Species at Risk** will be carried forward in the Effects Assessment.

6.5 Fauna

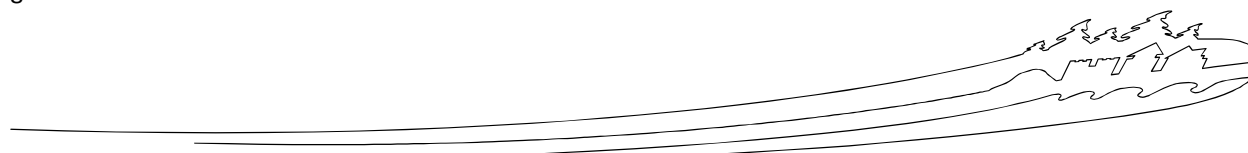
The Project Area provides a wide range of habitat for wildlife in the form of treed and shrubby areas, grasslands, wetlands, watercourses, and floodplains. Few developed areas (besides the road surface) are located within the Project Area; however, some of the existing human developments also provide habitat opportunities for specific wildlife species, such as Barn Swallow (*Hirundo rustica*). Highway 10 may deter some wildlife usage due to traffic noise; however, the highway has variable rates of traffic flow and/or species may become accustomed to the traffic; as a result, many species have been observed near and on the road. Salt licks in the ditches (thought to be the result of road salt runoff pooling in ditches) attract large ungulates (mainly Moose [*Alces alces*]) to these areas, creating potential danger for both wildlife and road users (Landels 2016). Between 1988 and 2013, there was an average of 10.9 wildlife-vehicle collisions per year (Parks Canada 2014). Parks Canada has identified that wildlife collisions are a concern that they hope can be improved with the Project works along Highway 10.

The Parks Canada Biotics Web Explorer was used to identify wildlife SOMC that are listed under SARA and described as being regularly present in RMNP (Table 1; PCA 2013). Species identified during field surveys that were absent from the Biotics Web Explorer and species with historical occurrences in the Project Area were also considered (Table 1). *The Endangered Species and Ecosystems Act* was also consulted to identify provincially-protected species that may be present within RMNP (Table 1).



**Table 1: Wildlife Species of Management Concern with Potential Presence near the Project**

Scientific Name	Common Name	COSEWIC Status ¹	SARA Status ²	ESEA Status ³	Potential for Presence near Project	Carried forward in VC Assessment?
Amphibians						
<i>Lithobates pipiens</i>	Northern Leopard Frog	Special Concern	Schedule 1 Special Concern	-	High – confirmed presence.	Yes
Birds						
<i>Anthus spragueii</i>	Sprague's Pipit	Threatened	Schedule 1 Threatened	Threatened	Low – generally found in native, undisturbed grasslands	No
<i>Cardellina canadensis</i>	Canada Warbler	Threatened	Schedule 1 Threatened	Threatened	High – confirmed presence.	Yes
<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Schedule 1 Threatened	Threatened	Low – usually requires large, hollow trees or human structures	No
<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Schedule 1 Threatened	Threatened	Moderate – nests in open areas	Yes
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Schedule 1 Threatened	Threatened	Moderate – tall trees near swamps	Yes
<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Schedule 1 Special Concern	-	Low – migration only	No
<i>Hirundo rustica</i>	Barn Swallow	Threatened	-	-	High – confirmed presence	Yes
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	Threatened	Schedule 1 Threatened	Threatened	Moderate – broadleaf forested areas	Yes
<i>Cygnus buccinator</i>	Trumpeter Swan	-	-	Endangered	Moderate – marshy shores	Yes
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	Threatened	Schedule 1 Threatened	Threatened	High – confirmed presence	Yes
Mammals						
<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Schedule 1 Endangered	Endangered	Moderate to High – foraging, roosting, maternal colonies	Yes
<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Schedule 1 Endangered	Endangered	Low to Moderate – foraging, roosting, maternal colonies	Yes
<i>Odocoileus hemionus</i>	Mule Deer	-	-	Threatened	Moderate to High - foraging	Yes
Insects						
<i>Danaus plexippus</i>	Monarch	Special Concern	Schedule 1 Special Concern	-	Moderate – host plants	Yes

¹COSEWIC – Committee on the Status of Endangered Wildlife in Canada (Government of Canada 2016b)²SARA - *Species At Risk Act* (Government of Canada 2002)³ESEA – The Endangered Species and Ecosystems Act (Government of Manitoba 1989)



The **Northern Leopard Frog** Western Boreal/Prairie populations recovered in Manitoba in the 1970s from steep declines in numbers. It is now thought to be common in the southern regions of the province, and is known to exist within RMNP (specific distribution is not known). Northern Leopard Frog typically uses separate sites for overwintering, breeding, and foraging, therefore, contiguity between sites is vital. Overwintering usually occurs in well-oxygenated bodies of water that do not freeze completely (e.g., rivers, near dams, deep lakes), breeding usually occurs in well-vegetated riparian zones of ponds and wetlands devoid of fish, and foraging and movement occur between moist upland areas and wetlands (Government of Canada 2016c).

Communications with RMNP staff identified historical observations of Northern Leopard Frog (*Lithobates pipiens*) at Edwards Creek (km 50/51; Figure 4). Tetra Tech EBA biologists detected Northern Leopard Frog at three locations in June 2015 (Figure 4). This species was carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Canada Warbler** breeds in wet, mixed deciduous-coniferous forest with a well-developed shrub layer and this habitat type was present in the Project Area (Figure 3) (Government of Canada 2016d). Tetra Tech EBA biologists detected Canada Warblers at two locations in June 2015 between km 24.5 and 25.5 (Figure 4d). Historical records of this species were documented in 10 locations within the Project Area (Figure 4). This species was carried forward in the Fauna VC effects assessment as a Species at Risk.

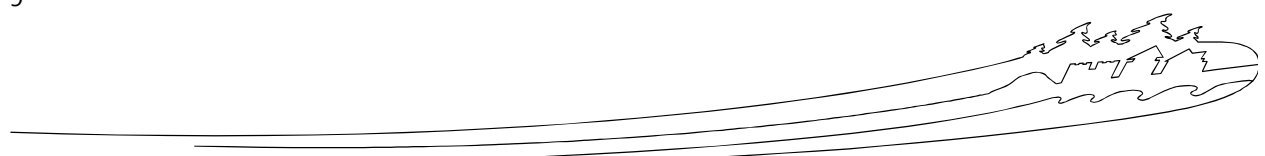
Sprague's Pipit nests in native, undisturbed grasslands. One historical record of this species exists at km 24 (Figure 4d). Given the general lack of suitable habitat, this species was not carried forward in the Fauna VC effects assessment.

The **Chimney Swift** historically nests in hollow trees but post-modernization has seen a switch to nesting in house chimneys (Government of Canada 2016e). There is one historical record of this species at approximately km 50.5 (Figure 4a). This species is regularly occurring in the park, although the Project Area generally lacks suitable chimneys for nesting. This species was not detected by Tetra Tech EBA during field surveys and thus will not be carried forward in the Fauna VC effects assessment.

The **Common Nighthawk** nests on the ground in vegetation-free habitats. Although this species is regularly occurring in RMNP and patches of bare habitat exist throughout the Project Area (Figure 3). This species was not detected during June 2015 surveys, although this may attributed in part due to the timing of surveys - the Common Nighthawk is active at dusk and surveys were completed at dawn. This species will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Olive-sided Flycatcher** is found in open areas containing tall live trees, including forest edges near rivers or swamps or burnt areas (Government of Canada 2016f). This species is regularly occurring in RMNP, although it was not detected during June 2015 surveys and we did not receive any historical records of this species occurring in the Project Area. Given the presence of marshes, swamps, and forest in the Project Area (Figure 3), there is a moderate potential for encountering this species and thus the Olive-sided Flycatcher will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Rusty Blackbird** nests in boreal forest near waterbodies. This species is regularly occurring in RMNP, although it was not detected during June 2015 surveys and we did not receive any historical records of this species occurring in the Project Area. Given the species range map and lack of suitable breeding habitat, it is likely to occur in RMNP during migration only. This species will not be carried forward in the Fauna VC effects assessment.





The **Barn Swallow** nests in man-made structures, including old buildings, bridges, barns, and culverts. This species was identified during June 2015 surveys at nine locations (Figure 4), plus a nest at approximately km 0.5. This species will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Red-headed Woodpecker** is found in a variety of open habitats, including forest edges, pastures, and open oak and beech forests (Government of Canada 2016g). This species is regularly occurring in RMNP, although it was not detected during June 2015 surveys nor did we receive any historical records of this species occurring in the Project Area. Given the presence of broadleaf forest habitat in the Project Area, there is moderate potential for encountering this species and this the Red-headed Woodpecker will be carried forward in the Fauna VC effects assessment as a Species at Risk.

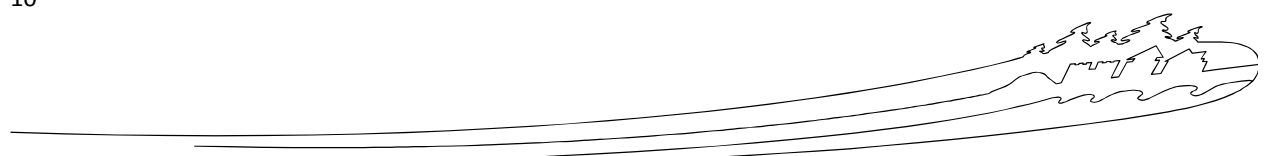
The **Trumpeter Swan** is regularly occurring in RMNP and has been documented nesting in the park (Government of Manitoba no date), although it was not observed during June 2015 surveys nor were historical occurrences provided. This species nests on the marshy shores of lakes and ponds. Given the presence of several waterbody edges in the Project Area, this species will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Golden-winged Warbler** can be found in areas of small shrubs, including edges of fields, recently logged areas, and utility rights-of-way (Government of Canada 2016h). This species was documented during June 2015 surveys and in three locations historically (Figure 4). The majority of RMNP is within proposed (draft) critical habitat for Golden-winged Warbler (Shannon Landels, Parks Canada, personal communication, March 17, 2016). Shrubby habitat along the edge of Highway 10 appears to provide suitable habitat and thus this species will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Little Brown Myotis** can be found roosting in old buildings, attics, crevices, and large trees (COSEWIC 2013). There is a lack of human-made structures suitable for nesting in the Project Area, although there is the potential for large roost trees. This species forages over water and given the abundance of marshes at wetlands in the Project Area, there is a moderate to high potential for this species to be foraging and roosting in the area. The Little Brown Myotis will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Northern Long-eared Myotis** forages near forest edges and rivers and can be found roosting in trees (COSEWIC 2013). During the winter, the Northern Long-eared Myotis hibernates in caves with high humidity but can tolerate cooler temperatures than other small-bodied bats. Myotis species generally roost in large, tall, decaying, snags rooted in mature forests (COSEWIC 2013). Similarly, female Northern Long-eared Myotis use large trees for maternal colonies (COSEWIC 2013). RMNP is on the edge of the Northern Long-eared Myotis range; however, there is a high proportion of forest and running water in the Project Area, there is a low to moderate likelihood of encountering this species and thus it will be carried forward in the Fauna VC effects assessment as a Species at Risk.

The **Mule Deer** is regularly occurring in RMNP and can be found foraging in a variety of habitats, including river valleys, pastures, meadows, and forest edges. Mule deer were observed during the June 2015 field surveys. The edge habitat surrounding Highway 10 may provide suitable foraging opportunities and thus this species is likely to be encountered. The mule deer will be carried forward in the Fauna VC effects assessment as a Species at Risk.





The **Monarch** caterpillars use milkweed as host plants and adults feed upon wildflowers. Milkweed can be found in open areas, including roadsides, and thus the edge habitat beside Highway 10 may provide suitable breeding habitat. The monarch will be carried forward in the Fauna VC effects assessment as a Species at Risk.

During the June 2015 field visit, Tetra Tech EBA detected 89 bird species within the Project Area, three of which are considered SOMC: **Barn Swallow**, **Canada Warbler** (*Cardellina canadensis*), and **Golden-winged Warbler** (*Vermivora chrysoptera*). Barn Swallows were observed at km 0.5, 5.5, 6, 30.5, 34.5, 42.5, 52.5, and 54, and specifically using culverts for nesting within the Project Area at approximately km 0.5, as well as two additional sites between km 12.5-19.5 (Figure 4). Canada Warbler and Golden-winged Warbler were detected at km 25 and 52.5, respectively (Figure 4). Three amphibian species were detected, including one species of management concern, Northern Leopard Frog (*Lithobates pipiens*), which was detected near km 35 and 52 (Figure 4). These species are all SARA-listed species (Table 1), and all have historical records of occurrence within the Project Area (Figure 4).

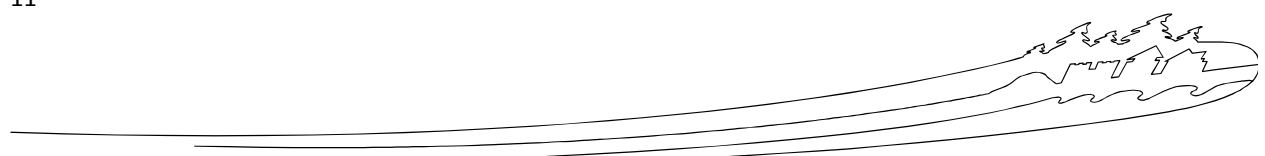
Several **American Beavers** (*Castor canadensis*) and signs of their presence were observed in June 2015 within the Project Area. American Beaver activity was observed at approximately 30% of the sample locations (Tetra Tech EBA 2015). RMNP staff were actively managing beaver activity at several locations in the Project Area (i.e., removing dams, unplugging culverts etc.) and Beaver Deceivers were observed at three locations in June 2015.

Based on the evaluation of existing conditions in the Project Area, there is potential for wildlife to be impacted due to noise, disturbance, and loss of habitat. Several wildlife SOMC occur within the Project Area, and several others have the potential to occur; these species are protected by legislation and may be sensitive to disturbance. Wildlife collisions have been identified by RMNP Field Unit as a concern since wildlife species are attracted to salt licks (thought to be the result of road salt runoff) found in the ditches and pose a risk to wildlife and road users. Poor sightlines within the Project Area may also create a greater risk of wildlife collisions. Therefore, **Wildlife**, **Wildlife Species at Risk**, and **Wildlife Collisions** will be carried forward in the Effects Assessment of the Fauna VC.

6.6 Visitor Experience

The Project is within RMNP, most easily accessed using Highway 10 through Wasagaming, MB, located at the south boundary of the park. RMNP has over 3,000 km² of wilderness and provides excellent scenery for tourists and locals alike. The park sees over 250,000 annually, 75% of which are Manitobans (Parks Canada 2007); summer is the busiest season for tourists. Recreational activities include sight-seeing, hiking, camping, bicycling, car and motorcycle touring, boating, fishing, golfing, snowmobiling, cross-country skiing, and more. Recreational areas near the Project Area include, but are not limited to: campground, trails, fishing, picnic areas, and more at Clear Lake, located at the south end of the Project Area; the Clear Lake Golf Course located between km 6 and 8; fishing dock at Grayling Lake, located between km 23 and 24; trails, campground, fishing dock, picnic areas at Moon Lake, located between km 35 and 39; backcountry fishing and trails at Edwards Lake, and various tourist stops along the highway with educational signage, restrooms, and trailheads (Parks Canada 2016). While traveling along Highway 10, tourists and locals also enjoy the beautiful scenery views of undisturbed forests, watercourses, and other natural features.

Aside from recreational users, Highway 10 is a throughway, allowing vehicular traffic to connect from townships south of the park boundary such as Brandon, Minnedosa, and Wasagaming, to north of the park boundary such as Dauphin. As of 2011, commercial truck traffic is banned within the boundaries of





RMNP for any trucks with 3 axels or more; these trucks may access the Townsite, Maintenance Compound and Golf Course from the South entrance of RMNP only. The commercial truck traffic ban will remain in effect following Project completion. In any capacity of highway use, road safety is extremely important; appropriate sight lines, passing lanes, barriers, signage, and other safety measures are in place to protect road users. Existing conditions of the highway surface include numerous areas of damaged asphalt, potholes and cracks, which may pose some risk to road users.

Visitor Experience will be evaluated in the Effects Assessment as a VC because visitor and road user experience and safety may be impacted by construction activities as a result of the Project. Operation of the Project is expected to improve visitor experience and safety.

6.7 Cultural Resources

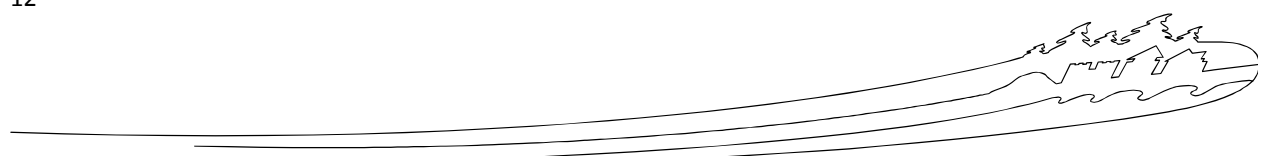
Cultural resources within Federal Lands are protected under PCA's Cultural Resource Management Policy (CRMP; PCA 2013c). Under this policy, PCA is required to manage and protect resources that comprise a part of Canada's heritage. Cultural resources are defined as: human work, an object, or a place that is determined, on the basis of its heritage value, to be directly associated with an important aspect or aspects of human history and culture (PCA 2013c). The heritage value of a cultural resource is "embodied in tangible and/or intangible character-defining elements". These resources may be identified and recovered from both surface and subsurface contexts. All ground disturbing activities have the potential to permanently damage these materials; therefore, PCA requires an Archaeological Overview Assessment (AOA) be completed prior to development to determine whether further investigation is required to protect heritage resources.

Riding Mountain National Park officially opened in 1933. Before this time, the Park's first visitors utilized terrain stable enough to support the plant and animal resources they required for survival. Such areas included high, dry terrain away from postglacial lakes and ancient waterways and were characterized by raised terraces, ridges, and glaciofluvial bars. Multiple cultural groups utilized the region before settlers arrived and the Park was established. The occupation of both pre-contact and post-contact periods are evident in the cultural resource sites inventory as well as the recorded history. These sites range in significance (i.e., low, moderate and high), levels of disturbance (e.g., intact, partially disturbed, destroyed) and recommended mitigation (e.g., none, testing, periodic monitoring, archival research).

Areas of significant First Nations importance are present throughout RMNP. First Nations consultation has occurred and has identified cultural resource sites that are located within, or in proximity of the Project Area; these locations are identified to RMNP Field Unit staff. An Archaeological Overview Assessment has been conducted by Brian Smith of Parks Canada and is included in Appendix 3.

Potential additional cultural resource sites at, or near, the Project Area include:

- Previously recorded cultural resource sites within RMNP;
- Areas within immediate proximity of several significant water bodies, such as Clear Lake, Moon Lake and Edwards Lake. There is potential for cultural resources to be recovered from terrain features such as banks or terraces associated with these hydrological features, and other water crossings within the development area;
- Topography indicative of moderate or higher archaeological potential;
- Areas of recorded historical significance (e.g., historical hunting cabins on the shores of Clear Lake); and
- Areas of Aboriginal Traditional Use.





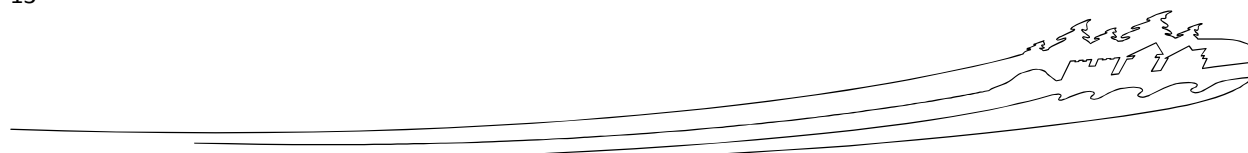
Cultural Resources will be carried forward in the Effects Assessment as a VC because they have the potential to be impacted by the Project. Communications with the RMNP Field Unit and locals will help determine specific locations and impacts (if any) of the Project.

6.8 Valued Components

A total of 13 VCs were selected for the Effects Assessment (Table 2).

Table 2: Summary of VCs selected for final inclusion in the Effects Assessment for the Project.

Component Category	Valued Component	Rationale for Inclusion
Air and Noise	Air Quality	Construction dust and emissions may affect human health and visitor experience, and deposition of dust may affect vegetation.
	Noise	Construction noise has the potential to affect wildlife and visitors.
Soil and Landforms	Soil and Landforms	Construction activities may affect soil quality, compaction, erosion and sedimentation, stability, and potentially aesthetics.
Water	Surface Water Quality and Quantity	All water bodies are connected to larger water bodies which likely support aquatic life, and therefore the tributaries contribute to overall aquatic health of the system
	Fish and Fish Habitat	There are several areas within the Project Area that provide adequate fish habitat. Evidence suggests that small-body fish can likely be supported throughout the Project Area. All waterbodies within the Project Area should be considered potentially fish-bearing because of their connectivity to other fish-bearing waters.
	Aquatic Invasive Species	The introduction of Aquatic Invasive Species has been identified by RMNP Field Unit as a concern. Aquatic Invasive Species are not known to occur within RMNP; however, the traffic and equipment associated with construction activities presents a potential vector for introducing invasive species into RMNP.
Flora	Vegetation	Removal of vegetation will occur in some areas of the Project Area and will result in long-term loss of vegetation, loss of biodiversity, habitat, and potentially soil stability.
	Species at Risk	The Project Area potentially supports the presence of vegetation SOMC. One SOMC was identified during field assessments in June 2015; this species, along with other SOMC with potential to occur in the Project Area may be sensitive to vegetation removal or changing water regimes.
Fauna	Wildlife	Wildlife have the potential to be impacted by the Project due to noise disturbance and loss of habitat.
	Species at Risk	Several wildlife SOMC have the potential to be found in the Project Area, with four species having been confirmed in June 2015. These species may be sensitive to disturbance and construction activities associated with the Project.
	Wildlife Collisions	Wildlife Collisions have been identified by the RMNP Field Unit as a concern within the Project Area. Moose, bears, and other wildlife species are attracted to salt licks (thought to be the result of road salt runoff) found in the ditches, and pose a risk to





Component Category	Valued Component	Rationale for Inclusion
		wildlife and road users. Poor sightlines within the Project Area may also create a greater risk of wildlife collisions.
Visitor Experience	Visitor Experience	Visitor Experience (tourists and locals alike) on roads and in nearby recreation areas/trails may be impacted by the Project construction due to traffic delays, access obstructions, emissions, dust and noise, and impediments to sightseeing opportunities. Construction equipment, vehicles, and activities may also create an additional risk for visitor safety.
Cultural Resources	Cultural Resources	Cultural resources, including artifacts and culturally important sites, within Federal Lands are protected under PCA's Cultural Resource Management Policy and a part of Canadian heritage. These resources may be identified from both surface and subsurface contexts. All construction activities have the potential to permanently damage or disrupt these resources.

7. EFFECTS ANALYSIS

The Effects Identification Matrix (Appendix 1) was used to determine potential direct (caused by the Project) and indirect (caused by changes to the environment) effects of the Project. This section provides an analysis of these potential effects of the Project on the identified Valued Components, based on anticipated pathways of planned work related to construction and operation of the Project. Effects during the operation phase were considered in terms of additional or incremental impacts beyond the baseline or pre-project condition. The potential effects do not include application of mitigation measures (which are discussed in Section 8) but assume application of routine or standard environmental best management practices.

7.1 Air and Noise

Air Quality

Construction

- 1) Use of machinery, and transport of materials and equipment will increase vehicular traffic to the Project Area and will result in emissions and dust mobilization into the air.
- 2) Removal of vegetation will expose soils and surficial materials that, when disturbed, may become airborne and have the potential to reduce air quality proximate to the Project. Depending on the wind direction, changes in air quality (e.g., dust, fumes) may negatively affect park visitors, particularly those who are queued up in close proximity to a site due to speed and lane restrictions.
- 3) Removal of vegetation will result in a decrease of natural air filtration provided by roadside vegetation, thereby increasing the amount of dust and emissions in the air, and also allowing further penetration into forested areas, wetlands, watercourse, and waterbodies, which may negatively affect park visitors and wildlife.
- 4) Transportation of fuels, compressed gases or other construction materials, creates potential for accidental releases into the atmosphere.





Operation

- 5) Permanent removal of some trees and shrubs may result in a decrease of natural air filtration provided by roadside vegetation. Clearing areas are expected to be small in size, and adjacent to larger, undisturbed forested areas. In the context of the Project Area and surrounding environment (i.e., small percentage of tree clearing to occur), the effects of the tree removal on air quality are expected to be minimal.

Noise

Construction

- 1) Increased traffic and transport (personnel and equipment) to the Project Area, and use of motorized machinery and equipment for construction activities will result in temporary increase of noise. Increased noise may negatively impact wildlife by eliciting avoidance behaviours, disturbing nest sites, den sites, feeding areas, or travel corridors. It may also negatively impact visitor experience, including for users on nearby trails or recreational areas.
- 2) Removal of vegetation will result in a decrease in the natural noise barrier provided by roadside vegetation, thereby increasing the amount of noise that can penetrate into forested areas, wetlands, watercourses, and waterbodies, which may negatively affect park visitors and wildlife.

Operation

- 3) Permanent removal of some trees and shrubs may result in a decrease of the natural noise barrier provided by roadside vegetation. Clearing areas are expected to be small in size, and adjacent to larger, undisturbed forested areas. In the context of the Project Area and surrounding environment (i.e., small percentage of tree clearing to occur), the effects of the tree removal on noise are expected to be minimal.

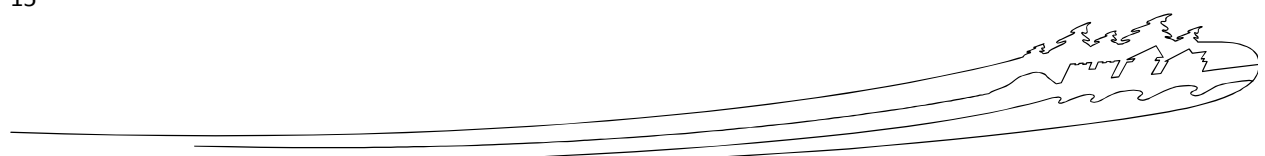
7.2 Soils and Landforms

Construction

- 1) The use of vehicles, equipment, and machinery may result in dust generation or accidental introduction of harmful construction related products due to leaks, spills and poorly maintained vehicles and equipment, causing adverse effects to soils if not properly addressed.
- 2) The use of areas off the hard highway surface for laydown areas and parking may result in soil compaction and disturbance.
- 3) Stripping, handling, or storing of soils has the potential to result in sediment releases into ditches, watercourses, and/or wetlands, potentially creating harm for fish and fish habitat, wildlife, vegetation, and other biota.
- 4) Disturbance to soils (including stripping and compaction) may negatively affect the biota in the immediate vicinity, including vegetation communities, wildlife, and invertebrates.
- 5) Where steep cliffs are present, construction activities may result in slope instability due to increased soil exposure, improper excavation, and storage.

Operation

- 6) Accidental spills or leaks from vehicles during operation or during maintenance activities may adversely affect soils. Run-off containing road salt may negatively affect soil chemistry and biota (including moose) in the immediate vicinity of the roadway. During the operation of the Project,





these activities are not expected to increase compared to pre-Project conditions; therefore, these effects are not expected to increase as a result of the Project.

7.3 Water

Surface Water Quality and Quantity

Construction

- 1) The use of equipment and machinery near of a surface water body may result in the accidental introduction of harmful construction related products, debris and sediment laden runoff causing adverse effects to surface water quality.
- 2) The storage, maintenance, or refueling of equipment and machinery near a surface water body may result in releasing harmful substances into the aquatic environment.
- 3) Changing the drainage patterns of ditches may affect surface water flows (inputs/outputs), altering the water regimes of wetlands and potentially impacting the overall wetland system.
- 4) Bare soil areas are subject to precipitation, surface water runoff, and therefore erosion of soil particles which can then be transported into a surface water body. Bare soil areas located on long or steep slopes, upslope of surface water, or within drainage pathways are particularly subject to soil erosion caused by runoff.

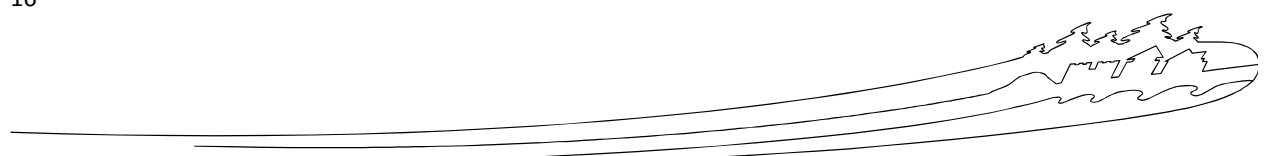
Operation

- 5) Surface water may be negatively affected during operation of the road and/or maintenance activities through accidental spills, dust, debris, salt, sand and road run-off. With changes to grading and ditch drainage in parts of the Project Area, there may be increased road and surface run-off; consequently there is potential for an incremental increase in impacts to water quality of watercourses and wetlands.

Fish and Fish Habitat

Construction

- 1) Stripping, handling, or storage of soils, or drilling into rock has the potential to create sedimentation, which can be released into ditches, watercourses, or wetlands downslope of disturbance, potentially harming fish and fish habitat.
- 2) Clearing and grubbing within 30 m of watercourses may degrade fish habitat through loss of riparian vegetation and erosion of topsoils.
- 3) Removal, rehabilitation, and installation of culverts may degrade instream fish habitat.
- 4) Fish could be directly harmed during culvert rehabilitation or installation or dewatering process (e.g., potential stranding in residual pools).
- 5) Existing culverts in poor condition (e.g., perched installation, debris blockages, weir blockages, or high velocity flow caused by grade or length) may be impeding fish passage; replacement or reinstalling culverts will help to improve fish passage as per recommendations of *Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat* (DFO and MNR, 1996).
- 6) Where new beaver deceivers are installed, they may help reduce blockage of flow as a result of beaver activity, and therefore, improve fish passage.





Operation

- 7) If the roadways require widening and/or culverts elongated into existing fish habitat, there will be an incremental permanent loss of fish habitat.
- 8) Fish habitat may be negatively affected during operation and/or maintenance of the Project through accidental spills, dust, debris, salt, sand and road run-off and during ditch, culvert, and drainage management. During the operation of the Project, these activities are not expected to increase compared to pre-Project conditions since traffic volumes and maintenance schedules will be similar; therefore, these effects are not expected to increase as a result of the Project.

Aquatic Invasive Species

Construction

- 1) Construction vehicles, equipment, and personnel working in and around watercourses have the potential to spread harmful aquatic invasive species into waterbodies or watercourses.
- 2) The use of water sourced from outside of the local watershed (e.g., for washing equipment, dust control, construction operations) could introduce invasive aquatic species by discharging water within the Project boundary if it is allowed to collect in drainages, wetlands, or surface water bodies.

Operation

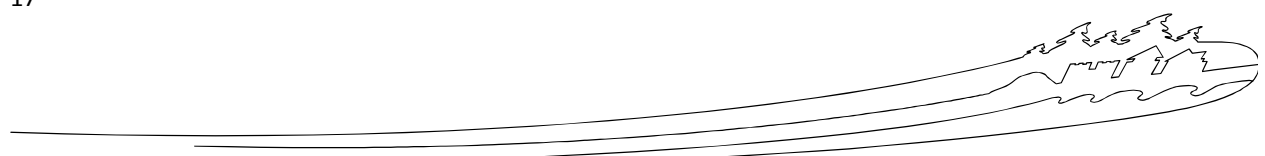
- 3) Tourists, recreational users, or maintenance crews have the potential to spread harmful aquatic invasive species into waterbodies or watercourses; however, this effect is not expected to increase as a result of the Project.

7.4 Flora

Vegetation

Construction

- 1) Vegetation in the immediate vicinity of construction activities may be negatively affected by dust and debris associated with clearing activities, and accidental spills of harmful substances.
- 2) Permanent removal of trees and shrubs along the roadside may cause adverse effects by removing their natural functions and contributions (e.g., air and noise filtration, soil and slope stability, nutrient uptake and replacement) to the surrounding environment.
- 3) Stripping vegetation may negatively affect the biota in the immediate vicinity of the Project works, including vegetation communities, wildlife, and invertebrates.
- 4) Construction vehicles, equipment, and personnel have the potential to spread weeds and harmful invasive plant species throughout the Project Area if not cleaned thoroughly prior to arriving on site.
- 5) Vegetation regrowth may be negatively affected by compacted soils due to construction activities.
- 6) Reseeding cleared areas with approved seed mixes may improve ditch vegetation health and communities, especially in areas that had previously high densities of weeds and invasive species.





Operation

- 7) Maintenance of roadside vegetation (e.g., cutting, trimming, reseeding) has the potential to introduce or spread harmful weeds or invasive species, resulting in adverse negative impacts to native vegetation communities and associated biota. Normal operation and maintenance of the road may result in vehicular emissions, accidental spills, dust, debris, salt, sand, run-off, and snow clearing that may also negatively impact vegetation. These effects are not expected to increase as a result of the Project.

Species at Risk

Construction

- 1) Construction activities in or around wetlands or watercourses that involve vegetation removal or altering water regimes have potential to negatively impact species at risk.
- 2) Iowa Golden-saxifrage, which was identified in a fen on the west side of Highway 10, near km 33, may potentially be present in other fen or swamp wetland systems within the Project Area, and can be sensitive to disturbance (including vegetation removal and changing water regimes).

Operation

- 3) Normal operation and maintenance of the roadway is not expected to have any additional impacts on vegetation species at risk as a result of the Project.

7.5 Fauna

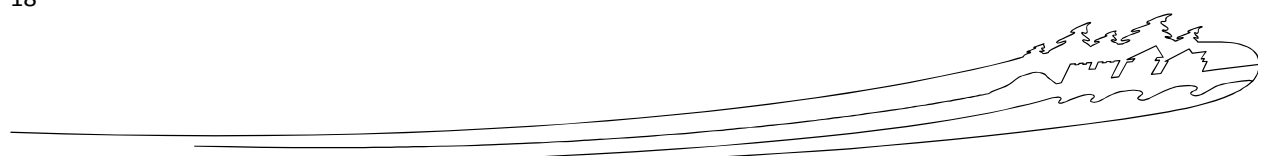
Wildlife

Construction

- 1) There is potential for loss of bird nests, which are protected by legislation, if vegetation clearing is required and occurs during the general bird nesting period (April 15 – August 31 (Environment and Climate Change Canada 2014)).
- 2) Short-term effects to wildlife are expected during the construction periods. Operation of machinery, equipment, human presence, and noise may result in temporary avoidance of habitat surrounding Highway 10.
- 3) Birds that are present in or adjacent to work areas when clearing or construction activities commence may be displaced, potentially affecting breeding and/or foraging.
- 4) Garbage and waste generated by the construction activities could attract local wildlife.
- 5) Local wildlife may be affected by an accidental spill of a harmful substance on-site.

Operation

- 6) Traffic use of Highway 10 may result in visual, aural, or olfactory deterrence for wildlife in the vicinity. Normal operation and maintenance of the roadway is not expected to increase these impacts on wildlife as a result of the Project.





- 7) Where installation of beaver deceivers occurs, a positive effect on beaver habitat may occur (e.g., less-frequent management, more stable pond levels) as a result of the Project.

Species at Risk

Construction

- 1) Accidental spills or leaks could reach waterbodies which may be Northern Leopard Frog breeding sites or Trumpeter Swan waterbodies resulting in negative affects to reproduction.
- 2) Culvert repairs or replacement in or adjacent to Northern Leopard Frog historical locations may negatively impact habitat or individuals.
- 3) Clearing, trampling, and/or removal of vegetation during the breeding bird period may remove potential breeding habitat and/or nests for bird species at risk (e.g., Canada Warbler, Common Nighthawk, Olive-sided Flycatcher, Red-headed Woodpecker, Golden-winged Warbler).
- 4) Clearing shrubs and/or small trees will remove identified critical habitat for the Golden-winged Warbler.
- 5) Removal or alteration of culverts may reduce quality or quantity of nesting sites for Barn Swallows.
- 6) Clearing of vegetation may remove potential forage for Mule Deer.
- 7) Clearing of large trees may remove roost or rearing sites for Little Brown Myotis and Northern Long-eared Myotis.
- 8) Clearing may remove potential host milkweed plants and/or caterpillars for the Monarch.

Operation

- 9) Traffic use of Highway 10 may result in visual, aural, or olfactory deterrence for species at risk in the vicinity. Normal operation and maintenance of the roadway is not expected to increase these impacts on species at risk as a result of the Project.

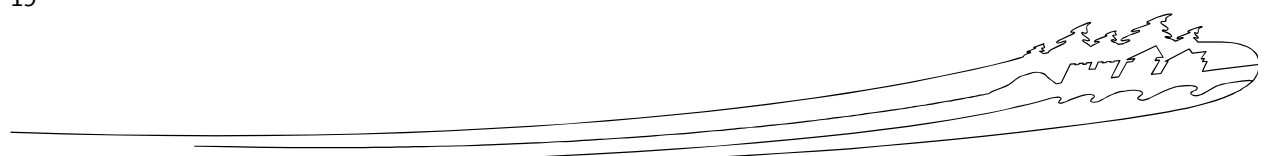
Wildlife Collisions

Construction

- 1) Increased vehicles and heavy machinery on Highway 10 may increase the risk of wildlife collisions.
- 2) Moose attracted to salt run-off in ditches alongside the road are particularly at risk of vehicular collisions.
- 3) Garbage left on roadways may attract wildlife which may be at risk of collision.

Operation

- 4) Regular vehicular use of the highway may result in wildlife-vehicular collisions.
- 5) Removal of salty soils and improvement of drainage may potentially result in a decrease in wildlife-vehicular collisions during operation of the Project.





7.6 Visitor Experience

Construction

- 1) Construction activities will cause traffic delays, shoulder closures, and speed reductions and may result in a negative experience for park visitors or road users.
- 2) Temporary presence of construction equipment, vehicles, and personnel along the highway will detract from views of RMNP and may result in a negative experience for road users.
- 3) Temporary noise, emissions, dust and debris from construction activities may temporarily affect human health and result in a negative experience for outdoor recreation users, as well as road users.
- 4) Pull-outs on either side of the road may be blocked during construction, and may affect the ability of road users and tourists to pull over for photos and viewing opportunities.
- 5) Access to trails, campgrounds, and other recreational areas should remain open, but may be affected by minor delays due to construction.
- 6) Visitor safety hazards will exist for the duration of construction as a result of additional large vehicles, heavy equipment, personnel on roadways, etc.

Operation

- 7) Overall visitor safety on the roadway will be improved during operation of the Project, as sight lines, road surface conditions, and signage will be improved.
- 8) Roadway maintenance activities, including snow removal, ditch maintenance, patching, etc. may pose safety hazards for tourists; however, these effects are not expected to increase as a result of the Project.

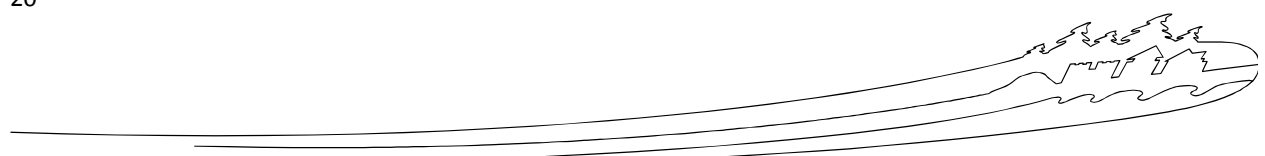
7.7 Cultural Resources

Construction

- 1) Previously recorded cultural resource sites are located within, or in immediate proximity of the Project Area. Proposed ground disturbances will result from clearing, equipment laydown areas and detour construction and operation.
- 2) The majority of the Project Area is disturbed from past road construction activities. It is anticipated that impacts to undisturbed terrain is negligible.
- 3) Negative impacts to identified cultural resources are not anticipated through implementation of mitigation measures outlined in Section 8.

Operation

- 4) Normal operation and maintenance of the roadway is not expected to have any additional impacts on cultural resources as a result of the Project.





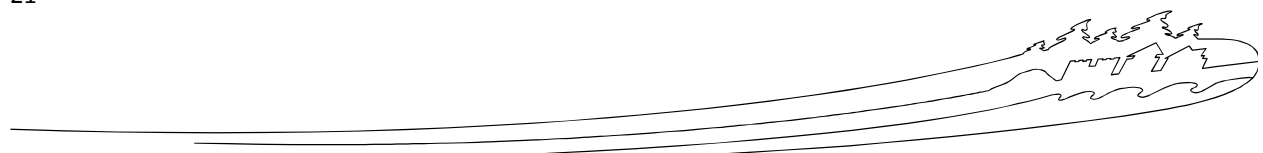
8. MITIGATION MEASURES

Mitigation measures can be applied by adhering to operational protocols or through Project design alterations to reduce potential adverse effects. All work will be conducted in accordance with *Parks Canada National Best Management Practices Roadway, Highway, Parkway and Related Infrastructure* (Parks Canada 2015), the *Riding Mountain National Park of Canada and Riding Mountain Park East Gate Registration Complex National Historic Site of Canada Management Plan* (Parks Canada 2007), the *Management Plan 2012 Amendment* (Parks Canada 2012), and other applicable Parks Canada Environmental Procedures. It will be expected that all Project staff and contractors will understand and comply with all National Park regulations within the Park. Pre-work briefings/meetings are required to address environmental sensitivities within the Project Area, such as potential harm to vegetation, wildlife interactions, equipment spills or leaks.

8.1 Environmental Protection Plan

An Environmental Protection Plan (EPP) will be prepared by the contractor and will be subject to approval by the Project Supervisor and Environmental Surveillance Officer (ESO). The EPP will be available to all staff during Project activities and will include:

- 1) An access plan including access routes, traffic safety, type of equipment used for various construction phases, and lay down areas in order to prevent/minimize disturbance to vegetation, soils, and aquatic habitat. Lay down areas will occur on paved and/or hardened surfaces, where possible. Any new lay down areas will require approval from the assigned RMNP Field Unit ESO;
- 2) Details on how work limits will be marked to minimize environmental impacts, and procedures to follow to ensure that workers do not leave the identified work limits.
- 3) An Erosion and Sedimentation Management Plan detailing appropriate work methods and best practices for working around water to prevent harm to fish or fish habitat, including but not limited to proper dewatering and erosion and sediment control measures, if required. This plan will also include preparedness measures for inclement weather events.
- 4) A Spill Response Plan shall detail emergency spill response procedures, spill kit requirements, and emergency response contacts, as well as the appropriate use of materials onsite. The Spill Response Plan will also describe proper containment and storage, security, handling, transportation, use and disposal of empty containers, and management of surplus product or waste generated in the application of these products; the plan shall be reviewed and executed to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. A list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment shall be defined within this plan and include the Material Safety Data Sheets (MSDS) for all chemicals used will be made available on-site;
- 5) A fire prevention plan, describing fire prevention equipment and procedures on-site in event of a fire.
- 6) An Emergency Response Plan that outlines procedures to follow in case of emergency (e.g., wildlife encounter, equipment malfunction/failure, fire);
- 7) Detailed environmental monitoring and rehabilitation requirements;
- 8) Provisions to reduce human-wildlife interactions; and





- 9) A traffic safety or management plan.
- 10) A waste disposal plan, including maintenance waste, domestic waste, highway materials (e.g., old culverts, old concrete), sanitary facilities, etc.

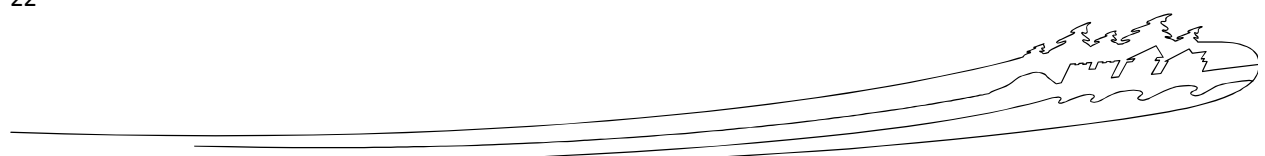
Further details will likely be required in the EPP depending on final approved Project design. The RMNP Field Unit will be consulted throughout all phases of the Project and in the development of the EPP.

All staff employed at the construction sites shall be instructed by the ESO during an Environmental Briefing regarding their individual and collective responsibilities to ensure that an avoidable adverse environmental impact does not arise from their activities and/or personal decisions; the briefing will include identification of sensitive environmental features, SOMC, and cultural resources. The ESO, assigned by the RMNP Field Unit, will conduct periodic visits to ensure Project operations are being conducted in accordance with identified environmental protection measures. The ESO maintains the right to halt work if required.

All spills (e.g., fuel, hydraulic fluids) will be reported immediately according to the RMNP spill response protocol. In the event of any fluid spills or leaks exceeding 1 litre (> 1 L) or any spill quantity in or near water, the Spill Response Plan must be followed including immediate containment, cleanup/mitigation, and immediate reporting to Parks Canada's Dispatch and the ESO. Any absorbent materials used in the clean-up or soils contaminated by the spill will be disposed of in the appropriate facilities and transported in accordance with the Transportation of Dangerous Goods Regulations. All spills, regardless of size or location, will be reported to the ESO.

Wildlife are likely to be observed or encountered during construction; therefore the following measures will be adhered to:

- 11) Notify the ESO immediately of any dens, litters, nests, carcasses (road kills or other), wildlife encounters (for species of interest as directed by the ESO), or carnivore (bears, wolves, or cougars) observations on or around the worksites.
- 12) If wildlife is observed at or near the work site, allow the animal(s) the opportunity to leave the work area to the surrounding habitat and away from areas of potential conflict.
- 13) If potentially dangerous wildlife (e.g., bear, cougar, wolf, coyote, deer, elk, moose) persistently enter the work area or display aggressive behaviour, the contractor will immediately notify RMNP Dispatch (1-877-852-3100), will stop work and safely evacuate the area.
- 14) The contractor will ensure that all workers receive a wildlife awareness briefing, including the use of bear spray. Bear spray will be mandatory on site.
- 15) Secure all materials that might attract wildlife (e.g., petroleum products, human food, recyclable food and drink containers, and garbage). Notify the ESO immediately if wildlife obtain garbage or human food. If wildlife attractants that have been intentionally or accidentally left out, individuals or the contractor could be charged under the Canada National Parks Act Regulations.
- 16) There will be absolutely no feeding, baiting, or luring or any wildlife (e.g., bears, small mammals, birds). Do not approach or harass wildlife in any way.





8.2 Specific Mitigation Measures for VCs

The following mitigation measures are specific to the evaluated VCs for the Project and are recommended to minimize or eliminate negative environmental impacts.

8.2.1 Air and Noise

Construction

- 1) Vehicles will not be left idling when not in use to reduce vehicular emissions.
- 2) Carpooling to site will be used whenever possible to reduce vehicular traffic and emissions.
- 3) Dust generated by Project activities will be controlled as necessary by covering and/or dust control for on-site work by methods approved by the Departmental Representative.
- 4) To reduce noise and air emissions, construction equipment will be turned off when not in use and should be maintained in order that they operate at optimal performance.

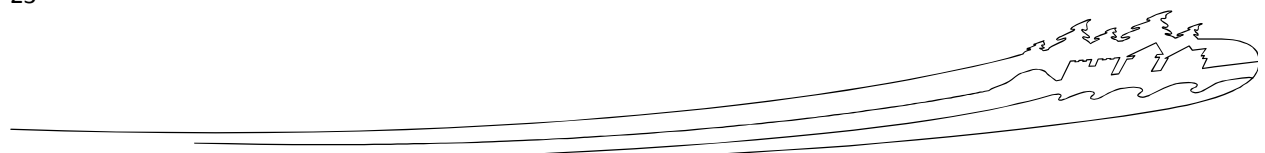
Operation

- 5) No additional mitigation measures are required during the operation phase of the Project.

8.2.2 Soils and Landforms

Construction

- 1) Soil stripping will be minimized to the greatest extent possible, and topsoil, where present, will be retained to facilitate recovery. Stripped topsoil from previous works (in 2015) that is currently stored at Grey Owl Pit may be screened and re-used for ditches as appropriate. All exposed soils required to be seeded will be done so in a timely manner.
- 2) All fuels, gasses, or harmful substances will be contained within the appropriate and approved containers, and transported according to the Transportation of Dangerous Goods Regulations.
- 3) Prior to use in the Project Area, all equipment and vehicles will be inspected for leaks of any kind. Any detected leaks will be addressed immediately. Inspections will be done daily and recorded. Equipment stored overnight will be stored on tarps with appropriate containment if required; containment must be capable of containing 110% of the largest potential spill.
- 4) The Contractor will present a plan for placement, spreading, and stabilization of reclamation materials that prevents erosion and controls sedimentation, to the satisfaction of the Departmental Representative and ESO (e.g., Erosion and Sedimentation Management Plan as part of the EPP). The Plan shall include preparedness measures for inclement weather events, and decommissioning timelines (e.g., removal after construction, establishment of vegetation).
- 5) All erosion and sediment control measures shall be implemented by the Contractor prior to commencement of the work or laydown of materials in the vicinity of any watercourse, water body, or wetland to the satisfaction of the Departmental Representative and ESO. Use erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal, or coir fiber).
- 6) Disturbed areas will be stabilized using an appropriate method (e.g., chip compost material and seeded, erosion control blankets), if required.





- 7) Equipment and materials laydown areas will be restricted to existing cleared surfaces or hard (paved) surfaces where possible, reducing the potential for soil disturbance and erosion. Any new laydown areas will require approval from the assigned PCA ESO and Departmental Representative. All laydown areas will be clearly delineated and marked.
- 8) All forms of site staking/markings to be removed at completion of the Project (e.g., flagging tape, stakes)

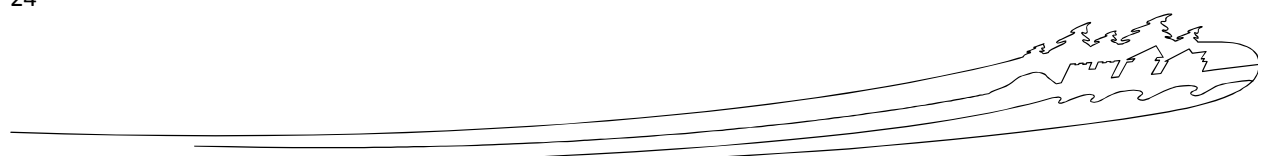
Operation

- 9) Ditches will be occasionally visually inspected by Parks staff to ensure salt accumulation is not occurring in the soils and attracting wildlife.

8.2.3 Water

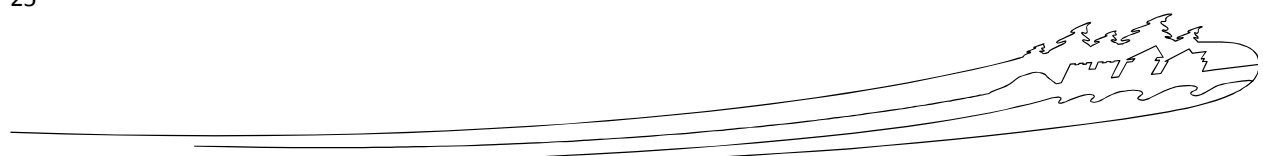
Construction

- 1) Setback distances from water bodies, watercourses, or wetlands will be calculated based on environmental features and general best management practices for working in and around water features. Generally, work within 30 m of water bodies or wetlands requires close oversight of the ESO and the Departmental Representative.
- 2) In the case of works being adjacent to or within the watercourses (e.g., culvert replacement), sediment discharges or spill of deleterious substances, if any, are likely to reach the watercourses. Mitigation planning for all works is imperative to minimizing the effects of potential construction related effects on the aquatic environment, particularly for work plans taking place within the standard construction boundary buffer. Equipment is not to enter any waterbody or watercourse without prior permission.
- 3) Effective sediment and erosion control measures will be installed before starting work as per above. Sediment and erosion control measures will be inspected regularly during the course of construction and repairs shall be made as necessary or as requested.
- 4) The sites will be secured against erosion during any periods of construction inactivity or shutdown.
- 5) Bare soil areas, particularly steep or long slopes, areas upgradient of water bodies, or areas located within drainage ditch networks, should be covered with topsoil and seeded to promote vegetative cover to prevent erosion of surface soils and sedimentation of surface water bodies.
- 6) Contractors will identify equipment laydown, vehicle fueling locations, and equipment maintenance plans for approval by the ESO.
- 7) Fuel tank, hoses, and connections will be inspected prior to use. All hose connections will be wrapped and secured with absorbent pads during fuel/oil transfers. All hoses, valves, and equipment are to be kept in a containment area whenever possible. Hose length and the number of connections will be minimized – use dripless connections if possible. Drain hoses when finished. Gravity fed systems will not be permitted within RMNP, manual or electric pump delivery systems will be used. All staff are to be trained on proper refueling procedures prior to conducting such tasks. All wastes are to be disposed of in the proper manner.





- 8) Machinery is to arrive to site in a clean condition and is to be maintained free of fluid leaks or losses of any kind.
- 9) Setback distances for washing, refueling, servicing, etc. of machinery will be calculated based on environmental features and general best management practices for working in and around water features. Fuel will be properly stored within secondary containment at a distance based on these calculations as well. Generally, these activities should be conducted on a hardened, impermeable surfaces at least 100 m away from any watercourse, water body, or wetland associated with the Project.
- 10) In the event of a spill or leak exceeding 5 L, all other work shall be stopped and all personnel devoted to spill containment and cleanup, following the procedures outlined in the Spill Response Plan.
- 11) All equipment that could potentially be in contact with water (i.e. water tanks, hoses, nozzles, couplings, discharge/uptake equipment, new culverts, dust control equipment) are to undergo an assessment by the ESO to evaluate potential for equipment to be a vector for invasive aquatic species. If cause for concern is determined by the ESO, any and all equipment that could potentially be in contact with water will be pressure washed or steam cleaned (outside of the park boundaries) to a temperature and duration specified by the ESO. All debris, including, including aquatic vegetation seeds, and/or parts of larvae/eggs of invertebrates and vertebrates, will be removed. Additionally, tire treads, wheel wells, and bumper areas will be clear of dirt and plant debris from former work sites. Procedure is to be observed by ESO or documentation from an approved wash facility are to be submitted prior to arrival on site.
- 12) Water brought onto site for construction purposes should be sourced from a location approved of by the PCA ESO prior to arrival onsite. Approval of water sources is at the discretion of PCA.
- 13) No water is to be extracted from a local stream, river or other water body within a National Park without a Restricted Activity Permit.
- 14) Fishing within watercourses in proximity to Project by Project crew is prohibited.
- 15) Where culverts are being replaced, all applicable measures from DFO's *Measures to Avoid Causing Harm to Fish and Fish Habitat* (Government of Canada 2013a) are to be followed, and restricted activity periods from the *Manitoba Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat* (Government of Canada 2013b) will be adhered to.
- 16) Where culverts are being replaced, culverts should be installed a minimum of 30 cm or 10% of the culvert diameter (whichever is greater) below the natural stream bed and filled with substrate material of similar type and size as the native streambed material with sections of larger stones to facilitate resting areas for fish passage. Establish a thalweg channel (low flow channel) within the substrate to ensure fish can pass during low flow conditions. Refrain from using blast rock in culverts and under the high water mark.
- 17) All instream work required will be conducted in isolation of water and fish will be salvaged from isolation area prior to dewatering. Stream flows will be maintained during isolation to ensure upstream pooling does not occur. The most likely method utilized will be "dam and pump" but other industry standards may be utilized where appropriate.
- 18) On-site sanitary facilities will be kept in clean order at all times, and will not be located within 30 m of a watercourse or water body (in case they get knocked or blown over).





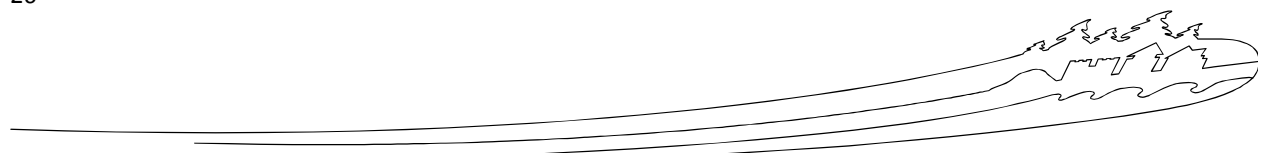
Operation

- 19) Ditches, drainage areas, and new culverts will be occasionally visually inspected by Parks staff to ensure proper water flow is occurring throughout the Project Area, and water is not pooling in ditches.

8.2.4 Flora

Construction

- 1) To minimize clearing of vegetation and release of dust, only pre-determined designated staging areas near the work areas will be used for equipment, preferably gravel or paved surfaces. Staging areas will be evaluated by Parks Canada and the ESO prior to construction/use.
- 2) All soils, seeds, and any debris attached to construction equipment to be used on the Project Site will be removed (e.g., by power washing) outside RMNP before delivery to the work site. Undercarriages, wheels, and blade/buckets will receive special attention. If construction activities occur within RMNP in areas with high densities of weeds or invasive species, equipment will be cleaned before moving to other sites within the Project Area.
- 3) If high densities of weeds or invasive species are identified on site, the RMNP field unit will be notified to determine appropriate treatment.
- 4) Clearing limits will be clearly flagged to ensure vegetation outside the clearing limits is not disturbed.
- 5) During clearing activities, trees will be felled toward the existing ROW wherever possible to avoid disturbing adjacent vegetation outside of the Project Area clearing limits. Extra caution will be taken to avoid trees falling into watercourses or riparian areas.
- 6) Vegetation clearing, in general, will be minimized and trees and shrubs will be retained where possible. Some clearing and grubbing of vegetation may be required to improve sightlines and reduce risk of wildlife collisions and improve public safety. Any vegetation removal needed for equipment access must be clearly marked, and stumps left no more than 10 cm in height.
- 7) Vegetation material/debris that is not salvageable may be mulched and taken to Grey Owl Pit or to an approved location outside of the park boundaries. No burning of slash is permitted. Slash is to be removed from site or distributed appropriately to prevent fuel accumulation for wildfires.
- 8) Any salvageable wood deemed suitable for use as firewood can be delivered to the Park Woodyard near the RMNP Maintenance Compound, with prior approval from the RMNP Field Unit and ESO.
- 9) Existing trails, roads, and hard surfaces will be used wherever possible to avoid disturbance to all vegetation.
- 10) A fire prevention plan will be submitted as part of the EPP. The fire prevention plan shall comply with applicable Parks Canada fire prevention policies.
- 11) Disturbed areas, including staging areas, laydown, or temporary storage (upon Project completion) will be restored by replacing any excavated topsoil, re-contouring and seeding with an approved seed mix for RMNP. The contractor is to provide laboratory certification documentation that the seed meets the blend specifications of minimum purity of 97% and





germination of 75%. Seeds shall be free of impurities, disease, and invasive species or non-native plants. Seed approval is at the discretion of Parks Canada.

- 12) To minimize the establishment and spread of invasive plants, a post-construction monitoring and control program will be developed with the RMNP Field Unit.
- 13) Follow up monitoring for revegetation success and for presence of invasive weeds is required for the growing season following the completion of construction.
- 14) If any topsoil, gravel, riprap, cobbles, etc. is brought in for ditch finishing, the source is to be inspected for invasive and non-native species and approved by the ESO during the growing season before transport into RMNP. A minimum of 48 hours' notice for source inspection is required. Material from a source with invasive or non-native plants present is subject to rejection.
- 15) Where species at risk have a high potential of occurrence, especially near wetlands and watercourses, disturbance or removal of vegetation should be avoided or minimized to the greatest extent feasible. If Iowa Golden-saxifrage or any other VEMC is found within the project footprint, the RMNP Field Unit will be notified to determine management options, such as transplanting.

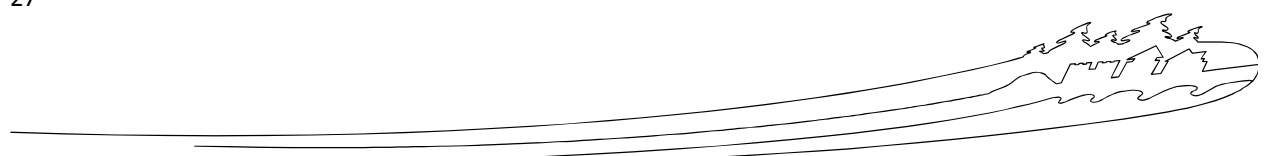
Operation

- 16) Ditches and any other re-seeded areas will be occasionally visually inspected for weeds by Parks staff. If weeds or invasive species are identified in high density, Parks staff will control implement applicable mitigation measures, taking into account the species, time of year, and location (e.g., near a waterbody, sensitive wildlife habitat, or other potentially sensitive environmental feature).

8.2.5 Fauna

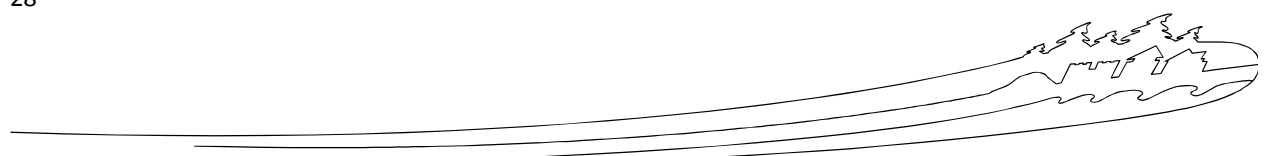
Construction

- 1) Unless otherwise impractical, vegetation removal shall not occur within the breeding bird period (April 15–August 31; Environment and Climate Change Canada 2014). If clearing must occur during that time, pre-clearing bird nest surveys will be completed by a qualified biologist to ensure no active nests are destroyed.
- 2) If culvert removal/replacement is required within the breeding bird period (April 15-August 31; Environment and Climate Change Canada 2014), Barn Swallow surveys will be completed by a qualified biologist to ensure no active nests are destroyed. Potential mitigation measures will be determined in conjunction with the RMNP Field Unit, and may include advanced placement of snow fencing (or other materials that do not risk birds getting caught) or plywood covering the openings of the culverts. Additional culverts could potentially be laid in areas that will not be disturbed during the duration of construction to offer additional potential nesting areas in the Project Area.
- 3) If an active nest, roost, or den of any species is found, work will be halted, the RMNP Field Unit will be contacted and a management plan will be determined, including potentially establishing a no-disturbance zone and the area remaining undisturbed until the nest, den or roost is non-active.





- 4) Tree clearing during the spring and summer may impact roosting bats (e.g., roosting individuals, maternity colonies). An assessment of the need for bat roost surveys will be conducted if clearing occurs during this period (i.e., May to September).
- 5) Most work will occur during daylight hours, and there will often be at least eight hours per day without construction activities, allowing wildlife time to cross Highway 10 without construction noise and human presence.
- 6) Existing salt lick areas in ditches along Highway 10 that are known to RMNP Field Unit will be excavated and disposed of in order to remove the attractant for moose and other wildlife. All efforts will be made to re-grade these areas to ensure water and salt runoff do not pool there or in other ditch locations in the future.
- 7) Where sightlines for road users are poor (e.g., curves in road, hills) and create higher risks of wildlife collisions, all efforts will be made to improve sightlines (which would likely require removal of vegetation) and/or signage thereby reducing risk of wildlife collisions.
- 8) The RMNP Field Unit and ESO will be notified immediately in the event of human-wildlife interactions, or activity or encounters with bears, wolves, coyotes, cougars, wolverines, any species at risk, dens and nests. The following should be reported to the RMNP field unit: a) immediate reports of (i) aggressive encounters involving any species, (ii) sightings of large carnivores or (iii) observations of carcasses; b) reports within 48 hours of other species or features of particular management interest.
- 9) Construction staff will be briefed on the potential presence of SARA-listed species and what to look for. Should any of these species be present on site, operations in the immediate vicinity of the species should be halted and should re-commence only when the species has left the immediate area. Parks Canada Resource Conservation staff shall be notified immediately via RMNP Dispatch.
- 10) Northern Leopard Frog may potentially breed in water bodies and wetlands in the Project Area. They may also breed in temporary pools and tire ruts within the work areas. If pools, wetlands and water-filled tire ruts are present in areas directly impacted by construction activities in spring and summer, pre-work Northern Leopard Frog surveys will be conducted. If they are present, RMNP Field Unit will be contacted to discuss management options. The final surface will have good drainage and be left in a smooth condition to avoid creating puddles that attract frogs to lay eggs but which later dry out to kill the eggs or tadpoles.
- 11) All efforts to prevent wildlife from obtaining food, garbage or other domestic wastes will be made by the Contractor and contract staff while undertaking work in National Parks. Such wildlife attractants will not be stored at the work site overnight. Lunches, coolers and food products, including waste food products, will be securely stored away from access by animals. Daily removal from the Park and off-site disposal of food scraps, food wrappers, pop cans, domestic waste, cigarette butts, and other potential wildlife attractants is mandatory. Existing Parks Canada waste receptacles will not be used for disposal of such wastes without prior arrangement with Parks Canada. Incidents involving wildlife accessing garbage or attractants will be reported immediately to Parks Canada.
- 12) Feeding, harassment or destruction of any wildlife is strictly prohibited. Wildlife encountered at or near Project sites will be allowed to passively disperse without undue harassment. Nuisance





wildlife will be immediately reported to the Parks Canada personnel and any incidents involving wildlife getting into garbage or attractants is to be immediately reported.

Operation

- 13) If mitigation for invasive plants and weeds is required during the life of the Project, proper consideration of location and wildlife habitat will be taken into consideration before choosing and applying any specific method.
- 14) Salt usage on the roadways should be minimized as much as possible to avoid creating salt licks and attractants for wildlife in the ditches. Ditches will be occasionally visually inspected by Parks Canada personnel to ensure road runoff is not pooling and creating such attractants.
- 15) If active Barn Swallow nests are present on any culverts or structures requiring maintenance during the life of the Project, the RMNP Field Unit will be contacted to determine the appropriate mitigation measures.

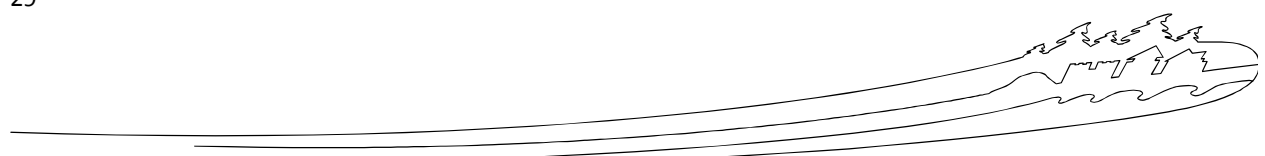
8.2.6 Visitor Experience

Construction

- 1) A traffic accommodation strategy or management plan shall be incorporated into the EPP to address contractor and public safety around the site.
- 2) Carpooling to the worksite will be used whenever possible to reduce traffic volume and resulting noise, dust, and emissions.
- 3) All construction equipment should be maintained to ensure they operate at optimal performance to reduce noise and air emissions.
- 4) Staging and laydown areas and the office trailer area will be kept in a tidy condition.
- 5) Vehicles will not be left idling when not in use to reduce vehicular emissions.
- 6) Construction activities will take place within the designated hours to be determined in consultation with Parks Canada.
- 7) Road and/or lane closures should be staged and operated to limit traffic delay through construction zones to a maximum of 20 minutes, as to minimize disruption to road users.
- 8) Dust generated by Project activities will be controlled by covering stockpiles and, if necessary, use a water truck to wet down dusty areas.
- 9) The Contractor will post road signage (e.g., trucks turning, reduced speed, lane closures) to ensure public safety is maintained.
- 10) RMNP Field Unit will be notified one month in advance of construction, with details on construction work areas and timing to enable communication to park visitors, local residents and stakeholders. The RMNP will be kept apprised of timelines, work periods, and construction activities so that they can provide information to the public.
- 11) Access to all facilities and recreational areas will be maintained throughout Project construction.

Operation

- 12) No additional mitigation measures are required during the operation of the Project.

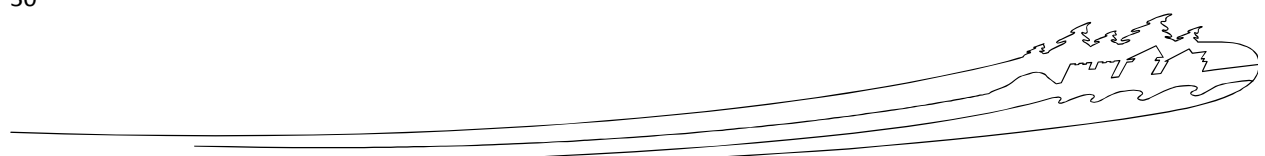




8.2.7 Cultural Resources

Construction

- 1) Impacts to previously identified cultural or historical resources are not anticipated; an Archaeological Impact Assessment (AIA) prior to work commencing will not be required (as per the AOA – Appendix 3). The Project is subject to further review by Terrestrial Archaeology utilizing the recently created *Archaeological Resources and Highway Re-paving Projects Preliminary Examination Checklist*.
- 2) Although a full AIA is not required, a pre-construction sweep will be conducted by Parks Canada personnel from the RMNP Field Unit to search for signs of offerings or indications that modern traditional cultural practices or uses are taking place in the vicinity of the Project Area.
- 3) Guidance on types of cultural artifacts or features that could be present will be given in the environmental briefing. The ESO will remain in contact with a Knowledge Holder throughout the duration of the Project to ensure culturally significant First Nations resources are not impacted.
- 4) Restrict construction related activities to the current Highway 10 footprint and inside the previously established boundaries of current staging or stockpiling areas to the greatest extent possible.
- 5) In any area where grubbing, clearing, excavating, grading and/or re-profiling are necessary to improve the highway beyond approximately 5 to 15 m from the current Highway 10 right-of-way, these areas must be noted for Terrestrial Archaeology as locations where post-construction monitoring/assessment will take place before winter 2016.
- 6) Any new borrow areas or new road construction to access borrow areas must be identified and these locations sent to Terrestrial Archaeology in a timely fashion so that an assessment for potential to impact cultural resources may be undertaken prior to construction. This assessment work may be undertaken by Parks Canada archaeologists.
- 7) No disturbance or work will be permitted around cultural/First Nations resources that have been identified to the RMNP Field Unit staff; their locations will be communicated to the contractors and/or marked to ensure they are not disturbed.
- 8) If a cultural resource is observed during works, all construction activities in the vicinity of the artifact will cease immediately, it will be left undisturbed and reported to Parks Canada personnel right away. Parks Canada may advise that photographs and GIS location be taken.
- 9) If a significant find occurs (e.g., concentrations of historic objects, structural features, tent platforms, or human remains), all work will cease immediately and Parks Canada personnel will be notified immediately for further direction.
- 10) All cultural resources within RMNP are protected under the National Parks Act and Regulations and are the property of Parks Canada. All cultural resources found on the work site shall be reported to the ESO or the Departmental Representative immediately. The contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative before work proceeds.





Operation

- 11) No additional mitigation measures are required during the operation of the Project.

9. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

- 9 a) Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:
- ☐ No
 - ☒ Yes (describe the process to involve relevant parties and indicate how comments were taken into consideration).

The highway upgrade project has been publicly announced and the response has been positive. The public perception is that repairs to the highway are long overdue and badly needed. No environmental concerns have been raised and in general the public supports the project. A communications plan will be developed and the public will be notified of project plans and progress throughout the life of the overall highway upgrade project (Roger Schroeder, External Relations manager, RMNP, Personal Communication. February 2015).

- 9 b) Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:
- ☐ No
 - ☒ Yes (describe the process to involve relevant parties and how the results were taken into consideration).

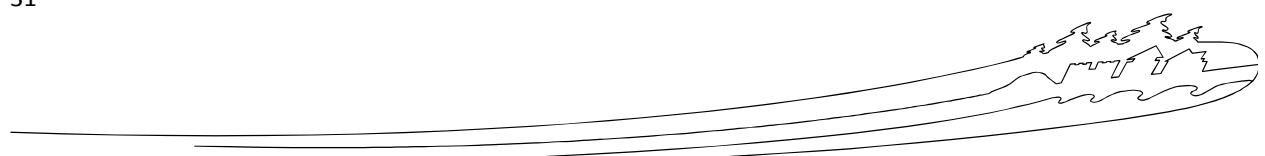
10. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

The majority of Project effects are associated only with the construction phase of the Project and are generally temporary in nature and short in duration. Once operation of the Project is underway, pre-Project conditions will resume as normal, including road travel/traffic, road maintenance, and winter maintenance and snow removal. Some residual adverse effects will result from the Project, including:

- 1) Permanent removal of vegetation may result in localized loss of biodiversity and habitat.
- 2) Decrease in the capture/filter of air emissions, dust, and noise as a result of vegetation removal; however, clearing areas are adjacent to large, undisturbed forested areas and these effects are expected to be minimal.
- 3) Permanent loss of fish habitat and riparian vegetation may occur as a result of installing culvert extensions or possible ditch encroachments of the shoulder areas into riparian areas.
- 4) Permanent changes to water regimes may occur as a result of re-grading in ditches. These changes could affect (i.e., increase or decrease) water inputs to nearby waterbodies including wetlands and watercourses, which may negatively impact the habitat conditions and supported biota.
- 5) Loss of potential critical habitat for the Golden-winged Warbler may occur. A Critical Habitat Destruction Analysis Form is included in Appendix 2.

Several improvements from existing conditions may result from the Project, including:

- 6) Minimizing wildlife (e.g., moose, bear) attractants in the ditch, by re-grading and reducing of salt and water collection, thereby improving wildlife and public safety;





- 7) Improvements to fish passage through culvert replacement and placement of materials and creation of thalweg channels inside the culverts;
- 8) Installation of beaver deceivers to ensure effective drainage of water away from the road surfaces, and reducing impacts of beaver ecology; and
- 9) Improvements to public safety by way of road repairs, regrading, improved signage and sightlines, and repaving.

If all mitigation measures discussed in this BIA be followed significant adverse residual environmental effects as a result of the proposed project activities are not anticipated.

11. SURVEILLANCE

- ☐ Surveillance is not required
- ☒ Surveillance is required

As per mitigation measures described in Section 8, an on-site ESO or other Parks Canada Representative will be available to oversee the construction activities and ensure that all project operations are conducted in accordance with all identified environmental protection measures. The ESO will complete frequent and unscheduled site visits. The ESO maintains the right to halt any work that does not comply with all Project Approvals, Permits or Authorizations, or to take lead in case of an emergency. Any concerns or comments will be relayed through the Departmental Representation.

12. FOLLOW-UP MONITORING

Follow-up monitoring is:

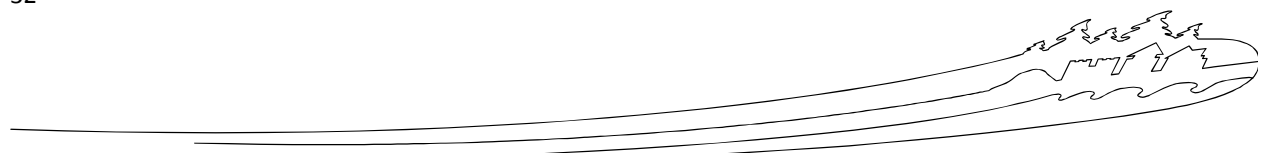
- ☒ not required
- ☐ legally required (e.g. under the *Species at Risk Act* or *Fisheries Act*)
- ☐ required in accordance with the *Parks Canada Cultural Resource Management Policy*

Follow-up monitoring will be conducted for vegetation re-establishment to ensure it is free of invasive species (see Mitigation Measures in Section 8). A follow-up site visit will take place for culvert modification/replacement locations to ensure there are no barriers to fish passage.

13. SARA NOTIFICATION

Notification is:

- ☒ not required
- ☐ required under the *Species at Risk Act* (outline the nature of and response to any notification).





14. EXPERTS CONSULTED

Include Parks Canada experts. Add as many entries as necessary for the project.

1.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title:
Expertise Requested: Biophysical information for Project Area. Guidance on BIA scope.	
Response: Provided biophysical information for Project Area and guidance on BIA scope.	

2.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Resource Management Officer
Expertise Requested: Biophysical information for Project Area. Guidance on BIA scope.	
Response: Provided biophysical information for Project Area and guidance on BIA scope.	

3.

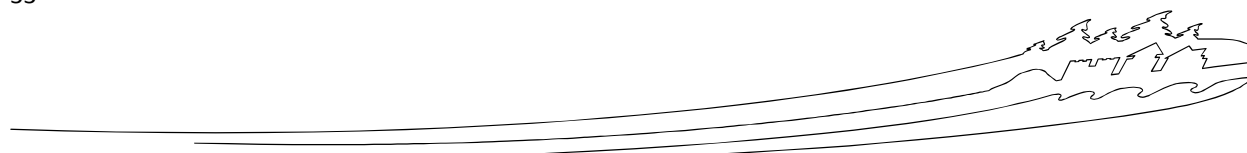
Department/Agency/Institution: Parks Canada	Date of Request: 2016-03-08
Expert's Name & Contact Information:	Title: Impact Assessment Specialist
Expertise Requested: BIA review.	
Response: Provided feedback and local knowledge/information.	

4.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-03-08
Expert's Name & Contact Information:	Title: Species Conservation Specialist
Expertise Requested: Species at risk information for Project Area.	
Response: Provided feedback and local knowledge/information of species at risk, including information on Golden-winged warbler critical habitat draft.	

5.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-03-01
Expert's Name & Contact Information:	Title: First Nations Program Advisor
Expertise Requested: Information regarding local cultural resources and areas of importance.	
Response: Met with First Nations elder and provided information about important cultural areas.	





6.

Department/Agency/Institution: McElhanney Consulting Services Ltd.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Project Manager
Expertise Requested: Design and Project scope/information.	
Response: Provided design drawings and files and project scope/information.	

7.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Vegetation and Wetlands Biologist
Expertise Requested: Assessment of vegetation, wetlands, land use; BIA information.	
Response: Conducted field work in June 2015, contributed to summary report (Tetra Tech EBA 2015), contributed to BIA report.	

8.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Wildlife Biologist
Expertise Requested: Assessment of wildlife (birds, amphibians, etc.).	
Response: Conducted field work in June 2015, contributed to summary report (Tetra Tech EBA 2015), reviewed BIA report.	

9.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Wildlife Biologist
Expertise Requested: Assessment of wildlife (birds, amphibians, etc.).	
Response: Contributed to wildlife sections of BIA report.	

10.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Project Manager, Biologist
Expertise Requested: Assessment of Fish and Fish Habitat; BIA information.	
Response: Conducted field work in June 2015, provided communication between Parks and Tetra Tech EBA Inc.	

11.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Fisheries Biologist
Expertise Requested: Assessment of Fish and Fish Habitat.	
Response: Conducted field work in June 2015, contributed to summary report (Tetra Tech EBA 2015), reviewed BIA report.	





12.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Fisheries Biologist
Expertise Requested: Information on fish and fish habitat.	
Response: Contributed to fish and fish habitat information in BIA.	

13.

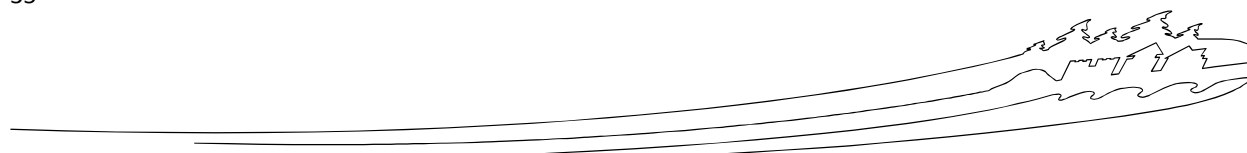
Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Archaeologist
Expertise Requested: Cultural and archaeological resources in the Project Area.	
Response: Provided information on history and potential archaeological resources in the Project Area.	

14.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Senior Scientist
Expertise Requested: Review of biological information, BIA information.	
Response: Contributed to Project Description for the BIA, and conducted review of the biological information.	

15.

Department/Agency/Institution: Tetra Tech EBA Inc.	Date of Request: 2016-02-25
Expert's Name & Contact Information:	Title: Senior Ecologist
Expertise Requested: Review of biological information.	
Response: Conducted review and provided feedback of biological information in BIA.	



**15. DECISION**

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

- ☒ not likely to cause significant adverse environmental effects.
☐ likely to cause significant adverse environmental effects.

FOR SARA REQUIREMENTS:



- ☒ There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required

The Critical Habitat Destruction Analysis Form (Appendix 2) was used to assess residual adverse effects to Golden-winged Warbler critical habitat.

OR, the SARA-Compliant Authorization Decision Tool was used and determined:

- ☐ There is no contravention of SARA prohibitions
☐ Project activities contravene a SARA prohibition and CAN be authorized under SARA
☐ Project activities contravene a SARA prohibition and CANNOT be authorized

16. RECOMMENDATION AND APPROVAL

Prepared by: BIA authors (Tetra Tech EBA): Teia Clement (B.Sc. (hons), B.I.T.) Biologist Danielle MacDonald (B.Sc., P.Biol., P.Eng.) Biologist Kristen Mancuso (M.Sc., R.P.Bio., P.Biol) Biologist Charla Downey (M.Sc., RPCA, PMP, RPA) Archaeologist BIA reviewers (Tetra Tech EBA): Jeff Matheson (M.Sc., R.P.Bio., P.Biol) Senior Scientist Jason Jones (Ph.D., R.P.Bio., P.Biol) Senior Scientist Nick Bartok (M.Sc., R.P.Bio., P.Biol) Wildlife Biologist Shawneen Walker (B.Sc., R.P.Bio., P.Biol., EP) Biologist	Date: 2016-03-09
Recommended by: Functional manager of the project (name):  Zachary Boles	Date: 2016-04-11
Approved by: Michaela Kent, Riding Mountain National Park Unit Superintendent	Date: 2016-04-11
Signature: 	





17. ATTACHMENTS

Figures

Figure 1 – Project Location

Figure 2 – Overview

Figure 3 – Land Cover Mapping and Vegetation Assessment Locations

Figure 4 – 2015 Wildlife Results

Appendices

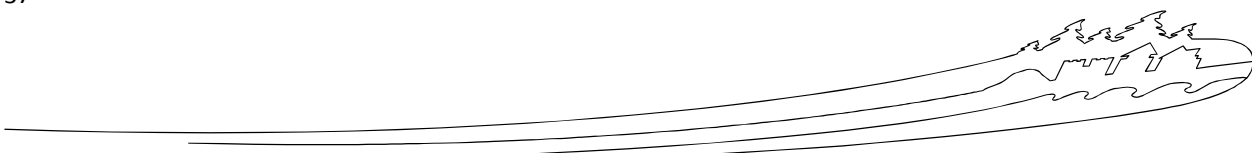
Appendix 1 – Environmental Impact Analysis Tools: Effects Identification Matrix

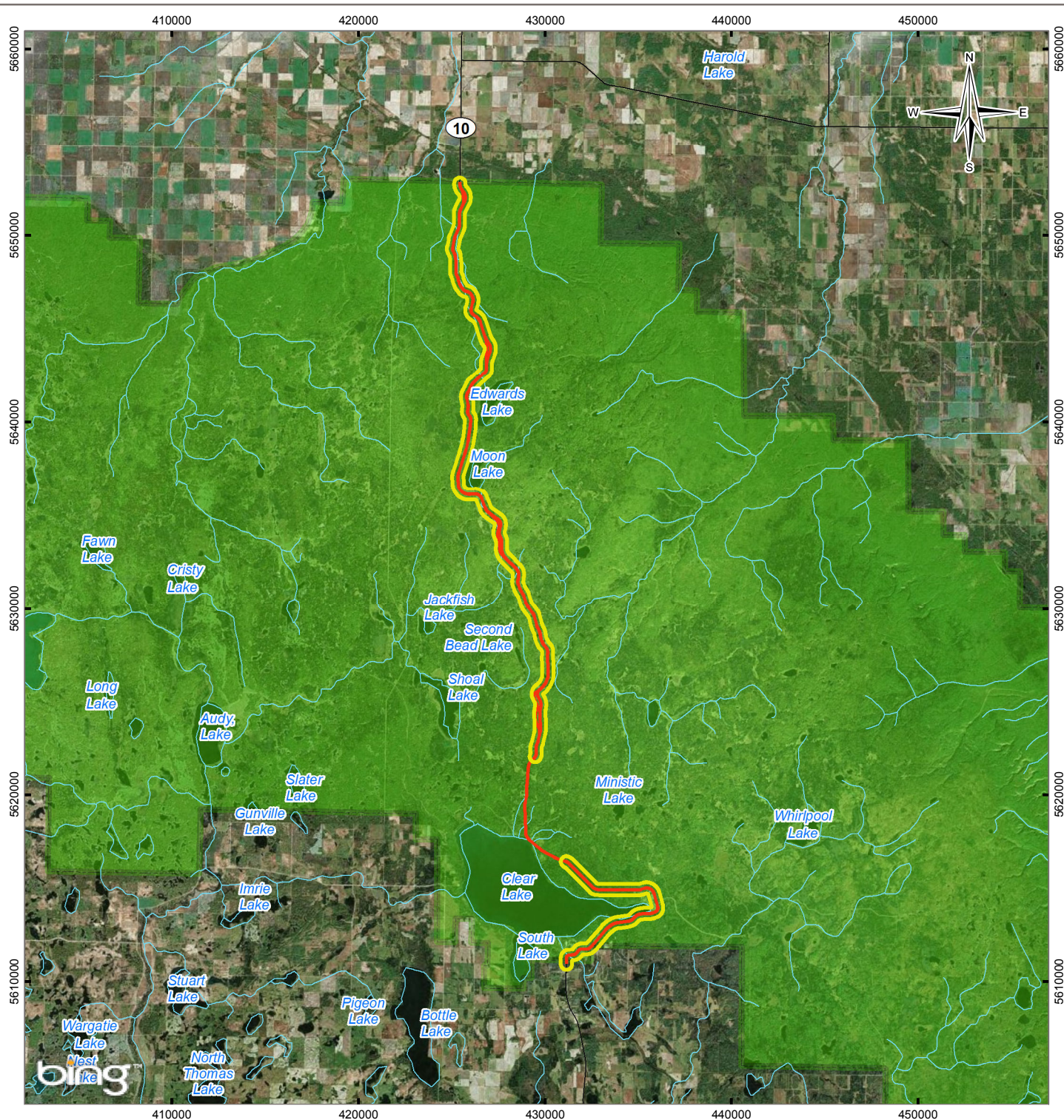
Appendix 2 – Critical Habitat Destruction Analysis Form

Appendix 3 – Archaeological Overview Assessment

18. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM

- ☒ Project registered in tracking system – The Project will be registered in the Parks Canada Tracking System within the fiscal year the Project takes place in accordance with PCA policy.
- ☐ Not yet registered (*CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting*)



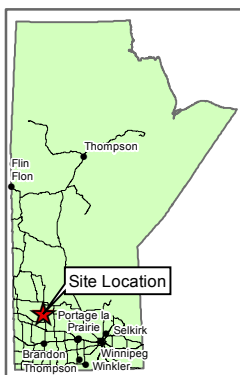


LEGEND

- Highway 10 (within Park limits)
- Major Highway
- Water Feature
- Riding Mountain National Park Boundary
- Project Area

NOTES

Base data source: Government of Manitoba (CWS 500K)
Imagery: Bing Imagery Services



STATUS ISSUED FOR REVIEW

HIGHWAY 10 REHABILITATION BIOPHYSICAL IMPACT ASSESSMENT

Project Location

PROJECTION

UTM Zone 14

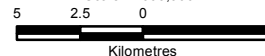
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FILE NO.

ENVIND03979_FIG1.mxd

PROJECT NO.

ENVIND03979

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OFFICE

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DATE

March 3, 2016

TETRA TECH EBA

Figure 1



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
 - Bottom of Ditch
 - Top of Ditch
 - Clearing and Grubbing


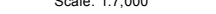
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CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2a
OFFICE Tt EBA-CAL	DATE March 17, 2016				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing






NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

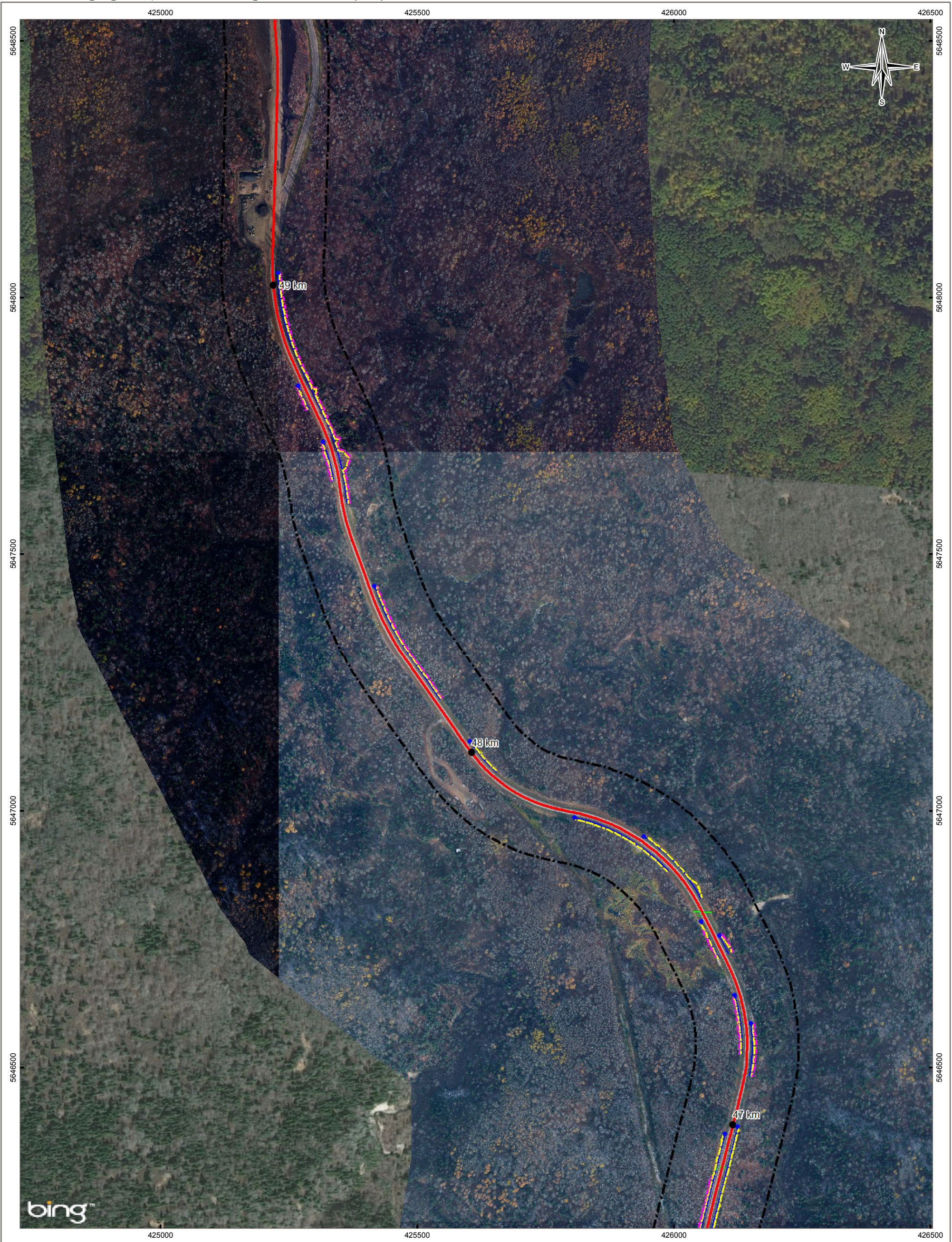
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC		REV 0
OFFICE Tl EBA-CAL	DATE March 17, 2016				
				Figure 2b	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

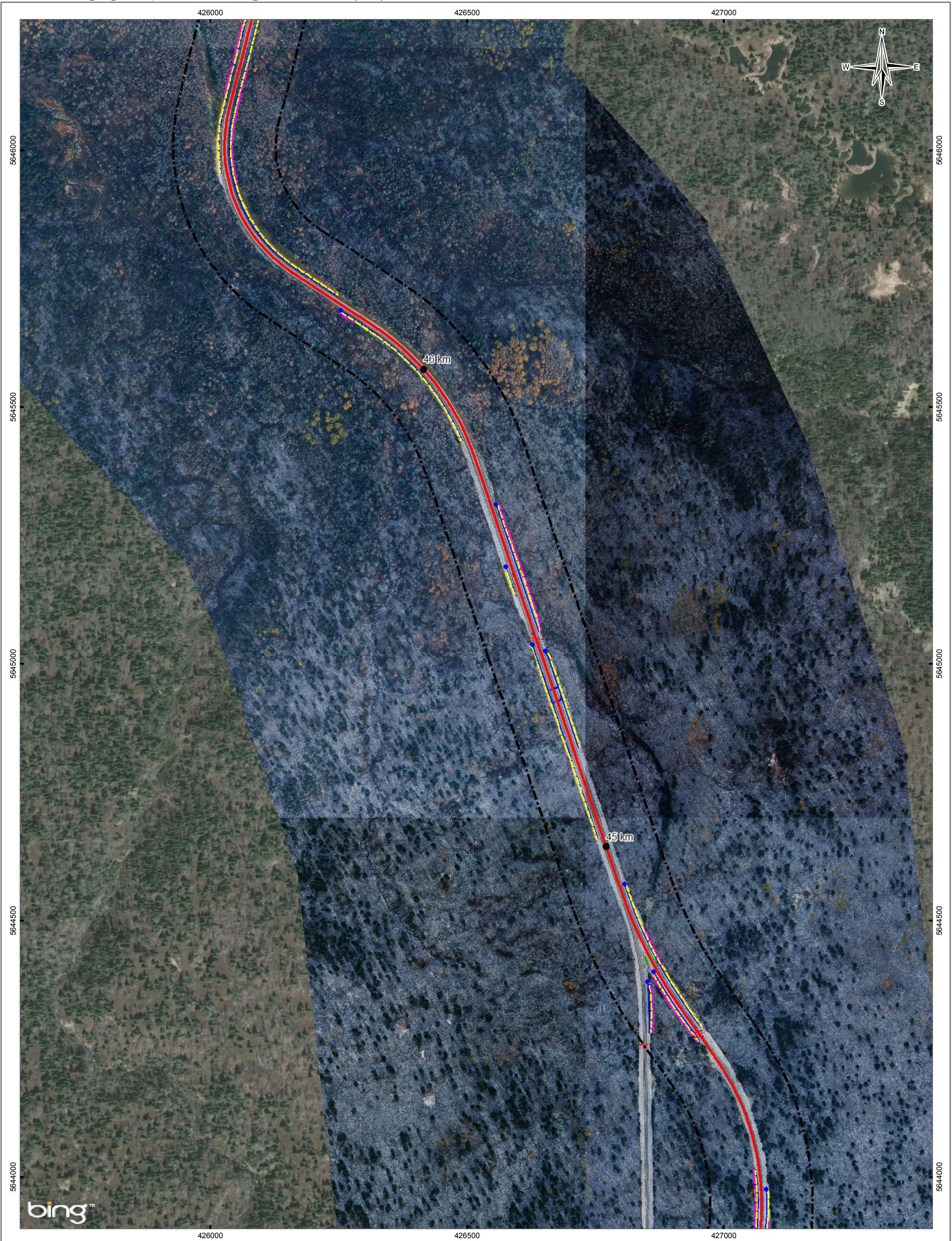
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE TtEBA-CAL		DATE March 17, 2016		Figure 2c	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
 - Bottom of Ditch
 - Top of Ditch
 - Clearing and Grubbing



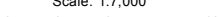
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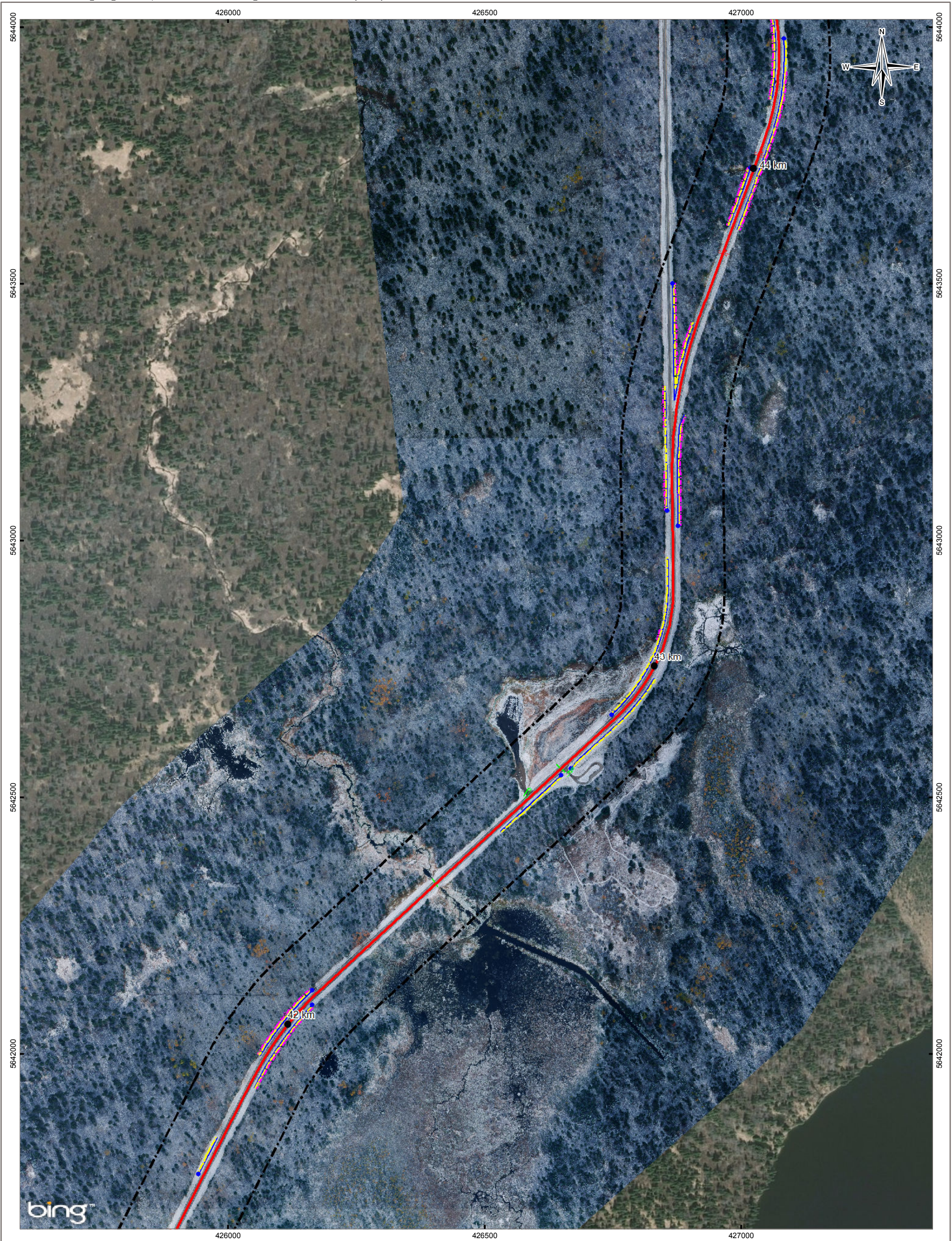
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tt EBA-CAL	DATE March 17, 2016			
Figure 2d				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing



NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

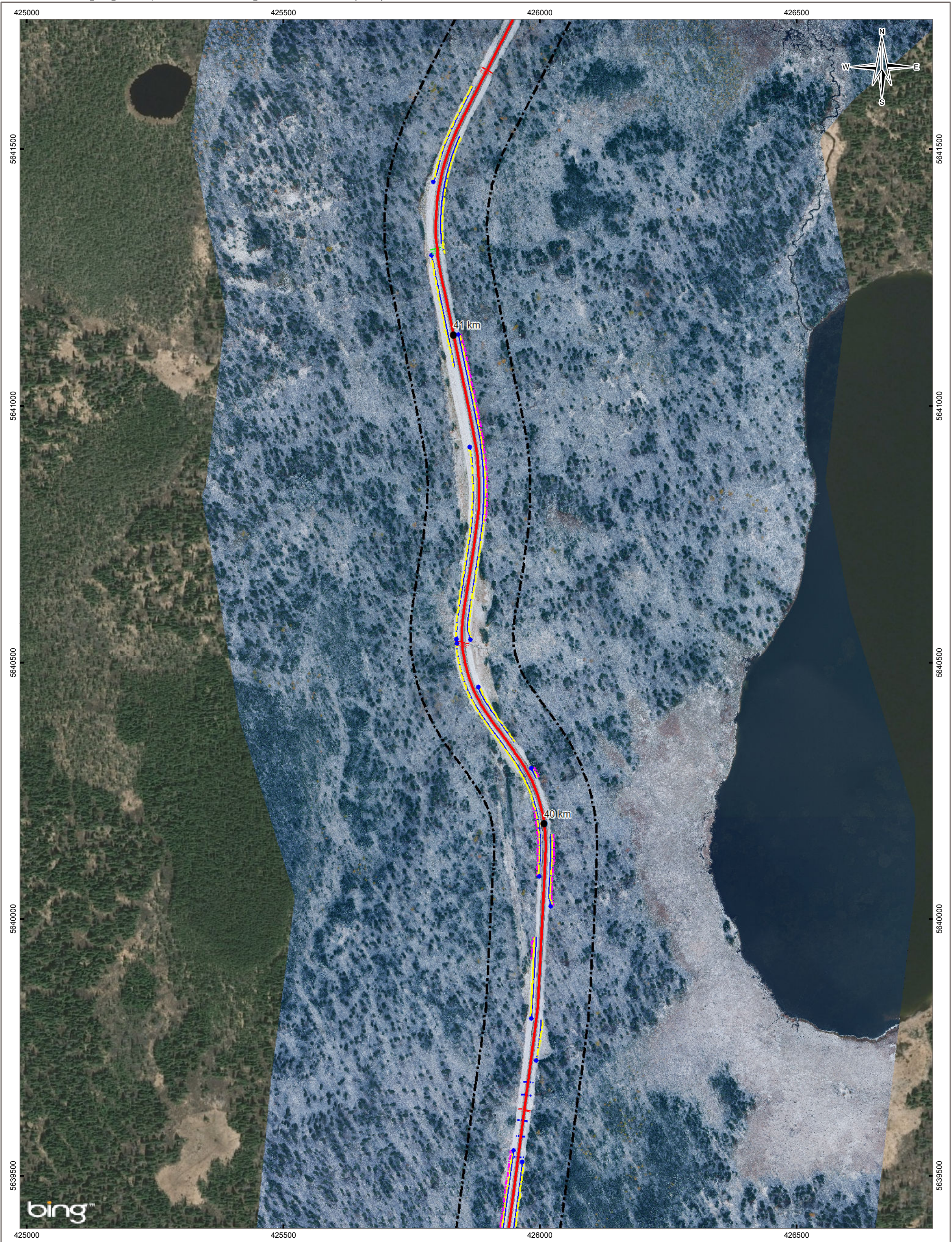
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE TlEBA-CAL		DATE March 17, 2016		Figure 2e	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


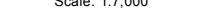

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Imagery provided by McElhanney
and Bing Imagery Services

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT  Parks Canada
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PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	
OFFICE Tl EBA-CAL		DATE March 17, 2016		Figure 2f



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing





NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

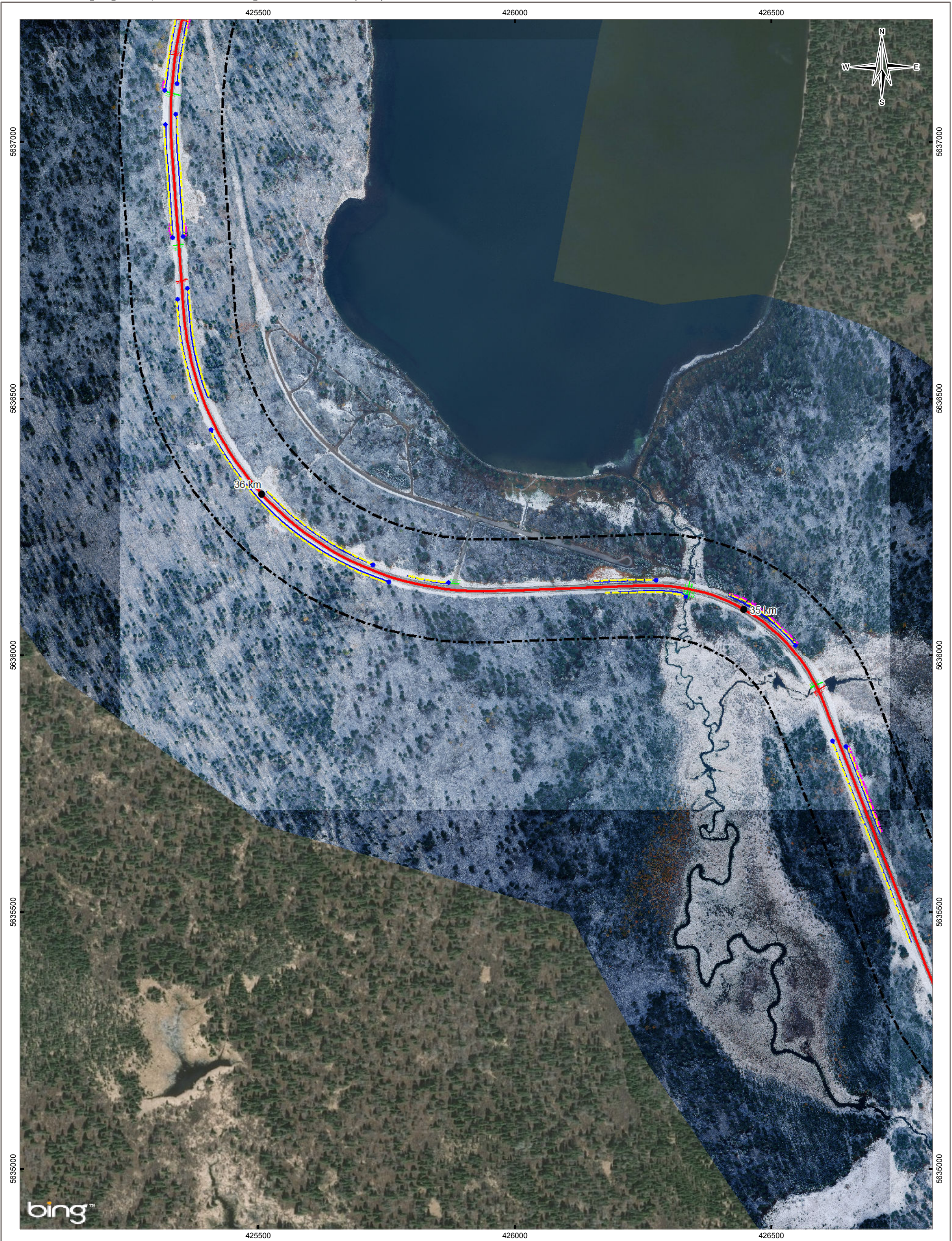
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

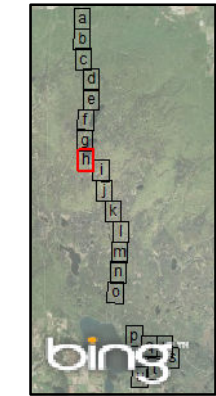
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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2g
OFFICE Tl EBA-CAL	DATE March 17, 2016				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
Base data source:
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Imagery provided by McElhanney
and Bing Imagery Services

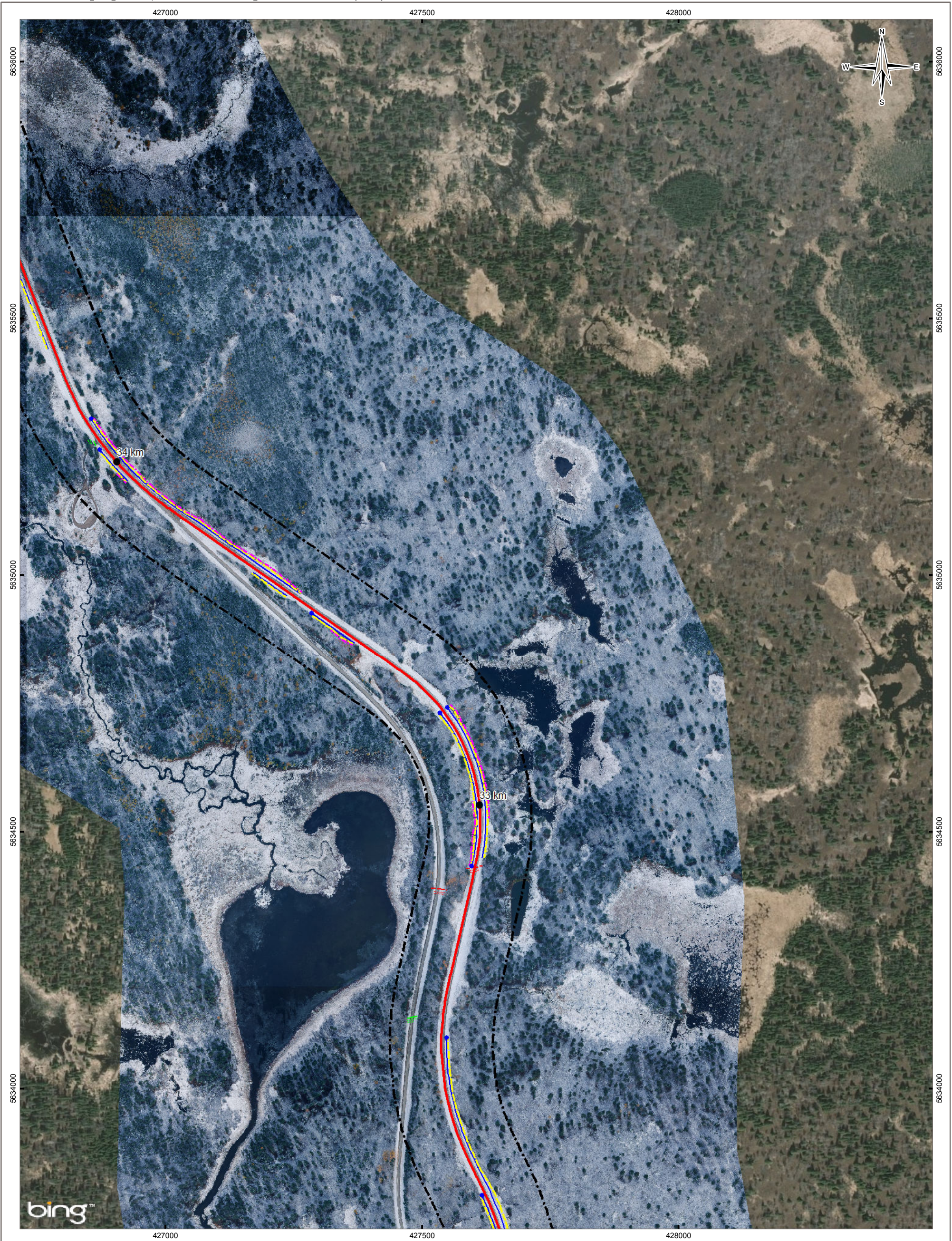


STATUS
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT  TETRA TECH EBA	
Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		Figure 2h	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE TtEBA-CAL		DATE March 17, 2016			



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing




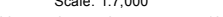
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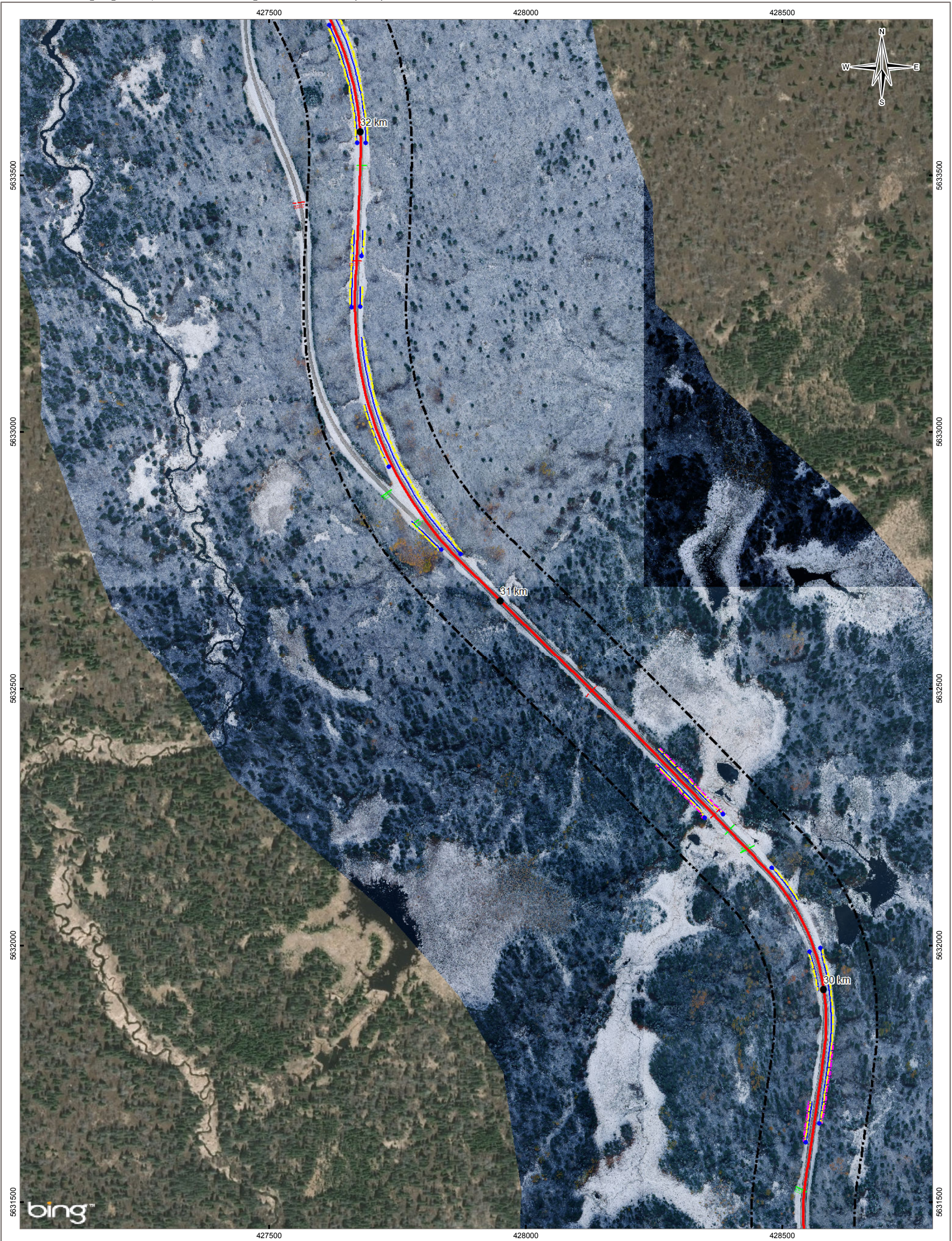
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2i
OFFICE Tt EBA-CAL	DATE March 17, 2016				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
 - Bottom of Ditch
 - Top of Ditch
 - Clearing and Grubbing





NOTES
Base data source:
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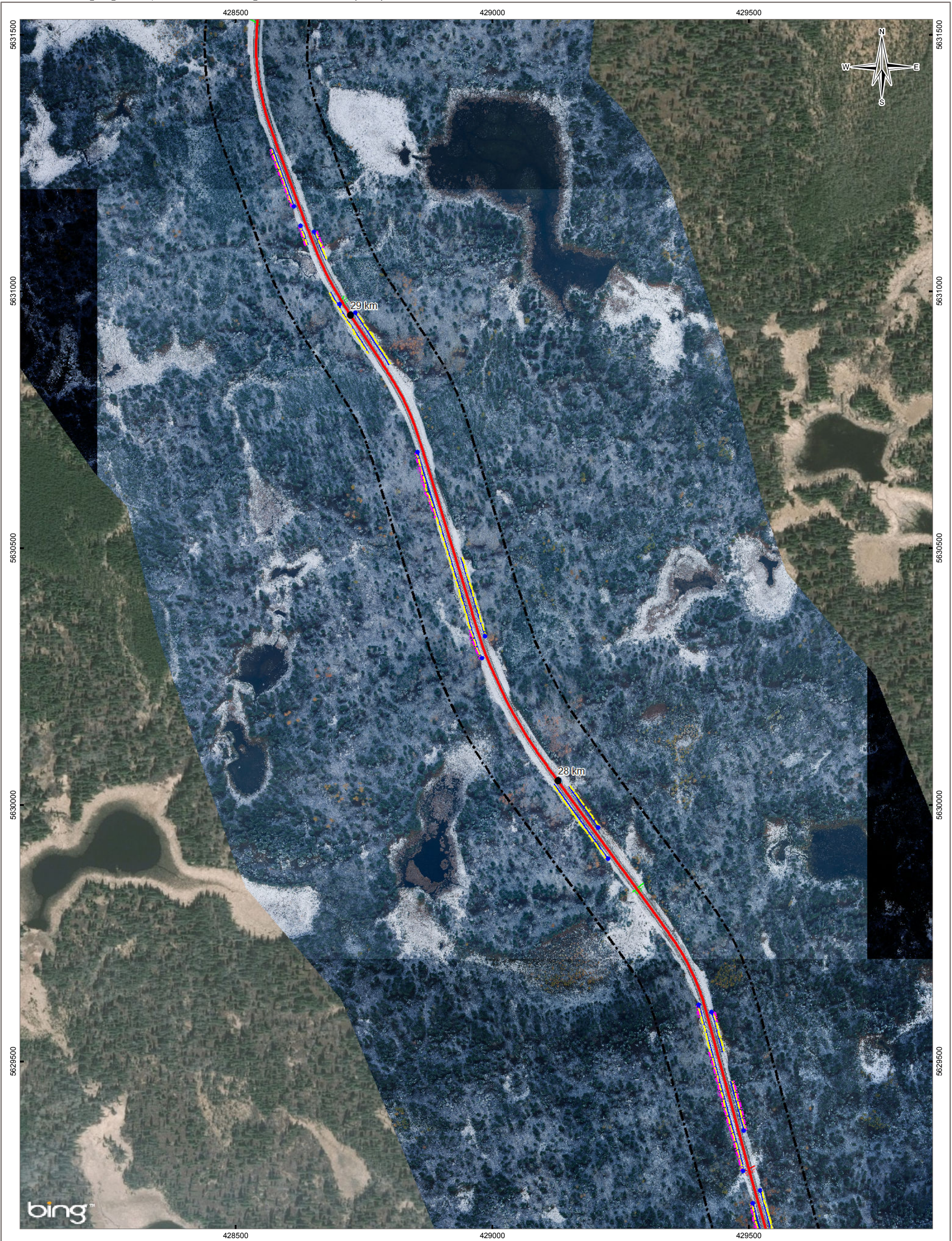
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT   Tetra Canada Tetra Canada	
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PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2j
OFFICE Tt EBA-CAL	DATE March 17, 2016				



LEGEND

●

KM Marker

Highway 10 (within Park Limits)

Road

Riding Mountain National Park Boundary

100m Buffer

Construction Plans

Bottom of Ditch

Top of Ditch

Clearing and Grubbing

NOTES

Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

STATUS

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DATE
March 17, 2016

PROJECTION
UTM Zone 14

DATUM
NAD83

CLIENT

Parks Canada

Tt

TETRA TECH EBA

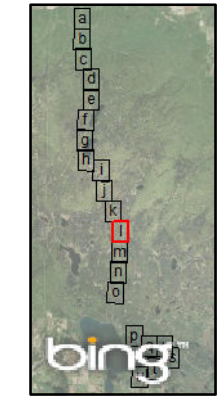
Figure 2k



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
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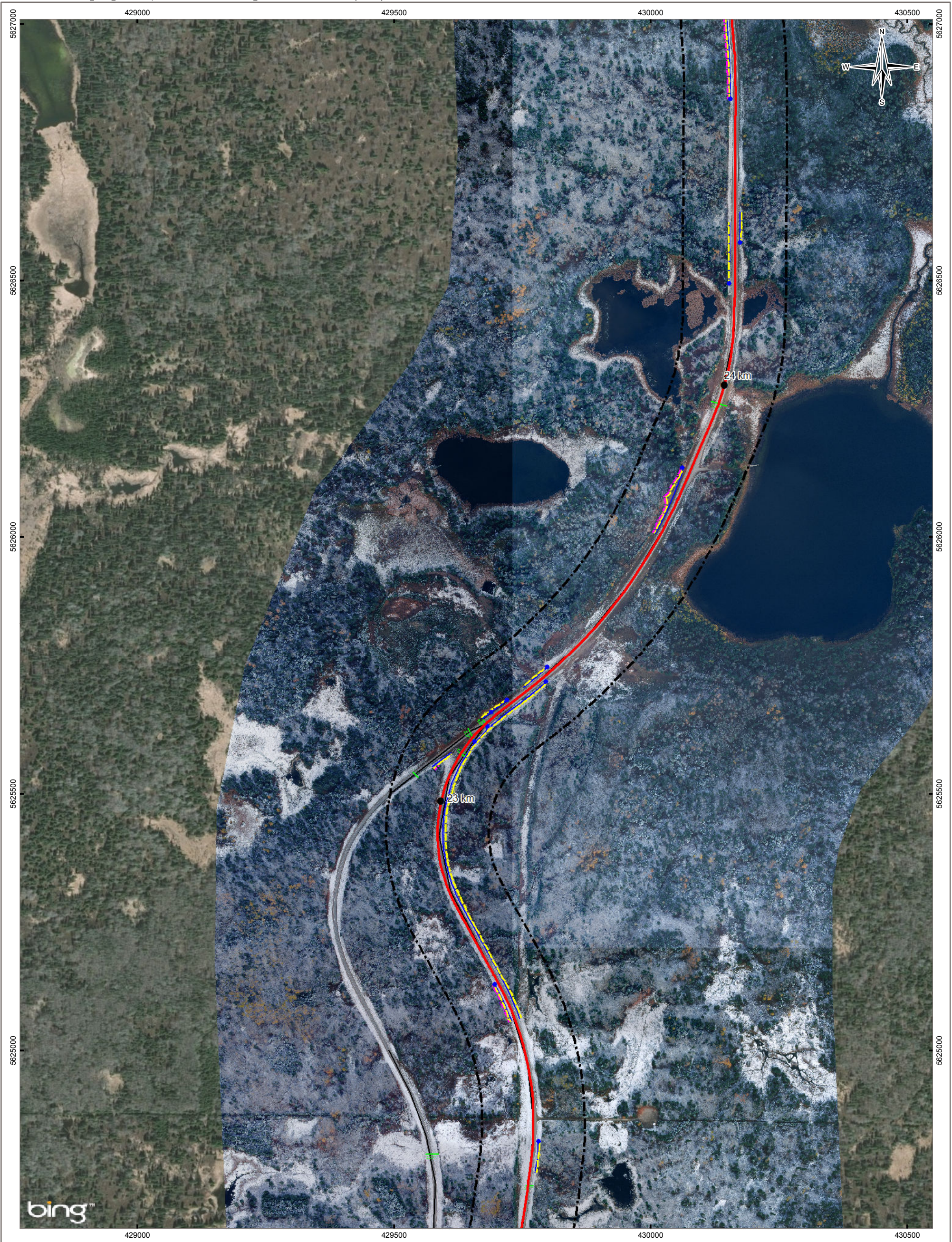


STATUS
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tt EBA-CAL		DATE March 17, 2016		Figure 21	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- - - 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- - - Clearing and Grubbing



NOTES
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Imagery provided by McElhanney
and Bing Imagery Services

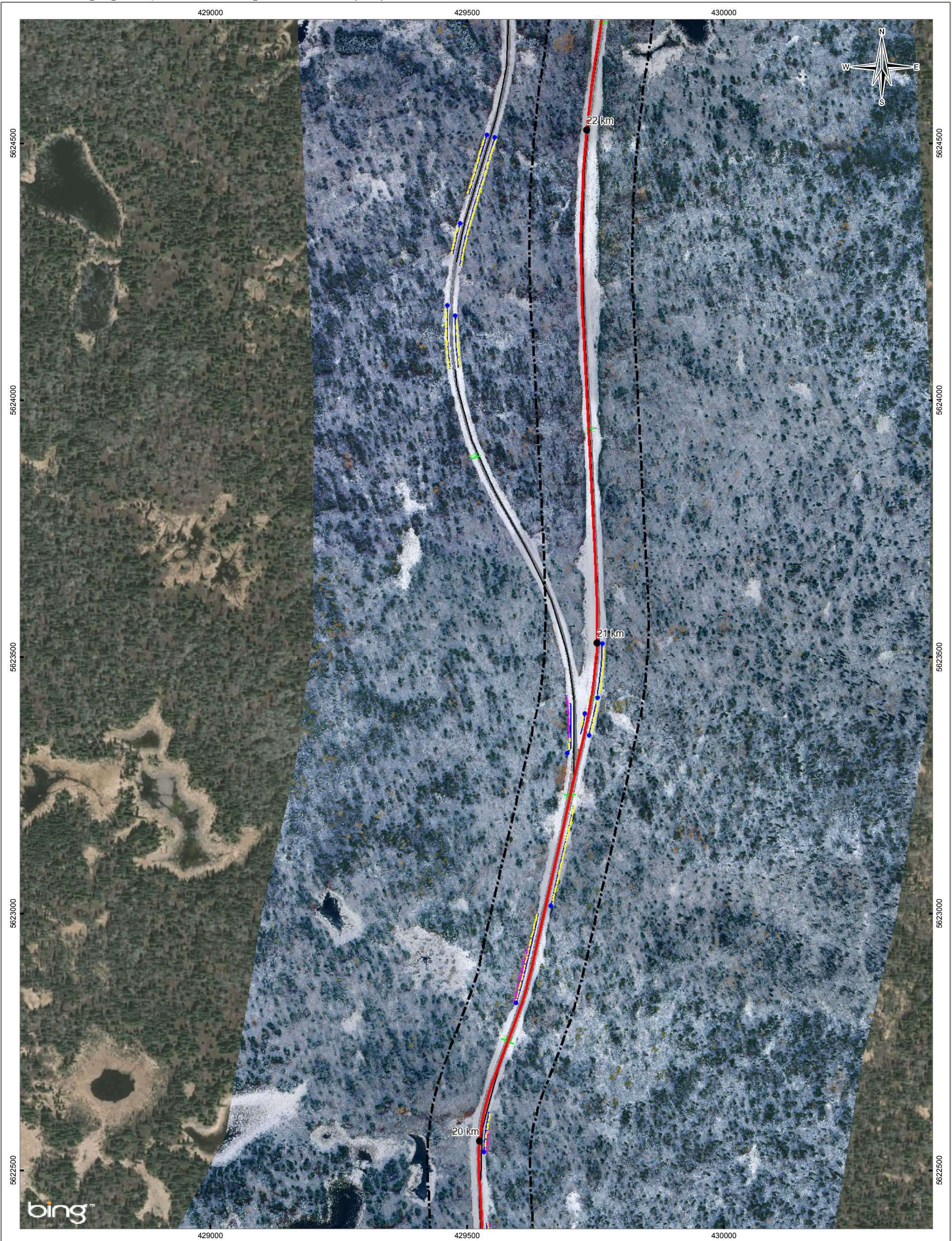
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

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Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		 TETRA TECH EBA	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tl EBA-CAL		DATE March 17, 2016		Figure 2m	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing



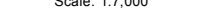

NOTES
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CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

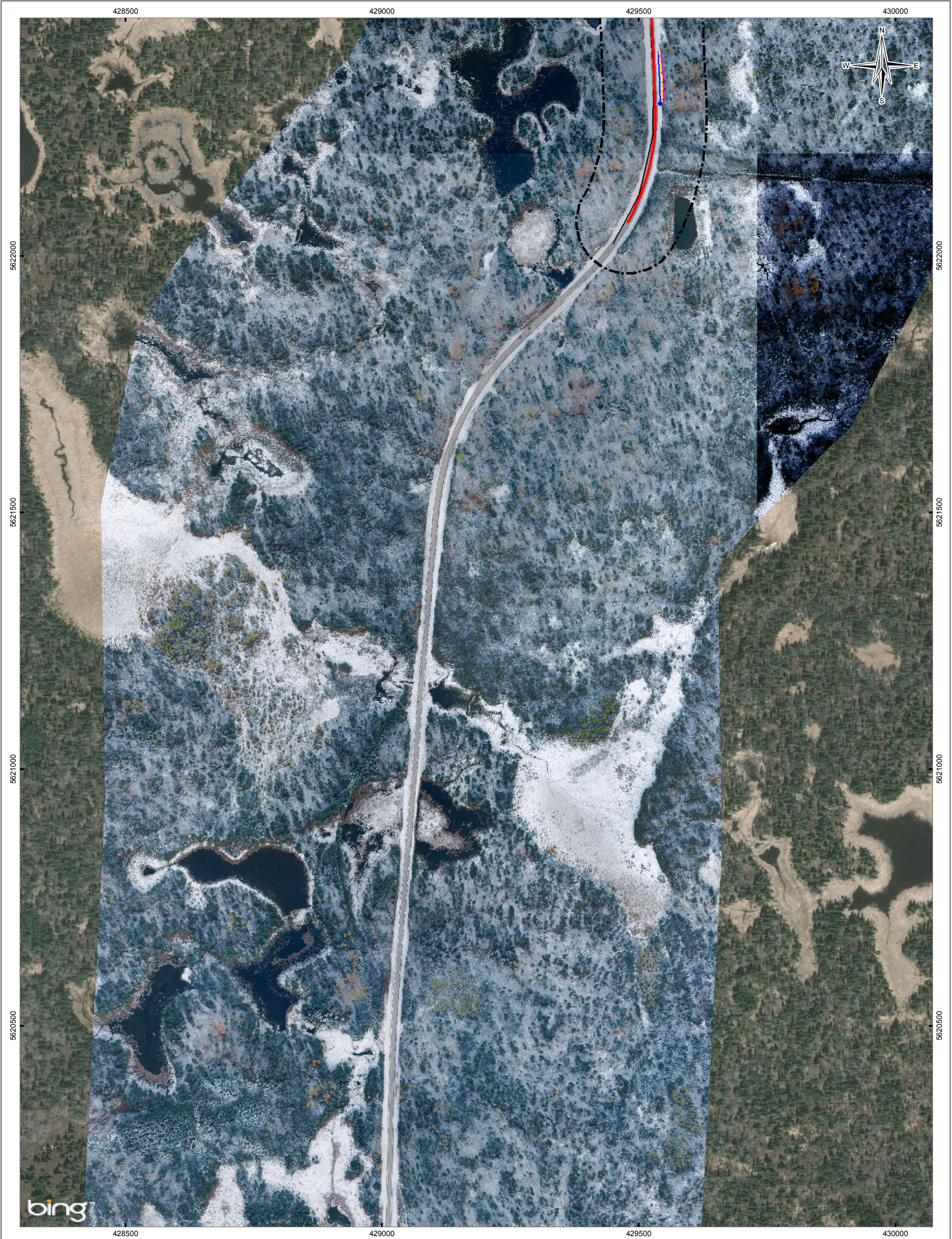
STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT  	
Scale: 1:7,000 100 50 0 100  Metres				 TETRA TECH EBA	
FILE NO. ENVIND03979_FIG2.mxd					
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2n
OFFICE TtEBA-CAL	DATE March 17, 2016				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- - - 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing




NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

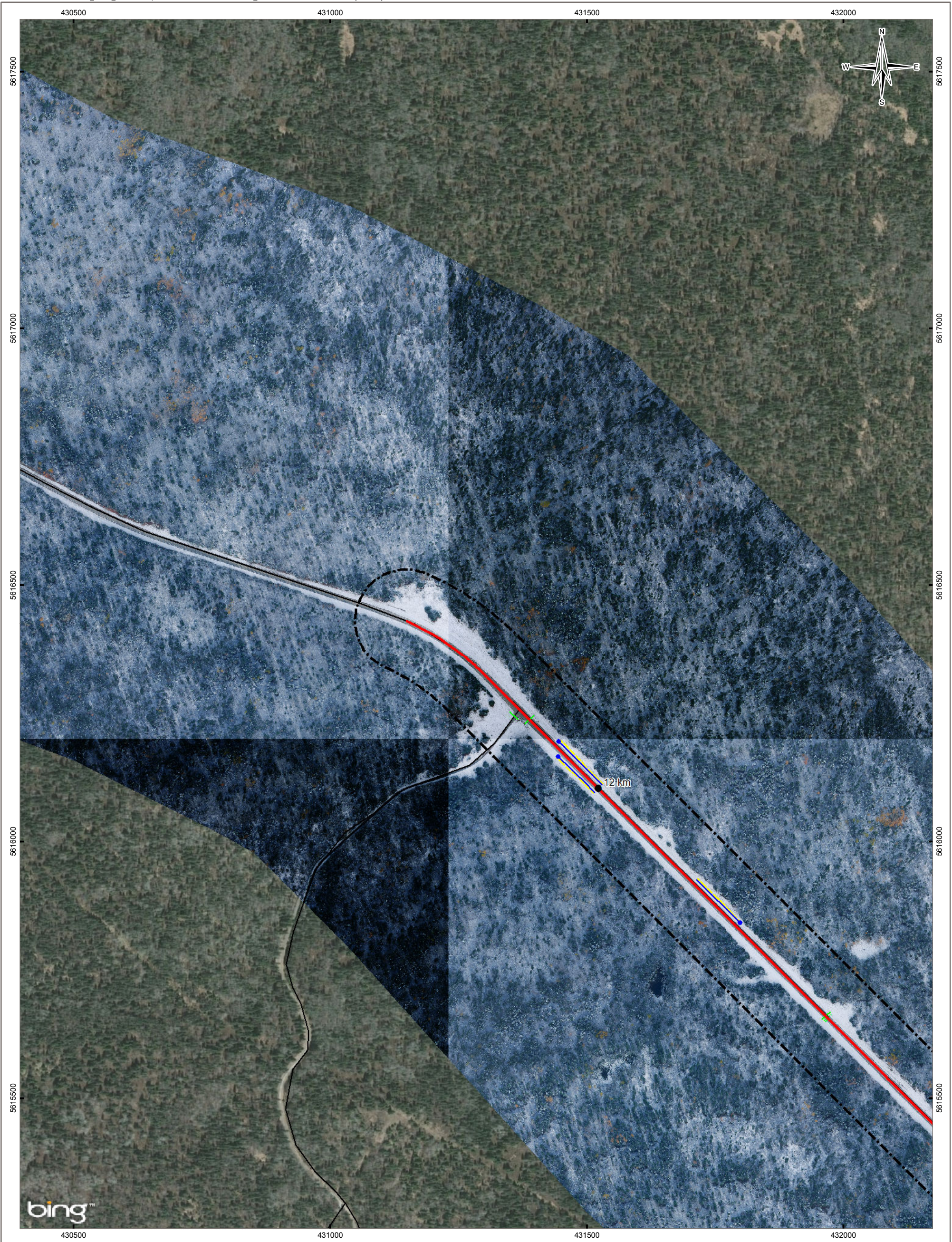
STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT 	
<div>Scale: 1:7,000</div> <div>100 50 0 100</div> <div></div> <div>Metres</div>				 TETRA TECH EBA	
FILE NO. ENVIND03979_FIG2.mxd					
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	Figure 2o
OFFICE Tl EBA-CAL	DATE March 17, 2016				



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
 - Bottom of Ditch
 - Top of Ditch
 - Clearing and Grubbing





NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

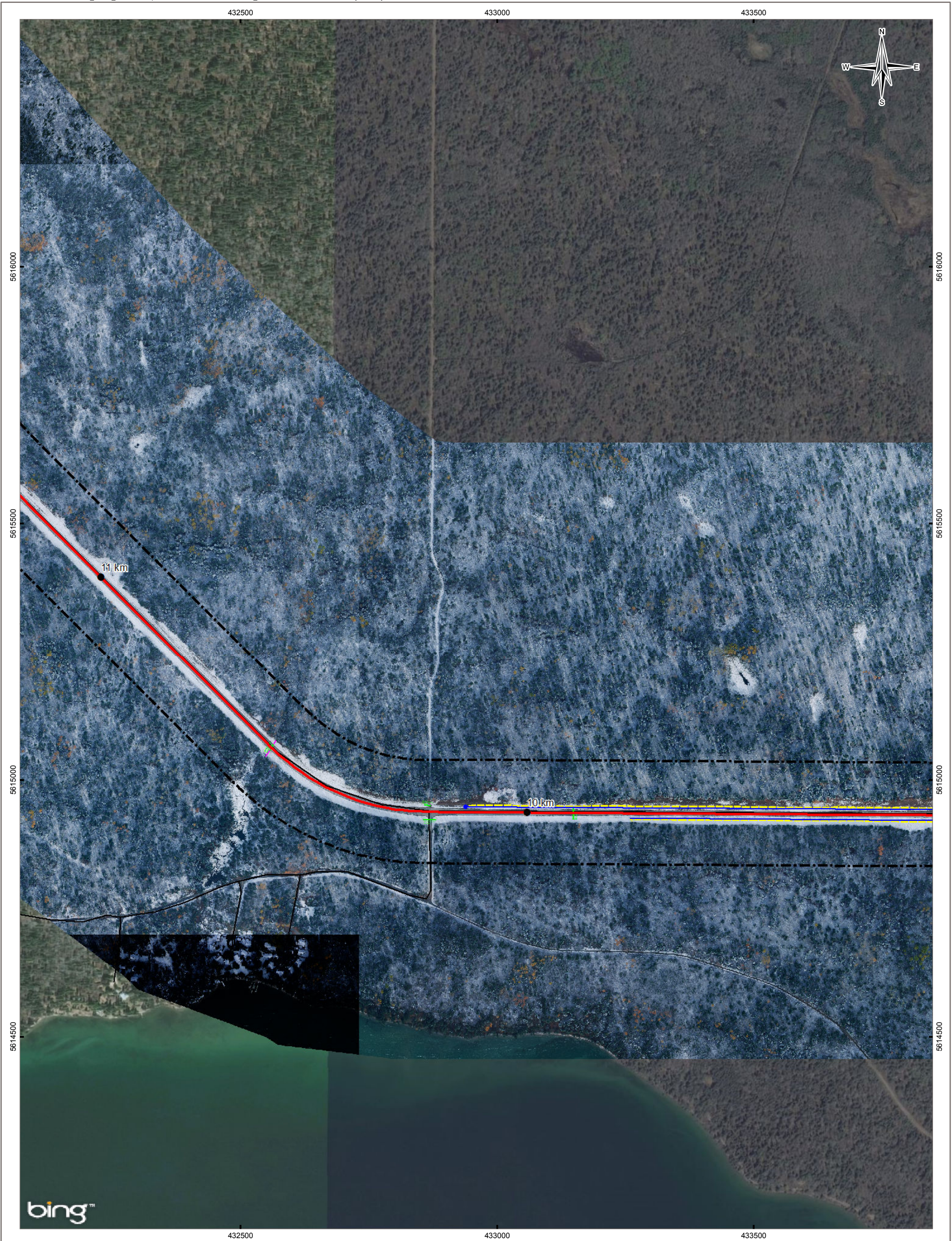
STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT   Tetra Canada  TETRA TECH EBA
Scale: 1:7,000 100 50 0 100  Metres		FILE NO. ENVIND03979_FIG2.mxd		
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tl EBA-CAL	DATE March 17, 2016		Figure 2r	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


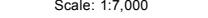

NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT  Parks Canada Parcs Canada	
<p>Scale: 1:7,000</p> <p>100 50 0 100</p>  <p>Metres</p>					
FILE NO. ENVIND03979_FIG2.mxd					
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	 TETRA TECH EBA
OFFICE Tt EBA-CAL	DATE March 17, 2016				
Figure 2s					



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- - - 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

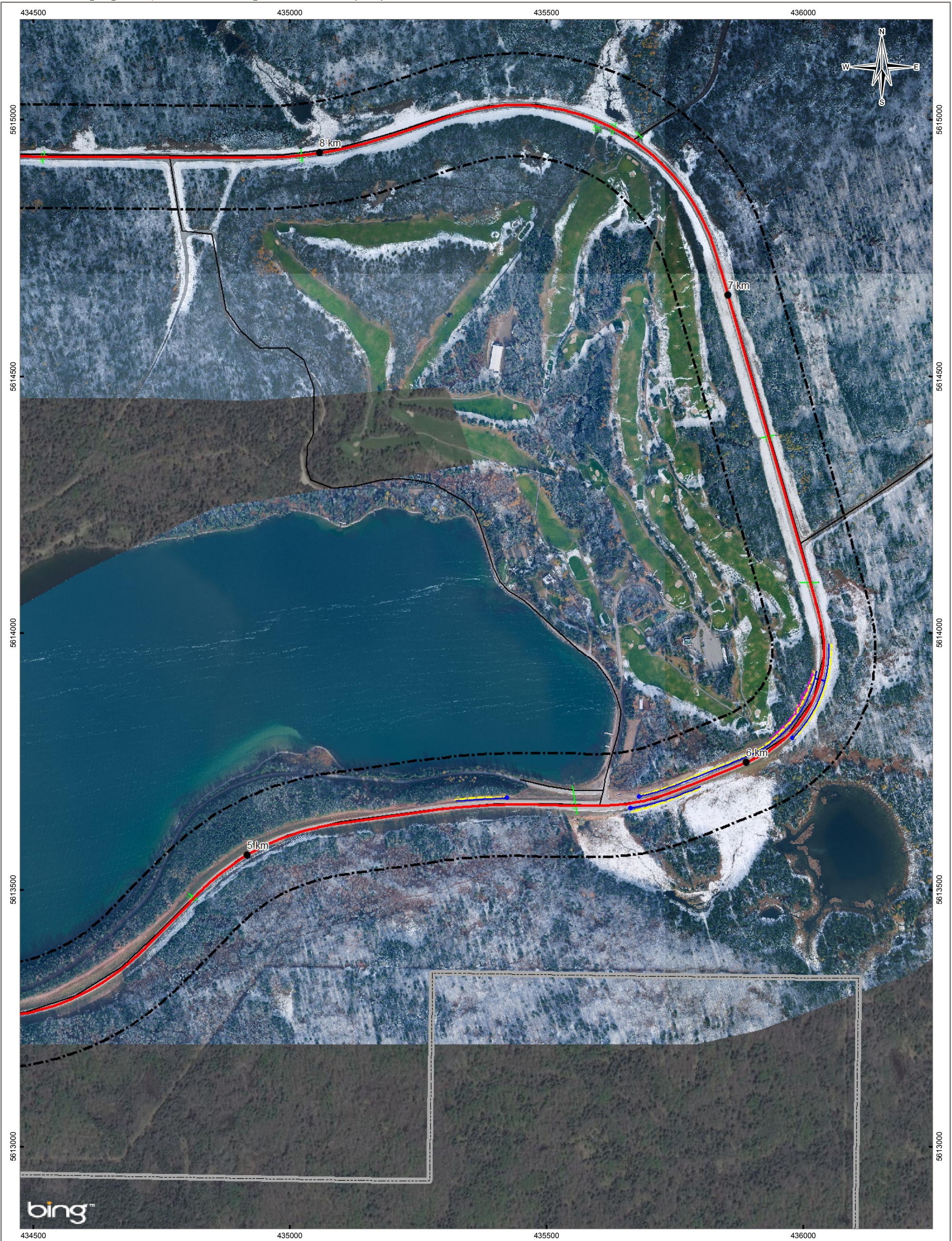
STATUS
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT 	
Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		Tt TETRA TECH EBA	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tt EBA-CAL		DATE March 17, 2016		Figure 2t	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans
 - Bottom of Ditch
 - Top of Ditch
 - Clearing and Grubbing


NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

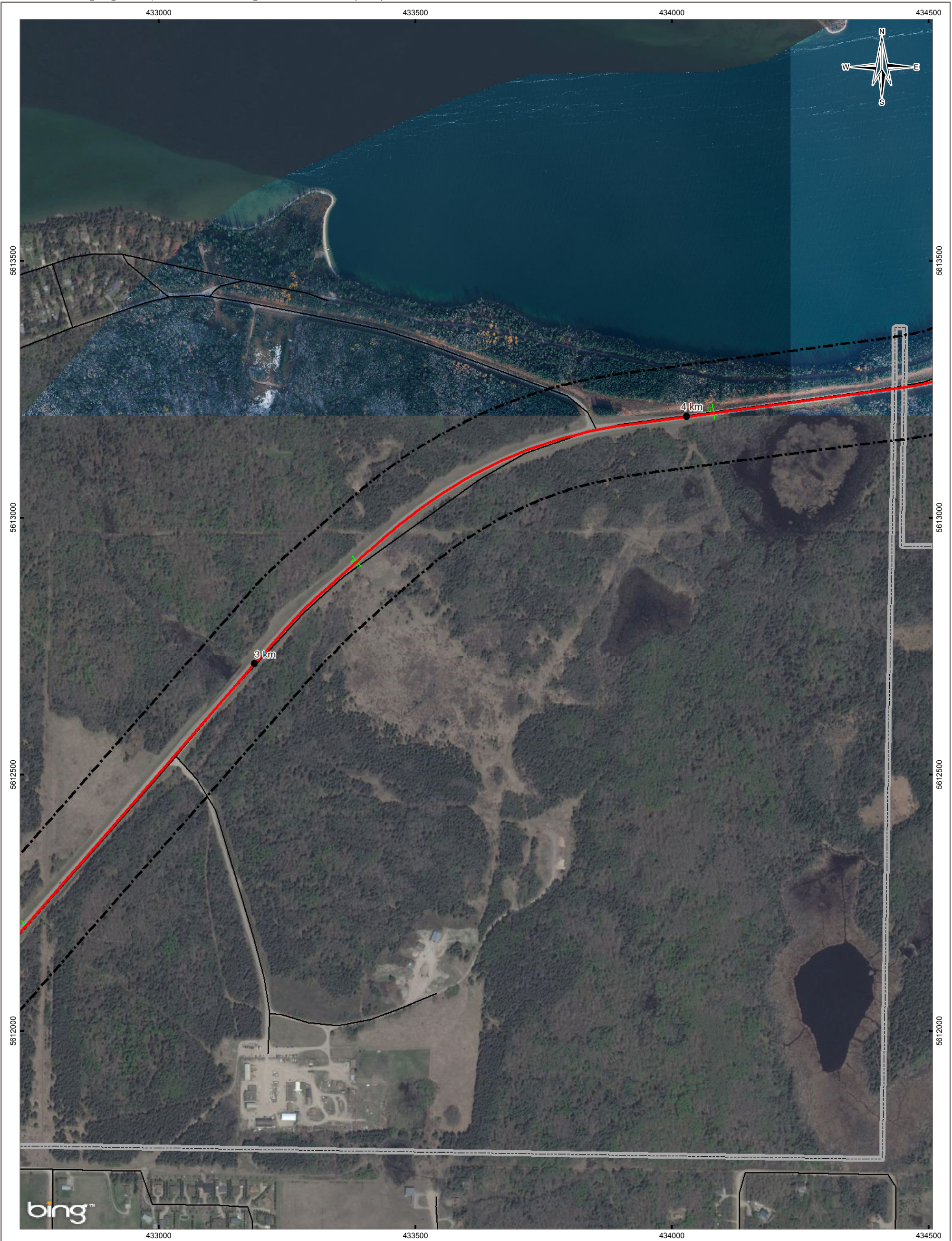
STATUS
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT 	
Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		Tetra Tech EBA	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE TlEBA-CAL		DATE March 17, 2016		Figure 2u	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT 	
Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		Tt TETRA TECH EBA	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tt EBA-CAL		DATE March 17, 2016		Figure 2v	



LEGEND

- KM Marker
- Highway 10 (within Park Limits)
- Road
- Riding Mountain National Park Boundary
- - - 100m Buffer
- Construction Plans**
- Bottom of Ditch
- Top of Ditch
- Clearing and Grubbing


NOTES
Base data source:
CanVec+ (1:50,000), Geobase
Imagery provided by McElhanney
and Bing Imagery Services

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Overview

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT  TETRA TECH EBA	
Scale: 1:7,000 100 50 0 100 Metres		FILE NO. ENVIND03979_FIG2.mxd		Figure 2w	
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE TlEBA-CAL		DATE March 17, 2016			



LEGEND

●

KM Marker

—

Highway 10 (within Park limits)

●

Broadleaf

●

Coniferous

●

Fen

●

Marsh

●

Mixedwood

●

Open / Disturbed

●

Swamp

■

Broadleaf

■

Coniferous

■

Fen

■

Marsh

■

Mixedwood

■

Open / Disturbed

■

Open Water

■

Swamp

Project Area (100m)

Riding Mountain National Park Boundary

NOTES

Alignment and KM Markers from McElhanney Consulting Services Ltd. Imagery from Bing

STATUS

ISSUED FOR USE

3a

3b

3c

3d

3e

HIGHWAY 10 REHABILITATION

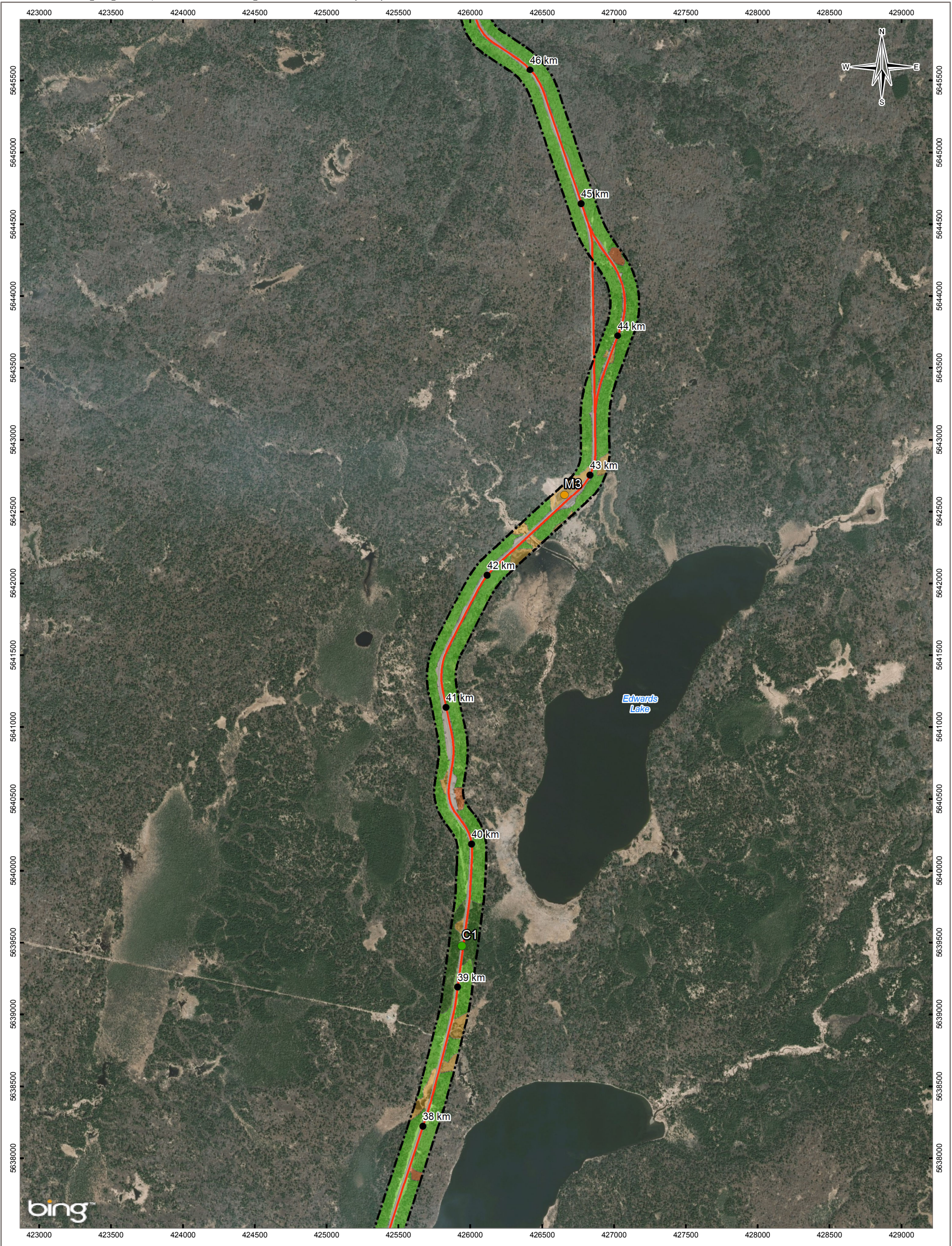
BIOPHYSICAL IMPACT ASSESSMENT

Land Cover Mapping and

Vegetation Assessment Locations

PROJECTION	UTM Zone 14	DATUM	NAD83	CLIENT	<div><div><div><div></div><div>Parks Canada</div></div></div></div>				
FILE NO.	ENVIND03979_FIG3.mxd				<div><div><div><div></div><div>TETRA TECH EBA</div></div></div></div>				
PROJECT NO.	ENVIND03979-01	DWN	BB	CKD	MS	APVD	TC	REV	0
OFFICE	TtEBA-CAL	DATE	March 17, 2016						

Figure 3a



LEGEND

●

KM Marker

—

Highway 10 (within Park limits)

●

Broadleaf

●

Coniferous

●

Fen

●

Marsh

●

Mixedwood

●

Open / Disturbed

●

Swamp

■

Broadleaf

■

Coniferous

■

Fen

■

Marsh

■

Mixedwood

■

Open / Disturbed

■

Open Water

■

Swamp

Project Area (100m)

Riding Mountain National Park Boundary

3a

3b

3c

3d

3e

NOTES

Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS

ISSUED FOR USE

HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Land Cover Mapping and
Vegetation Assessment Locations

PROJECTION

UTM Zone 14

DATUM

NAD83

CLIENT

Parks Canada

Parks Canada

FILE NO.

ENVIND03979_FIG3.mxd

PROJECT NO.

ENVIND03979-01

OFFICE

Tl EBA-CAL

DWN

BB

CKD

MS

APVD

TC

REV

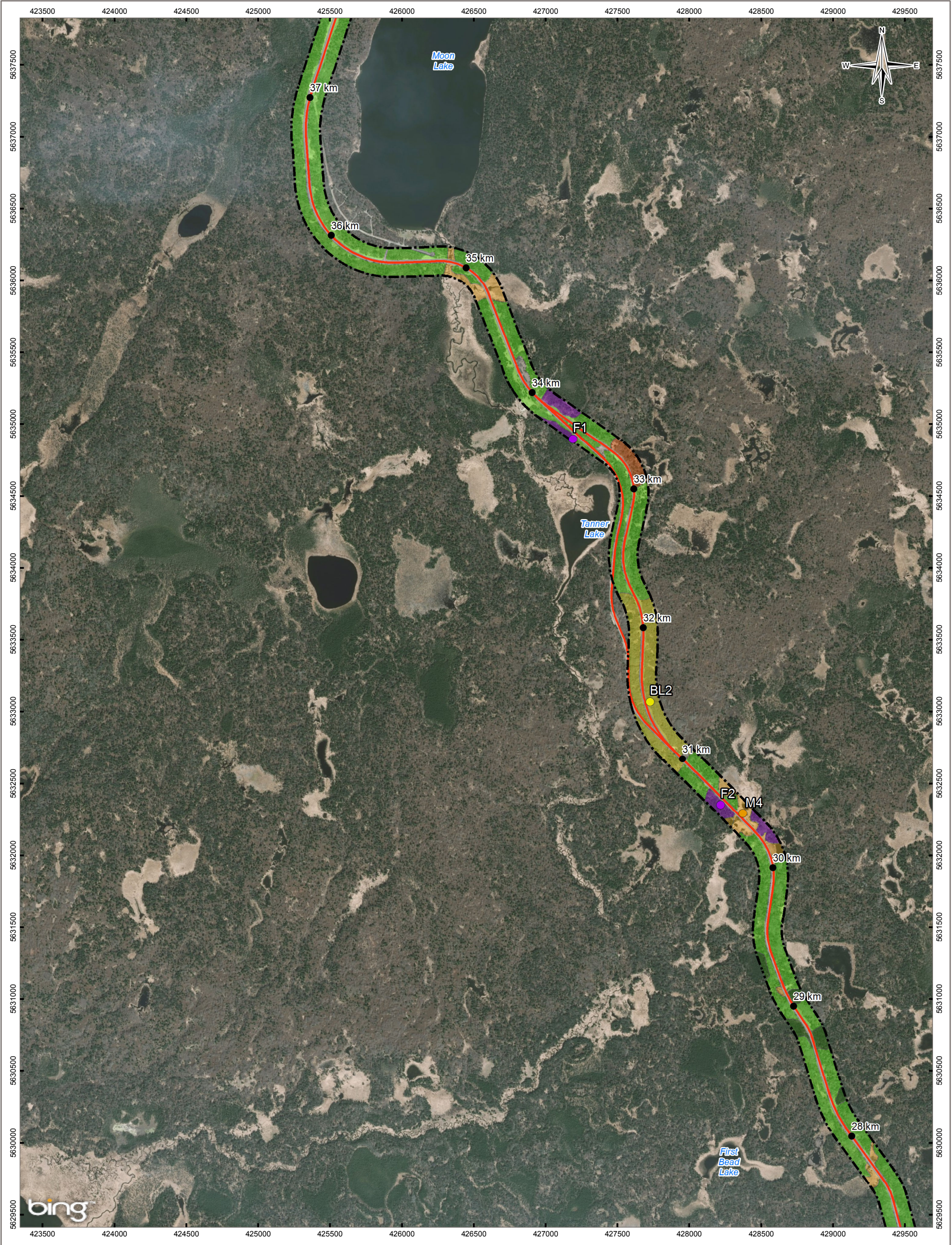
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DATE

March 17, 2016

TETRA TECH EBA

Figure 3b



LEGEND

●

KM Marker

—

Highway 10 (within Park limits)

Vegetation Assessment Location

●

Broadleaf

●

Coniferous

●

Fen

●

Marsh

●

Mixedwood

●

Open / Disturbed

●

Swamp

■

Broadleaf

■

Coniferous

■

Fen

■

Marsh

■

Mixedwood

■

Open / Disturbed

■

Open Water

■

Swamp

Project Area (100m)

Riding Mountain National Park Boundary

3a

3b

3c

3d

3e

NOTES

Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS

ISSUED FOR USE

HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

Land Cover Mapping and
Vegetation Assessment Locations

PROJECTION

UTM Zone 14

DATUM

NAD83

CLIENT

Parks Canada

Parks Canada

FILE NO.

ENVIND03979_FIG3.mxd

PROJECT NO.

ENVIND03979-01

OFFICE

TL EBA-CAL

DWN

BB

CKD

MS

APVD

TC

REV

0

DATE

March 17, 2016

TETRA TECH EBA

Figure 3c

- KM Marker

- Vegetation Assessment Location**

 - KM Marker
 - Highway 10 (within Park limits)
 - Broadleaf
 - Coniferous
 - Fen
 - Marsh
 - Mixedwood
 - Open / Disturbed
 - Swamp

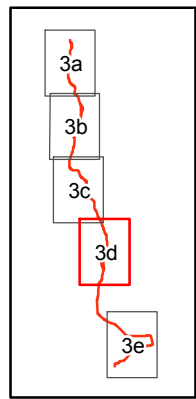
Project Area (100m)

Riding Mountain National Park Boundary

NOTES
Alignment and KM Markers from McElhanney Consulting Services
Imagery from Bing

NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION BIOPHYSICAL IMPACT ASSESSMENT

Land Cover Mapping and Vegetation Assessment Locations


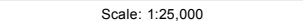
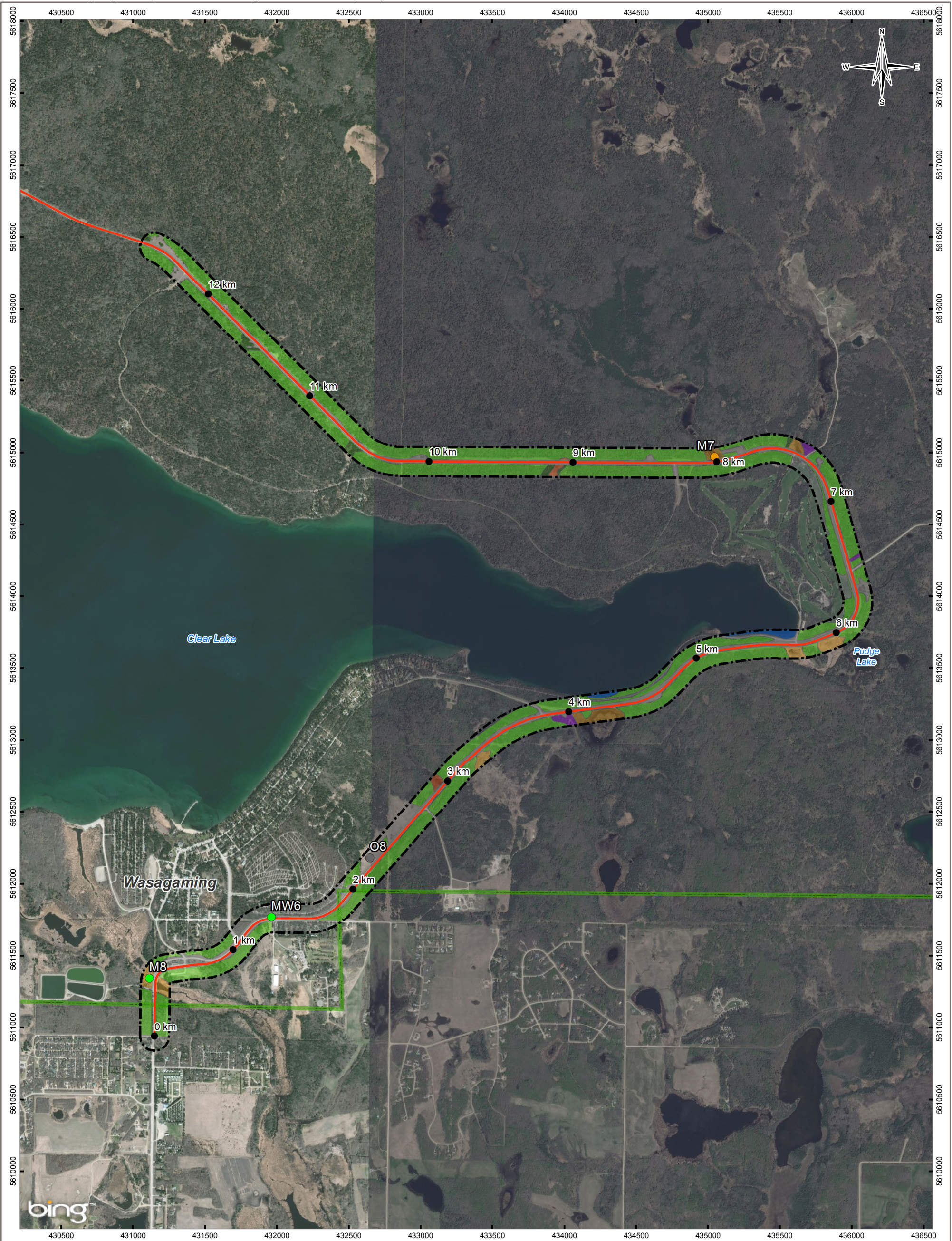
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Scale: 1:25,000 500 250 0 500  Metres				
FILE NO. ENVIND03979_FIG3.mxd				
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tt EBA-CAL		DATE March 17, 2016		

Figure 3d

Figure 3d



LEGEND

●

KM Marker

—

Highway 10 (within Park limits)

●

Broadleaf

●

Coniferous

●

Fen

●

Marsh

●

Mixedwood

●

Open / Disturbed

●

Swamp

■

Broadleaf

■

Coniferous

■

Fen

■

Marsh

■

Mixedwood

■

Open / Disturbed

■

Open Water

■

Swamp

Project Area (100m)

Riding Mountain National Park Boundary

3a

3b

3c

3d

3e

PROJECT NO.

ENVIND03979-01

OFFICE

TlEBA-CAL

DWN

BB

CKD

MS

APVD

TC

REV

0

DATE

March 17, 2016

PROJECTION

UTM Zone 14

DATUM

NAD83

Scale: 1:25,000

500

250

0

500

Metres

CLIENT

Parks Canada

Tt

TETRA TECH EBA

Figure 3e

NOTES

Alignment and KM Markers from McElhanney Consulting Services Ltd. Imagery from Bing

STATUS

ISSUED FOR USE



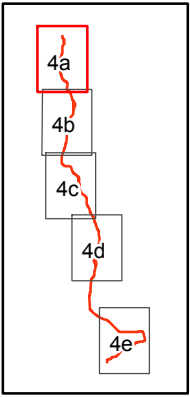
LEGEND

- KM Marker
- Highway 10 (within Park limits)
- - - Project Area (100m Buffer)
- ▭ Riding Mountain National Park Boundary
- June 2015 Observations**
- ▲ Barn Swallow Nest
- Barn Swallow Observation
- Canada Warbler Observation
- Golden-winged Warbler Observation
- Northern Leopard Frog Observation

- Historical Observations**
- ◆ Historical Golden-winged Warbler Observation
 - ◆ Historical Chimney Swift Observation
 - ◆ Historical Canada Warbler Observation
 - ◆ Historical Sprague's Pipit Observation
 - ◆ Historical Nothern Leopard Frog Observation
- Salt Lick Locations and Activity**
- ★ Low
 - ★ Moderate
 - ★ High





NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

2015 Wildlife Results

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT   Tetra Canada  Tetra Canada	
Scale: 1:25,000 500 250 0 500  Metres					
FILE NO. ENVIND03979_FIG4.mxd					
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tl EBA-CAL		DATE April 8, 2016			Figure 4a



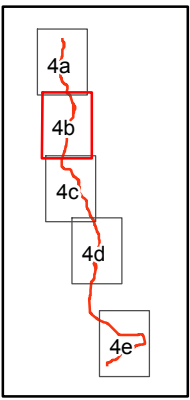
LEGEND

- KM Marker
- Highway 10 (within Park limits)
- - - Project Area (100m Buffer)
- - - Riding Mountain National Park Boundary
- June 2015 Observations**
- ▲ Barn Swallow Nest
- Barn Swallow Observation
- Canada Warbler Observation
- Golden-winged Warbler Observation
- Northern Leopard Frog Observation

- Historical Observations**
- ◆ Historical Golden-winged Warbler Observation
 - ◆ Historical Chimney Swift Observation
 - ◆ Historical Canada Warbler Observation
 - ◆ Historical Sprague's Pipit Observation
 - ◆ Historical Nothern Leopard Frog Observation
- Salt Lick Locations and Activity**
- ★ Low
 - ★ Moderate
 - ★ High




NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

2015 Wildlife Results

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT 	
Scale: 1:25,000 500 250 0 500  Metres				 TETRA TECH EBA	
FILE NO. ENVIND03979_FIG4.mxd					
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC		
OFFICE Tt EBA-CAL		DATE April 8, 2016		Figure 4b	



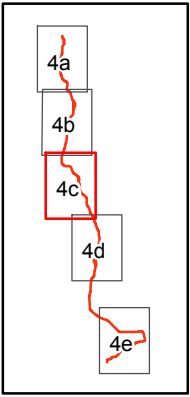
LEGEND

- KM Marker
- Highway 10 (within Park limits)
- - - Project Area (100m Buffer)
- ▭ Riding Mountain National Park Boundary
- June 2015 Observations**
- ▲ Barn Swallow Nest
- Barn Swallow Observation
- Canada Warbler Observation
- Golden-winged Warbler Observation
- Northern Leopard Frog Observation

- Historical Observations**
- ◆ Historical Golden-winged Warbler Observation
 - ◆ Historical Chimney Swift Observation
 - ◆ Historical Canada Warbler Observation
 - ◆ Historical Sprague's Pipit Observation
 - ◆ Historical Nothern Leopard Frog Observation
- Salt Lick Locations and Activity**
- ★ Low
 - ★ Moderate
 - ★ High




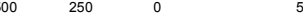

NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
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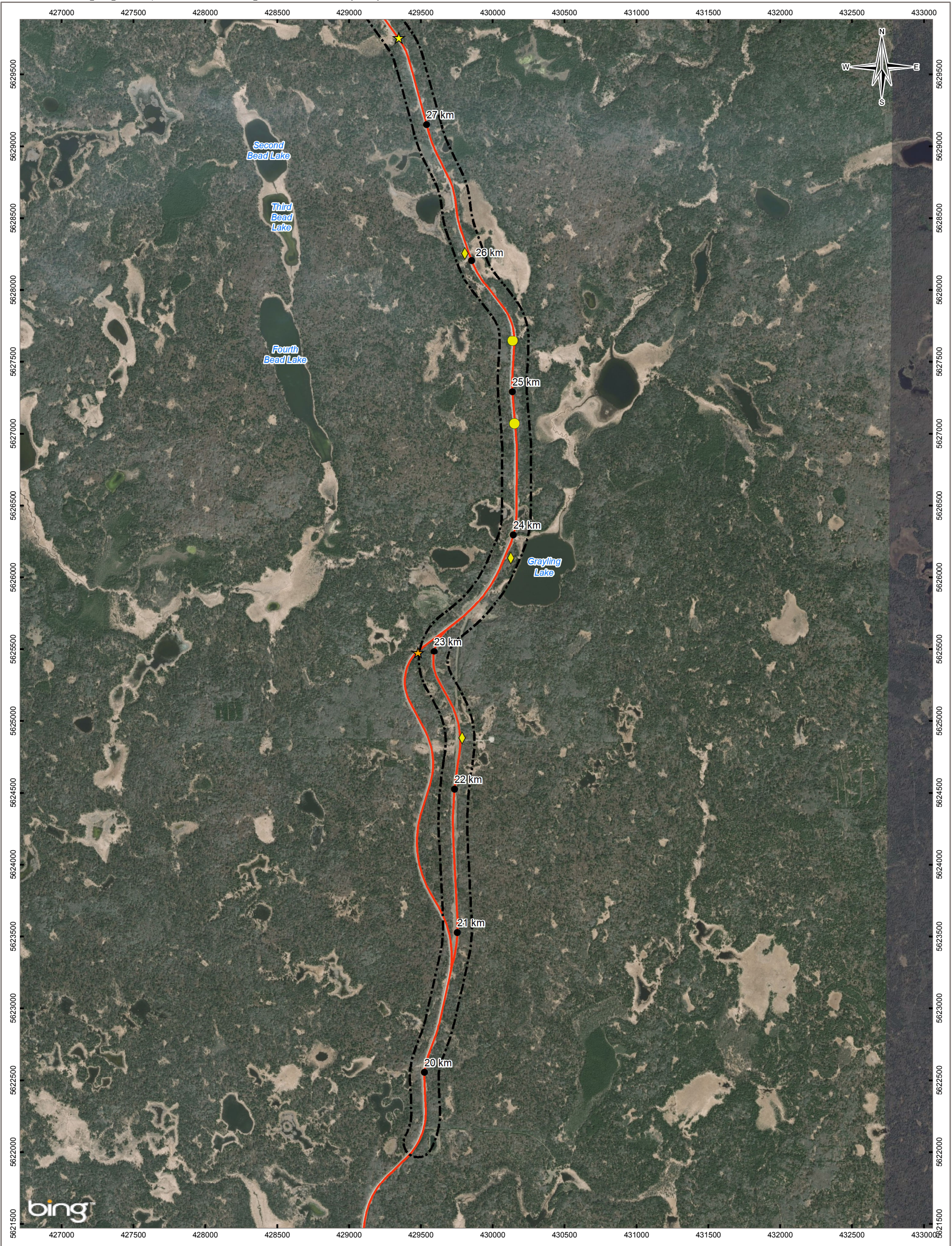
STATUS
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HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

2015 Wildlife Results

PROJECTION UTM Zone 14		DATUM NAD83		CLIENT   Tetra Canada  Tetra Canada	
Scale: 1:25,000 500 250 0 500  Metres					
FILE NO. ENVIND03979_FIG4.mxd					
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tl EBA-CAL		DATE April 8, 2016		 TETRA TECH EBA	
Figure 4c					



LEGEND

- KM Marker
- Highway 10 (within Park limits)
- - - Project Area (100m Buffer)
- ▭ Riding Mountain National Park Boundary
- June 2015 Observations**
- ▲ Barn Swallow Nest
- Barn Swallow Observation
- Canada Warbler Observation
- Golden-winged Warbler Observation
- Northern Leopard Frog Observation

Historical Observations

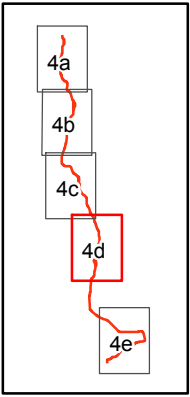
- ◆ Historical Golden-winged Warbler Observation
- ◆ Historical Chimney Swift Observation
- ◆ Historical Canada Warbler Observation
- ◆ Historical Sprague's Pipit Observation
- ◆ Historical Nothern Leopard Frog Observation

Salt Lick Locations and Activity

- ★ Low
- ★ Moderate
- ★ High

NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS
ISSUED FOR USE



HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

2015 Wildlife Results




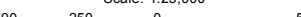

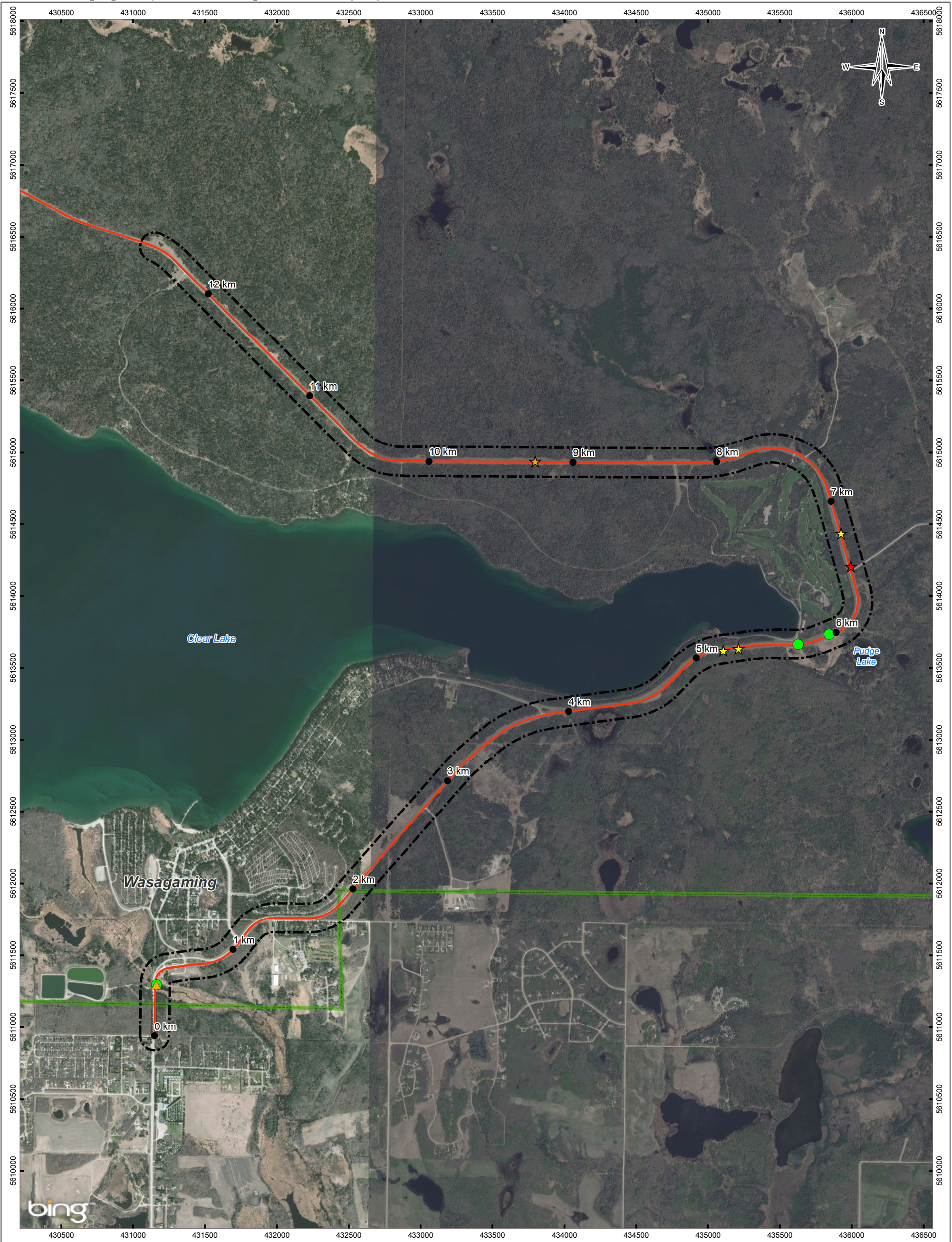
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Scale: 1:25,000 500 250 0 500  Metres					
FILE NO. ENVIND03979_FIG4.mxd					
PROJECT NO. ENVIND03979-01	DWN BB	CKD MS	APVD TC	REV 0	 Figure 4d
OFFICE Tl EBA-CAL	DATE April 8, 2016				

Figure 4d



LEGEND

- KM Marker
- Highway 10 (within Park limits)
- Project Area (100m Buffer)
- ▭ Riding Mountain National Park Boundary
- June 2015 Observations**
- ▲ Barn Swallow Nest
- Barn Swallow Observation
- Canada Warbler Observation
- Golden-winged Warbler Observation
- Northern Leopard Frog Observation

- Historical Observations**
- ◆ Historical Golden-winged Warbler Observation
 - ◆ Historical Chimney Swift Observation
 - ◆ Historical Canada Warbler Observation
 - ◆ Historical Sprague's Pipit Observation
 - ◆ Historical Nothern Leopard Frog Observation
- Salt Lick Locations and Activity**
- ★ Low
 - ★ Moderate
 - ★ High

NOTES
Alignment and KM Markers from
McElhanney Consulting Services Ltd.
Imagery from Bing

STATUS
ISSUED FOR USE

HIGHWAY 10 REHABILITATION
BIOPHYSICAL IMPACT ASSESSMENT

2015 Wildlife Results



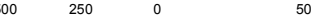

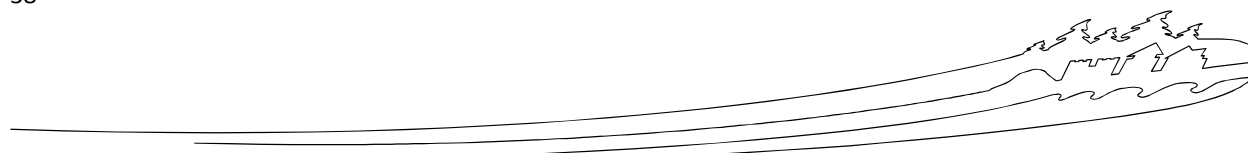
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Scale: 1:25,000 500 250 0 500  Metres					
FILE NO. ENVIND03979_FIG4.mxd					
PROJECT NO. ENVIND03979-01		DWN BB	CKD MS	APVD TC	REV 0
OFFICE Tl EBA-CAL		DATE April 8, 2016		 TETRA TECH EBA	

Figure 4e



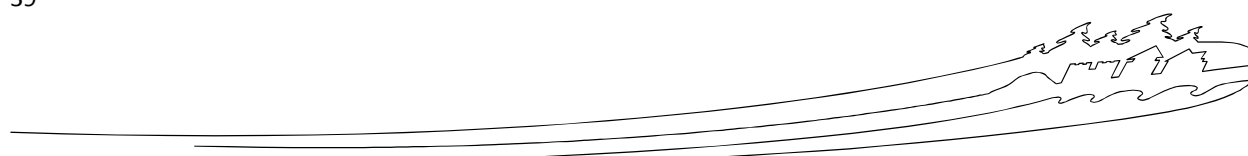
19. REFERENCES

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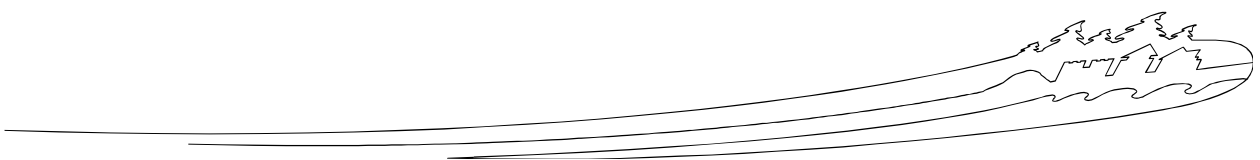
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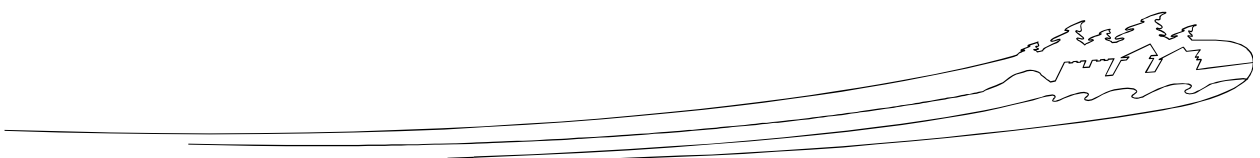
Appendix 1 Environmental Impact Analysis Tools: Effects Identification Matrix

A. Direct Effects								
			Valued components potentially directly affected by the proposed project					
			Natural Resources				Cultural Resources	
			Air & Noise	Soil & Landforms	Water	Flora	Fauna	Visitor Experience
	Phase	Activities						
Project Components	Preparation / Construction	Staging and Laydown	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Asphalt Production and Handling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Concrete Handling	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Paving, Resurfacing, and Grading	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Barriers and Guardrails	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Vegetation Removal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Drainage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Waste Disposal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Operation	Pavement surface management,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Ditch, culvert and drainage management,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Snow and ice control, and	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Roadside vegetation management	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>





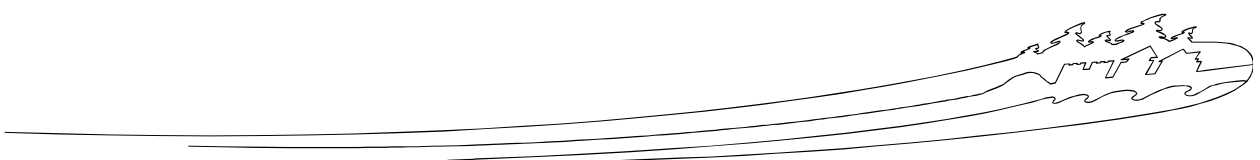
B. Indirect Effects (all phases)							
		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:		With respect to visitor experience		
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommod'n opportunities	Safety
Phase	Natural resource components affected by the project						
Preparation /construction operation/implementation/decommissioning	Could impacts to <u>air and noise</u> lead to adverse effects on...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>soils and landforms</u> lead to adverse effects on...	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Could impacts to <u>water</u> (e.g. surface, ground water and water crossings) lead to adverse effects on...	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>flora</u> (including SAR) lead to adverse effects on...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Could impacts to <u>fauna</u> (including SAR) lead to adverse effects on...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



April 2016



Appendix 2: Critical Habitat Destruction Analysis Form





Critical Habitat Destruction Analysis

Part A - General Information					
Date this document was completed:	Where this activity will occur: (i.e., PCA site)	SAR (En, Th, Ex) implicated by this activity:	Title of proposed project (e.g., Trail development in Blue Meadow):	Author of this Document:	Collaborators involved in drafting this document:
	Highway 10-Riding Mountain National Park	Golden Winged Warbler (<i>Vermivora chrysoptera</i>)	<i>Highway 10 Pavement Rehabilitation-Riding Mountain National Park Phase II, III & IV</i>	Shannon Landels, Resource Management Officer	Joanne Tuckwell, Species Conservation Specialist

Part B – Determining whether the proposed activity(ies) <u>affects</u> critical habitat
1. For the implicated SAR listed in Part A, does the proposed activity(ies) affect habitat within a bounding polygon of critical habitat identified in a recovery strategy or action plan? <ul style="list-style-type: none"> Keep in mind that, in some cases, activities occurring outside of a bounding polygon can affect habitat within the polygon.
<input type="checkbox"/> No. The proposed activity(ies) will not affect habitat within a bounding polygon of critical habitat. Critical habitat is not affected. No need to continue with analysis. Check the first box in Part D and attach this analysis form to your assessment document.
<input checked="" type="checkbox"/> Yes. The proposed activity(ies) will affect habitat within a bounding polygon of critical habitat for one or more SAR. Continue to Question 2.
2. Does the habitat meet the biophysical attributes of critical habitat for the implicated SAR listed in Part A, as described in the recovery strategy or action plan for the species? <ul style="list-style-type: none"> A site survey may be required to determine the biophysical attributes of the affected habitat.
<input type="checkbox"/> No. The habitat does not meet the biophysical attributes of critical habitat for any of the implicated SAR; the affected habitat is not critical habitat. No need to continue with analysis. Check the first box in Part D and attach this analysis form to your assessment document.
<input checked="" type="checkbox"/> Yes. The habitat meets the biophysical attributes of critical habitat. The affected habitat IS critical habitat for one or more SAR. For each affected SAR describe the biophysical attributes that are affected and continue to Part C of this analysis when completing the <i>Residual Adverse Effects</i> section of your assessment. <p>The project proposes to clear trees and understory in a forest landscapes which are considered suitable habitat for Golden Winged Warbler (GWW). Some areas noted for clearing and grubbing in the Project area meet the composition of “50-75% forest cover that is composed of at least 50% deciduous and</p>



contain less than 30% coniferous forest cover.” (Environment Canada 2014) All areas are located adjacent to Hwy 10, which along with ditch vegetation meets the criteria of an open/shrub habitat thus incorporating the proposed clearing into the biophysical attributes of critical habitat (defined by an interface with the open/shrub that extends 200m into the forest component) and confirmed in some locations by species observations.

☐ **Uncertain.** The habitat may meet the biophysical attributes of critical habitat. The affected habitat MAY BE critical habitat for one or more SAR. **For each affected SAR describe the biophysical attributes that may be affected and continue to Part C of this analysis when completing the *Residual Adverse Effects* section of your assessment.**

Part C – Determining whether the proposed activity(ies) is/are likely to destroy critical habitat

3. For each implicated SAR, what is the *ecologically relevant area* (ERA) for assessing destruction of critical habitat for the species?

- Destruction determinations will be conducted at a spatial scale that is ecologically relevant for the species (e.g. local population unit, average home range size) and that is appropriate based on the information available and the biology/ecology of the species. The approach used to describe critical habitat in the recovery strategy or action plan may be useful towards making the determination of ERA.
- Once a species' ERA has been determined for your protected heritage place, it must remain the same for each project, unless new ecological information leads to an updated ERA determination.

The ERA (ecologically relevant area) for GWW in Riding Mountain National Park (RMNP) has been determined based on an estimate of the total amount of GWW critical habitat within the park boundary. The GWW critical habitat area estimate for RMNP was developed using a GIS model of vegetation characteristics throughout the park and is explained in the following document: (*This is an interim model and its limitations should be noted as presented in the document.)

Landels, Shannon and Sean Frey. 2016. Analysis of Residual Effects to Golden Winged Warbler Critical Habitat: Protocol for Riding Mountain National Park. Riding Mountain National Park, MB.

As defined in the document, the most recent model shows potential GWW critical habitat for RMNP at approximately 1,200 km² and is illustrated in Appendix I. Note that this is greater than what the recovery strategy estimates as the amount of critical habitat in that area of Manitoba. (see Footnote #1)

4. For each implicated SAR, what percentage/amount of critical habitat within the ERA is affected by the proposed activity(ies)?



Percentage of ecologically relevant area to be impacted by the Project was calculated as is discussed in the above mentioned document (Landels and Frey 2016) and is illustrated in Appendix I.

The amount of critical habitat within the ERA affected by the proposed project is approximately 0.038 km² or 0.0032% of the ERA over the remaining three years of the project (Phase II, III, IV).

Critical habitat within Riding Mountain National Park is a component of Focal Area GL1 identified in the Golden Winged Warbler Recovery Strategy. The recovery strategy estimates that this focal area hosts approximately 96,300 ha (963 km²) of critical habitat.¹ In Manitoba, the total estimated critical habitat as per the recovery strategy is 184,900 ha (1849 km²).

The percentage of critical habitat within Focal Area GL1 affected by the proposed project is 0.0039%.

The percentage of critical habitat within Manitoba affected by the proposed project is 0.0021%.

5. What are the components of the species' life process(es) that the affected critical habitat supports?

The components of the species's life process(es) that the affected critical habitat may support are:

- Nesting
- Foraging
- Movement
- Mating

6. Does the project impact the ability of critical habitat in the ERA to support those life processes listed in Question 5?

The project activities are noted as a "Permanent Habitat Loss or Conversion" as defined by "Activities Likely to Destroy Critical Habitat" since habitat is to be incorporated into the established ditch area where maintenance activities will not allow for significant regrowth. The habitat features associated with this conversion would be loss of perching structures, herbaceous layer, dense shrub and forest component through:

- Permanent removal of vegetation associated with forest and nesting/foraging components. This includes indirect and accidental damage to adjacent vegetation through construction activities including clearing, grubbing, excavation etc.

After taking into account the affects to habitat as described above, it is determined the remaining critical habitat will still be able to support the species life processes when needed based on the following considerations:

¹ The total amount of critical habitat for the entire Focal Area GL1 estimated in the recovery strategy is represented as less than what is estimated for Riding Mountain National Park alone (963 km² vs 1200 km² for RMNP). This may be due to two factors; 1) an underestimating of critical habitat by the recovery strategy which can be inferred based on locations in RMNP with Golden Winged Warbler observations and suitable habitat that were not identified in recovery strategy layers and 2) an overestimating of critical habitat in RMNP due to limitations of the RMNP model as explained in the protocol. Both factors are due to the lack of an up to date, applicable and consistent vegetation model for the Golden Winged Warbler habitat; a hindrance that has been acknowledged and RMNP is working towards addressing.



- The amount and type of vegetation to be removed from the project area is not expected to affect the composition or coniferous/deciduous ratio of the surrounding forest landscape and thus not expected to have an effect on the remaining habitat's suitability. The remaining critical habitat within the ERA will still provide the function needed to support the species in RMNP.
- The project does not contribute to the potential for impact by man-made structures. The small size of clearing does not suggest any impact on migration routes, nor will it encompass a significant enough area to suggest habitat fragmentation for this species. It should be noted that the clearing is to take place at an average 5m deep in association with edge habitat along the Highway corridor which may promote an open/ forest interface. GWW observations have been confirmed in these interface areas along the Highway.
- Increased parasitism by Brown-headed Cowbirds (*Molothrus ater*) has been shown to be positively correlated to early stage successional habitat (a growth of herbaceous layer above median for the site) associated with disturbance. (Confer 2003) However, this does not seem to be a factor of significant concern for this project because the vegetation removal is maintained and thus no regrowth to facilitate this condition above pre construction conditions is expected.
- The areas proposed for clearing will not significantly reduce the amount of critical habitat available within RMNP, focal area GL1 or the province of Manitoba.

Overall the extremely small area proposed for clearing should not be considered to compromise the ability of critical habitat to support Golden Winged Warbler's life process(es) when needed within Riding Mountain National Park or the Manitoba Focal Area.

Part D – Critical Habitat Destruction Decision

☐ **Project activities do not take place in, or otherwise impact, critical habitat.** There is likely no chance of project activities affecting critical habitat. **Attach this form to your assessment document.**

☒ **No destruction of critical habitat.** Although a small amount of critical habitat is degraded by this activity, the habitat function being impacted is still supported by the critical habitat at the relevant spatial scale for the implicated SAR. Therefore this activity will not destroy critical habitat. **Attach this form to your assessment document.**

☐ **Destruction of critical habitat.** Due to this activity, the function of the habitat being impacted is not supported at the relevant spatial scale for one or more SAR. Therefore this activity will destroy the critical habitat. **SARA Authorization will be required for your proposed project. Complete the SARA-Compliant Authorization Decision Form², checking off the "Yes" box in Question 1, Part A of the form. Attach this form to your assessment document.**

Definition of Destruction of Critical Habitat³

² <http://intranet2/our-work/natural-resource-conservation-branch-test/species-at-risk-program/sara-authorizations/>

³ Based on: Government of Canada. 2009. *Species at Risk Act Policies, Overarching Policy Framework. SARA Policies and Guidelines Series. Draft.*



Destruction is determined on a case by case basis. Destruction would result if a portion of the critical habitat were degraded, either permanently or temporarily, by activities occurring either internal or external to the critical habitat, such that the habitat function provided by the degraded portion is no longer available to the species when needed. Destruction may result from a single or multiple activities at one point in time or from cumulative effects of one or more activities over time.

References:

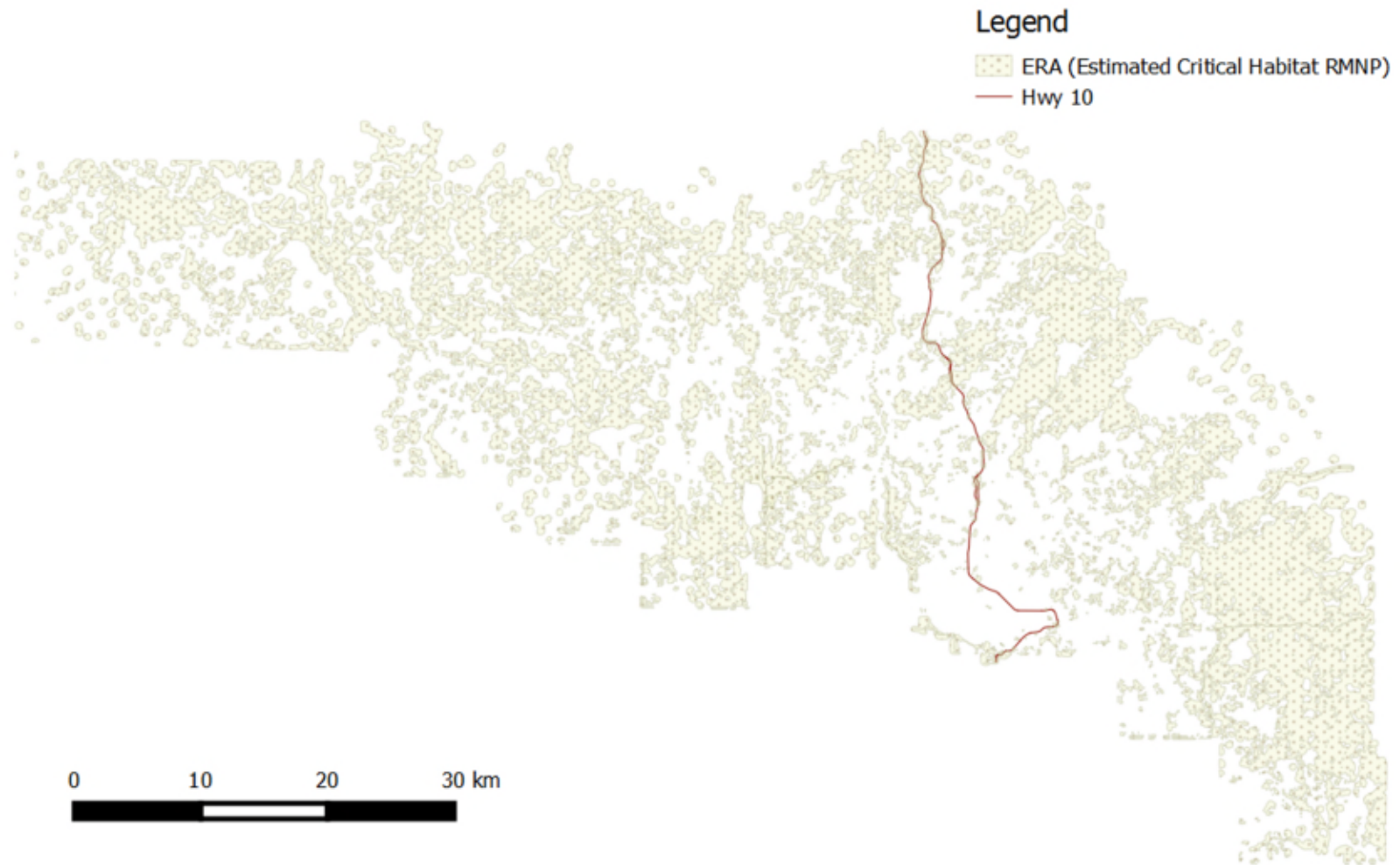
Confer, John L. et al. 2003. Effects of Vegetation, Interspecific Competition, and Brood Parasitism on Golden-Winged Warbler (*Vermivora Chrysoptera*) Nesting Success. *The Auk* 120(1); 138-144.

Confer, J. L., P. Hartman, and A. Roth. 2011. Golden-winged Warbler (*Vermivora chrysoptera*). In A. Poole, editor. *Birds of North America*. Number 20. Cornell Laboratory of Ornithology, Ithaca, New York, USA. [online] URL: <http://bna.birds.cornell.edu/bna/species/020/articles/introduction>[http://dx.doi.org/ 10.2173/bna.20](http://dx.doi.org/10.2173/bna.20)

Landels, Shannon and Sean Frey. 2016. Analysis of Residual Effects to Golden Winged Warbler Critical Habitat: Protocol for Riding Mountain National Park. Riding Mountain National Park, MB.



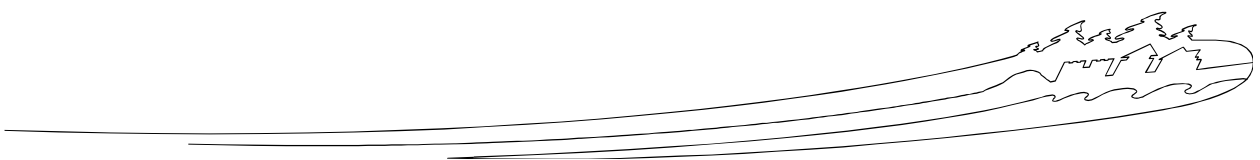
Appendix I: Current Footprint of Hwy 10 in Relation to Ecologically Relevant Area (RMNP Estimated Critical Habitat)



April 2016



Appendix 3: Archaeological Overview Assessment



Archaeological Overview Assessment
Project: Riding Mountain National Park Highway 10 Pavement Rehabilitation and Ditch Grading.
Riding Mountain National Park, Manitoba

Brian Smith (FII)
 Terrestrial Archaeology, IACHD
 April, 2016

Introduction

Highway Engineering Services will be undertaking Highway 10 rehabilitation in Riding Mountain National Park (RMNP) between Km 0 – 12.5 km and km 19.5 – 54 due to present deteriorating conditions. The majority of the proposed rehabilitation/maintenance works involve repair of existing roadway within the existing right of way. In some specific locations, small sections of tree removal, brushing, and/or ditching is proposed. Highway 10 rehabilitation activities began in 2015, when km 12.5 through 19.5 were completed; the areas proposed for rehabilitation in 2016 through 2018 include km 0 – 12.5 and km 19.5 – 54 (herein referred to as “the Project”) (Figure 1).

General and Specific Hwy 10 Project Impacts to Valued Components within RMNP

The Highway 10 rehabilitation project planning for 2016 through 2018 considered effects to the Park’s Valued Components (VCs) in the formulation of *Parks Canada Basic Impact Analysis* (March 2016) based largely on work undertaken in 2015 including:

- Air and Noise;
- Soil & Landforms;
- Water (including fish and fish habitat);
- Flora (including species at risk);
- Fauna (including species at risk);
- Visitor Experience and
- Cultural Resources.

These potential VCs were evaluated to determine if they met the following criteria:

- Potential interaction with the Project (e.g., present or near the Project Sites); and
- Potential to generate stakeholder (e.g., park visitor) or regulator concern.

Based on results of the June 2015 field assessments, consultation with Parks Canada, publicly available information and the professional judgment of the study team, VCs that met one or both of these criteria were carried forward into the impact analysis of this Project. Following the background review of environmental information, the above-mentioned potential VCs were carried forward for evaluation. The Effects Identification Matrix (Appendix 1) was used to identify potential interactions between VCs and the Project. Project activities that may interact with VCs are identified by considering the various components of the works that have potential effect pathways to the receiving environment. For the purpose of the effects assessment, a 100 m buffer was applied to the highway surface. Evaluation of existing conditions, effects, and mitigation include the 100 m buffer.

Hwy 10 Project Impacts to Cultural Resources within RMNP

Cultural resources within Federal Lands are protected under PCA’s Cultural Resource Management Policy (CRMP; PCA 2013c). Under this policy, PCA is required to manage and protect resources that comprise a part of Canada’s heritage. Cultural resources are defined as: human work, an object, or a place that is determined, on the basis of its heritage value, to be directly associated with an important aspect or aspects of human history and culture

(PCA 2013c). The heritage value of a cultural resource is “embodied in tangible and/or intangible character-defining elements”. These resources may be identified and recovered from both surface and subsurface contexts. All ground disturbing activities have the potential to permanently damage these materials; therefore, PCA requires terrestrial archaeological assessments to be completed prior to development to ensure heritage resource protection. Riding Mountain National Park officially opened in 1933. Before this time, the Park’s first visitors utilized terrain stable enough to support the plant and animal resources they required for survival. Such areas included high, dry terrain away from postglacial lakes and ancient waterways and included such features as raised terraces, ridges, and glaciofluvial bars. Multiple cultural groups utilized the region before settlers arrived and the Park was established. The occupation of both pre-contact and post-contact periods are evident in the cultural resource sites inventory as well as the recorded history. These sites range in significance (i.e., low, moderate and high), levels of disturbance (e.g., intact, partially disturbed, destroyed) and recommended mitigative measures (e.g., none, testing, periodic monitoring, archival research). Potential cultural resource sites at, or near, the Project Area include:

- Previously recorded cultural resource sites within RMNP;
- Areas within immediate proximity of several significant water bodies, such as Clear Lake, Moon Lake and Edwards Lake. There is potential for cultural resources to be recovered from terrain features such as banks or terraces associated with these hydrological features, and other water crossings within the development area;
- Topography indicative of moderate or higher archaeological potential;
- Areas of recorded historical significance, inclusive of hunting cabins on the shores of Clear Lake;

Cultural Resources as a Valued Component will be carried forward in the Effects Assessment as a VC because they have the potential to be impacted by the Project. Communications with the RMNP Field Unit and locals will help determine specific locations and impacts (if any) of the Project.

Hwy 10 Project Matrix Analysis of Potential Impacts to Cultural Resources within RMNP

The *Parks Canada Basic Impact Analysis* (March 2016) of the potential impacts to Cultural Resources derived the following:

Construction Phase

- Previously recorded cultural resource sites are located within, or in immediate proximity of the Project Area. Proposed ground disturbances will result from clearing, equipment laydown areas and detour construction and operation.
- The majority of the Project Area is disturbed from past road construction activities. It is anticipated that impacts to undisturbed terrain is negligible.
- Negative impacts to identified cultural resources are not anticipated through implementation of mitigation measures outlined below.

Operations Phase

- Normal operation and maintenance of the roadway is not expected to have any additional impacts on cultural resources as a result of the Project.

Mitigation Measures

Impacts to previously identified cultural or historical resources are not anticipated.

- If a cultural resource is observed during works, it will be left undisturbed and reported to Parks Canada personnel immediately.
- All cultural resources within RMNP are protected under the National Parks Act and Regulations and are the property of Parks Canada. All cultural resources found on the work site shall be reported to the ESO or the Departmental Representative immediately. The contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative before work proceeds.

Archaeological Requirements: Highway 10 Pavement Rehabilitation and Ditch Grading Riding Mountain NP

It has been determined from this Archaeological Overview Assessment that the Highway 10 Pavement Rehabilitation and Ditch Grading Project through Riding Mountain National Park between Km 0 – 12.5 km and km 19.5 – 54, using the methods as described in the Basic Impact Analysis March 2016, has a very low potential to negatively impact on any archaeological resources. **Therefore an Archaeological Impact Assessment prior to work commencing will not be required for any of these locations.** However, the following general and specific requirements along with those mitigation measures outlined in Section 8.2.7 of the Basic Impact Analysis are to be implemented throughout this project.

Archaeological Requirements: Highway 10 Rehabilitation, Riding Mountain NP

The following general archaeological requirements are being set for this project because archaeological resources may occur in the immediate vicinity of the work locations.

As much as possible, **restrict construction related activities to the current Highway 10 footprint and inside the previously established boundaries of current staging or stockpiling areas.**

In any area where grubbing, clearing, excavating, grading and / or re-profiling are necessary to improve the highway beyond approximately 5 to 15 m from the current Highway 10 right of way, **these areas must be noted for Terrestrial Archaeology as locations where post-construction monitoring / assessment will take place before winter 2016.** This work may be undertaken by Parks Canada archaeologists.

Any new borrow areas or new road construction to access borrow areas **must be identified and these locations sent to Terrestrial Archaeology in a timely fashion in order that an assessment for potential to impact on cultural resources may be undertaken prior to construction.** This assessment work may be undertaken by Parks Canada archaeologists.

The Project is subject to further review by Terrestrial Archaeology utilising the recently created ***Archaeological Resources and Highway Re-Paving Projects Preliminary Examination Checklist***. In order to determine potential impacts not covered by the *Parks Canada Basic Impact Analysis* (March 2016), **this checklist is attached to the end of this assessment, and must be completed and signed by the Project Manager.** The completed form must then be sent to virginia.sheehan@canada.ca (Federal Infrastructure Investments Archaeologist - National Coordinator) and to the appropriate IACHD CRM advisor, in this case to Flo.Miller@pc.gc.ca for audit purposes. The results will be incorporated into any additional requirements for the 2016 to 2018 Highway 10 Pavement Rehabilitation and Ditch Grading Project. If any additional requirements are necessary, the Project Manager will be notified in a timely manner and appropriate strategies will be developed and implemented in order to ensure any potential threat to cultural resources is appropriately mitigated.

Accidental Finds

As there could be a chance, however low, that features or artifact concentrations are encountered in the course of rehabilitation work and operational staging. If significant features (i.e., structural remains and/or high artifact concentrations) are encountered, work should stop in the immediate area, photographs and a GIS reading should be taken, and the Parks Canada project manager informed. The project manager should then contact Parks Canada's Terrestrial Archaeology section for advice and assessment of significance that will in turn determine what will be required to mitigate the chance find.

What is a significant find? It is possible that a scattering of historic objects will be found in the project areas. Isolated finds of such things as tin cans or bottles are not reason to stop work. If there is a particularly interesting specimen, it could be set aside for the archaeologist to collect later. Concentrations of them are significant, however, and so are structural features like log cabin foundations, tent platforms, or log cribbing retaining features. Encountering any of these would be a stop work situation, as would the accidental find of human remains.

References

Deck, Donalee

2016 Personal communication.

Parks Canada Agency

March 2016

Parks Canada Basic Impact Analysis Riding Mountain National Park Highway 10 Pavement Rehabilitation and Ditch Grading.

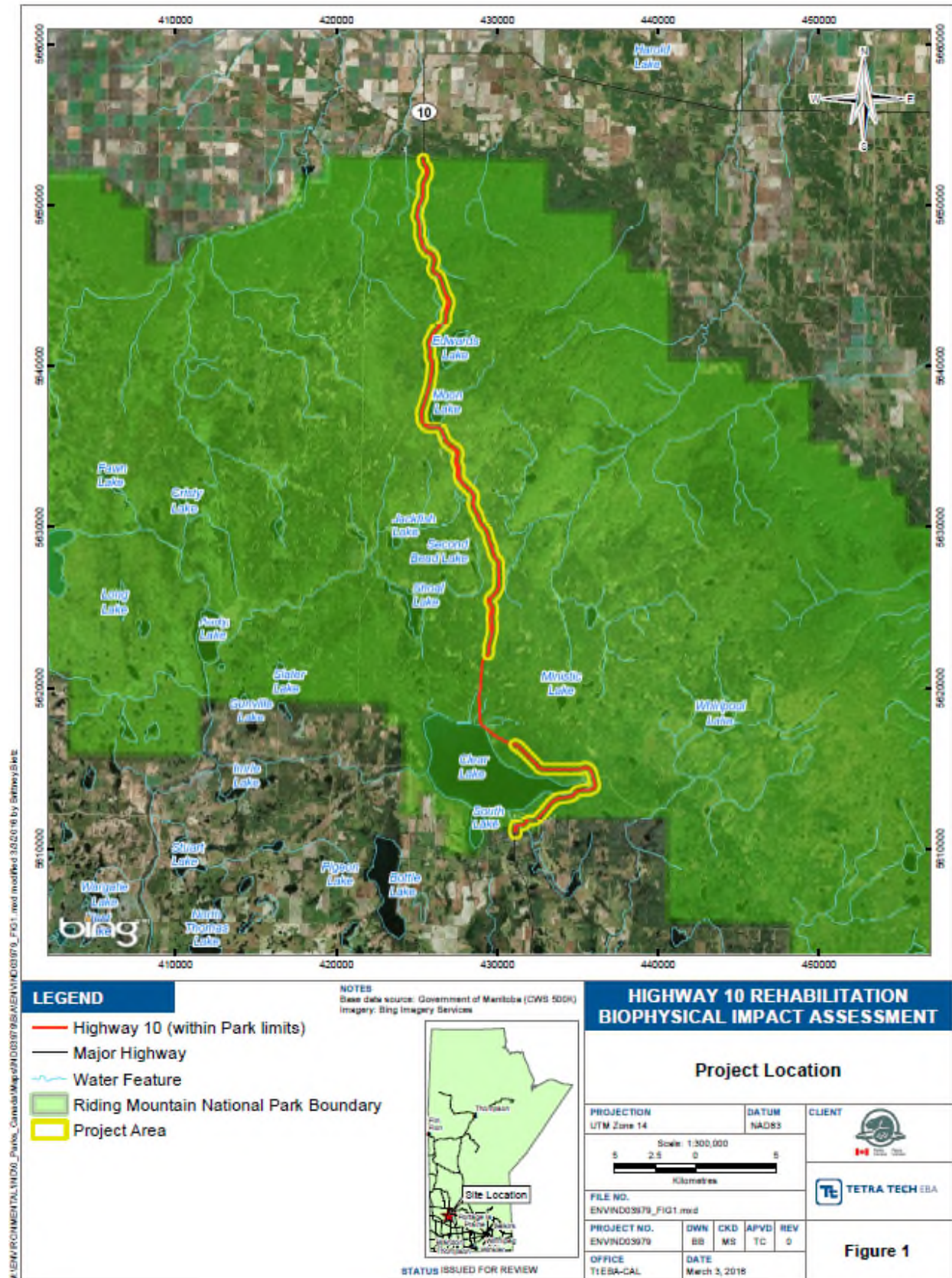


Figure 1: Location of Highway 10 Rehabilitation Project in RM NP.

Archaeological Resources and Highway Re-Paving Projects

Preliminary Examination Checklist

PREAMBLE:

Project Highway 10 Rehabilitation (2016 through 2018) by Manitoba Field Unit within Riding Mountain National Park has been identified as needing a preliminary examination to determine whether or not the project will require more detailed information to be supplied to Terrestrial Archaeology for their review in order to determine the potential impact of the project, if any, on cultural resources.

As per Parks Canada's CRM Policy, the Field Unit's Superintendent is accountable for applying the requirements of CRM Policy to all the Heritage Places under their management, such as assessing impacts of interventions to cultural resources. This checklist has been designed specifically to streamline the process of assessing the impacts of paving projects on highways and is to be used a complement to the *National BMP for Roadway, Highway, Parkway and Related Infrastructure*.

The following checklist must be completed and signed by the project manager. Please circle or highlight Yes or No in response to each of the following questions 1-7. This list must be re-examined if the project plans change. The completed form must be sent to virginia.sheehan@canada.ca (Federal Infrastructure Investments Archaeologist - National Coordinator) and to the appropriate IACHD CRM advisor for audit purposes.

1.	Does the current project involve more than resurfacing an existing paved road / highway (as opposed to a new surface treatment of an existing, but non-paved roadway)?	YES	NO
2.	Will the current resurfacing project spill outside the pre-existing road-bed and encroach on additional lands including those lands beyond the current roadbed and outside the existing Right of Way (ROW)?	YES	NO
3.	Are any staging areas used for heavy equipment and material either: a) new locations, b) pre-existing unpaved locations/un-gravelled locations or c) will the enlarging of any pre-existing staging areas be required?	YES	NO
4.	Will the current resurfacing project include the addition or expansion of new roadway access points or run away lanes?	YES	NO
5.	Will the resurfacing project involve any of the following activities along the roadway or within the existing ROW:		
	Widening	YES	NO
	Grading	YES	NO
	Re-alignment (curve modification; straightening)	YES	NO
	Scaling and or grading of adjacent hillsides or rock faces	YES	NO
	Culvert removal, installation, replacement	YES	NO
	Bridge installation, or modification	YES	NO
	Vegetation removal / clearing	YES	NO
	Drainage modification	YES	NO
	Fence or guardrail installation	YES	NO
	New installation or replacement of signage	YES	NO
6.	Will the current project require the creation and use of new borrow/extraction locations?	YES	NO
7.	Will access to the borrow areas be achieved through newly created roadways or access points?	YES	NO

If **YES** to any of the above questions, a Terrestrial Archaeologist will require that descriptive details be provided for that work prior to construction start in order to determine the potential impact, if any, on cultural resources.

SIGN OFF

With regard to the above mentioned roadway resurfacing / paving project I have reviewed the above list regarding the current project description, work activities, work areas, and work that may concern Terrestrial Archaeology and:

1. Have not identified any items in the project's description, or locations, work areas, and work activities that will require additional information to be supplied to Terrestrial Archaeology for further review.

Project Manager

Date

2. Have identified the above noted items in the project that will require additional information to be supplied to Terrestrial Archaeology for further review.



Project Manager

April 21, 2016
Date