

Section 3.0

Wetlands and Vegetation



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3.0 WILDLIFE AND WILDLIFE HABITAT

3.1 VEC Description

Wildlife and wildlife habitat (excluding breeding birds) was identified by NBDTI as a VEC with an assessment required for the completion of the Environmental Impact Assessment (EIA). Large portions of the Project footprint consist of undeveloped environments such as forest habitat and wetland areas that are of importance to wildlife populations.

For the purposes of this environmental field study, wildlife and wildlife habitat include the following components:

- Wildlife (excluding breeding birds) and wildlife habitat which includes faunal species and their habitat that may potentially be impacted by Project activities, including “Critical Habitat” as defined in the Canadian *Species at Risk Act* (SARA) and may be established within final recovery plans for species.
- Faunal species at risk and species of conservation concern as listed by the federal and provincial authorities in addition to those listed as regionally sensitive (S1, S2 or S3) by the Atlantic Canada Conservation Data Centre (ACCDC).
- Designated Areas which include environmentally sensitive areas identified by federal and provincial authorities or non-government organizations as protected or managed.

3.2 Boundaries for Environmental Effects Assessment

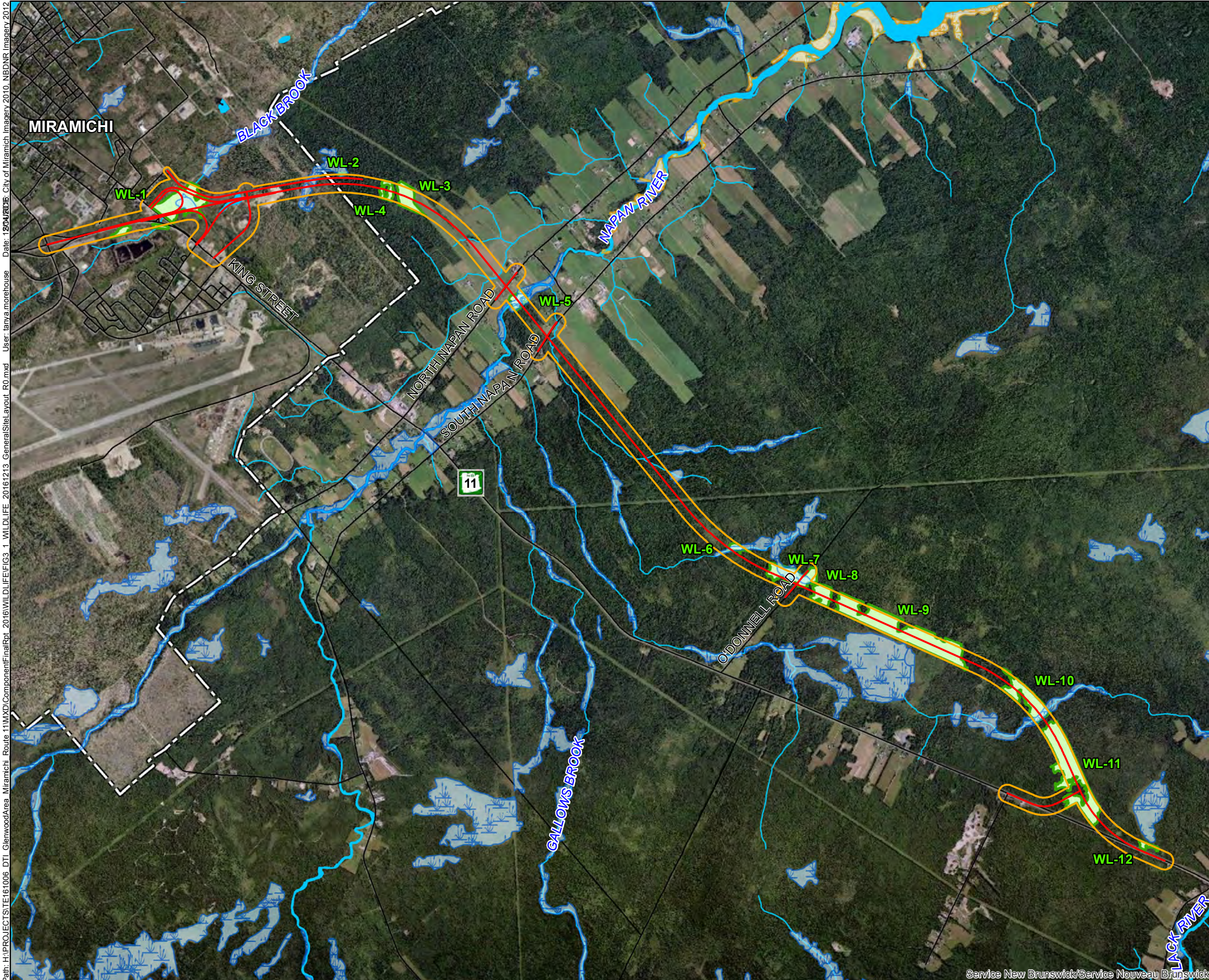
3.2.1 Spatial Boundaries

The spatial boundary of the Project Area includes all undeveloped environments within the following description of the proposed Project (Figure 3.1):

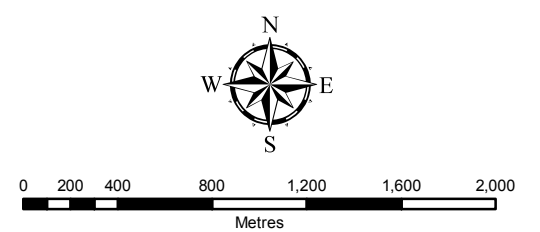
- 75 m on either side of any new centerline alignment, including the interchange ramps.
- 75 m on either side of the service road centerline alignments.
- 75 m on either side of North Napan Road, South Napan Road and O’Donnell Road for 150 m extending from the centerline on either side of the main highway alignment.
- 75 m on either side of King St. between its intersection with the northern service road and its intersection with Springvale Avenue.
- 30 m on either side of the property access road centerline alignment.
- Any area encompassed by the proposed interchange and the northern service road, as well as any area encompassed by the southern service road, existing Route 11 and proposed highway.

In addition, a 5 km desktop survey surrounding the proposed Project ROW (Study Area) for faunal species at risk and species of conservation concern was included (ACCDC, 2016).

Path: H:\PROJECTS\TE161006 DTI GlenwoodArea Miramichi Route 11\Map\WLDLIFE\FIG3_1 WLDLIFE_20161213 GeneralSiteLayout.R0.mxd User: tanya.morehouse Date: 15/04/2016 10:06:00 AM



- LEGEND:
- Bypass Alignment
 - Wildlife and Wildlife Habitat Assessment Area
 - Field Verified Wetland Area
 - Watercourse
 - Provincially Significant Wetland
 - Regulated Wetland
 - Municipal Area (Miramichi)



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VALUED ENVIRONMENTAL COMPONENT ASSESSMENT
WILDLIFE & WILDLIFE HABITAT
ROUTE 11 GLENWOOD AREA TO
MIRAMICHI BYPASS PROJECT

TITLE: GENERAL SITE LAYOUT

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	August 2016
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:32,000
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R0	3.1

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3.2.2 Temporal Boundaries

The temporal boundaries for this environmental assessment is assumed to be composed of two phases:

- Clearing, Site Preparation and Construction Phase; and
- OMR Phase.

In the construction phase, specific construction-related effects are anticipated to be short term whereas during the operational period, effects are anticipated to be long term.

3.3 Methodology

The wildlife and wildlife habitat component study consisted of a desktop review and field survey. The desktop review focussed on the identification of undeveloped environments within the Study Area in addition to habitat areas that faunal species at risk and species with special conservation status could potentially inhabit (e.g. *potential (proposed)* Critical Habitat for species at risk, such as the wood turtle (*Glyptemys insculpta*)). In addition, Environmentally Significant Areas (ESAs), Deer Wintering Areas (DWAs), Wildlife Managed Areas (WMAs) or Provincially recognized Protected Natural Areas (PNAs) were identified.

Undeveloped environments were identified using high resolution aerial photography and Geographic Information Systems (GIS) data provided by NBDTI and obtained from GeoNB (ie forest inventory data, wetland data, and watercourse data) (NB Department of Energy and Resource Development (NBERD), 2016). Data from the ACCDC, and government organizations (i.e., Environment Canada, NBERD, etc.) were used to determine the potential occurrence of faunal species at risk and species with special conservation status within the Project Area. Species at risk were considered to be all species listed under both the SARA and the *New Brunswick Species at Risk Act* (NBSRA). Species of conservation concern were considered to be all species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and identified as S1, S2, and S3 by the ACCDC report for the Study Area. Wildlife habitat areas that have been Federally or Provincially designated as sensitive were identified using available mapping resources and through consultation with Provincial and Federal regulators. Stakeholders were also consulted during the desktop review to determine the occurrences of potentially sensitive wildlife species (excluding breeding birds) in the Study Area which may not have been represented in current data sources. Consultation took place mainly with NBDTI and NBDERD.

The field survey methodology consisted of walking the entire length of the Project Area in a sinuous fashion to confirm the results of the desktop review and identify any previously unmapped environmentally sensitive habitats. Subsequent field visits were to be conducted in concert with the breeding bird surveys as well as wetland and vegetation surveys to maximize observances of wildlife and wildlife signs in the Project Area. During the field surveys, wildlife observations and signs of wildlife (dens, scat, tracks, and browse) were recorded.

3.4 Description of Existing Environment

3.4.1 Wildlife Habitat

Vegetative communities are the main indicator of habitat suitability for the majority of terrestrial wildlife species. The Study Area is comprised of a variety of terrestrial habitats that support wildlife common to New Brunswick. The Study Area is located within the Kouchibouguac Ecodistrict of the Eastern Lowlands Ecoregion (NBDNR, 2007). The landscape in this Ecodistrict is relatively flat with a low, gently sloping appearance. Elevations vary between 60 masl (metres above sea level) along the coast to 90 masl along the western boundary of the Ecodistrict. Bedrock is composed entirely of Pennsylvanian grey and red sandstone, mudstone and conglomerate. The terrain in this Ecodistrict is noted to be divided by sprawling river valleys such as the Napan River and Black River located in and near the Project Area (NBDNR, 2007).

Large portions of this Ecodistrict is known to be poorly drained with compact loams to clay loams of the Stony Brook and Harcourt Unit. Peat bogs are noted throughout the landscape. Forest productivity is restricted by the poor drainage. Black spruce (*Picea mariana*) stands are common on most of the poorly drained soils with jack pine (*Pinus banksiana*) occurring along the rivers. In the better drained soils, shade tolerant hardwoods such as red maple (*Acer rubrum*) grow with balsam fir (*Abies balsamea*) (NBDNR, 2007).

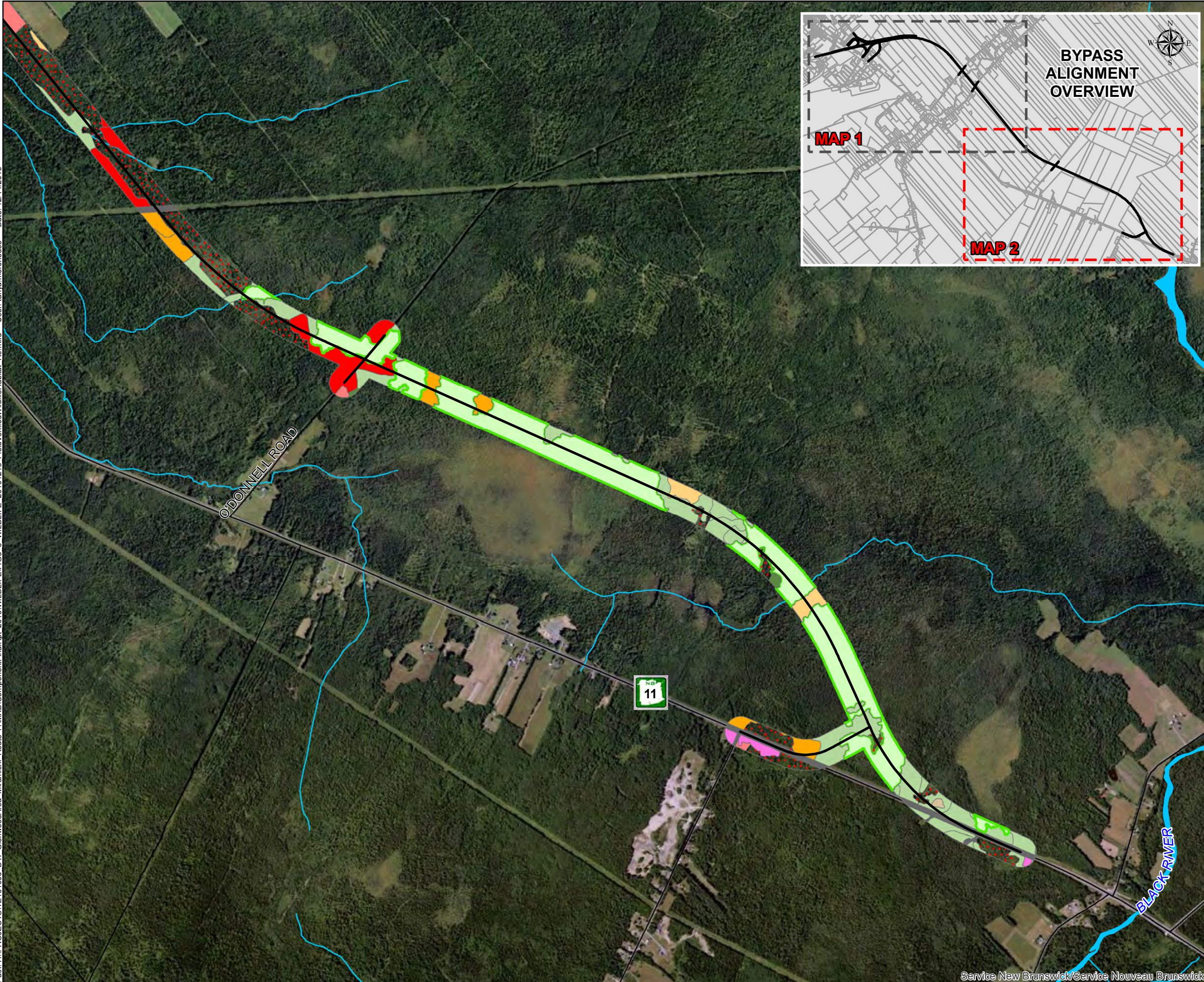
A field survey was conducted mid-May 2016 along the entire length of the Project Area. The purpose of this survey was to verify the habitat mapping created from GIS data which indicate that several habitat types occupy the Project Area including immature and mature hardwood, softwood and mixed-wood forest stands as well as wetlands, open areas and riparian habitats. Open areas generally consist of agricultural lands (pastures and fallow fields), residential inhabitations as well as industrial and transportation/utilities infrastructure. Habitat information collected from that field survey was combined with the information collected during the wetland and vegetation component study surveys to give a better picture of the layout of the terrain. Figures 3.2 and 3.3 illustrate the wildlife habitat that was identified during those surveys. Site photographs are available in Appendix 3A.

3.4.2 Designated Areas

A number of natural areas within the Province of New Brunswick have been either formally protected or inventoried as sites of potential significance, and are recommended for protection as Conservation Areas or Significant Natural Areas. The areas identified below are referred to as “Designated Areas” in this report. Available information was compiled and reviewed to determine their location relative to the Study Area.

The presence of SARA designated Critical Habitat (in a recovery strategy) is described in Section 3.4.3.3 below, for SOCC species identified in the Study Area.

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LEGEND:

- Bypass Alignment
- Watercourse
- Municipal Area (Miramichi)

Field Verified Wildlife Habitat

- Field Verified Wetland
- Agriculture
- Industrial
- Recreation
- Residential
- Transportation/Utilities
- Regen
- Hardwood
- Old Hardwood
- Mixedwood
- Old Mixedwood
- Softwood
- Old Softwood

0 100 200 400 600 800 1,000
 Metres

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VALUED ENVIRONMENTAL COMPONENT ASSESSMENT
WILDLIFE & WILDLIFE HABITAT
ROUTE 11 GLENWOOD AREA TO
MIRAMICHI BYPASS PROJECT

TITLE: FIELD VERIFIED
WILDLIFE HABITAT
MAP 2 of 2

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	August 2016
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:18,000
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R0	3.3

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“Designated Areas” as identified by the NBERD’s New Brunswick’s Crown Land Conservation Areas interactive online mapping include (NBERD, 2016):

- National Parks;
- Provincial Parks;
- Protected Natural Areas;
- Deer Wintering Areas;
- Other Habitats (Old Forest Community and Old-Forest Wildlife Habitat);
- Conservation Sites; and
- Special Management Areas.

Other “Designated Areas” not shown on the interactive mapping include:

- ESAs;
- Wildlife Refuges; and
- National Wildlife Areas.

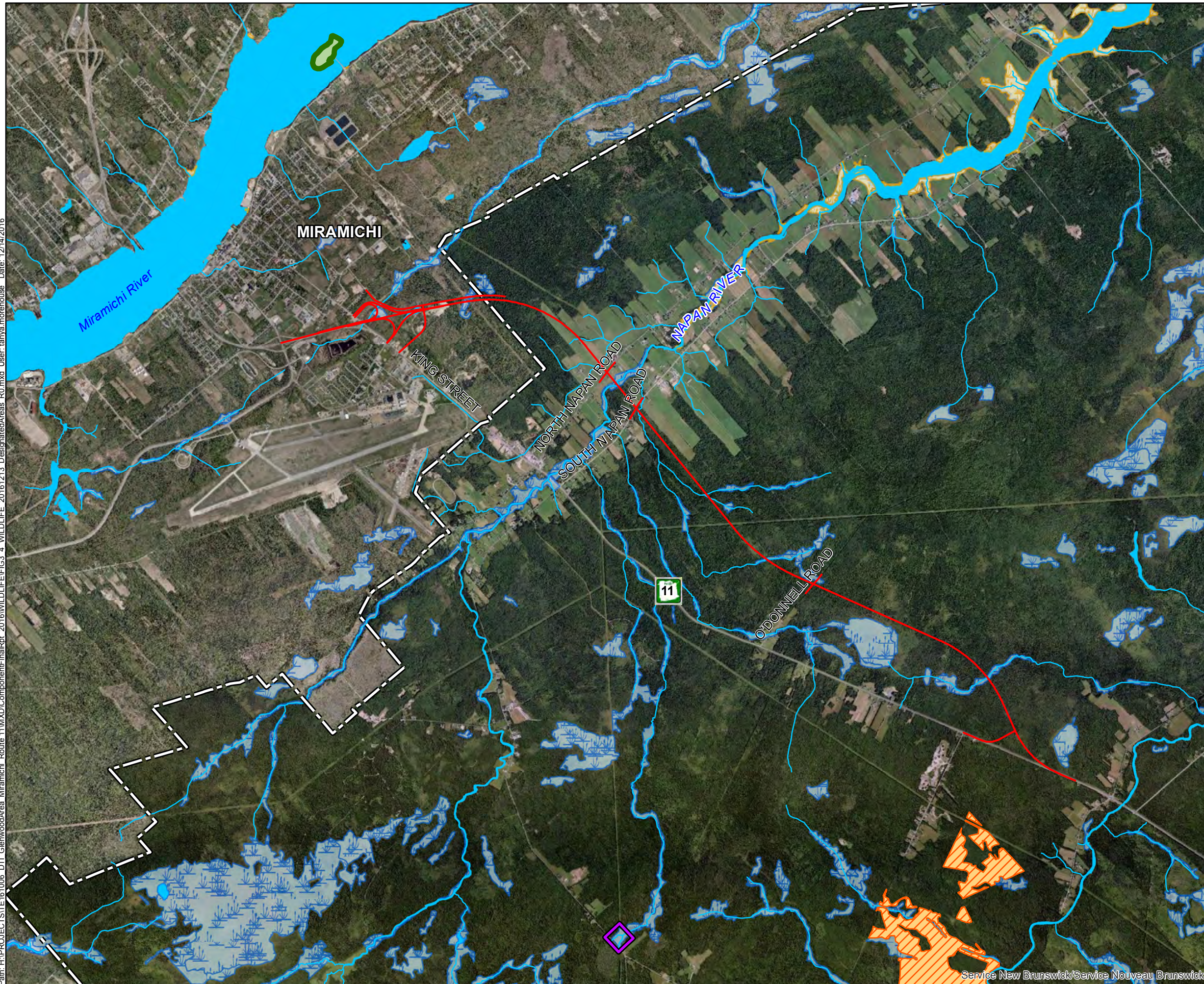
Within the Study Area none of the following “Designated Areas” were identified:

- National Parks;
- Protected Natural Areas;
- Deer Wintering Areas;
- Other Habitats (Old Forest Community and Old-Forest Wildlife Habitat);
- Conservation Sites;
- Special Management Areas;
- Wildlife Refuges; or
- National Wildlife Areas;

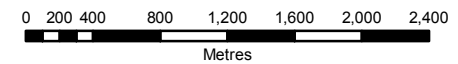
According to the ACCDC Report (2016), there are no ESAs located within 500 m of the Project Area; however, there is one ESA located within 5 km of the Project Area. Gallows Brook Marsh ESA (ESA391) is located approximately 5 km south of the Project Area along the Napan River. It is considered to be a significant habitat for waterfowl and is also used by beavers.

In addition, the ACCDC Report (2016) identifies one Provincial Park located within 5 km of the Project Area. The Middle Island Provincial Park is located approximately 4 km north of the Project Area within the Miramichi River. It is managed by NBERD under the *Parks Act* and considered to be of historical significance. Refer to Figure 3.4 for the locations of the “Designated Areas”.

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- LEGEND:
- Bypass Alignment
 - Deer Wintering Areas
 - Middle Island Provincial Park
 - Gallows Brook Marsh ESA
 - Provincially Significant Wetland
 - Regulated Wetland
 - Municipal Area (Miramichi)



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WILDLIFE & WILDLIFE HABITAT
ROUTE 11 GLENWOOD AREA TO
MIRAMICHI BYPASS PROJECT

TITLE: DESIGNATED AREAS

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	August 2016
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:45,000
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R0	3.4

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3.4.3 Wildlife

There are 57 known native species of mammals (Dilworth, 1984), and 25 species of amphibians and reptiles, including various species of salamanders, frogs, turtles, and snakes (Gorham, 1970) that inhabit terrestrial habitats of New Brunswick.

3.4.3.1 Hunting and Trapping

The Project Area is located within Wildlife Management Zone (WMZ) 14 which is open for furbearer harvesting (i.e., bobcat (*Lynx rufus*), fisher (*Martes pennant*), North American river otter (*Lontra canadensis*), red fox (*Vulpes vulpes*), eastern coyote (*Canis latrans*), American marten (*Martes americana*), North American beaver (*Castor canadensis*), American mink (*Neovison vison*), northern raccoon (*Procyon lotor*), common muskrat (*Ondatra zibethicus*), striped skunk (*Mephitis mephitis*), weasel (*Mustela* sp.), and squirrel (*Sciuridae* sp.). Of these, bobcat, marten, and otter are considered to be furbearers of special management concern and require trappers to submit the carcasses to the NBERD. According to the NBERD, Furbearer Harvesting Report, a total of 29 otters and 12 bobcat were harvested for fur in 2012/2013, and 17 otters and 10 bobcat harvested in 2013/2014. No martens were harvested in either of the 2012/2013 and 2013/2014 furbearer harvesting seasons (New Brunswick Department of Natural Resources (NBDNR), 2014).

In addition to furbearer harvesting, big game sport hunting is permitted in WMZ14 for white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*) and black bear (*Ursus americanus*). According to the 2015 NBERD Big Game Harvest Report (In Progress), a total of 24 adult male white-tailed deer were registered as kills in 2015 (NBERD, undated). No antlerless deer were registered as killed. A total of 64 moose were registered as kills in this zone in 2015. Of these 40 were adult males, 9 adult females, 8 yearling males, 6 yearling females and one male of unknown age. At the time of this desktop review no information was made available regarding the registered as kills for black bear (NBERD, undated).

Furbearer harvests of the three managed species in WMZ14 were below the average numbers taken per WMZ, while deer and moose harvests in WMZ14 were less than half the average number taken per WMZ, suggesting that relative to other parts of the province, this WMZ is a less important area for hunting and trapping.

3.4.3.2 Wildlife Collisions

The Study Area includes the existing Route 11, as well as O'Donnell Road, South Napan Road, North Napan Road and King Street. Wildlife collision data is available along the current stretch of Route 11 between North Black River Road and Miramichi for the years 2008 to 2012, inclusive (Greg Profit, pers.comm, 2016). A summary of the total number of ungulate (moose and deer) collisions reported for this area is provided in Table 3.1. This information can be used to represent expected collision rates from the new Project as the Project footprint is in close proximity to the current Route 11 and the habitat is similar.

Table 3.1 Total Number of Ungulate (Moose and Deer) Collisions Reported between 2008 and 2012, Inclusive Between North Black River Road to Miramichi

Year	Wildlife Collisions	
	Moose	Deer
2008	6	1
2009	12	0
2010	7	1
2011	6	0
2012	4	0
	35	2

3.4.3.3 Wildlife Species of Conservation Concern

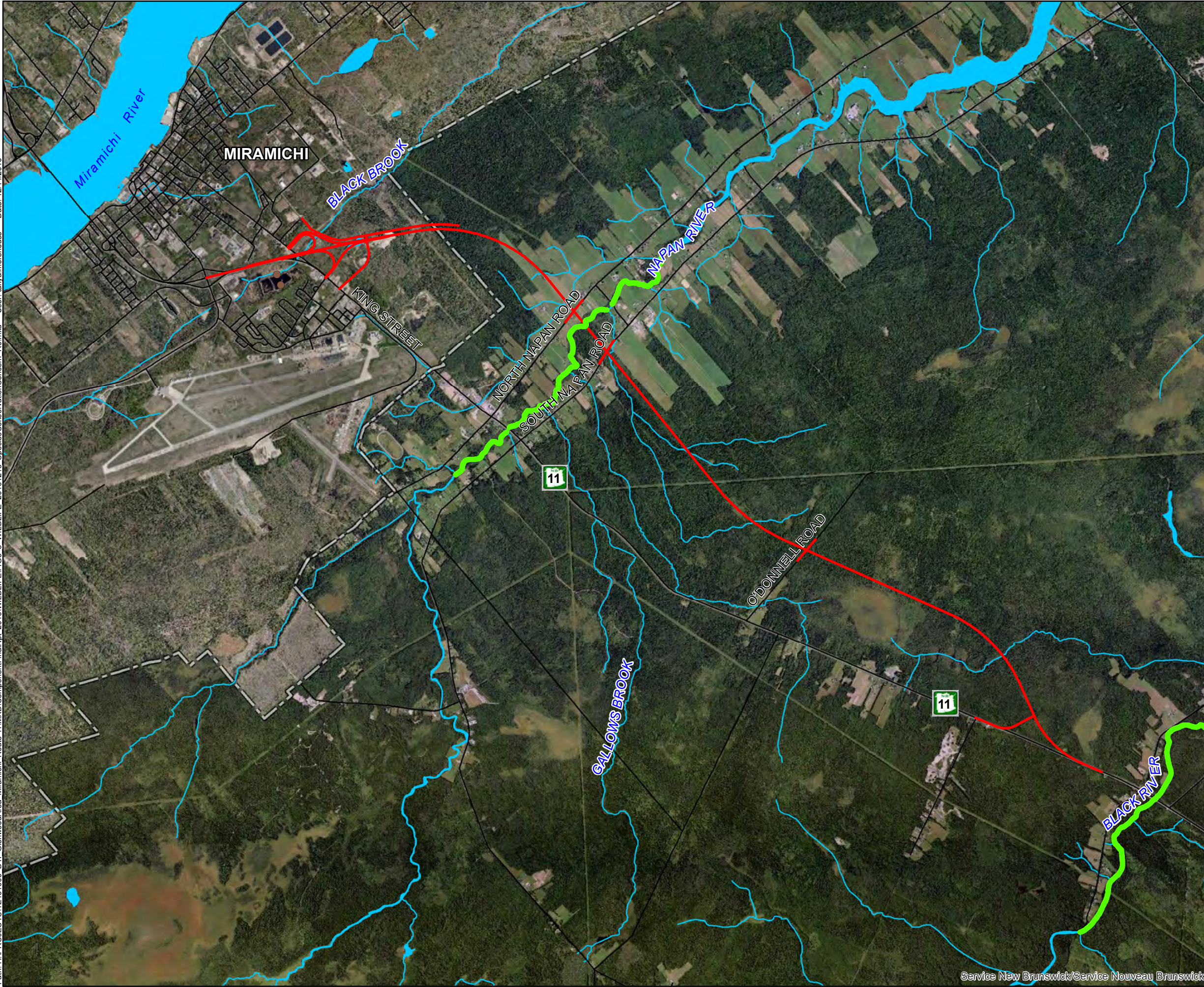
The ACCDC database was queried for all records of SOCC within a 5 km buffer around the Project footprint (see Figure 3.5). There are two wildlife species of conservation concern (excluding birds) observed in close proximity the proposed Project footprint (ACCDC, 2016), described below.

The Bronze Copper butterfly (*Lycaena hyllus*) is ranked as S3 (Vulnerable) by the ACCDC but is not listed by COSEWIC, SARA, or NBSRA. This species is typically observed in marshes and meadow wetland areas (NatureServe, 2015). The two known locations were south of Black Brook, in the man-made waterfowl park near the east end of the Study Area (Figure 3.5). No interaction with project activities is anticipated for that feature.

The Wood Turtle (*Glyptemys insculpta*) is listed as Threatened by COSEWIC, and in Schedule 1 of SARA, and the NBSRA. The ACCDC has observations within 5 km of the study site. Precise locations are not released for the protection of the species. The regional biologist for the Miramichi area (Eric Sullivan, pers.comm. 2016) indicated that wood turtles have been observed in the Napan River and are likely to occur in Black River. They prefer rivers and streams with sandy or gravelly-sandy bottoms and clear meandering watercourses with a moderate current. Nests are located next to water on open sandy areas, such as high riverbanks, roadsides, rail embankments, and in wetlands (Government of Canada, 2016). While wood turtles utilize a broad variety of terrestrial habitats, their requirements for overwintering and nesting habitats are more specialized and are therefore considered more limiting. For nesting, wood turtles require bare ground areas such as beaches or riverbanks, with sparse or no vegetation throughout the incubation period, full to partial sunlight, and fairly moist but well-drained sandy/gravelly substrate (Environment Canada, 2016). Watercourses are the primary overwintering habitat for wood turtles, although shallow lakes, ponds and wetlands are also used (Environment Canada, 2016). There is potential for overwintering in the major watercourses crossed by the proposed bypass.

A proposed recovery strategy has been developed for wood turtle (Environment Canada, 2016) that defines conditions for the establishment of Critical Habitat (under SARA), and reports known Critical Habitat in the region. According to definitions in the proposed recovery strategy, there is *potential* Critical Habitat for wood turtle within the Study Area along the Napan River and major tributaries, and just east of the Study Area along the Black River (see Figure 3.5). The Napan River will be crossed by the proposed bypass.

Path: H:\PROJECTS\TE161006 DTI GlenwoodArea Miramichi Route 11\MXD\ComponentFinalRpt_2016\WLDLIFE\FIG3_5_WLDLIFE_20161213_SpeciesConservationConcern_R0.mxd User: tanya.morehouse Date: 12/14/2016



LEGEND:

- Bronze Copper
- ~ Inferred Wood Turtle Habitat
- Bypass Alignment
- Municipal Area (Miramichi)

0 200 400 800 1,200 1,600 2,000
Metres

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PROJECT: **ENVIRONMENTAL FIELD STUDIES
VALUED ENVIRONMENTAL COMPONENT ASSESSMENT
WILDLIFE & WILDLIFE HABITAT
ROUTE 11 GLENWOOD AREA TO
MIRAMICHI BYPASS PROJECT**

TITLE: **WILDLIFE SPECIES OF
CONSERVATION CONCERN**

DATUM:	DWN BY:	DATE:
NAD 83 CSRS	TM	August 2016
PROJECTION:	CHK'D BY:	SCALE:
NB Stereographic	CL / JB	1:40,000
PROJECT NO:	REV NO:	FIGURE NO:
TE161006	R0	3.5

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No other wildlife SOCC or associated sensitive/limiting habitat was identified in the Study Area.

3.4.4 Wildlife Observations

3.4.4.1 Mammals

A total of 79 mammal observations were made during the wildlife surveys, breeding bird surveys as well as the wetland and vegetation surveys. Direct observations (sightings) and/or indirect evidence (such as presence of scat and tracks) of these species were recorded during field surveys (Appendix 3B, Table 3B-1). Of the total number of observations, 24 were of large mammals (moose, white-tailed deer and black bear) and 49 of small mammals (i.e., red squirrel, eastern chipmunk, porcupine, snowshoe hare, raccoon, beaver, red fox, coyote, bobcat, and American marten).

The majority of the observations made of large mammals were moose. Evidence of moose was found throughout the undeveloped areas of the Project Area, but predominantly between O'Donnell Road and Route 11. Bear observations were most frequent along the Napan River, and deer observations were most frequent in the undeveloped areas of the northern portion of the Project Area (Miramichi). With respect to small mammals, red squirrels were the most abundant species and were observed throughout the undeveloped areas of the Project Area. Beaver and raccoon were most often observed adjacent to watercourses and wetland areas. The remainder of the species observed were noted in the undeveloped portions of the Project Area.

3.4.4.2 Amphibians and Reptiles

A total of 43 herpetile observations were made during the wildlife surveys, breeding bird surveys as well as the wetland and vegetation surveys (i.e., spring peepers, green frog, wood frog, bull frog, and garter snake). These species were mainly observed adjacent to watercourses and wetland areas (Appendix 3B, Table 3B-1). The species of primary interest, the wood turtle, was not observed during field surveys; however, the Napan River floodplain provides suitable habitat for wood turtle breeding and hibernating, as discussed in Section 3.4.3.3, above.

3.5 Potential Effects Assessment

For the purposes of this assessment, the wildlife and wildlife habitat component study refers to wildlife species (excluding breeding birds), potential faunal species at risk in the Project Area and their habitat. Potential effects to wildlife and wildlife habitat include direct disturbance through clearing, preparation, construction, and surfacing, as well as operational disturbance relating to vegetation management, application of road salts, and infrastructure maintenance.

3.5.1 Construction Phase Potential Effects

Wildlife and wildlife habitat within the Study Area has the potential to be temporarily as well as permanently affected by construction related activities of the Project. Potential Project interactions with wildlife and species at risk and related effects resulting from construction are summarized in Table 3.2.

Table 3.2 Potential Project Construction Effects on Wildlife and SOCC

Valued Environmental Component	Project Interaction	Potential Effects
Wildlife Species at Risk	<ul style="list-style-type: none"> Clearing, grubbing, and excavation activities Accidents, malfunctions and unplanned events 	<ul style="list-style-type: none"> Noise/physical disturbance of wildlife Behavioural changes Alteration/displacement of habitat Loss of sensitive/limiting habitat for SOCC or identified Critical Habitat (under SARA) Mortality

3.5.1.1 Mammals

A number of furbearers have potential to occur in the Project Area. Habitat removal and disturbance due to human activities may result in a reduction of suitable habitat within the Study Area for some or all of these species. Impacts on mammals are also expected to be mainly related to loss and fragmentation of habitat. The furbearers and large mammal populations in the Study Area may temporarily move elsewhere during the construction period. Local populations may return to normal after construction is complete, although effects from habitat fragmentation and wildlife collisions may be anticipated.

3.5.1.2 Herpetiles

The loss of ponds, wetlands and riparian areas in the Project Area will result in habitat loss for local amphibians and for turtles, and increased sedimentation from dust generated by construction may further impact aquatic habitats. Snakes may utilize much of the Project Area, and will be impacted by habitat loss as well as increased fragmentation which may inhibit movement between areas of suitable habitat. Wood turtle, in particular, has been identified as vulnerable to project activities. Wood turtle nesting sites and overwintering sites may be impacted by construction.

3.5.2 Operation, Maintenance and Rehabilitation (OMR) Phase Potential Effects

Wildlife and wildlife habitat within the Study Area has the potential to be permanently affected by ongoing OMR activities of the Project. Potential Project interactions with wildlife and species at risk and related effects resulting from construction are summarized in Table 3.3.

Table 3.3 Potential Project OMR Effects on Wildlife and SOCC

Valued Environmental Component	Project Interaction	Potential Effects
Wildlife Species at Risk	<ul style="list-style-type: none"> Operation activities Maintenance activities Rehabilitation activities Accidents, malfunctions and unplanned events 	<ul style="list-style-type: none"> Incremental loss of sensitive/limiting habitat for SOCC or Critical Habitat (under SARA) Noise/physical disturbance of wildlife Behavioural changes Disruption of migration patterns Mortality

The greatest impacts to wildlife will likely occur during the operational phase of the Project through direct mortality as a result of collisions with vehicles. In addition, there may be a disruption of migration patterns of moose; however, discussions with the regional biologists indicate that there

is a healthy population and no sensitive/limiting habitat features are in the Study Area. Also, since wood turtles are very mobile, it is possible that where the highway crosses high quality habitat, there may be an increase in wood turtles crossing the road resulting in injuries and death. Maintenance activities may also have an increased likelihood of encountering wood turtles or their nesting sites in these areas.

3.5.3 Accidents, Malfunctions and Unplanned Events

As noted in Table 3.2 and Table 3.3, a potential for accidents malfunctions and unplanned events to occur is possible in all phases of the Project. The following is a list of accidents, malfunctions and unplanned events that may occur:

- failure of sediment and erosion control measures;
- chemical and fuel spills;
- fires;
- wildlife encounters; and
- vehicle accidents.

3.5.3.1 Erosion and Sediment Control Failure

During the course of the Project, either through the construction, maintenance, or rehabilitation phases, a major or catastrophic storm event could cause sediment protection measures and other on-site safeguards to fail. Such a failure could adversely affect surface water quality, wetlands, and wildlife habitat, which could directly impact wildlife and species at risk through loss of habitat.

3.5.3.2 Chemical and Fuel Spills

During all phases of the Project, the transfer of fuel and chemicals from storage containers or tanker trucks, vehicle accidents and leaks from vehicles, storage facilities or delivery lines can result in spills of petroleum hydrocarbons, hazardous materials, or other substances. Such spills could contaminate soils and groundwater and, through runoff, contaminate watercourses and wetlands. Contaminants may adversely affect surface water quality, wetlands, and wildlife habitat, which could directly impact wildlife and species at risk through loss of habitat.

3.5.3.3 Fire

During all phases of the Project, accidental fires may occur. Sources of fire include hot exhaust or equipment, discarded cigarettes, or sparks. In addition, during the operational phase motor vehicle accidents may result in fire. Accidental fires can be expected to impact wildlife through direct mortality but also loss of habitat.

3.5.3.4 Wildlife Encounters

During the course of the Project, either through the construction, maintenance, or rehabilitation phases, wildlife encounters may occur. These encounters may be increased at camp sites where food refuse and garbage is not disposed in properly sealed containers. In addition, clearing activities may also encourage wildlife use throughout the Project footprint. Such encounters can lead to a disruption in behaviour and potentially mortality in the case of bears should ongoing site safety be a concern.

3.5.3.5 Vehicle Accidents

Wildlife collisions can occur during any phase of the Project but are anticipated to be greatest during the operation of the Project. The anticipated impact is direct mortality to wildlife and potential injury, damage or harm to the public.

3.6 Mitigation Measures

Mitigation measures to be employed during the Construction and OMR Phases as well as in the event of an Accident, Malfunction and Unplanned Event, of the Project are presented in Table 3.4. These measures are presented in an effort to reduce the impact of the Project's wildlife and wildlife habitat interactions.

Table 3.4 Summary of Mitigation Measures for Wildlife and Habitat

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures ¹	Additional Recommended Mitigation Measures
Construction			
Wildlife and Wildlife Habitat (Including Species at Risk and Species of Conservation Concern)			
<p>All aspects of highway construction, including clearing, roadbed construction, surfacing, construction of access roads where there is the potential to encroach upon wood turtle habitat.</p> <p>Storm water management during construction.</p>	<ul style="list-style-type: none"> Alteration of, disruption to, or removal of wildlife and/or their habitat. Reduction in quantity and quality of habitat within and in proximity to the ROW. 	<p>5.2 Beaver and Beaver Dam Removal</p> <p>5.3 Clearing</p> <p>5.4 Culverts</p> <p>5.5 Detouring</p> <p>5.6 Dust Control</p> <p>5.7 Erosion and Sediment Management</p> <p>5.8 Excavation, Blasting and Aggregate Production</p> <p>5.10 Fire Prevention and Contingency</p> <p>5.11 Grubbing</p> <p>5.12 Spill Management</p> <p>5.13 Storage and Handling of Petroleum Products</p> <p>5.14 Storage and Handling of Other Hazardous Materials</p> <p>5.15 Structures</p> <p>5.16.3 Ditch Maintenance</p> <p>5.17.2 Pits</p> <p>5.17.3 Stockpiling</p> <p>5.17.4 Quarries</p> <p>5.17.5 Temporary Access Roads</p> <p>5.17.6 Temporary Watercourse/Wetland Crossings</p> <p>5.17.7 Marshalling Yards and Laydown Areas</p> <p>5.17.9 Work Camps</p> <p>5.17.10 Decommissioning Temporary Ancillary Facilities</p> <p>5.18 Topsoil</p> <p>5.19 Vehicle and Equipment Management</p> <p>5.20.1 Disposal Areas</p> <p>5.20.3 Garbage and Other Wastes</p> <p>5.20.4 Litter Barrels and Litter Pick-up</p> <p>5.20.6 Vegetation Waste</p> <p>5.22 Work Progression</p> <p>5.23.7 Rare Plants</p> <p>5.23.8 Watercourses, Fish and Fish Habitat</p> <p>5.23.9 Watershed and Wellfield Protection Zones</p> <p>5.23.10 Wetlands</p> <p>5.23.11 Wildlife and Wildlife Habitat</p>	<ul style="list-style-type: none"> Specific wood turtle mitigation will be developed and included in designs and contract specifications during construction, particularly around areas of potential overwintering habitat. Should a wood turtle be observed: <ul style="list-style-type: none"> The Resident Engineer will be notified. The direction of travel of the turtle will be determined and the date, time, location approximate size of the individual and the direction of travel will be recorded. The turtle will then be gently removed to an area just off the ROW, along the same habitat corridor in the direction of travel. The Resident Engineer will contact the New Brunswick Museum (Don McAlpine, Curator of Zoology: 506-643-2345) and provide details recorded.

Table 3.4 Summary of Mitigation Measures for Wildlife and Habitat

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures ¹	Additional Recommended Mitigation Measures
		5.24 Working Near Pipelines and Other Underground Services	
Waste Management			
All aspects of highway construction, including clearing and grubbing, roadbed construction, surfacing, construction of access roads.	<ul style="list-style-type: none"> Contaminants may adversely affect surface water quality, wetlands and wildlife habitat. 		<ul style="list-style-type: none"> No additional protective measures required.
Operation, Maintenance and Rehabilitation (OMR)			
Wood Turtle			
Highway operation and maintenance activities near areas of suitable habitat for wood turtles (mainly watercourses).	<ul style="list-style-type: none"> Where the highway crosses suitable habitat for wood turtle, especially near the Napan River, there may be a higher incidence of wood turtles crossing the road resulting in higher mortality rates. Highway maintenance activities may also have an increased likelihood of encountering wood turtles or their nesting sites. This is sometimes referred to as creation of "sink habitat", that could impose a steady drain on the watershed population of wood turtles. 	5.2 Beaver and Beaver Dam Removal 5.3 Clearing 5.4 Culverts 5.5 Detouring 5.7 Erosion and Sediment Management 5.10 Fire Prevention and Contingency 5.11 Grubbing 5.12 Spill Management 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials 5.15 Structures 5.16.3 Ditch Maintenance 5.17.5 Temporary Access Roads 5.17.6 Temporary Watercourse/Wetland Crossings 5.17.7 Marshalling Yards and Laydown Areas 5.17.10 Decommissioning Temporary Ancillary Facilities 5.19 Vehicle and Equipment Management 5.20.1 Disposal Areas 5.20.3 Garbage and Other Wastes 5.20.4 Litter Barrels and Litter Pick-up 5.20.6 Vegetation Waste 5.22 Work Progression 5.23.8 Watercourses, Fish and Fish Habitat	<ul style="list-style-type: none"> Specific wood turtle mitigation will be developed and included in designs and contract specifications during maintenance activities, particularly around areas of suitable habitat (mainly near watercourse crossings). Should a wood turtle be observed: <ul style="list-style-type: none"> The Resident Engineer will be notified. The direction of travel of the turtle will be determined and the date, time, location approximate size of the individual and the direction of travel will be recorded. The turtle will then be gently removed to an area just off the ROW, along the same habitat

Table 3.4 Summary of Mitigation Measures for Wildlife and Habitat

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures ¹	Additional Recommended Mitigation Measures
		5.23.10 Wetlands 5.23.11 Wildlife and Wildlife Habitat	corridor in the direction of travel. <ul style="list-style-type: none"> The Resident Engineer will contact the New Brunswick Museum (Don McAlpine, Curator of Zoology: 506-643-2345) and provide details recorded.
Infrastructure and Winter Maintenance			
All aspects of highway infrastructure OMR.	<ul style="list-style-type: none"> Alteration of, disruption to, or removal of wildlife and/or their habitat. Emission of combustion gases/particulate matter from vehicles and equipment and creation of fugitive dust and greenhouse gas emissions potentially decreasing air quality in the vicinity of the Project footprint for the duration of maintenance and rehabilitation activities. Elevated noise exposure to sensitive receptors. 	5.1 Asphalt Concrete 5.2 Beaver Dam Removal 5.4.4 Culvert Maintenance 5.5 Detouring 5.6 Dust Control 5.7 Erosion and Sediment Management 5.10 Fire Prevention and Contingency 5.12 Spill Management 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials 5.15.2 Structure Maintenance 5.16 Summer Maintenance 5.19 Vehicle and Equipment Management 5.20 Waste Management 5.21 Winter Highway Maintenance 5.24 Working Near Pipelines and Other Underground Services	<ul style="list-style-type: none"> Maintenance activities within 30 m of a watercourse or wetland will require Watercourse and Wetland Alteration Permit (WAWA) permit.
Accidents, Malfunctions and Unplanned Events			
Hazardous Material Spill			
All aspects of Project construction, and OMR activities.	<ul style="list-style-type: none"> Contaminants may adversely affect wildlife habitat, surface water quality, and wetlands. Alteration of, disruption to, or removal of species of conservation concern/species at risk or their habitat. 	5.7 Erosion and Sediment Management 5.12 Spill Management 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials	<ul style="list-style-type: none"> No additional protective measures required.

Table 3.4 Summary of Mitigation Measures for Wildlife and Habitat

Environmental and Project Component	Summary of Potential Effects	Standard NBDTI EMM Mitigation Measures ¹	Additional Recommended Mitigation Measures
Erosion and Sediment Control Failure			
All aspects of highway construction, including clearing and grubbing, roadbed construction, or surfacing, as well as the construction of access roads.	<ul style="list-style-type: none"> Alteration of, disruption to, or removal of wildlife and/or their habitat. Increased sediment loading in the watercourse resulting from all aspects of highway construction. Degradation of wildlife habitat and water quality due to increased water temperatures related to the removal of vegetation/shade. Potential for loss of riparian habitat within the footprint. 	5.7 Erosion and Sediment Management	<ul style="list-style-type: none"> No additional protective measures required.
Fire			
All aspects of Project construction and OMR activities.	<ul style="list-style-type: none"> Alteration of, disruption to, or removal of wildlife and/or their habitat. Direct wildlife mortality. Loss of Species of Conservation Concern/Species at Risk. 	5.10 Fire Prevention and Contingency 5.13 Storage and Handling of Petroleum Products 5.14 Storage and Handling of Other Hazardous Materials 5.24 Working Near Pipelines and Other Underground Services	<ul style="list-style-type: none"> No additional protective measures required.
Vehicular Collision			
All aspects of Project construction and OMR activities.	<ul style="list-style-type: none"> Direct wildlife mortality. Loss of Species at Risk or Species Conservation Concern/Species at Risk. 		<ul style="list-style-type: none"> Risk can be reduced with the appropriate use of wildlife signage and other mitigation measures to be designed in consultation with NBERD.
Wildlife Encounters			
All aspects of Project construction and OMR activities.	<ul style="list-style-type: none"> Wildlife become accustomed to human presence which could lead to mortality. 	5.17.9 Work Camps 5.20.3 Garbage and Other Wastes 5.20.4 Litter Barrels and Litter Pick-up 5.23.11 Wildlife and Wildlife Habitat	<ul style="list-style-type: none"> No additional protective measures required.

Note:

- Source: NBDTI EMM (2010)

3.7 Significance of Residual Effects

A significant adverse effect of Project components or activities on wildlife including species at risk or species of conservation concern is defined as an effect that causes a decline in abundance and/ or a change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return the population to its pre-project level within several (three to five) generations. A significant adverse effect on sensitive/ limiting habitat is defined as an adverse effect that causes a net loss of habitat function in the Study Area.

An adverse effect that does not cause such declines or changes is not considered to be significant.

A positive effect occurs when Project activities help increase abundance or diversity of species or enhances habitat.

Table 3.5 provides a summary of the potential for proposed Project activities to cause significant adverse environmental effects after mitigation.

Table 3.5 Significance of Residual Effects to Wildlife and Habitat after Mitigation

Project Related Environmental Effect	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological Context	Significant Effect
Construction – Activities / Interactions						
Clearing and grubbing, site preparation work, road construction and surfacing that could disturb or harm terrestrial wildlife (including wood turtle).	M	L	During Construction	Yes	No species expected to be affected at a population level.	No
Operation, Maintenance and Rehabilitation (OMR) – Activities / Interactions						
Reduction in quantity/quality of habitat within and in proximity to the ROW.	L	L	OMR Period	Yes	No significant habitat is expected to be affected.	No
Reduced water quality, change in roadside vegetation, and salt attracting wildlife to highway.	L	L	OMR Period	Yes	Adjacent habitat to be maintained.	No
Wildlife Injury/Death (including wood turtle).	M	L	OMR Period	Yes	No species are expected to be affected at a population level.	No

Notes:

Magnitude:

- High (H)* An impact on wildlife resulting in a population level effect; for SOCC that could mean a single individual.
- Moderate (M)* An impact on wildlife habitat resulting in diminished capacity to support the current population; for SOCC this could be a relatively small area.
- Low (L)* An impact on wildlife or habitat that does not result in population level effect or reduced capacity to support the current population.

Geographic Extent:

- High (H)* An impact on wildlife habitat that effects > 30% of available habitat in the Study Area.
- Moderate (M)* An impact on wildlife habitat that effects 10 - 30% of available habitat in the Study Area.
- Low (L)* An impact on wildlife habitat that effects <10% of available habitat in the Study Area.

3.8 Monitoring and Follow-up Requirements

Ungulate-vehicle collision reports to the Royal Canadian Mounted Police (RCMP) are regularly provided to NBDTI and will be monitored as part of their wildlife management program.

3.9 Wildlife and Wildlife Habitat - References

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3.9.1 Personal Communications

Profit, Gregory. New Brunswick Department of Transportation and Infrastructure. Design Branch.

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