

8.6 TERRESTRIAL ENVIRONMENT

The Terrestrial Environment includes wildlife (fauna) and the habitats that support wildlife species. Specifically, this valued environmental component (VEC) focuses on birds, mammals, and herpetofauna, including species at risk (SAR) and species of conservation concern (SOCC), and their habitats. The Terrestrial Environment has been selected as a VEC because of the intrinsic value of wildlife and wildlife habitat. SAR and SOCC are defined later.

The Project has the potential to interact with the Terrestrial Environment by changing terrestrial habitats and/or populations of wildlife that are important in a socioeconomic or environmental context, including SAR or SOCC. SOCC are species that, unlike SAR, are not afforded direct protection by legislation. SOCC are placed on lists as a precautionary measure that reflects an observed trend in their population status. SAR and SOCC are important indicators of ecosystem health and regional biodiversity.

As will be discussed in the sub-sections that follow, habitat will be lost as a result of the Construction and subsequent Operation of the Project, but some habitat restoration will occur upon Decommissioning, Reclamation and Closure as Project elements are removed and some re-vegetation of disturbed areas is carried out. Wildlife habitat types within the Local Assessment Area (LAA, defined later) are common and found throughout Central New Brunswick, and no habitat will be lost that is unique to the region or that is critical for the survival of a wildlife SAR or SOCC population. Managed conservation areas including interior forest, deer wintering areas, old forest wildlife habitat, protected natural areas (existing and proposed) will not be affected substantially by the Construction and subsequent Operation of the Project. The assessment of environmental effects identifies the presence or possible presence of various secure species of birds, mammals and herpetiles in the Project Development Area (PDA, Figure 1.2.1). These secure species are not limited by their habitat and will not be adversely affected significantly by Project presence. SAR (Canada lynx, Bald Eagle, Common Nighthawk, Olive-sided Flycatcher, Canada Warbler, and Rusty Blackbird) and several SOCC have been recorded in or near the PDA, but they are not likely to be affected substantially by the Project activities. The Project will not cause the decline of any population of a non-secure wildlife species such that their survival in New Brunswick is jeopardized.

Adverse environmental effects of the Project on wildlife will be minimized or avoided through a number of mitigation measures including timing restrictions on clearing, and Project design. While the Terrestrial Environment may be sensitive to perturbation, secure and non-secure wildlife populations will not change substantively within the greater Central Uplands Ecoregion (Madawaska Uplands portion) and/or Valley Lowlands Ecoregion and the province as a result of the Project. With the proposed mitigation and environmental protection measures, the residual environmental effects of the Project on the Terrestrial Environment during all phases of the Project will be not significant. While other projects or activities are ongoing within the proximal ecoregions and the Province as a whole, the potential cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried are rated not significant.

8.6.1 Scope of Assessment

This section defines the scope of the environmental assessment of the Terrestrial Environment in consideration of the nature of the regulatory setting, issues identified during public, stakeholder, and First Nations engagement activities, potential Project-VEC interactions, and existing knowledge.

8.6.1.1 Rationale for Selection of Valued Environmental Component, Regulatory Context, and Issues Raised During Engagement

The Terrestrial Environment was selected as a VEC because of the potential for interactions between the Project and the Terrestrial Environment, and also because of the intrinsic value of wildlife and wildlife habitat. The Terrestrial Environment supports terrestrial wildlife in the area surrounding the Project, and is important to the public for a number of reasons as it contains many components of the landscape that are valued (*i.e.*, wildlife and natural resources). These components are additionally linked to biodiversity.

This VEC focuses on terrestrial wildlife, including birds, mammals, and herpetofauna (including SAR and SOCC), and wildlife habitat. SOCC are included in this VEC as a precautionary measure, reflecting observations and trends in their population status, and are often important indicators of ecosystem health and regional biodiversity. SAR and SOCC are defined in Section 8.6.1.5.

Though vegetation and wetlands can be considered as part of the Terrestrial Environment, they are addressed separately in the Vegetated Environment (especially for SAR and SOCC plant species) and Wetland Environment VECs.

New Brunswick regulates wildlife under the New Brunswick *Fish and Wildlife Act* and the New Brunswick *Species at Risk Act* (NB SARA). The federal government regulates wildlife species under the *Species at Risk Act* (SARA) and the *Migratory Birds Convention Act* (MBCA).

SARA and NB SARA generally prohibit listed wildlife species or their residences from being destroyed, disturbed, or otherwise interfered with. SARA prohibits the interference, disturbance or destruction of endangered or threatened species or critical habitats for any listed species, and the NB SARA contains similar provisions. Migratory birds and active nests are protected federally under the MBCA. The killing of migratory birds or the destruction of their nests, eggs, or young is an offence under the MBCA. The New Brunswick *Fish and Wildlife Act* protects all fish and wildlife species from angling, hunting, trapping and other forms of intentional take except under the authority of permits or licenses.

To meet the requirements of the Final Guidelines (NBENV 2009) and the Terms of Reference (Stantec 2012a), the assessment of the Terrestrial Environment includes a description of the existing environment and the assessment of potential environmental effects of the Project during all phases, with a focus on wildlife populations and their habitat. The description of the existing conditions will also assist with developing mitigation strategies and the assessment of cumulative environmental effects of the Project in combination with other past, present, or reasonably foreseeable future projects or activities.

Few issues or concerns regarding the Terrestrial Environment were specifically raised during consultation and engagement activities with stakeholders, community members, and Aboriginal

organizations in respect of the Project. Generally, concerns were expressed regarding the loss of wildlife habitat, the depth of the open pit and its potential to be a hazard to wildlife, the potential for change to wildlife important for hunting and trapping, and the potential for wildlife to encounter hazardous substances such as contaminated water. These issues are addressed in this assessment.

8.6.1.2 Selection of Environmental Effect and Measurable Parameters

The environmental assessment of the Terrestrial Environment is focused on the following environmental effect:

- Change in Wildlife Populations.

The Project has the potential to affect the Terrestrial Environment through changes in abundance in wildlife (including SAR and SOCC), and changes in wildlife habitat quantity and quality. These potential changes could possibly influence the sustained presence of wildlife populations or communities within the greater Central Uplands Ecoregion (Madawaska Uplands portion) and/or Valley Lowlands Ecoregion, or more broadly in the Province. Given the value placed on the Terrestrial Environment by regulatory agencies, the public, Aboriginal people and groups, and other stakeholders, the environmental assessment of the Terrestrial Environment is focused on this key environmental effect which encompasses the critical aspects of the VEC.

The measurable parameters for a Change in Wildlife Populations and the rationale for their selection are provided in Table 8.6.1.

Table 8.6.1 Measurable Parameters for the Terrestrial Environment

Environmental Effect	Measurable Parameter	Rationale for Selection of the Measurable Parameter
Change in Wildlife Populations	Change in wildlife habitat (ha and % of RAA)	<ul style="list-style-type: none"> • Change in habitat (loss or gain, or change in quality) can lead to changes in wildlife abundance, behavior and/or species mortality and breeding success. The <i>MBCA</i>, <i>SARA</i>, and <i>NB SARA</i> afford some protection of habitat for SAR, SOCC, or species of migratory birds.
	Mortality (number of individuals, % of population in RAA, New Brunswick)	<ul style="list-style-type: none"> • Wildlife is protected under the New Brunswick <i>Fish and Wildlife Act</i>. • SAR are protected by law (under <i>SARA</i> or <i>NB SARA</i>), and SOCC are of concern to NBDNR or COSEWIC. • Migratory bird species are protected by law under the <i>MBCA</i>. • Direct mortality can occur through collision with construction vehicles. Indirect mortality can result from an increase in predation, hunting, and/or poaching because of improved access or other habitat changes.

The selection of these measurable parameters was based on input from regulatory agencies, stakeholders, and the professional judgement of the Stantec Study Team, and on the results of the Baseline Wildlife and Wildlife Habitat Technical Report (Stantec 2012f).

8.6.1.3 Temporal Boundaries

The temporal boundaries for the assessment of the potential environmental effects of the Project on the Terrestrial Environment include the phases of Construction, Operation, and Decommissioning, Reclamation and Closure of the Project. The Project's environmental effects are predicted to be greatest during Construction, when the majority of disturbance and ground work is being conducted. Decommissioning, Reclamation and Closure of the Project is expected to have the least potential to create adverse environmental effects on the Terrestrial Environment.

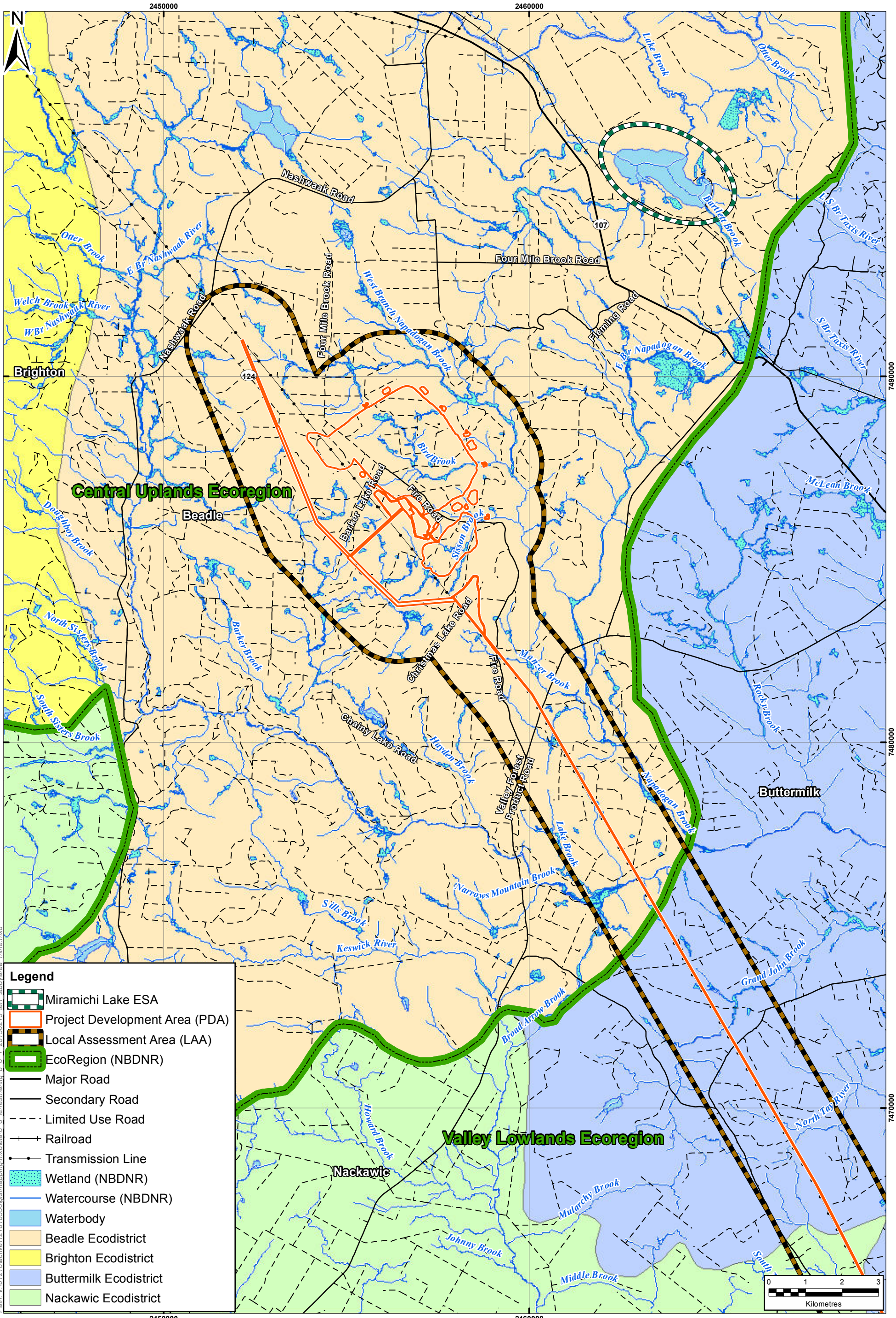
8.6.1.4 Spatial Boundaries

The spatial boundaries for the environmental effects assessment of the Terrestrial Environment are defined below.

Project Development Area (PDA): The PDA (Figure 8.6.1 and 8.6.2) is the most basic and immediate area of the Project, and consists of the area of physical disturbance associated with the Construction and Operation of the Project. Specifically, the PDA consists of an area of approximately 1,253 hectares that includes: the open pit; ore processing plant; storage areas; TSF; quarry; the relocated Fire Road and new Project site access road; and new and relocated power transmission lines. The PDA is the area represented by the physical Project footprint as detailed in Chapter 3.

Local Assessment Area (LAA): The LAA is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence (encompassing the likely zone of influence for the Terrestrial Environment). The LAA (Figures 8.6.1 and 8.6.2) includes the PDA and any adjacent areas where Project-related environmental effects may reasonably be expected to occur. For the Terrestrial Environment specifically, this area includes the PDA plus an additional 1.5 km perimeter around the PDA. Within this area, air contaminants (e.g., dust) and noise emissions from the Project may also have the potential to have an environmental effect on wildlife and wildlife habitat.

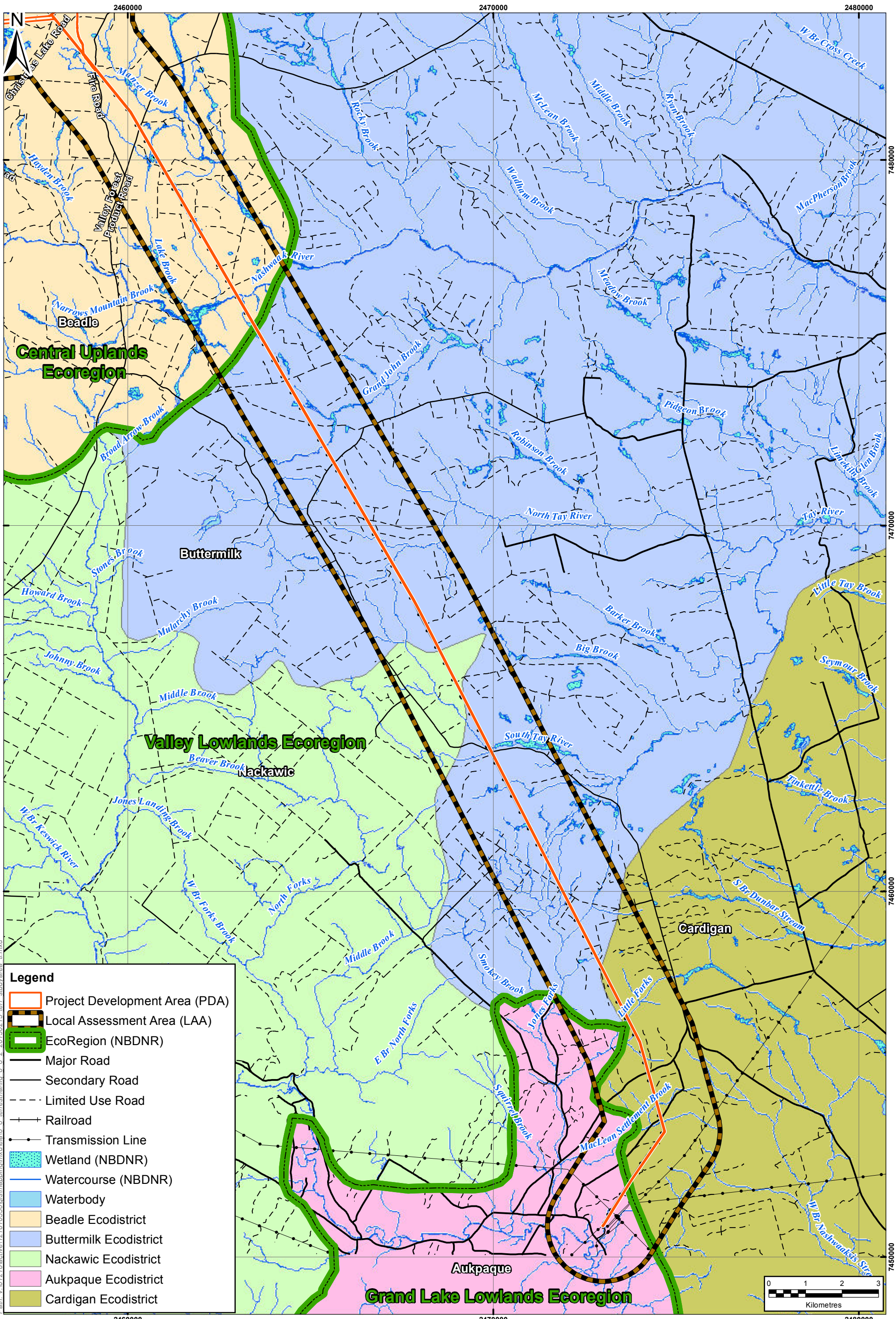
Regional Assessment Area (RAA): The RAA is the area within which the Project's environmental effects may overlap or accumulate with the environmental effects of other projects or activities that have been or will be carried out. The extent to which cumulative environmental effects for the Terrestrial Environment may occur depend on physical and biological conditions and the type and location of other past, present, and reasonably foreseeable future projects or activities that have been or will be carried out, as defined within the RAA. For the Terrestrial Environment, the RAA includes the Central Uplands (Madawaska Uplands portion only and excluding the Caledonia Uplands) and the Valley Lowlands Ecoregions (Figure 8.6.3). The Caledonia Uplands portion of the Central Uplands Ecoregion is distant from the Project and considered inappropriate for inclusion in the RAA. These encompassing ecoregions were selected as the RAA because these areas represent environments similar to those in the LAA and PDA, and provide relevant comparisons with terrestrial populations and communities in the greater landscape. Although a small portion of the southernmost component of the new 138 kV electrical transmission line is within the Grand Lake Lowlands Ecoregion, this ecoregion is excluded from the RAA, as the small portion in the PDA is excluded from the RAA, for reasons discussed in sub-section 8.6.2.1.



Path: V:\01219\active\121810356\gis\mapping\mxd\fig_8_6_1_20130215 terr_studyarea_mine.mxd

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Project Development Area (PDA), and Local Assessment Area (LAA) for the Terrestrial Environment – Mine Site Portion				Scale: 1:95,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.1	
Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.				Date: (dd/mm/yyyy) 21/02/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.								



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Project Development Area (PDA), and Local Assessment Area (LAA) for the Terrestrial Environment – Transmission Line Portion		Scale: 1:95,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.2	
Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.		Date: (dd/mm/yyyy) 21/02/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.						

8.6.1.5 Administrative and Technical Boundaries

The administrative boundaries for the Terrestrial Environment generally include the legislative, regulatory and policy instruments at the provincial and federal level intended to protect wildlife populations and their habitats. The key federal and provincial legislation and policies include:

- New Brunswick *Fish and Wildlife Act*;
- *Species at Risk Act (SARA)*;
- *Migratory Birds Convention Act (MBCA)*; and
- New Brunswick *Species at Risk Act (NB SARA)*.

The New Brunswick *Fish and Wildlife Act* protects all fish and wildlife species (including all vertebrate animals or birds) which are usually wild in the province of New Brunswick from angling, hunting, trapping and other forms of intentional take except under the authority of permits or licenses. The act also prohibits the disturbance, gathering, or collection of the nests or eggs of any bird species except under the authority of a permit. Under Section 4 of the Act, some wildlife and bird species (including American Crow, Double-crested Cormorant, and European Starling) may be taken under permit if they present a risk of injury to landowners, or a risk of property damage.

SAR includes those species listed as “Extirpated”, “Endangered”, “Threatened”, or “Special Concern” by the federal *Species at Risk Act (SARA)* or the New Brunswick *Species at Risk Act (NB SARA)*. NB SARA was recently proclaimed, and this EIA assumes that NB SARA and its regulations will be in effect by the time this EIA review is completed, including the protection assessments for various species.

SOCC are here defined as species ranked S1 or S2 in New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC), or species ranked “May Be at Risk” or “Sensitive” in New Brunswick by the Canadian Endangered Species Conservation Council (CESCC). Also included as SOCC are species for which a status report from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is pending, or that are COSEWIC candidate species due to historic population trends, even if other rankings still suggest a secure status.

SARA and NB SARA generally prohibit listed wildlife species or their residences from being destroyed, disturbed, or otherwise interfered with. Under SARA and NB SARA, a wildlife species is defined as “...a species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is (a) native to Canada (New Brunswick), or (b) has extended its range into Canada (New Brunswick) without human intervention and has been present in Canada (New Brunswick) for at least 50 years.” SARA is co-administered by Environment Canada, Parks Canada Agency, and Fisheries and Oceans Canada (DFO). NB SARA is administered by the New Brunswick Department of Natural Resources (NBDNR). The MBCA is mainly administered by Environment Canada.

The purposes of SARA are to prevent wildlife species from becoming extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered

or threatened. General prohibitions include Section 32(1), which states that no person shall kill, harm, harass, capture, or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species, and Section 33, which states that no person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada. In addition, critical habitat, defined as the habitat that is necessary for the survival or recovery of a listed wildlife species, may be defined and protected under Section 58. Only those species currently listed in Schedule 1 of SARA (*i.e.*, those listed as extirpated, endangered, or threatened) are protected by the prohibitions of Sections 32-36 and 58 of that Act, and then only on federal lands, except for aquatic species and migratory birds which are protected throughout Canada by other acts and regulations. SARA-listed species designated as special concern are not protected by the prohibitions of Sections 32-36 or 58 of that Act; however, these species do require that provincial or regional management plans, including conservation measures, be developed to protect the species.

Similarly, the purposes of NB SARA are to prevent wildlife species from being extirpated from the Province, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to conserve species of special concern to prevent them from becoming endangered or threatened. Prohibitions include Section 28(2), which states that no person shall kill, harm, harass, or take any individual that is listed as an extirpated species, an endangered species or a threatened species. However, under Section 25, each species must undergo a protection assessment which will determine whether or not prohibitions stated in Section 28 should apply. Protection assessments consider, among other aspects, the management implications for the Province, land ownership issues, and social and economic factors.

Migratory birds are protected federally under the *MBCA*. The *MBCA* and regulations afford protection to all birds listed in the Canadian Wildlife Service (CWS) Occasional Paper No. 1, "Birds Protected in Canada under the *Migratory Birds Convention Act*" (CWS 1991). The act and regulations state that no person may disturb, destroy, or take/have in their possession a migratory bird (alive or dead), or its nest or eggs, except under authority of a permit. The purpose of the *MBCA* is to protect and conserve migratory bird populations and individuals and their nests. Migratory birds covered under the *MBCA* in Canada, and relevant to the Project, include:

- waterfowl (*e.g.*, ducks and geese);
- rails (*e.g.*, coots, gallinules, sora, and other rails);
- shorebirds (*e.g.*, plovers and sandpipers); and
- songbirds (*e.g.*, thrushes and warblers) (CWS 1991).

Birds not falling under federal jurisdiction of the *MBCA* within Canada include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays and kingfishers. Most birds not included in this list are protected under provincial laws (*e.g.*, New Brunswick *Fish and Wildlife Act*).

In the *Migratory Birds Regulations* under the *MBCA*, Section 6 states that the disturbance, destruction, taking of a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird; possessing a

migratory bird, carcass, skin, nest or egg of a migratory bird are prohibited. In addition, Section 35(1) has been repealed and replaced with Section 5(1) of the *MBCA* which prohibits the deposition of substances harmful to migratory birds in waters or areas frequented by migratory birds or in a place from which the substance may enter such waters or such an area.

As there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices (including most notably avoiding clearing activities during the breeding period) must be followed to prevent contravention of the *MBCA*.

Technical boundaries for the Terrestrial Environment include limitations in existing data sources used to characterize the LAA and RAA. These data sources include the Atlantic Canada Conservation Data Centre (AC CDC) (AC CDC 2012a; AC CDC 2012b), New Brunswick Department of Natural Resources (NBDNR) forest cover inventory data and aerial imagery, LiDAR (light detecting and ranging) data, 2008 survey data (Rescan 2010), 2011 survey data (Stantec 2012f), and 2012 survey data (Stantec 2013x). These data are sufficient and have been used to accurately describe existing conditions and assess potential Project-related environmental effects, but many of the data sources do not cover the entire RAA, and will not be used for the cumulative environmental effects assessment. Habitat information is unavailable for a portion (*i.e.*, 5 km along industrial freehold land) of the proposed new 138 kV transmission line PDA and LAA, as the NBDNR forest and wetland inventory data are unavailable.

8.6.1.6 Residual Environmental Effects Significance Criteria

For SAR and SOCC, a significant adverse residual environmental effect on the Terrestrial Environment is:

- one that alters the terrestrial habitat within the assessment area physically, chemically, or biologically, in quality or extent, in such a way as to cause a change or decline in the distribution or abundance of a viable population that is dependent upon that habitat such that the likelihood of long-term survival of these rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result;
- one that results in the direct mortality of individuals or communities such that the likelihood of the long-term survival of these rare, uncommon and/or non-secure population(s) within New Brunswick is substantially reduced as a result;
- one that results in a non-permitted contravention of any of the prohibitions stated in Sections 32-36 of *SARA*, or in contravention of any of the prohibitions stated in Section 28 of the New Brunswick *Species at Risk Act* (NB *SARA*); or
- in the case of species of special concern listed in Schedule 1 of *SARA*, and where the Project activities are not in compliance with the objectives of management plans (developed as a result of Section 65 of *SARA* or Section 20 of the NB *SARA*) that are in place at the time of relevant Project activities.

For all other terrestrial fauna, a significant adverse residual environmental effect on the Terrestrial Environment is one that affects wildlife populations in such a way as to cause a decline in abundance

or change in distribution of common and secure population(s) such that the populations will not be sustainable within the Madawaska Uplands portion of the Central Uplands Ecoregion and the Valley Lowlands Ecoregion.

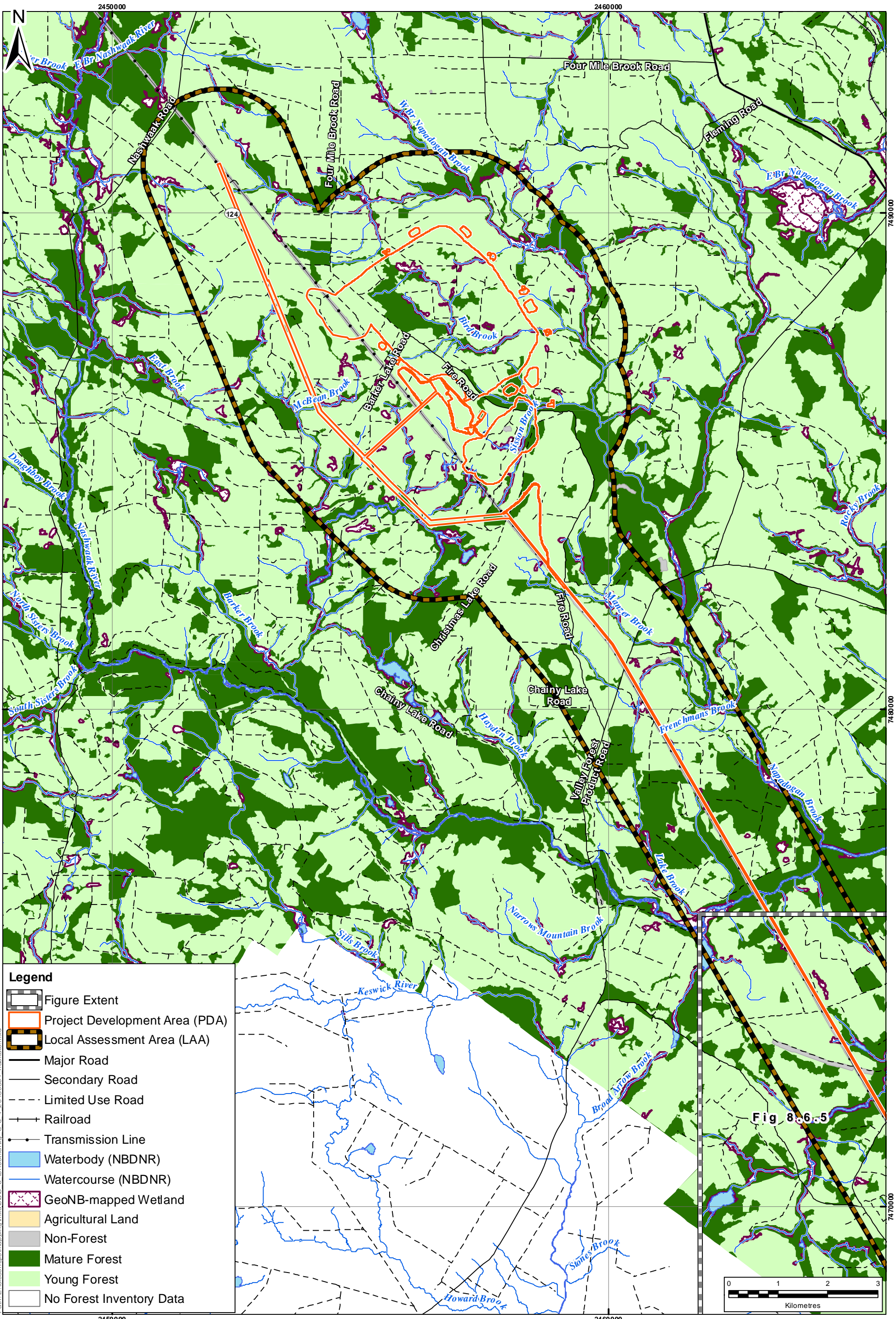
8.6.2 Existing Conditions

8.6.2.1 Habitat Overview

New Brunswick is divided into seven ecoregions which differ in physical characteristics such as climate, geology and soils, forest cover and vegetation, and wetlands. The mine site portion of the PDA is entirely within the southern portion of the Central Uplands Ecoregion, but relatively close (approximately 3 km) to the Valley Lowlands Ecoregion. The transmission line portion of the PDA extends from the mine site in the Central Uplands Ecoregion through the Valley Lowlands Ecoregion and ending near Burtt's Corner. The southernmost 1.5 km of the transmission line is within the Grand Lake Lowlands Ecoregion, which is the smallest ecoregion in the province and differs markedly from other ecoregions in its warm climate and abundance of floodplain wetlands. The combination of these characteristics results in a species assemblage in the Grand Lake Lowlands Ecoregion that includes many southern species not seen in other areas of the province. The area surrounding the transmission line portion of the PDA within the Grand Lake Lowlands Ecoregion does not differ greatly from the Valley Lowlands or Central Uplands Ecoregions in the vicinity of the Project in terms of soils or forestry data. Because such a small portion of the overall Project is within the most northern section of the Grand Lake Lowlands Ecoregion, it is believed that this small section is not representative of the ecoregion as a whole. In addition, increasing the RAA to include the Grand Lake Lowlands would cause the environmental effects predictions to be less conservative. Therefore, the RAA for the Terrestrial Environment includes the Central Uplands and Valley Lowlands Ecoregion, but does not include the Grand Lake Lowlands Ecoregion.

In the forests within these Ecoregions, the lower slope positions are typically dominated by balsam fir (*Abies balsamea*); red, white, and black spruce (*Picea rubens*, *P. glauca*, and *P. mariana*) trees largely as a result of the daily cold air drainage into the valley bottoms. The higher ground is dominated by tolerant hardwoods such as sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and beech (*Fagus grandifolia*) (NBDNR 2007). Common understory shrub species include mountain maple (*A. spicatum*), striped maple (*A. pensylvanicum*), and hobblebush (*Viburnum lantanoides*).

The predominant land use in the LAA is forest harvesting and other public uses of Crown land such as outdoor recreational activities including hunting, trapping, and off-road vehicle use—all conducted at the Crown's convenience. These land uses, particularly road infrastructure and forest resource harvesting, affect the extent and character of the Terrestrial Environment. There is some agricultural activity near the southern extent of the transmission line section of the LAA. Of the available data, the portion of the LAA associated with the mine site consists of approximately 97% forest of varying developmental stage and type. The mix of forest types within this portion of the LAA is very similar to that of the surrounding area, with 59-60% softwood, 32-33% hardwood, and 8-9% mixedwood. Along the transmission line portion of the LAA, the forest composition is different, with 50% softwood, 14% hardwood, and 36% mixedwood, making up 92% of this portion of the LAA (excluding the restricted freehold land for which data are not available). Areas of the LAA at the southern end of the transmission line contain proportionally more non-forest areas (such as agricultural and private residential land) than the remainder of the LAA (which is all Crown land) (Figures 8.6.4 and 8.6.5).

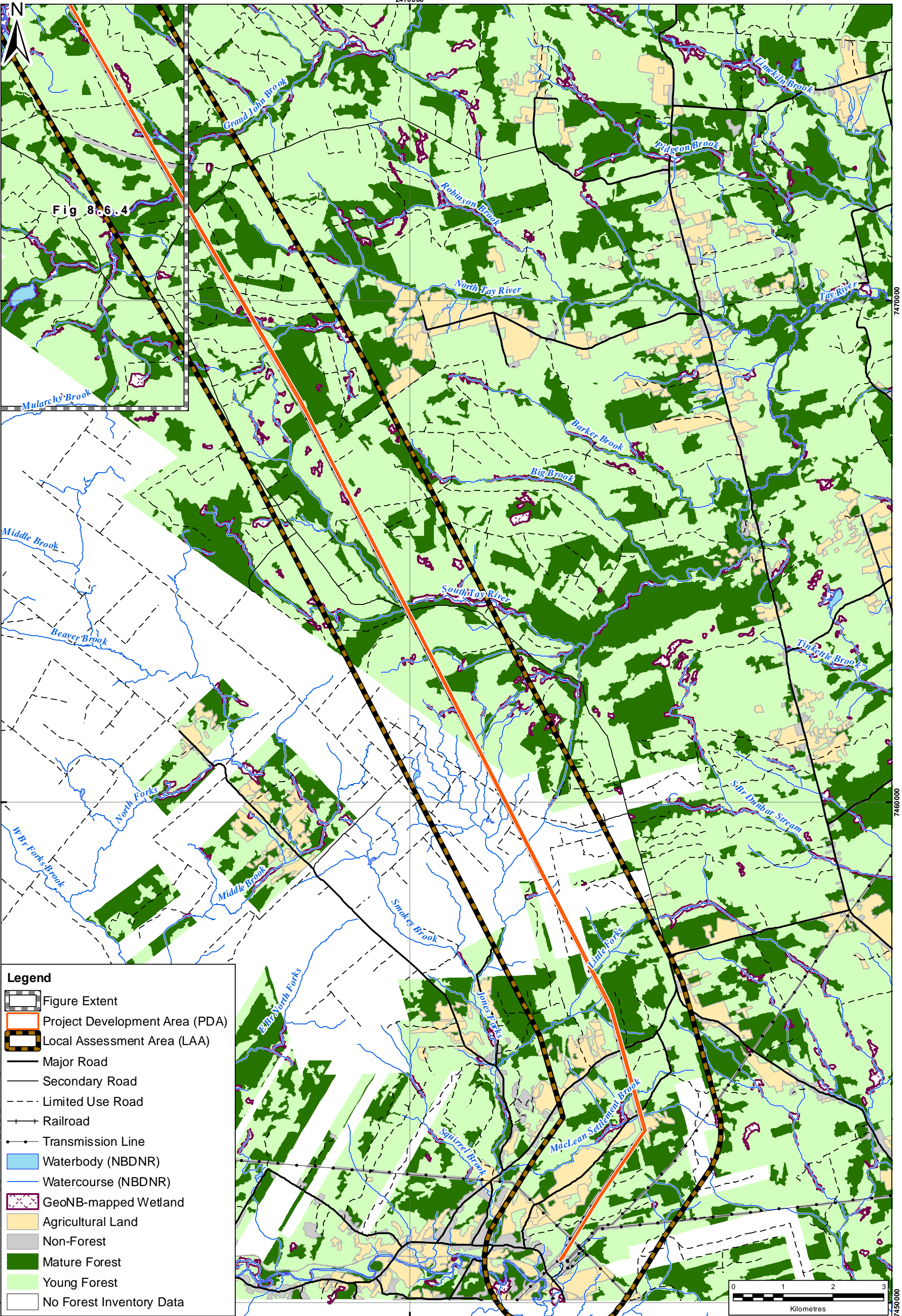


Legend

- Figure Extent
- Project Development Area (PDA)
- Local Assessment Area (LAA)
- Major Road
- Secondary Road
- Limited Use Road
- Railroad
- Transmission Line
- Waterbody (NBDNR)
- Watercourse (NBDNR)
- GeoNB-mapped Wetland
- Agricultural Land
- Non-Forest
- Mature Forest
- Young Forest
- No Forest Inventory Data

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Habitats - Mine Site Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		<p>Scale: 1:70,000</p>	<p>Project No.: 121810356</p>	<p>Data Sources: NBDNR, AC CDC</p>	<p>Fig. No.: 8.6.4</p>
<p>Client: Northcliff Resources Ltd.</p>		<p>Date: (dd/mm/yyyy) 01/03/2013</p>	<p>Dwn. By: JAB</p>	<p>Appd. By: DLM</p>	



Path: E:\sisson\gis\mapping\mxd\fig_8_6_4_20130301_1\habits.mxd

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Habitats - Transmission Line Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.5	
		Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.						

8.6.2.2 Managed Wildlife Habitats

8.6.2.2.1 Conservation Forest

Conservation forest is that in which the primary objectives are to conserve and protect a variety of non-timber forest values including water quality, riparian environments, wildlife habitats, and to conserve representative portions of the forest whose development is shaped only by natural environmental forces (New Brunswick Task Force on Forest Diversity and Wood Supply 2008). Conservation forest with a wildlife objective includes Old Forest Wildlife Habitat (OFWH) and Deer Wintering Areas (DWA).

Approximately 1,968 ha of conservation forest with a wildlife objective are intersected by the LAA (Figures 8.6.6 and 8.6.7), of which 1,111 ha (53%) is classified as only OFWH, 530 ha (27%) is only DWA, and the remainder is classified as both OFWH and DWA. Candidate Protected Natural Areas (PNA) makes up 761 ha of the conservation forest in the LAA. The PDA intersects 13.3 ha of conservation forest that is OFWH and/or DWA, of which 5 ha is within a candidate PNA (#150).

8.6.2.2.2 Deer Wintering Areas

DWAs are areas (usually mature softwood stands on south or southeast facing slopes) in which deer congregate when winter snowfall accumulates. These areas are important to deer as they provide protection from prevailing winds and snow, and maximize exposure to the sun's radiant heat. New Brunswick actively manages over 800 DWAs on Crown land (NBDNR 2012b), and requires a specified area of land be maintained as deer habitat on each of its 10 Crown timber licenses.

There are a total of 8 DWAs within the LAA, as defined by the conservation forest data. Three DWAs are intersected along the transmission line portion of the PDA (7.2 ha total area intersected) (Figures 8.6.6 and 8.6.7).

8.6.2.2.3 Protected Natural Areas (PNAs)

Protected Natural Areas (PNAs) are nature reserves that are legally protected under the *Protected Natural Areas Act*. There are currently over 158,000 hectares of New Brunswick being conserved in PNAs. There are two classes of PNAs in New Brunswick: Class I, the more restrictive, and Class II, which allows low-impact recreational activities. There are currently no PNA's located within the LAA.

In March of 2012, the Government of New Brunswick committed to doubling the amount of PNAs on forested Crown land. In keeping with this commitment, Candidate Protected Natural Areas have been selected. The candidate areas have been selected based on their ecological value, their importance as wildlife habitat, and their distribution throughout the province (NBDNR 2012f). Efforts have been made to avoid areas that are of priority for development or for resources use. There are no Candidate PNA's within the mine site portion of the PDA, though one (PNA#183) located west of the Nashwaak Road lies partially (7.6 ha) within the western extent of the LAA (Figure 8.6.7). One of these areas, PNA#150, is approximately 4,478 ha in area, and is crossed by the proposed and existing transmission line corridor. The area intersected by the transmission line portion of the PDA is approximately 5 ha, which also overlaps conservation forest, accounted for above. Another PNA (PNA #325) overlaps the southwest corner of Northcliff's mineral claim boundary, apparently in contradiction of the stated PNA objective to avoid areas for resource use.

In total, 14.3 ha of managed wildlife habitats, including conservation forest, DWA and candidate PNA would be crossed by linear facilities, including 3 ha by the relocated 345 kV transmission line and Fire Road realignments, and 11.3 ha by the new 138 kV transmission line. The LAA contains a total of 2,048 ha of managed wildlife habitats.

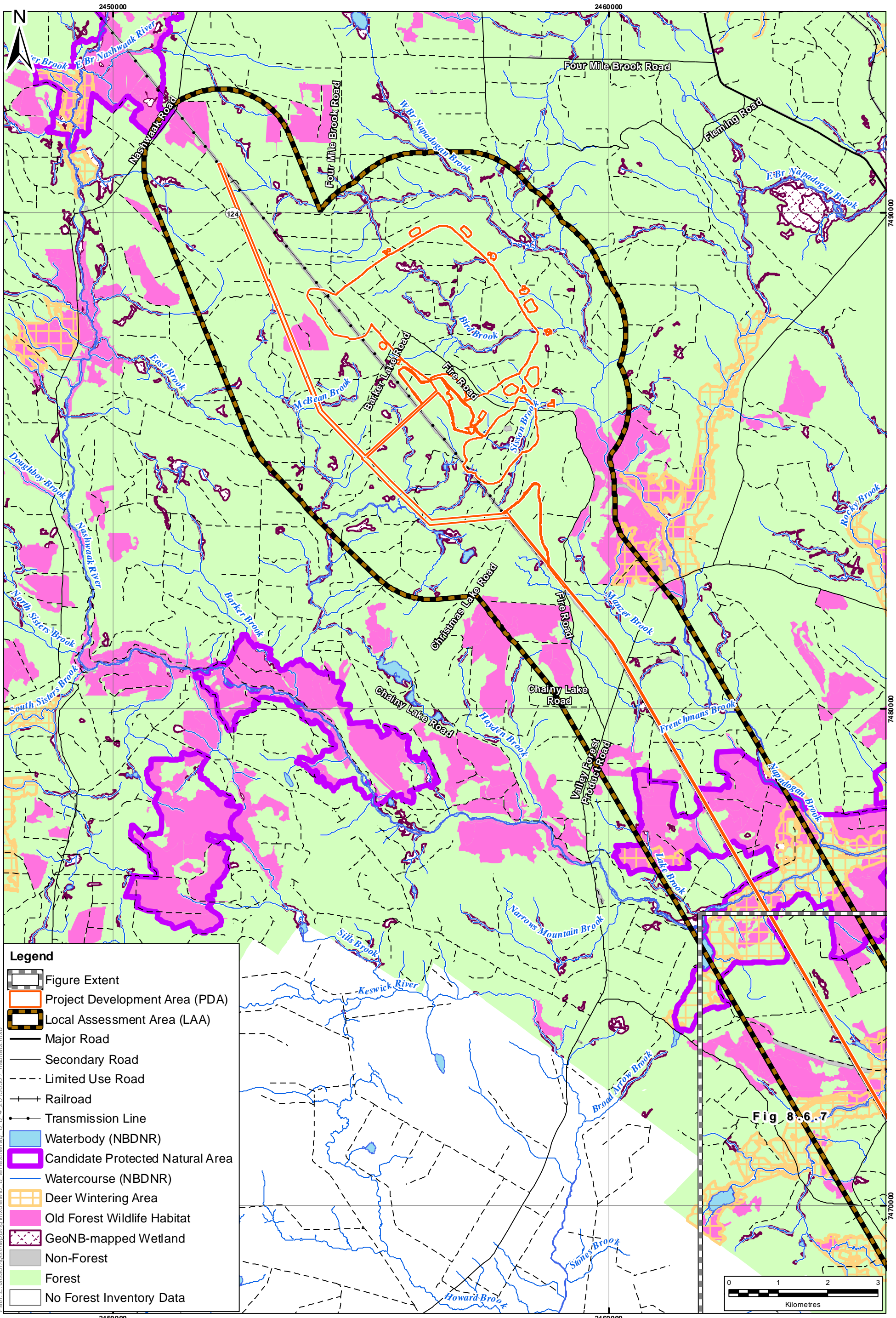
8.6.2.3 Interior Forest

Interior forest is recognized as important habitat for climax forest species. Interior forest is defined as continuous stands of mature forest greater than 10 ha that are free of edge effect (*i.e.*, more than 100 m from an edge); this definition is based upon discussions with the Canadian Wildlife Service (CWS) and has been used in past studies and environmental assessments in the Atlantic Canada region. Interior forest within and surrounding the LAA is shown in Figures 8.6.8 and 8.6.9. Species of wildlife that inhabit interior forest require habitat that is free of edge effects (*i.e.*, the deleterious environmental effects of generalist species affecting species where specific habitat is required). In some circumstances, the creation of edge increases the number of species using that landscape, but it can lead to increased predation or out-competition of interior forest species. Wildlife species such as American marten, fisher, Black-throated Blue Warbler, Barred Owl, Scarlet Tanager, and Black-backed Woodpecker are considered to be reliant on large patches of older mature forest. Within the existing landscape, the high incidence of forestry operations has resulted in loss of interior forest in and around the LAA

There are 72 interior forest stands within the LAA, eight of which are intersected by the mine site portion of the PDA. Seven of these eight stands intersected by the PDA range between 10.9 and 73.9 ha and are all or mostly within the PDA, while the eighth is 179.2 ha with only a few ha within the PDA. The total area of interior forest intersected by LAA is 3,303 ha. There are 8 stands that intersect the PDA, totaling 374 ha.

8.6.2.4 Wildlife

Records of wildlife were obtained for the LAA and surrounding area from available sources (Stantec 2012f; 2013b) including the Atlantic Canada Conservation Data Centre, the Maritimes Breeding Bird Atlas, the Atlantic Canada Nocturnal Owl Survey, the North American Breeding Bird Survey (BBS; Environment Canada 2011c) and NBDNR. Baseline wildlife studies were conducted within and surrounding the LAA in 2008, 2011, and 2012 (Stantec 2012f; 2013b). The objective of these studies was to characterize the terrestrial ecology of the area in order to facilitate an assessment of the potential environmental effects of development on wildlife and wildlife habitat. Figures 8.6.10 and 8.6.11 show the location of surveys for this field work within or close to the LAA (within figure extents), as well as locations of past surveys from existing sources.



Legend

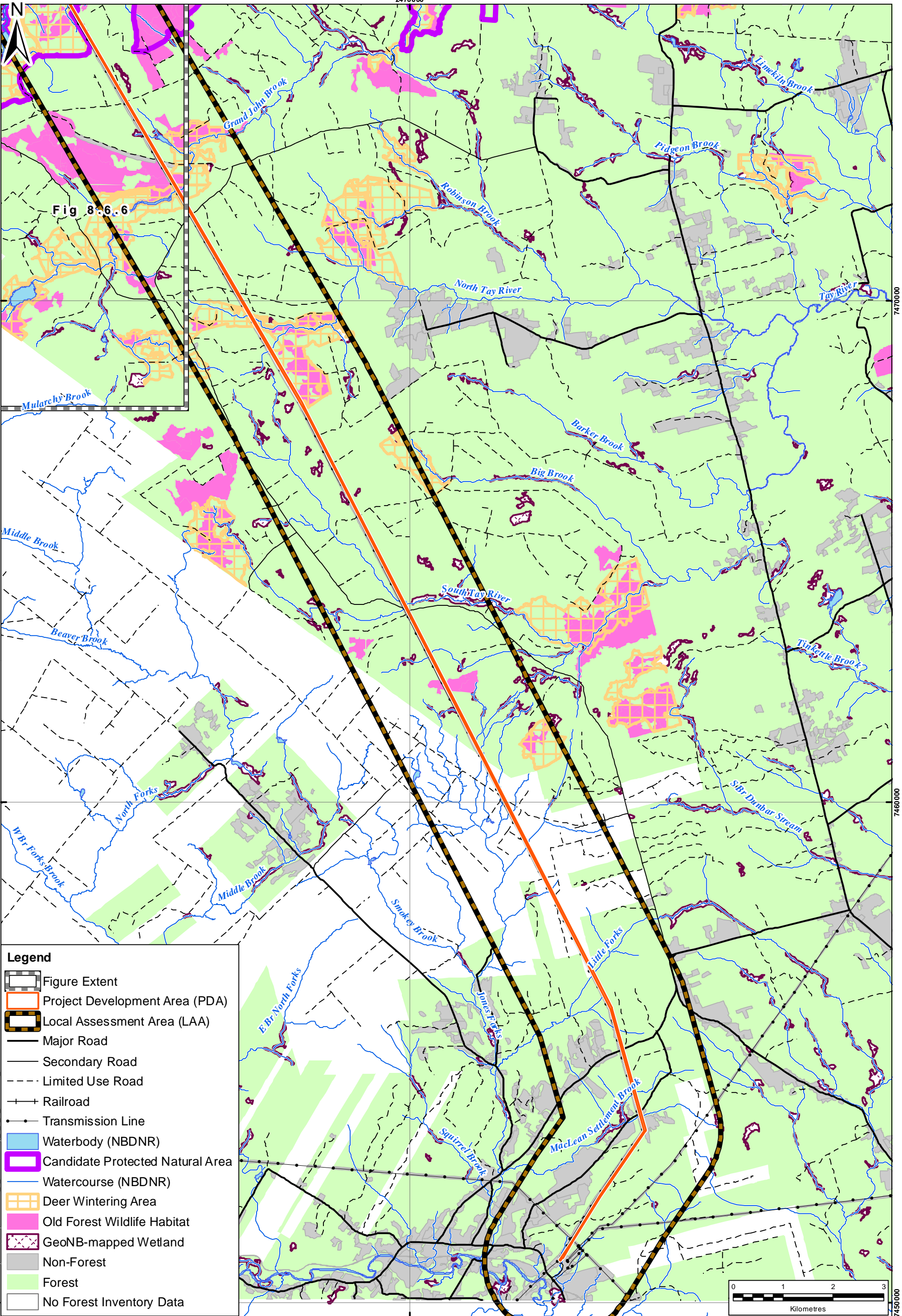
- Figure Extent
- Project Development Area (PDA)
- Local Assessment Area (LAA)
- Major Road
- Secondary Road
- Limited Use Road
- Railroad
- Transmission Line
- Waterbody (NBDNR)
- Candidate Protected Natural Area
- Watercourse (NBDNR)
- Deer Wintering Area
- Old Forest Wildlife Habitat
- GeoNB-mapped Wetland
- Non-Forest
- Forest
- No Forest Inventory Data

Fig 8.6.7

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p align="center">Conservation Forest - Mine Site Portion</p> <p align="center">Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.6
		Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM	
Client: Northcliff Resources Ltd.					

2470000

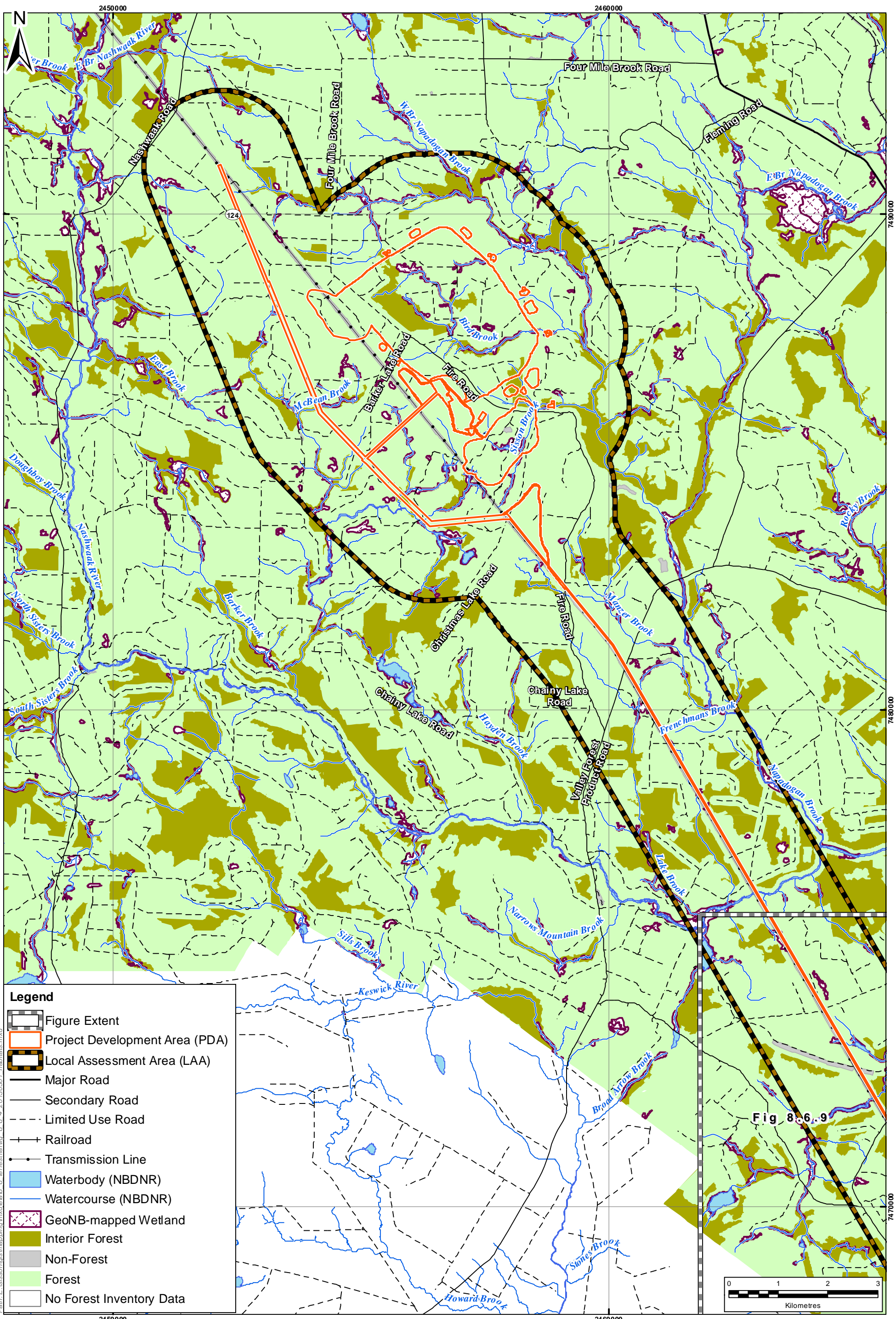


Legend

- Figure Extent
- Project Development Area (PDA)
- Local Assessment Area (LAA)
- Major Road
- Secondary Road
- Limited Use Road
- Railroad
- Transmission Line
- Waterbody (NBDNR)
- Candidate Protected Natural Area
- Watercourse (NBDNR)
- Deer Wintering Area
- Old Forest Wildlife Habitat
- GeoNB-mapped Wetland
- Non-Forest
- Forest
- No Forest Inventory Data

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Conservation Forest - Transmission Line Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale:	Project No.:	Data Sources:	Fig. No.:
		1:70,000	121810356	NBDNR, AC CDC	8.6.7
Client:	Northcliff Resources Ltd.	Date:	Dwn. By:	Appd. By:	
		01/03/2013	JAB	DLM	



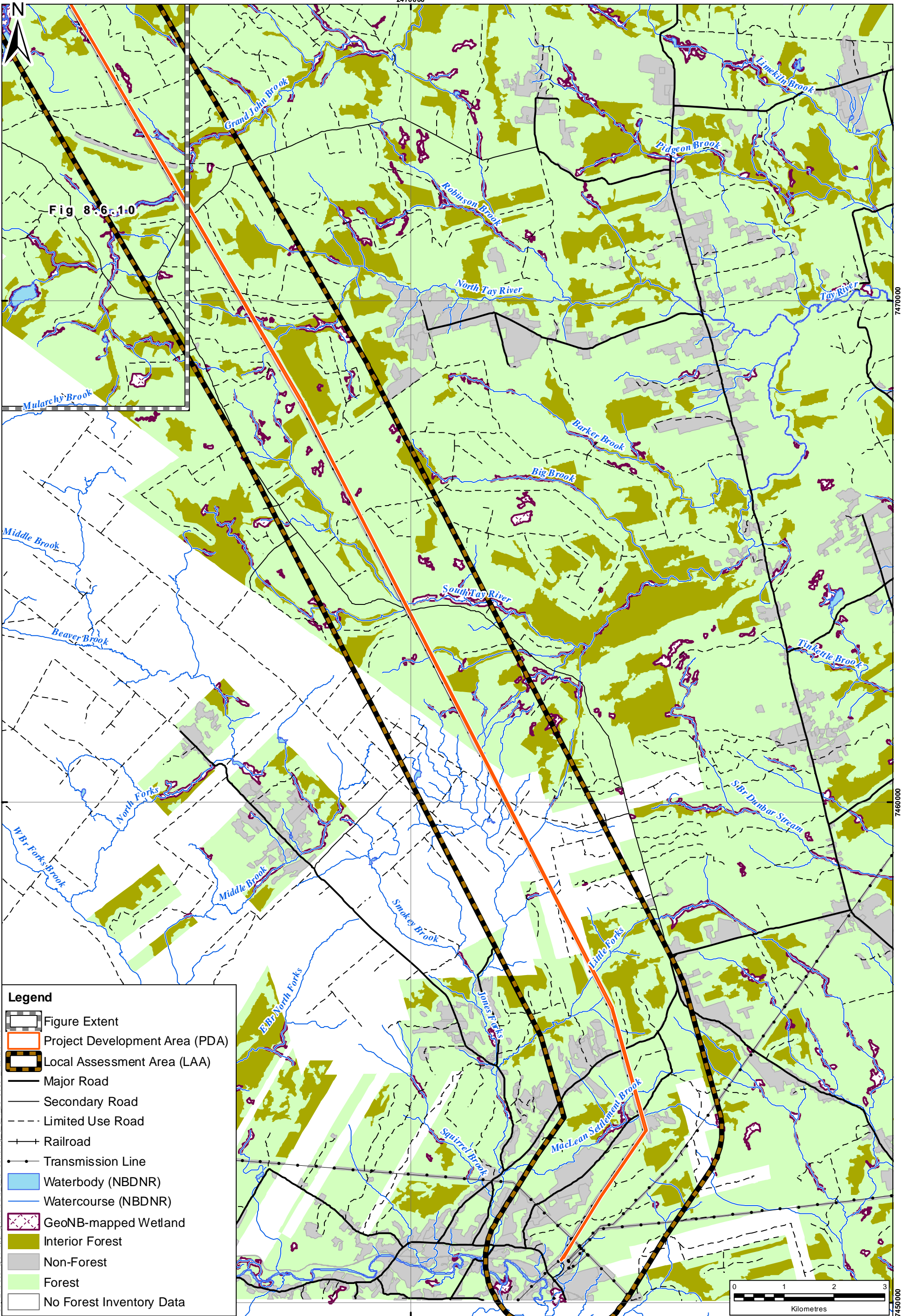
Legend

- Figure Extent
- Project Development Area (PDA)
- Local Assessment Area (LAA)
- Major Road
- Secondary Road
- Limited Use Road
- Railroad
- Transmission Line
- Waterbody (NBDNR)
- Watercourse (NBDNR)
- GeoNB-mapped Wetland
- Interior Forest
- Non-Forest
- Forest
- No Forest Inventory Data

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Interior Forest - Mine Site Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale:	Project No.:	Data Sources:	Fig. No.:
		1:70,000	121810356	NBDNR, AC CDC	8.6.8
Client:	Northcliff Resources Ltd.	Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:	
		01/03/2013	JAB	DLM	

2470000



7470000

7460000

7450000

2470000

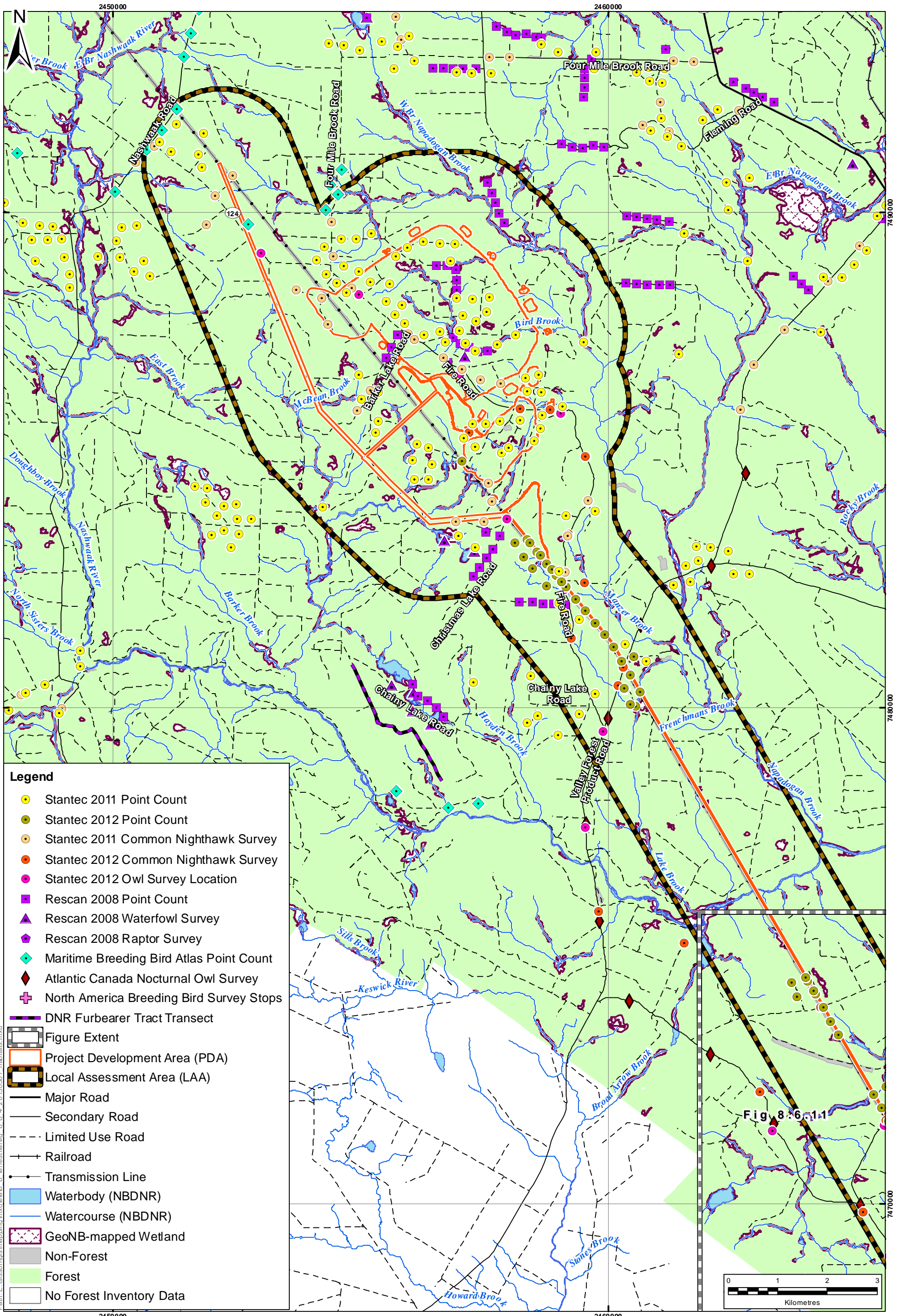
Legend

- Figure Extent
- Project Development Area (PDA)
- Local Assessment Area (LAA)
- Major Road
- Secondary Road
- Limited Use Road
- Railroad
- Transmission Line
- Waterbody (NBDNR)
- Watercourse (NBDNR)
- GeoNB-mapped Wetland
- Interior Forest
- Non-Forest
- Forest
- No Forest Inventory Data

Path: E:\sisson\gis\mapping\mxd\fig_8_6_4_20130301_1\trails.mxd

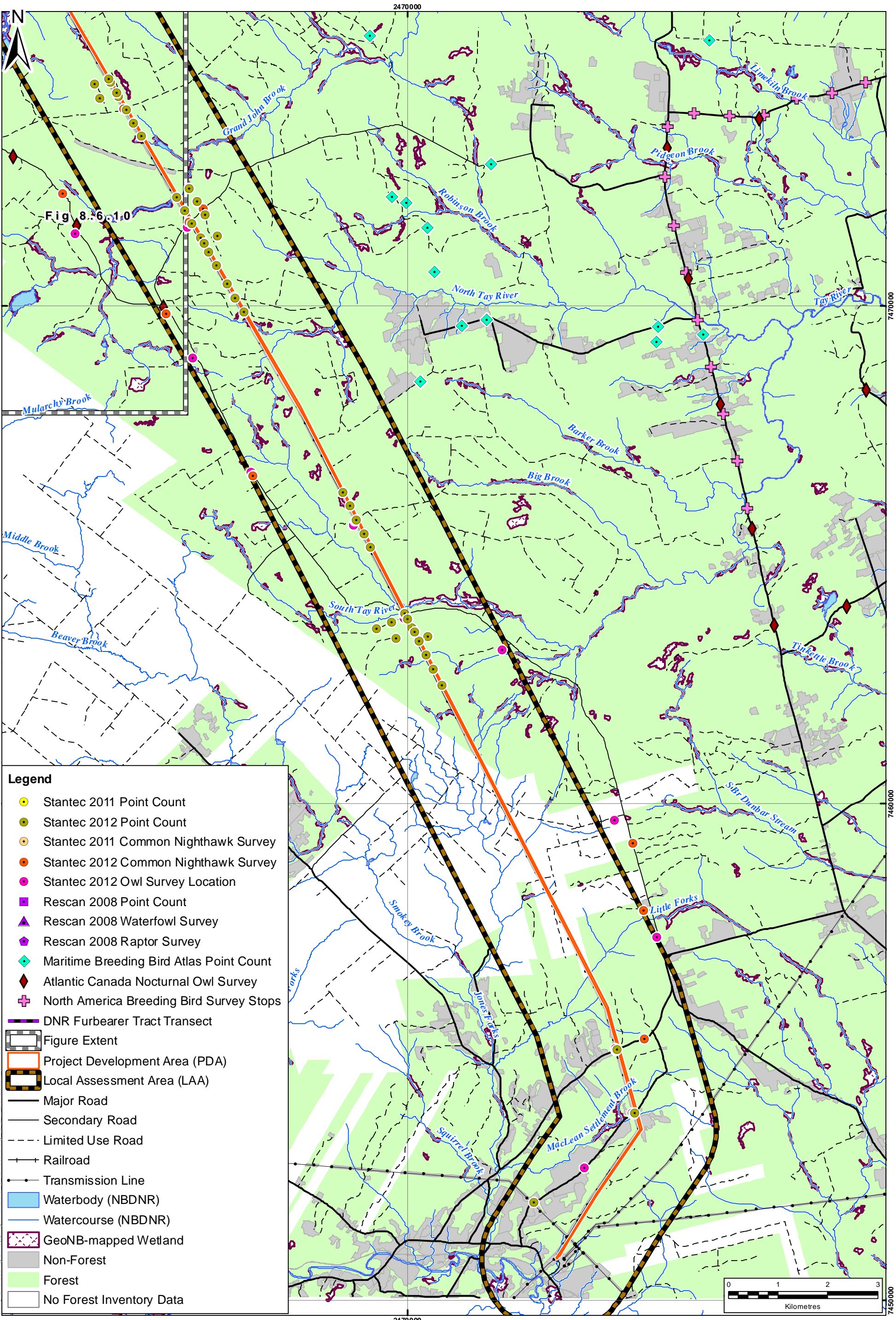
NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p align="center">Interior Forest - Transmission Line Portion</p> <p align="center">Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.9	
		Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.						



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Bird Survey Locations - Mine Site Portion Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.		Scale:	Project No.:	Data Sources:	Fig. No.:
		1:70,000	121810356	NBDNR, AC CDC	8.6.10
Client:	Northcliff Resources Ltd.	Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:	
		01/03/2013	JAB	DLM	



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Bird Survey Locations - Transmission Line Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.11	
		Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.						

More than 100 bird species were noted in or near the LAA during 2008, 2011, and 2012 field studies. Four of these species were SAR, including Canada Warbler, Olive-sided Flycatcher, Rusty Blackbird, and Common Nighthawk. There were eight SOCC observed, including Barn Swallow and Eastern Wood-pewee. Additional species observed in 2008, but not noted in 2011 or 2012 include Fox Sparrow (*Passerella iliaca*), Merlin (*Falco columbarius*), Canada Goose (*Branta canadensis*), Pied-billed Grebe (*Podilymbus podiceps*), and Wood Duck (*Aix sponsa*).

A total of 33 wildlife species (22 species of mammals, and 11 species of herpetiles), excluding birds, were noted in the LAA during 2008, 2011, and 2012 field studies. One of these was an SAR (Canada lynx).

8.6.2.4.1 Birds

The field crews observed a total of 78 bird species in 2011 during point count surveys. Fifty-nine species were observed within the LAA, and 74 species were observed in nearby areas. An additional 13 species were observed only incidentally.

Field crews observed a total of 64 species during point count surveys conducted on and near the transmission line corridor in 2012. Sixty-two species were observed during early June, and 63 species were observed in late June. There were six species, including Northern Goshawk, Spotted Sandpiper, Solitary Sandpiper, American Crow, Bobolink, and Pine Siskin, which were observed during the 2012 surveys, but were not observed during the 2011 surveys. The remainder of the species observed during the 2012 surveys, were also observed during the 2011 surveys. Table 8.6.2 lists the bird species observed during point counts, as well as species observed incidentally, in 2011 and/or 2012.

Table 8.6.2 Bird Species Observed During Breeding Bird Surveys in 2011 and/or 2012

Common Name	Scientific Name ^b	NBDNR Status ^c	AC CDC Rank ^c
American Black Duck	<i>Anas rubripes</i>	Secure	S5B,S4N
Green-winged Teal ^a	<i>Anas crecca</i>	Secure	S4S5B
Redhead ^a	<i>Aythya americana</i>	Accidental	SNA
Ring-necked Duck	<i>Aythya collaris</i>	Secure	S5B
Common Merganser ^a	<i>Mergus merganser</i>	Secure	S5B,S4N
Ruffed Grouse	<i>Bonasa umbellus</i>	Secure	S5
Spruce Grouse ^a	<i>Falcapennis canadensis</i>	Secure	S5
Common Loon	<i>Gavia immer</i>	Secure	S4B,S5M,S4N
Great Blue Heron	<i>Ardea herodias</i>	Secure	S4B
Turkey Vulture ^a	<i>Cathartes aura</i>	Secure	S3B
Osprey	<i>Pandion haliaetus</i>	Secure	S4S5B
Bald Eagle ^a	<i>Haliaeetus leucocephalus</i>	At Risk	S3B
Northern Harrier ^a	<i>Circus cyaneus</i>	Secure	S4B
Northern Goshawk	<i>Accipiter gentilis</i>	Secure	S4
Broad-winged Hawk	<i>Buteo platypterus</i>	Secure	S5B
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Secure	S4B
American Kestrel	<i>Falco sparverius</i>	Secure	S4B
Greater Yellowlegs ^a	<i>Tringa melanoleuca</i>	Secure	S5M
Wilson's Snipe ^a	<i>Gallinago delicata</i>	Secure	S4B
Solitary Sandpiper	<i>Tringa solitaria</i>	Secure	S2B,S5M
Spotted Sandpiper	<i>Actitis macularia</i>	Secure	S4B
American Woodcock ^a	<i>Scolopax minor</i>	Secure	S5B
Mourning Dove	<i>Zenaida macroura</i>	Secure	S5B

Table 8.6.2 Bird Species Observed During Breeding Bird Surveys in 2011 and/or 2012

Common Name	Scientific Name ^b	NBDNR Status ^c	AC CDC Rank ^c
Great Horned Owl ^a	<i>Bubo virginianus</i>	Secure	S4S5
Common Nighthawk	<i>Chordeiles minor</i>	At Risk	S3B
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Secure	S5B
Belted Kingfisher	<i>Ceryle alcyon</i>	Secure	S5B
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Secure	S5B
Downy Woodpecker	<i>Picoides pubescens</i>	Secure	S5
Hairy Woodpecker	<i>Picoides villosus</i>	Secure	S5
Northern Flicker	<i>Colaptes auratus</i>	Secure	S5B
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Secure	S5
Olive-sided Flycatcher	<i>Contopus cooperi</i>	At Risk	S3S4B
Eastern Wood-Pewee	<i>Contopus virens</i>	Secure	S4B
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Secure	S4S5B
Alder Flycatcher	<i>Empidonax alnorum</i>	Secure	S5B
Least Flycatcher	<i>Empidonax minimus</i>	Secure	S5B
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Sensitive	S3B
Blue-headed Vireo	<i>Vireo solitarius</i>	Secure	S5B
Red-eyed Vireo	<i>Vireo olivaceus</i>	Secure	S5B
Gray Jay	<i>Perisoreus canadensis</i>	Secure	S4B
Blue Jay	<i>Cyanocitta cristata</i>	Secure	S5
American Crow	<i>Corvus brachyrhynchos</i>	Secure	S5
Common Raven	<i>Corvus corax</i>	Secure	S5
Tree Swallow	<i>Tachycineta bicolor</i>	Secure	S4B
Barn Swallow	<i>Hirundo rustica</i>	Sensitive	S3B
Black-capped Chickadee	<i>Poecile atricapillus</i>	Secure	S5
Boreal Chickadee	<i>Poecile hudsonica</i>	Secure	S4
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Secure	S5
Brown Creeper	<i>Certhia americana</i>	Secure	S5B
Winter Wren	<i>Troglodytes troglodytes</i>	Secure	S5B
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Secure	S5
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Secure	S4S5B
Veery	<i>Catharus fuscescens</i>	Secure	S4B
Swainson's Thrush	<i>Catharus ustulatus</i>	Secure	S5B
Hermit Thrush	<i>Catharus guttatus</i>	Secure	S5B
American Robin	<i>Turdus migratorius</i>	Secure	S5B
Gray Catbird	<i>Dumetella carolinensis</i>	Secure	S4B
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Secure	S5B
Tennessee Warbler	<i>Vermivora peregrina</i>	Secure	S4B
Nashville Warbler	<i>Vermivora ruficapilla</i>	Secure	S5B
Northern Parula	<i>Parula americana</i>	Secure	S5B
Yellow Warbler	<i>Dendroica petechia</i>	Secure	S5B
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Secure	S5B
Magnolia Warbler	<i>Dendroica magnolia</i>	Secure	S5B
Cape May Warbler	<i>Dendroica tigrina</i>	Secure	S4B
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Secure	S5B
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Secure	S5B
Black-throated Green Warbler	<i>Dendroica virens</i>	Secure	S5B
Blackburnian Warbler	<i>Dendroica fusca</i>	Secure	S5B
Pine Warbler	<i>Dendroica pinus</i>	Secure	S4B
Palm Warbler	<i>Dendroica palmarum</i>	Secure	S5B
Bay-breasted Warbler	<i>Dendroica pastanea</i>	Secure	S4B
Black-and-white Warbler	<i>Mniotilta varia</i>	Secure	S5B
American Redstart	<i>Setophaga ruticilla</i>	Secure	S5B

Table 8.6.2 Bird Species Observed During Breeding Bird Surveys in 2011 and/or 2012

Common Name	Scientific Name ^b	NBDNR Status ^c	AC CDC Rank ^c
Ovenbird	<i>Seiurus aurocapilla</i>	Secure	S5B
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Secure	S4S5B
Mourning Warbler	<i>Oporornis philadelphia</i>	Secure	S4B
Common Yellowthroat	<i>Geothlypis trichas</i>	Secure	S5B
Canada Warbler	<i>Wilsonia canadensis</i>	At Risk	S3S4B
Scarlet Tanager	<i>Piranga olivacea</i>	Secure	S3S4B
Chipping Sparrow	<i>Spizella passerina</i>	Secure	S5B
Vesper Sparrow	<i>Poocetes gramineus</i>	May Be At Risk	S2B
Savannah Sparrow ^a	<i>Passerculus sandwichensis</i>	Secure	S5B
Song Sparrow	<i>Melospiza melodia</i>	Secure	S5B
Lincoln's Sparrow	<i>Melospiza lincolni</i>	Secure	S4B
Swamp Sparrow	<i>Melospiza georgiana</i>	Secure	S5B
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Secure	S5B
Dark-eyed Junco	<i>Junco hyemalis</i>	Secure	S5B
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Sensitive	S4B
Bobolink	<i>Dolichonyx oryzivorus</i>	Sensitive	S3S4B
Rusty Blackbird	<i>Euphagus carolinus</i>	May Be At Risk	S3B
Common Grackle	<i>Quiscalus quiscula</i>	Secure	S5B
Purple Finch	<i>Carpodacus purpureus</i>	Secure	S4S5B
Pine Siskin	<i>Carduelis pinus</i>	Secure	S4
White-winged Crossbill ^a	<i>Loxia leucoptera</i>	Secure	S4
American Goldfinch	<i>Carduelis tristis</i>	Secure	S5
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Secure	S3S4B,S4S5N

Notes:
^a Incidental observation only.
^b AC CDC nomenclature.
^c Status/ranking definitions:
NBDNR Status:
At Risk Species for which a formal assessment has been completed, and determined to be at risk of extirpation or extinction. Includes species either listed as "Endangered" or "Threatened" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or as Endangered or Regionally Endangered under the NB ESA and accompanying regulations.
May Be At Risk Species or populations that may be at risk of extirpation or extinction, and are therefore candidates for a detailed risk assessment.
Sensitive Species which are not believed to be at risk of extirpation or extinction, but which may require special attention or protection to prevent them from becoming at risk.
Secure Species that are not believed to be "At Risk", "May Be At Risk", or "Sensitive". These were generally species that were widespread and/or abundant.
AC CDC Status Ranks:
S1 Extremely rare: May be especially vulnerable to extirpation (typically 5 or fewer occurrences or very few remaining individuals).
S2 Rare: May be vulnerable to extirpation due to rarity or other factors (6 to 20 occurrences or few remaining individuals).
S3 Uncommon, or found only in a restricted range, even if abundant at some locations (21 to 100 occurrences).
S4 Usually widespread, fairly common, and apparently secure with many occurrences, but of longer-term concern (e.g., watch list) (100+ occurrences).
S5 Widespread, abundant, and secure, under present conditions.
S#S# Numeric range rank: A range between two consecutive ranks for a species/community. Denotes uncertainty about the exact rarity (e.g., S1S2).
Qualifiers:
B Breeding (Migratory species).
N Non-breeding (Migratory species).

Surveys targeting owl species were conducted in 2011 and in 2012. Three owl species were recorded including Barred Owl (*Strix varia*) (2011 and 2012), Great Horned Owl (2011), and Northern Saw-whet Owl (*Aegolius acadicus*) (2012). Each of these species is relatively common and widespread throughout New Brunswick. There are also two Atlantic Canada Nocturnal Owl Survey routes that

intersect or are near the LAA, that have reported these same species, as well as Boreal Owl, located over 10 km east of the PDA (Stantec 2013b).

In order to obtain data on waterfowl and other waterbirds, field studies conducted in June 2008 included a visit to eight locations at major water bodies in areas surrounding the Project (Miramichi Lake, Mud Lake, Napadogan Lake, Nashwaak Lake, and Christmas Lake). Twelve sites were surveyed in September 2008. Eight different species of waterfowl/waterbirds were observed in the various open-water wetlands and lakes visited during the waterfowl/waterbird surveys. These species included:

- Canada Goose;
- Wood Duck;
- American Black Duck;
- Green-winged Teal;
- Ring-necked Duck;
- Common Merganser;
- Common Loon; and
- Pied-billed Grebe.

Additionally, Redhead was observed incidentally during the 2011 surveys. All of these species are relatively common and generally widespread throughout New Brunswick, with the exception of Pied-billed Grebe and Redhead (MBBA 2011). All have an NBDNR general status rank of “Secure”, with the exception of Canada Goose, which is considered an “Exotic” breeder, and Redhead which is considered “Accidental”. Overall, waterfowl/waterbirds observed were limited to these nine species, and none were observed in large numbers; observations within the LAA included one Ring-necked Duck in Christmas Lake in June 2011 and six Green-winged Teal in a Bird Brook wetland in the fall of 2011.

8.6.2.4.2 Mammals and Herpetiles

Over the 2008, 2011 and 2012 field surveys, field crews observed a total of 33 wildlife species (or evidence thereof) excluding birds. A total of 22 species of mammals, and 11 species of herpetiles were observed, all of which are common and widespread throughout the province with the exception of Canada lynx, and potentially the *Myotis* species (see sub-section 8.6.2.6).

Table 8.6.3 lists all of the mammal and herpetile species observed during the course of the field studies. With the exception of the *Myotis* spp. and Canada lynx, all the species listed are common and secure in the province.

Table 8.6.3 Mammal and Herpetile Species Observed in the LAA During 2008, 2011, and 2012 Field Studies

Mammals	Herpetiles
White-tailed deer (<i>Odocoileus virginianus</i>)	<i>Ambystoma</i> sp.
Moose (<i>Alces alces</i>)	Red-backed salamander (<i>Plethodon cinereus</i>)
Black bear (<i>Ursus americanus</i>)	Spring peeper (<i>Pseudacris crucifer</i>)
Eastern coyote (<i>Canis latrans</i>)	Pickerel frog (<i>Rana palustris</i>)
Snowshoe hare (<i>Lepus americanus</i>)	Mink frog (<i>Rana septentrionalis</i>)
Bobcat (<i>Lynx rufus</i>)	Wood frog (<i>Rana sylvatica</i>)
North American beaver (<i>Castor canadensis</i>)	Green frog (<i>Rana clamitans</i>)
Red squirrel (<i>Tamiasciurus hudsonicus</i>)	Bull frog (<i>Rana catesbeiana</i>)
American marten (<i>Martes americana</i>)	American toad (<i>Bufo americanus</i>)
Fisher (<i>Martes pennant</i>)	Maritime garter snake (<i>Thamnophis sirtalis</i>)
Weasel sp. (<i>Mustela</i> sp.)	Eastern newt (<i>Notophthalmus viridescens</i>)
North American river otter (<i>Lontra canadensis</i>)	
American mink (<i>Neovison vison</i>)	
Canada lynx (<i>Lynx canadensis</i>)	
Eastern chipmunk (<i>Tamias striatus</i>)	
Striped skunk (<i>Mephitis mephitis</i>)	
Muskrat (<i>Ondatra zibethicus</i>)	
Deer mouse (<i>Peromyscus maniculatus</i>)	
Woodland jumping mouse (<i>Napaeozapus insignis</i>)	
Northern short tailed shrew (<i>Blarina brevicauda</i>)	
Southern red-backed vole (<i>Myodes gapperi</i>)	
<i>Myotis</i> species	

8.6.2.4.3 Winter Track Surveys

To examine the abundance of commercially important fur-bearing mammals and their use of habitats in and around the PDA in winter, track transect surveys were conducted by experienced local trappers of the New Brunswick Trappers and Fur Harvesters Federation (NBTFHF) during the winter of 2012. Two transects were arranged along roads intersecting the PDA that would experience little or no vehicle traffic or plowing (*i.e.*, where snow would not likely experience anthropogenic disturbance) and where a variety of habitat types would be surveyed.

Evidence of eight mammal and one bird species was detected during these surveys including:

- Canada lynx;
- American marten;
- Fisher;
- Weasel;

- Red squirrel;
- Snowshoe hare;
- Eastern coyote;
- Moose;
- North American beaver; and
- Ruffed Grouse.

The most frequently recorded species in both transects were snowshoe hare and red squirrel.

8.6.2.4.4 Aerial Wildlife Survey

An aerial wildlife survey was also conducted in the winter of 2012, led by a Stantec terrestrial ecologist with assistance from the two local trappers of the NBTFFH who conducted the track transect survey. A helicopter was used to fly over a sequence of waypoints through mature forest habitat (including NBDNR DWAs) during an estimated period of 6.5 hours. The helicopter fly over was conducted within and around the LAA approximately 24 hours following a light snowfall. During the survey, tracks from and/or sightings of eight mammal species were recorded including:

- Moose;
- Eastern coyote;
- Canada lynx;
- American marten;
- Fisher;
- North American river otter;
- North American beaver; and
- American mink.

No white-tailed deer tracks or individuals were observed during the survey. Moose tracks were the most widespread and commonly seen animal tracks observed both inside and outside the PDA, and moose were the only wildlife species seen during the aerial survey.

Canada lynx tracks were recorded at each of the two track transects, and at multiple locations across the landscape during the aerial survey.

8.6.2.5 Species at Risk (SAR)

SAR are defined as any wildlife species listed in Schedule 1 of the federal SARA, or in Schedule A of the NB SARA, as “Extirpated”, “Endangered”, “Threatened”, or “Special Concern”.

Data supplied by AC CDC (AC CDC 2012a; AC CDC 2012b) has identified nine terrestrial wildlife SAR which have the potential to be found within or near the LAA. These species and their associated conservation status are presented in Table 8.6.4, and locations where they were recorded within or close to the LAA are illustrated in Figures 8.6.12 and 8.6.13.

Table 8.6.4 Wildlife Species At Risk with Records Within or Near the LAA

Common Name	Scientific Name	NBDNR Status	NB SARA	COSEWIC Status	SARA Status
Canada lynx	<i>Lynx canadensis</i>	At Risk	Endangered	Not At Risk	^b N/A
Eastern cougar	<i>Puma concolor</i>	Undetermined	^a	Data Deficient	^b N/A
Wood turtle	<i>Glyptemys insculpta</i>	At Risk	-	Threatened	Schedule 1 (Threatened)
Bald Eagle	<i>Haliaeetus leucocephalus</i>	At Risk	Endangered	Not At Risk	^b N/A
Common Nighthawk	<i>Chordeiles minor</i>	At Risk	-	Threatened	Schedule 1 (Threatened)
Chimney Swift	<i>Chaetura pelagica</i>	At Risk	-	Threatened	Schedule 1 (Threatened)
Olive-sided Flycatcher	<i>Contopus cooperi</i>	At Risk	-	Threatened	Schedule 1 (Threatened)
Canada Warbler	<i>Wilsonia canadensis</i>	At Risk	-	Threatened	Schedule 1 (Threatened)
Rusty Blackbird	<i>Euphagus carolinus</i>	May Be At Risk	-	Special Concern	Schedule 1 (Special Concern)

Notes:

^a Eastern cougar, formerly considered endangered under the former New Brunswick *Endangered Species Act* (now repealed and superseded by NB SARA, is not listed under Section 18 of NB SARA.

^b No SARA status at this time.

Of the SAR records from the AC CDC (AC CDC 2012a; AC CDC 2012b), Canada lynx, Bald Eagle, Common Nighthawk, Olive-sided Flycatcher, Canada Warbler, and Rusty Blackbird have been reported by other sources or observed during field surveys conducted in support of the Project, in or near the LAA. Eastern cougar, while previously included in the former New Brunswick *Endangered Species Act*, is the only species not carried forward for inclusion in Schedule A of the NB SARA, without an initial assessment. Given its uncertain status in the province, this species is not carried forward in the assessment.

Canada Lynx

In New Brunswick, Canada lynx tend to inhabit forested wilderness areas, favouring mature forests with a dense undercover of thickets and windfalls. There is habitat suitable for Canada lynx in the PDA, LAA and RAA. They will however inhabit other types of habitat as long as they contain minimal forest cover and adequate numbers of prey (e.g., varying hare). In New Brunswick, lynx are reported by naturalists to inhabit mostly the northern portion of the Saint John River basin despite the paucity of data regarding their presence. There are two records of Canada lynx in the AC CDC data near Deersdale (10 km north of the PDA; AC CDC 2012a), and one near Dorn Ridge west of the transmission line (AC CDC 2012b). Lynx tracks have also been detected once (2004) since NBDNR

winter track-transects have been conducted south of Chainy Lakes (4 km south of the PDA), beginning in 2003. No lynx were observed during 2008 field surveys by Rescan. Despite the paucity of observation data, this species appears to be wide-ranging. Tracks were detected within the LAA during track-transect surveys in 2012 and throughout the area surrounding the LAA during an aerial survey conducted in March 2012. This level and intensity of survey is not common and available information is limited, consequently it is postulated that the species is more common in the region than the limited data would suggest.

Wood Turtle

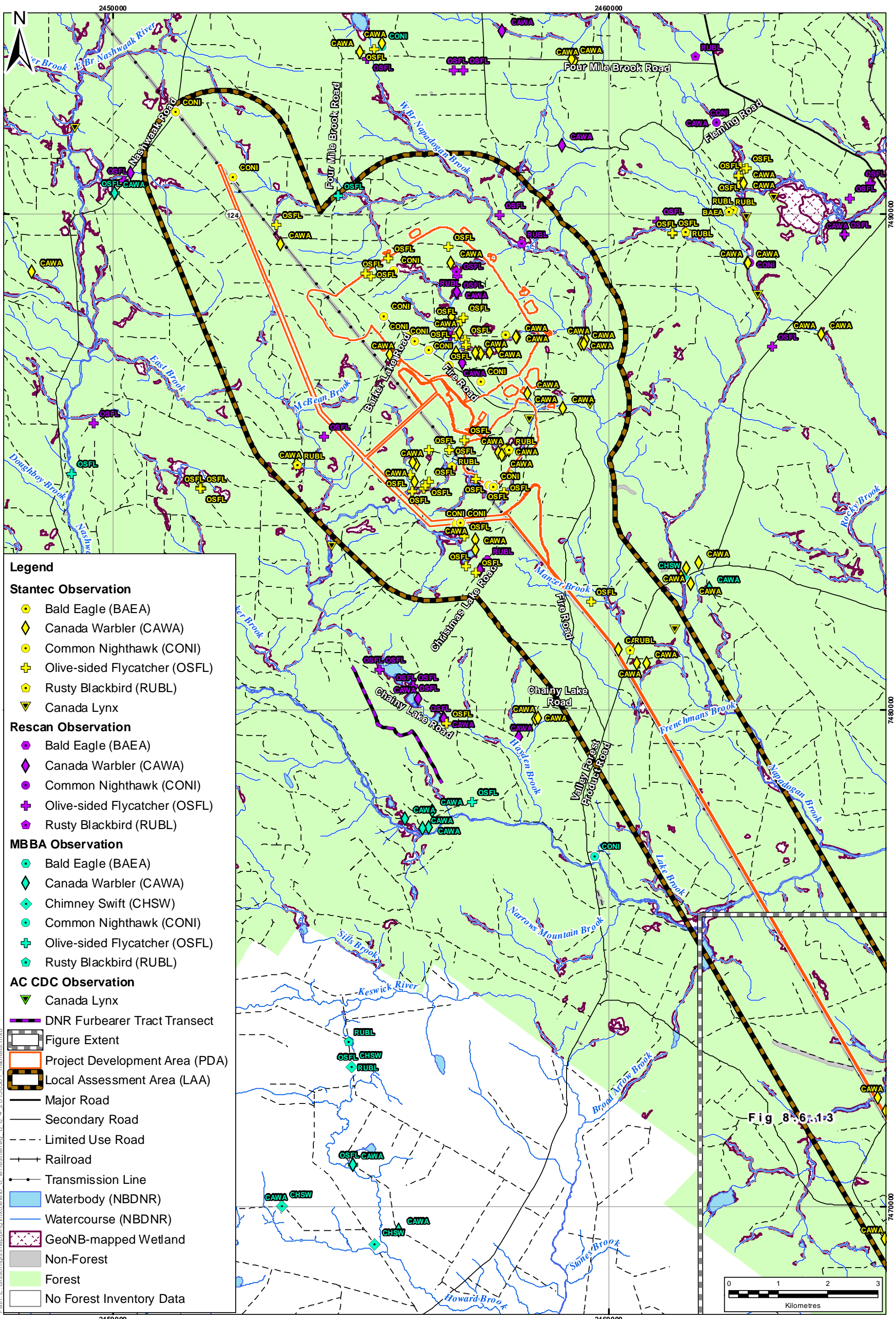
There is one species of herpetile listed as “Threatened” on Schedule 1 of SARA and as At Risk by NBDNR, the wood turtle. There is one AC CDC record of wood turtle north of the LAA, in Deersdale on the north side of the Southwest Miramichi River, north of Route 107, near the J.D. Irving sawmill (AC CDC 2012a). A second record from before 1998 is located on the Keswick River near Burtt's Corner, south of the transmission line terminus (AC CDC 2012b).

The wood turtle is a medium-sized freshwater turtle. It is found throughout northeastern North America, with a patchy Canadian range from Nova Scotia west through New Brunswick, Québec, and Ontario (Species at Risk Public Registry 2012). Though semi-aquatic, the wood turtle spends more time in the terrestrial environment than most other freshwater turtles. The main aquatic habitat for this species is typically meandering watercourses with moderate current, and sand or gravel bottoms (Species at Risk Public Registry 2012), a habitat type that is of limited availability within the PDA. The preferred terrestrial habitat is generally riparian areas with diverse and patchy cover. The species has also been observed in a variety of other habitat types, including bogs, beaver ponds, coniferous and mixed forests, and agricultural fields.


The main threats to wood turtles are:

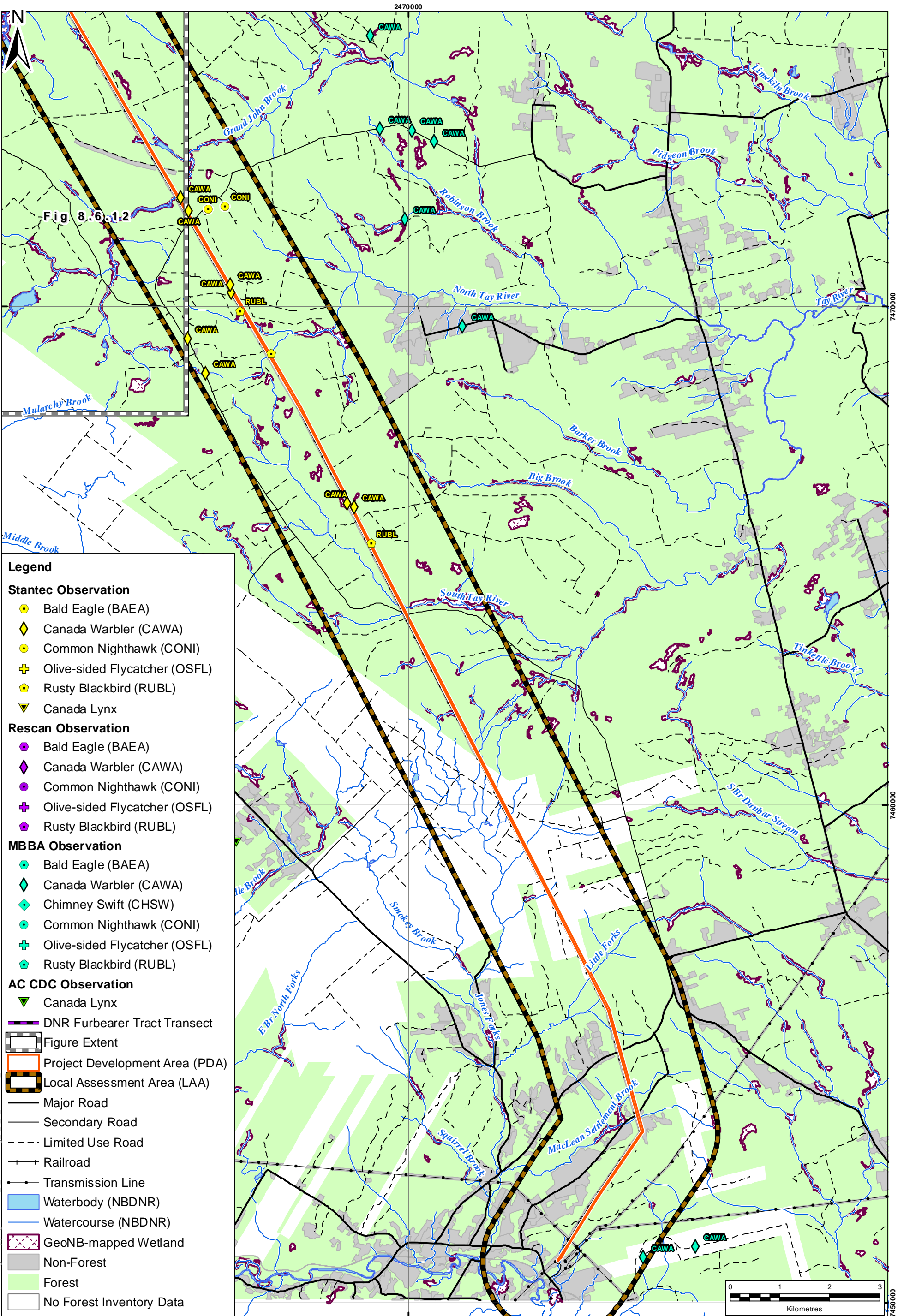
- increased mortality on roads and trails;
- destruction and alteration of riparian habitats;
- loss of nesting and hibernacula habitat due to stream bank alteration, flooding, and shoreline stabilization;
- construction of forestry roads; and
- collection of individuals for the pet trade.

No wood turtles were observed in the LAA by field staff during any of the surveys for the Project (Stantec 2012f; 2013b) despite extensive observation by field biologists conducting a range of surveys in association with this EIA.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

<p>Locations of Recorded Species at Risk - Mine Site Portion</p> <p>Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.</p>		Scale:	Project No.:	Data Sources:	Fig. No.:
		1:70,000	121810356	NBDNR, AC CDC	8.6.12
Client:	Northcliff Resources Ltd.	Date: (dd/mm/yyyy)	Dwn. By:	Appd. By:	
		01/03/2013	JAB	DLM	



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Locations of Recorded Species at Risk - Transmission Line Portion		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.13
Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.		Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM	
Client: Northcliff Resources Ltd.					

Bald Eagle

Bald Eagle is considered “Not at Risk” by COSEWIC and has no schedule or status under SARA. The species is considered “At Risk” by NBDNR. Most Canadian populations of Bald Eagle are now stable or increasing. Declines noticed in the past, especially in the Maritime Provinces, have been reversed (COSEWIC 2011a). The North American BBS reports that, across Canada, populations of this species are increasing (Environment Canada 2011c).

Bald Eagle was recorded during 2008 surveys near Miramichi Lake, 8 km northwest of the PDA (Stantec 2012f). While likely to be occasionally present in the LAA, there are no known nests identified in surveys.

Common Nighthawk

The Common Nighthawk is a medium-sized bird which nests in almost all of North America, and in some parts of Central America. This species occurs in all of the Canadian provinces and territories with the exception of Nunavut (COSEWIC 2007a). The Common Nighthawk is listed as “Threatened” under Schedule 1 of SARA and considered “At Risk” by NBDNR. The BBS (Environment Canada 2011c) reports that this species is in decline at a Canada-wide and New Brunswick-wide level.

Common Nighthawks are most commonly observed in a wide range of open, vegetation-free habitats including beaches, recently cleared forests, rocky outcrops, and grasslands. The species has probably benefited from newly-opened habitats created by the forestry industry (COSEWIC 2007a). Suitable habitat does not appear to be declining in some areas in its range, particularly the Maritimes, where logged-over areas, commercial blueberry fields, coal mines and gravel quarries, which provide suitable breeding habitat, are constantly being created (COSEWIC 2007a).

Common Nighthawk was recorded within the LAA during the Maritime Breeding Bird Atlas (MBBA), and during the 2008, 2011 and 2012 field surveys (Stantec 2012f).

The exact causes of the decline of this species are not well understood, however it may be related to the widespread decline in insect populations which this species relies upon for food. This theory is supported by the widespread declines observed among many other insectivorous bird species (COSEWIC 2007a).

Chimney Swift

The Chimney Swift is a small swallow-like bird which breeds mainly in eastern North America. Approximately one quarter of this species’ breeding range is in Canada, and it can be found in southern New Brunswick. It is estimated that there are approximately 900 breeding individuals in the Maritimes (COSEWIC 2011b). The Chimney Swift is listed as “Threatened” under Schedule 1 of SARA, and “At Risk” by NBDNR. The BBS (Environment Canada 2011c) reports that this species is in decline at a Canada-wide and New Brunswick-wide level.

The Chimney Swift is mainly associated with urban and rural areas, where the birds use chimneys as nesting and roosting sites. A small portion of the population probably continues to use natural nesting sites such as hollow trees (COSEWIC 2011b). Chimney Swift was recorded near the LAA as a possible breeder during the MBBA. No Chimney Swifts were observed in the LAA during 2008, 2011, or 2012 field surveys (Stantec 2012f; 2013b) and their habitat is limited in the LAA.

The most important threat to the Chimney Swift population seems to be the decreasing number of both natural and anthropogenic nesting sites. Possible declines in insect populations may also play a role by decreasing the available food for these birds.

Olive-sided Flycatcher

The Olive-sided Flycatcher is a mid-sized passerine which breeds throughout much of forested Canada. Approximately 54% of its breeding range is in Canada (COSEWIC 2007b). This species is ranked as “Threatened” on Schedule 1 of *SARA* and as “At Risk” by NBDNR. The BBS (Environment Canada 2011c) reports that this species is in decline at a Canada-wide and New Brunswick-wide level.

The Olive-sided Flycatcher is most often found in open areas within coniferous or mixed forests which contain large trees or snags, on which the males perch while singing. The open areas may include forest openings, forest edges near natural or anthropogenic clearings, and semi-open mature forest stands (COSEWIC 2007b).

Olive-sided Flycatcher was recorded within the LAA by the MBBA, and during the 2008, 2011, and 2012 field surveys (Stantec 2012f). Suitable habitat is common in the LAA.

It is unclear exactly why Olive-sided Flycatcher populations continue to decline given the potential for the species to respond positively to forest management, such as timber harvest, which would increase the availability of habitat with sparse canopy cover. Evidence from the western United States suggests that the species experiences a substantial drop in nest success in harvested stands versus fire origin stands (COSEWIC 2007b). Habitat loss on migration and wintering grounds as well as possible declines in the abundance of insect prey species may also be a contributing factor in population declines.

Canada Warbler

The Canada Warbler is a small and brightly coloured passerine. Approximately 80% of the entire breeding range for this warbler is located in Canada (COSEWIC 2008), where it can be found breeding in every province and territory except Newfoundland and Labrador, and Nunavut. Canada Warbler is ranked as “Threatened” on Schedule 1 of *SARA* and as “At Risk” by NBDNR. The BBS (Environment Canada 2011c) reports that this species is in decline Canada-wide and at a province-wide level in New Brunswick.

The Canada Warbler can be found in a wide range of forest types including deciduous, coniferous, and mixed. It is often associated with moist mixed forest and riparian shrub forests on slopes and ravines (COSEWIC 2006). The presence of a well-developed shrub layer also seems to be associated with preferred Canada Warbler habitat.

Canada Warbler was recorded within the LAA by the AC CDC, MBBA, and the 2008, 2011 and 2012 surveys (Stantec 2012f) where suitable habitat is common.

The main factors thought to be responsible for the decline of this species are loss of habitat in the wintering range, and conversion of swamp forests to agricultural and urban lands in the breeding range.

Rusty Blackbird

The Rusty Blackbird is a mid-sized passerine which breeds in most Canadian provinces, including New Brunswick. The Canadian range of this species extends from the Yukon to Newfoundland and includes all Canadian provinces and territories. This species is designated as “Special Concern” under Schedule 1 of SARA and “May be at Risk” by NBDNR. The BBS (Environment Canada 2011c) reports that this species is in decline both nation-wide and province-wide. Rusty Blackbird was recorded within the LAA during the 2008, 2011 and 2012 surveys (Stantec 2012f).

The breeding habitat of Rusty Blackbird is primarily forest wetlands such as slow-moving streams, bogs, and beaver ponds (COSEWIC 2006) of which there is some limited habitat in the LAA. Rusty Blackbird overwinters primarily in damp woodlands or cultivated fields. During winter, this species can only be found in the most southerly parts of the Canadian provinces, while most of the population overwinters in the United States.

The most serious threat to Rusty Blackbird is wintering habitat converting to agricultural and urban lands (COSEWIC 2006).

8.6.2.6 Species of Conservation Concern (SOCC)

SOCC are listed wildlife species not under the protection of SARA or the NB SARA (*i.e.*, listed in Schedule 2 or 3 of SARA; ranked as S1, S2, or S3 by AC CDC; and/or ranked “May Be at Risk” or “Sensitive” by NBDNR). SOCC also includes species assessed by COSEWIC but not included in Schedule 1 of SARA.

A search of the AC CDC, MBBA, and BBS databases revealed records of thirteen bird SOCC near the LAA (Stantec 2012f; 2013b). These species include:

- American Three-toed Woodpecker (*Picoides dorsalis*);
- Great Crested Flycatcher (*Myiarchus crinitus*);
- Barn Swallow (*Hirundo rustica*);
- Eastern Bluebird (*Sialia sialis*);
- Northern Mockingbird (*Mimus polyglottos*);
- Rose-breasted Grosbeak (*Pheucticus ludovicianus*);
- Belted Kingfisher (*Ceryle alcyon*);

- Cliff Swallow (*Petrochelidon pyrrhonota*);
- Bank Swallow (*Riparia riparia*);
- Evening Grosbeak (*Coccothraustes vespertinus*);
- Eastern Wood-pewee (*Contopus virens*);
- Bobolink (*Dolichonyx oryzivorus*); and
- Pine Grosbeak (*Pinicola enucleator*).

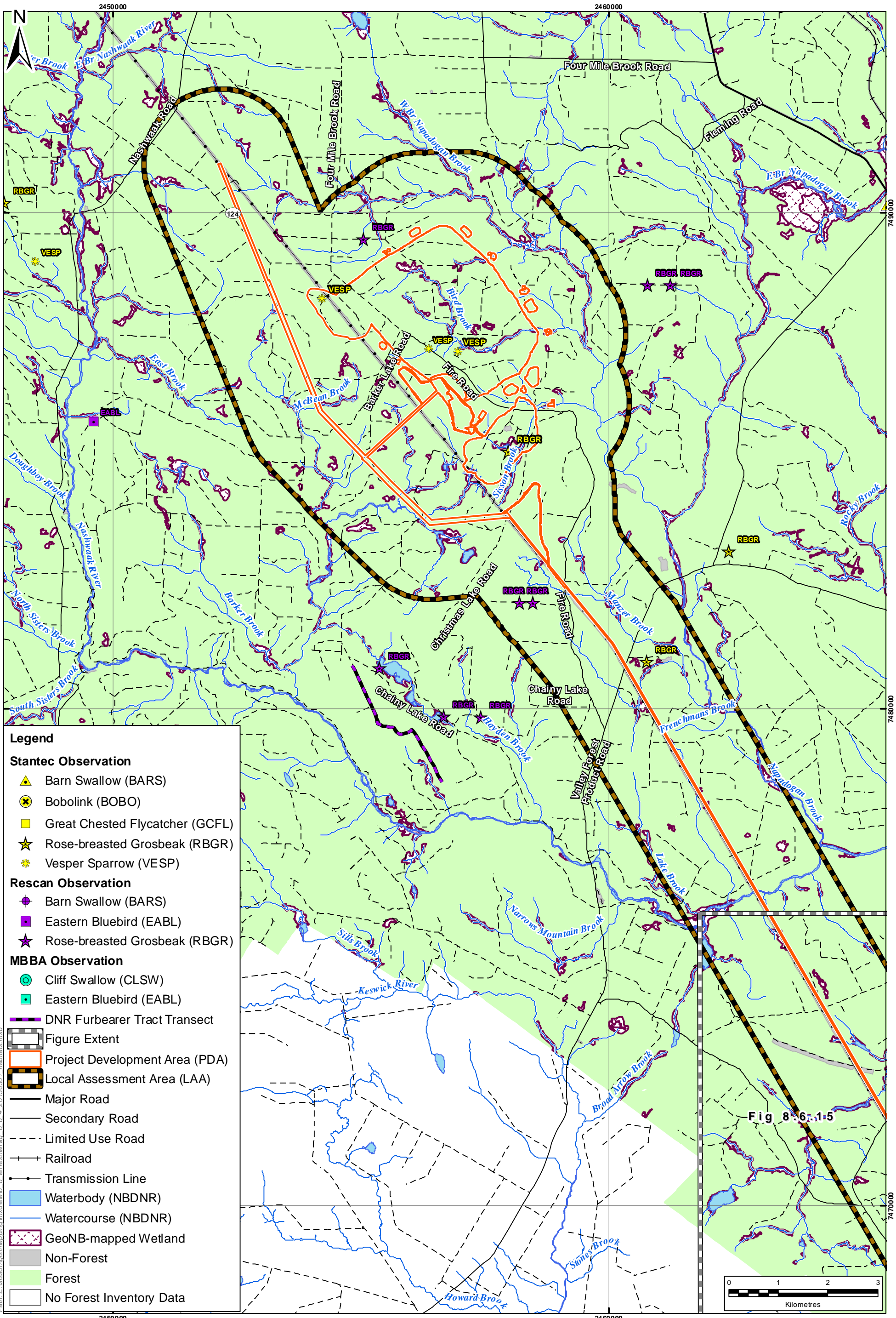
Seven bird SOCC observed during the 2011 field season include:

- Barn Swallow;
- Rose-breasted Grosbeak;
- Great Crested Flycatcher;
- Evening Grosbeak;
- Belted Kingfisher;
- Vesper Sparrow (*Pooecetes gramineus*); and
- Eastern Wood-Pewee.


Bobolink was observed during surveys in 2012 near the 138 kV transmission line right-of-way (ROW). Each of the bird SOCC observed in 2011, except for Great Crested Flycatcher and Barn Swallow, were also observed during the surveys conducted in 2012. Vesper Sparrow was observed within the LAA during field surveys but not previously reported. Locations of species of conservation concern from field surveys and other sources are shown in Figures 8.6.14 and 8.6.15.

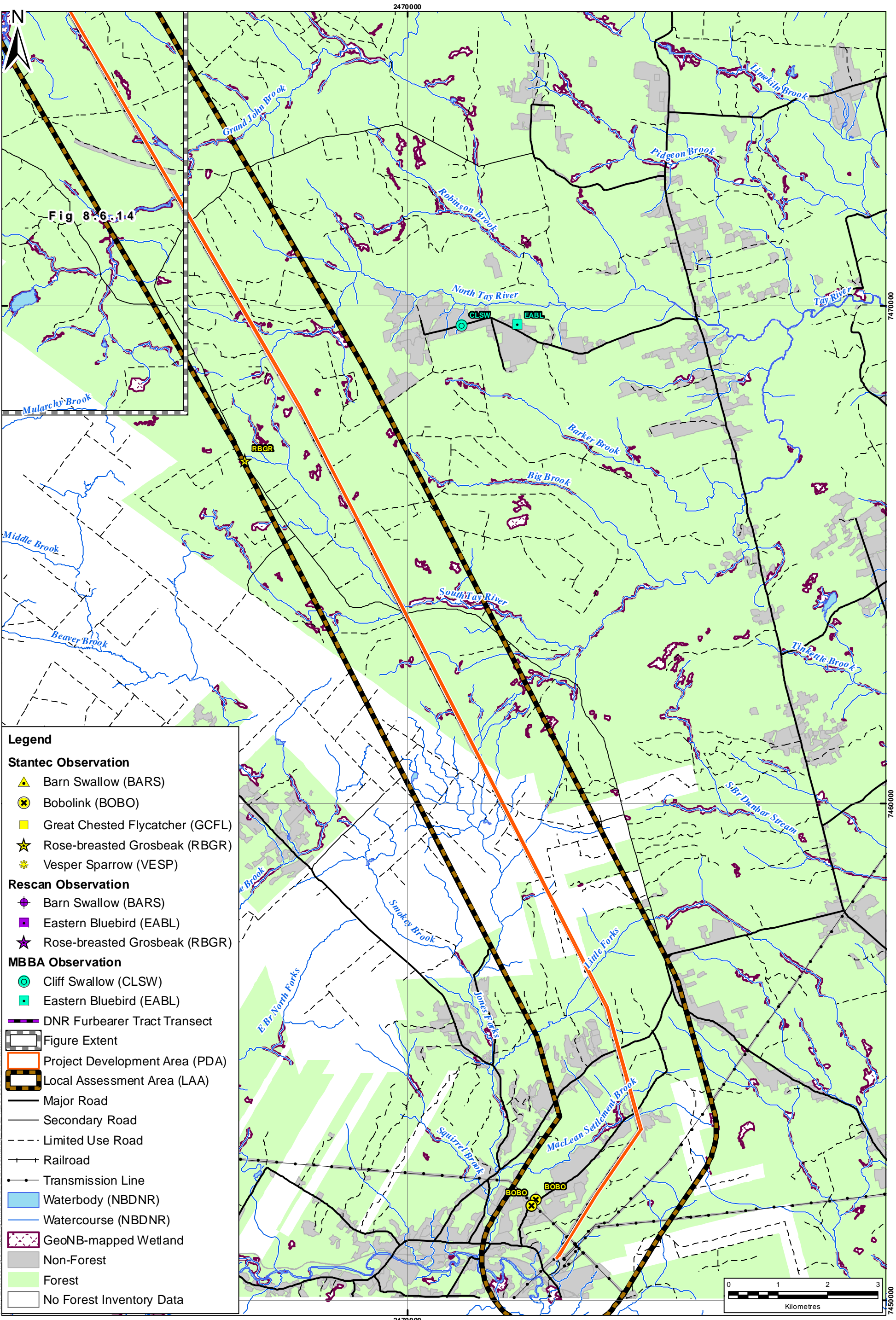
Although they have not yet been listed under SARA or NB SARA, three species of bats indigenous to New Brunswick underwent an emergency assessment by COSEWIC in February 2012. All three species, including tricolored bat (*Perimyotis subflavus*), northern myotis (*Myotis septentrionalis*), and little brown myotis (*M. lucifugus*), were designated as “Endangered” under COSEWIC following the assessment. Massive mortality events associated with White-nose Syndrome (WNS) have been recorded over the past six years for these species (COSEWIC 2012). WNS, caused by a fungus likely introduced from Europe, causes hibernating bats to emerge early, and subsequently succumb to starvation or exposure.

Non-systematic acoustic surveys conducted in 2008 found that *Myotis* spp. were present north of the LAA, although due to the limitations of the recording device (Anabat 2™ (Titley Electronic Australia)) it was not possible to distinguish between northern myotis and little brown myotis. It is unlikely that tricolored bats are present as their range in the Maritimes is limited to the southernmost portions of New Brunswick (where it is uncommon) and southwestern Nova Scotia.



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Locations of Recorded Species of Conservation Concern - Mine Site Portion Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.		Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.14
Client: Northcliff Resources Ltd.	Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM		



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.

Locations of Recorded Species of Conservation Concern - Transmission Line Portion Sisson Project: Environmental Impact Assessment (EIA) Report, Napadogan, N.B.	Scale: 1:70,000	Project No.: 121810356	Data Sources: NBDNR, AC CDC	Fig. No.: 8.6.15	
	Date: (dd/mm/yyyy) 01/03/2013	Dwn. By: JAB	Appd. By: DLM		
Client: Northcliff Resources Ltd.	Stantec Consulting Ltd. © 2013 Map: NAD83 CSRS NB Double Stereographic				

Cavity trees were investigated for use as bat maternity colonies opportunistically, throughout the PDA during 2011 and 2012 field surveys. Although no colonies or guano were found, it is likely that they do occur somewhere in an area as large as the LAA. There are no known hibernacula for bats within the LAA.

8.6.3 Potential Project-VEC Interactions

Table 8.6.5 below lists each Project activity and physical work for the Project, and ranks each interaction as 0, 1 or 2 based on the level of interaction each activity or physical work will have with the Terrestrial Environment. These ranking are indicative of the level of interaction each activity or physical work will have with the Terrestrial Environment.

Table 8.6.5 Potential Project Environmental Effects to the Terrestrial Environment

Project Activities and Physical Works	Potential Environmental Effects Change in Wildlife Populations
	Construction
Site Preparation of Open Pit, TSF, and Buildings and Ancillary Facilities	2
Physical Construction and Installation of Project Facilities	2
Physical Construction of Transmission Lines and Associated Infrastructure	2
Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads	2
Implementation of Fish Habitat Compensation Initiatives	1
Emissions and Wastes	1
Transportation	1
Employment and Expenditure	0
Operation	
Mining	0
Ore Processing	0
Mine Waste and Water Management	2
Linear Facilities Presence, Operation, and Maintenance	1
Emissions and Wastes	1
Transportation	1
Employment and Expenditure	0
Decommissioning, Reclamation and Closure	
Decommissioning	1
Reclamation	1
Closure	1
Post-Closure	1
Emissions and Wastes	1
Transportation	1
Employment and Expenditure	0
Project-Related Environmental Effects	
Notes:	
Project-Related Environmental Effects were ranked as follows:	
0 No substantive interaction. The environmental effects are rated not significant and are not considered further in this report.	
1 Interaction will occur. However, based on past experience and professional judgment, the interaction would not result in a significant environmental effect, even without mitigation, or the interaction would clearly not be significant due to application of codified practices and/or permit conditions. The environmental effects are rated not significant and are not considered further in this report.	
2 Interaction may, even with codified mitigation and/or permit conditions, result in a potentially significant environmental effect and/or is important to regulatory and/or public interest. Potential environmental effects are considered further and in more detail in the EIA.	

Project activities and physical works for the environmental effects assessment of the Terrestrial Environment were ranked in Table 8.6.5 for the Project. Some Project activities listed in Table 8.6.5 are not expected to have any interaction with the VEC. Project Activities such as Mining (which takes place in an existing disturbed environment), Ore Processing (which will be conducted in an enclosed environment), and Employment and Expenditure (in all phases) will not interact with terrestrial wildlife populations in a substantive way and as such were ranked as 0 in Table 8.6.5, their environmental effects including cumulative environmental effects on the Terrestrial Environment are rated not significant, and will not be considered further.

Project activities and physical works associated with Construction, Operation, and Decommissioning, Reclamation and Closure of the Project are included in the assessment; however, only those interactions ranked as 2 will be carried forward to the detailed environmental effects assessment analyses in sub-section 8.6.4, as those interactions may result in an adverse environmental effect that could be significant. Interactions that occur but are not considered likely to result in any significant adverse environmental effects, even without the use of mitigation, are ranked as 1, and are thus rated not significant.

The following Project activities and physical works may interact with the Terrestrial Environment, but will not likely result in *significant adverse residual environmental effects*, and are thus ranked as 1 in Table 8.6.5:

- Emissions and Wastes (during all phases);
- Implementation of Fish Habitat Compensation Initiatives;
- Transportation (during all phases);
- Linear Facilities Presence, Operation, and Maintenance;
- Decommissioning;
- Reclamation;
- Closure; and
- Post-Closure.

The interaction between the Terrestrial Environment and these activities will be mitigated by the use of standard construction and best management practices, or would be low enough in magnitude so as to not result in a significant adverse residual environmental effect on wildlife populations.

Emissions and Wastes during all phases were ranked as 1 in Table 8.6.5 as they may interact with wildlife populations through sensory disturbance including noise, air contaminant emissions (including dust), surface run-off, and solid waste disposal. Activities associated with Emissions and Wastes during all phases can potentially interact with the Terrestrial Environment by lowering the quality of adjacent habitat for wildlife populations through disturbances such as dust generation, sound, and/or light, by displacing or otherwise affecting species that are sensitive to these activities. Mitigation that includes noise suppression systems on all machinery, using existing vegetation (forest) to suppress and

attenuate noise emissions during all stages of the Project will decrease the interaction of the Project to neighbouring wildlife populations. Dust suppression techniques such as watering of the site access road, internal site roads and tailings beaches, and the seeding of topsoil and overburden stockpiles will be used. These activities are not expected to affect any habitat beyond the LAA. Environmental effects assessment with respect to those activities ranked as 2 do consider habitat loss and alteration related to dust in the LAA.

Increased sound levels (as measured in dB_A) may cause wildlife to temporarily relocate to a less disturbed location, especially for species that rely on sound transmission to attract and communicate to members of the same species. Actual sound levels that are disruptive to wildlife may vary depending on the species, or group of similar species (e.g. birds) and the environmental conditions in which the sound is experienced. The potential interaction between emissions and wastes and wildlife populations will be reduced by using appropriate noise suppression for Project equipment and down-lighting on lighting systems as recommended in guidelines of the Commission Internationale de l'Eclairage (CIE). Environmental effects assessment with respect to those activities ranked as 2 do consider habitat loss and alteration related to sound in the LAA.

Implementation of Fish Habitat Compensation Initiatives, as proposed by Northcliff and subject to authorization by DFO, was ranked as 1 in Table 8.6.5. This activity involves the removal of the Lower Lake Dam on the main stem of the Nashwaak River. The removal of the Lower Lake Dam will require the construction of a short (<500 m) access road so that heavy equipment can access the dam for its removal. The width of the road will be minimized to that necessary for heavy equipment to access the dam, and the area will be surveyed by a terrestrial biologist prior to construction to ensure no migratory birds or their nests are affected. Adverse environmental effects to the Terrestrial Environment are expected to be minimal and easily addressed through avoidance, route selection, limiting the footprint of disturbance, and standard mitigation techniques.

Activities associated with Transportation during all phases were ranked as 1 in Table 8.6.5 as they may result in vehicle collisions with wildlife; these interactions are considered accidental events and are addressed as such in Section 8.17. Road Transportation may also result in sensory disturbance to wildlife populations through noise and dust, as discussed above. Environmental effects assessment with respect to those activities ranked as 2 do consider habitat loss and alteration related to sound, including that from vehicles, in the LAA.

Linear Facilities Presence, Operation and Maintenance were ranked as 1 in Table 8.6.5 as it has the potential to interact with wildlife populations through potential wildlife strikes with infrastructure and/or transmission lines. There are thousands of kilometres of transmission lines in New Brunswick ranging in voltage from 69 kV to 345 kV. NB Power has advised that line inspections (*i.e.*, ground and aerial) performed over the years by maintenance staff, mainly to check for the deterioration of conductors, insulators, hardware, as well as changes in terrain which may affect structure stability, have revealed no widespread concerns with respect to bird mortalities due to collisions or electrocution with transmission lines. Transmission line faults are monitored to determine their locations on the transmission system and their cause. Between 1992 and 2008, the transmission system experienced over 140 faults due to bird activities on lines. Of these faults, only one resulted in an osprey electrocution. All other faults are as a result of nest building activities (St. Pierre, C., Personal communication, January 17, 2013).

It is well known that birds (especially ospreys, but also crows, owls, and hawks) nest on transmission structures. The installation of structures presents ideal nesting locations for larger birds, as they are typically the highest point in an area, are stable, and are easily accessible to birds. NB Power maintains an inventory of nests as part of line inspections, and has noted that approximately 320 nests can typically be found on power line structures in New Brunswick, mostly osprey nests. H-frame structures to be used in the construction of the new 138 kV electrical transmission line would be considered “avian-safe” as they provide adequate clearances (*i.e.*, 3.8 m between conductors; 3 m vertical separation between conductors and overhead ground wires) to accommodate a large bird between energized and/or grounded parts (APLIC and USFWS 2005). No stick nests were noted on power poles along the existing 345 kV transmission line during field surveys, however historically, up to four American Crow stick nests have been reported on towers along line 3011 (NB Power unpublished data).

While there may be occasional bird mortality along transmission lines, consultation with NB Power indicated that it has not identified bird collisions as a substantive issue in the 6,829 km of transmission lines throughout New Brunswick (St. Pierre, C. Personal communication, January 17, 2013). The Project does not include any factors or features that if were present, would have the potential to result in increased risk of bird collisions or electrocutions as compared to any other of the thousands of kilometres of transmission line in New Brunswick. Factors that could increase such risks may include the crossing of major watercourses or wetlands frequented by waterfowl or the interruption of known migration paths of daily movements of birds. As the 138 kV electrical transmission line will be located parallel to an existing 345 kV electrical transmission line, this is not expected to be a concern for the Project.

Portions of linear facilities will not be parallel to existing linear corridors. As such, new edge habitat will be created. Edge habitat can increase predation on birds and small mammals, but also has potential benefits related to habitat, and food availability. These linear facilities may also present a barrier to migration for terrestrial species, however given the relatively small size and length of the facilities this is not expected to be substantive.

The Reclamation and Closure Plan for remediating the mine site will specify the procedures that will be followed with respect to the decommissioning, removal, and disposal of site equipment and structures, and for site remediation, where required. Potential environmental effects of decommissioning activities will also be managed following the Project-specific EPP. Owing to the open pit nature of the Project, restoration of the mine footprint upon decommissioning is unlikely to result in the complete reversal of a number of the environmental effects associated with the Project. The former tailings storage facility (TSF) and open pit will continue to exist; the TSF embankments and beaches will be reclaimed, with a surface pond draining to the open pit, and the open pit will be filled with water, in perpetuity. Surplus water from the pit lake will be treated as needed to comply with a discharge permit from the Province of New Brunswick, and released.

Decommissioning and Reclamation of the Project were ranked as 1 in Table 8.6.5. Decommissioning would create at most a minor interaction with the Terrestrial Environment, as removal of equipment and buildings will take place within existing disturbed areas and potential environmental effects would be limited to emissions (*i.e.*, noise) and wastes. Reclamation will create some disturbance to local wildlife populations during the disturbance of stockpiles of topsoil and its redistribution to disturbed areas, but site reclamation is anticipated to produce an overall positive interaction by restoring vegetated habitats.

As described in Section 3.4.3, it is anticipated that the site will be restored to near natural conditions to meet desired end land uses and as required under provincial and federal legislation and regulations.

Closure was ranked as 1 in Table 8.6.5 and involves the filling of the open pit from the TSF and precipitation. Post-Closure was ranked as 1 in Table 8.6.5 and begins when the pit has been filled, and involves the ongoing treatment, as needed, and release of surplus water from the pit lake. Reclamation activities will include addressing the potential risk of wildlife (and people) falling into the open pit by establishing a perimeter berm and fence with gates that allow animals to only exit the pit area. Reclamation of the TSF will involve establishing vegetative cover on the embankments and beaches surrounding the residual TSF pond. Until reclamation of the TSF is complete, which could include the establishment of aquatic life such as aquatic plants, invertebrates, and fish, the TSF is unlikely to attract waterfowl and other wildlife for the purposes of nesting/breeding, rearing or foraging.

Thus, in consideration of the nature of the interactions and the planned implementation of known and proven mitigation, the potential environmental effects of all Project activities and physical works that were ranked as 0 or 1 in Table 8.6.5, including cumulative environmental effects, on the Terrestrial Environment during any phase of the Project are rated not significant with a high level of confidence, and are not considered further in the assessment.

8.6.4 Assessment of Project-Related Environmental Effects

A summary of the environmental effects assessment and prediction of residual environmental effects resulting from interactions ranked as 2 on the Terrestrial Environment is provided in Table 8.6.6.

Table 8.6.6 Summary of Residual Project-Related Environmental Effects on the Terrestrial Environment

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socioeconomic Context					
Change in Wildlife Populations	<ul style="list-style-type: none"> Construction of Site Preparation of Open Pit, TSF, and Buildings and Ancillary Facilities. Physical Construction and Installation of Project Facilities. Physical Construction of Transmission Lines and Associated Infrastructure. Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads 	<p>Mitigation to be considered in Construction and Operation is as follows.</p> <ul style="list-style-type: none"> Northcliff will work with NBDNR and Crown licensees and sub-licensees to communicate information about the Project footprint and schedule for habitat alteration so that it can be factored into broader forest management and other related wildlife management initiatives in the region. Avoidance of, to the extent feasible, known locations of wildlife SAR and SOCC. Minimization of the loss or fragmentation of mature forest habitat and interior forest. Co-location of linear facilities, where possible, to other linear disturbances to minimize the environmental effects of fragmentation. Minimization of linear corridor width/footprint and clearing to extent practicable. Minimization of size of temporary work spaces. Limiting clearing and grubbing to infrastructure footprint to that 	A	L	S	ST/O	I	D	N	H	-	Y	None recommended.

Table 8.6.6 Summary of Residual Project-Related Environmental Effects on the Terrestrial Environment

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socioeconomic Context					
		<p>which is necessary.</p> <ul style="list-style-type: none"> • Maintenance of natural buffers around wetlands and riparian zones. • Use of down-lighting, a technique of directing night lighting downward so as not to attract migrating birds; • An Avifauna Management Plan (AMP) to address incidental take. • Establishment of buffers and protection of active migratory bird nests until fledging, upon their discovery in work areas. • Scheduling of clearing activities outside the breeding season of migratory birds (when possible). • Flag environmentally sensitive areas prior to commencement of clearing and construction. • Development of a wildlife awareness program for Construction and Operation. • Permitting the development of shrub vegetation along transmission lines (to the extent practical) to promote their use by wildlife. • Rehabilitate access routes that are no longer needed. 											

Table 8.6.6 Summary of Residual Project-Related Environmental Effects on the Terrestrial Environment

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socioeconomic Context					
		<ul style="list-style-type: none"> • Proper storage of food and waste on site so as to avoid the attraction of wildlife to the Project. • Use of approved noise arrest mufflers on all equipment to reduce potential environmental effects of noise. • Implementation of various dust control measures. • Vehicle operation at appropriate speed and yielding to wildlife. 											
	Operation <ul style="list-style-type: none"> • Mine Waste and Water Management. 	<ul style="list-style-type: none"> • See all measures identified above. 	A	L	S	P/R	I	D	N	H	-	Y	None recommended.
	Decommissioning, Reclamation and Closure												
	Residual Environmental Effects for all Phases								N	H	-	Y	

Table 8.6.6 Summary of Residual Project-Related Environmental Effects on the Terrestrial Environment

Potential Residual Project-Related Environmental Effects	Project Phases, Activities, and Physical Works	Mitigation / Compensation Measures	Residual Environmental Effects Characteristics						Significance	Prediction Confidence	Likelihood	Cumulative Environmental Effects?	Recommended Follow-up or Monitoring												
			Direction	Magnitude	Geographic Extent	Duration and Frequency	Reversibility	Ecological/Socioeconomic Context																	
<p>KEY</p> <p>Direction: P Positive. A Adverse.</p> <p>Magnitude: L Low - the residual Project environmental effects (alteration/loss) are not expected to exceed 5 percent of the known population in the Province or RAA for secure and non-secure populations, respectively, and/or are not measurable. M Moderate - the residual Project environmental effects (alteration/loss) are expected to be greater than 5 percent and not exceed 25 percent of the known population in the Province or RAA for secure and non-secure populations, respectively, and the effect can be measured. H High - the residual Project environmental effects to (alteration/loss) are expected to exceed 25 percent of the known population in the Province or RAA for secure and non-secure populations, respectively; the effect can be easily observed, measured and described, and may be widespread.</p> <p>Geographic Extent: S Site-specific: Within the PDA. L Local: Within the LAA. R Regional: Within the RAA.</p>													<p>Duration: ST Short-term: Occurs and lasts for short periods (e.g., days/weeks). MT Medium-term: Occurs and lasts for extended periods of time (e.g., years). LT Long-term: Occurs during Construction and/or Operation and lasts for the life of Project. P Permanent: Occurs during Construction and Operation and beyond.</p> <p>Frequency: O Occurs once. S Occurs sporadically at irregular intervals. R Occurs on a regular basis and at regular intervals. C Continuous.</p>			<p>Reversibility: R Reversible. I Irreversible.</p> <p>Ecological/Socioeconomic Context: U Undisturbed: Area relatively or not adversely affected by human activity. D Developed: Area has been substantially previously disturbed by human development or human development is still present. N/A Not Applicable.</p> <p>Significance: S Significant. N Not Significant.</p>						<p>Prediction Confidence: Confidence in the significance prediction, based on scientific information and statistical analysis, professional judgment and known effectiveness of mitigation: L Low level of confidence. M Moderate level of confidence. H High level of confidence.</p> <p>Likelihood: If a significant environmental effect is predicted, the likelihood of that significant environmental effect occurring, based on professional judgment: L Low probability of occurrence. M Medium probability of occurrence. H High probability of occurrence.</p> <p>Cumulative Environmental Effects? Y Potential for environmental effect to interact with the environmental effects of other past, present or foreseeable projects or activities in RAA. N Environmental effect will not or is not likely to interact with the environmental effects of other past, present or foreseeable projects or activities in RAA.</p>			

8.6.4.1 Potential Project Environmental Effects Mechanisms

The following Project activities and physical works were ranked as 2 in terms of their potential interactions with the Terrestrial Environment, and will thus be considered in more detail:

- Site Preparation of Open Pit, TSF, and Buildings and Ancillary Facilities;
- Physical Construction and Installation of Project Facilities;
- Physical Construction of Transmission Lines and Associated Infrastructure;
- Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads; and
- Mine Waste and Water Management.

This section identifies the key effects mechanisms that would likely result in environmental effects, particularly in the absence of mitigation. Table 8.6.6 describes the various mitigation measures that will be employed to minimize the potential environmental effects and which are more fully considered and applied in Section 8.6.4.2.

Site Preparation activities and construction of the infrastructure for the Project will have the greatest potential to affect wildlife populations through the net loss or alteration of terrestrial habitat for wildlife species, and/or the potential direct loss of individual animals, including SAR and/or SOCC. The loss of freedom of movement between patches of habitat, resulting from habitat fragmentation, is also a potential issue for some species which regularly move around in a landscape, exploiting resources that are seasonally available and other species that require large home ranges.

Site preparation activities will cause ground disturbance, clearing, grubbing, grading, infilling, and/or excavation, the removal of overburden, material haulage, and stockpiling, and will result in the loss or alteration of habitat for wildlife species and managed wildlife areas. Initial clearing of habitat may result in adverse environmental effects such as the loss of breeding, nesting, rearing, or other habitat for birds and other wildlife species. Depending on the timing of this activity, it can result in the direct loss of individuals that are slow moving or not mobile, such as young birds and other wildlife that are unable to leave a nest or den.

Clearing of forested areas can change the quality of the habitat along the edge of the Project footprint as a result of increased side lighting or drying of what was previously interior forest habitat. This may enable more disturbance-tolerant and edge species to inhabit adjacent forest habitat. Indirect environmental effects may also occur due to changes in substrate composition, moisture, drainage and temperature. Alteration or loss of habitat for wildlife species could also occur due to changes in other environmental conditions, and increased human activity (*i.e.*, indirect environmental effects) including dust generation. The production of edge habitat can also increase predation on birds and small mammals, but also has potential benefits related to habitat, and food availability. Small mammal and herpetile populations with limited dispersal capabilities are particularly susceptible to the edge effect and habitat fragmentation. Populations isolated from other populations in small habitat fragments are more prone to local extirpation since these fragments may be too small to support a population.

Fragments which are large enough to support a population may not be large enough to provide enough animals to rebuild a population, should it be heavily affected by disease or predation. Isolation of the fragment can also impair the immigration of new animals into an area where a local population has been extirpated. Impaired immigration can also adversely affect populations by restricting gene flow between populations, leading to inbreeding.

Habitat fragmentation can also affect highly mobile animals such as birds. During the breeding season, some species may be reluctant to cross clearings due to fear of predators, causing populations to be isolated in resultant habitat fragments.

Physical Construction and Installation of Project Facilities has the potential to interact with wildlife populations through loss or change of available habitat primarily within the area of the TSF. Although the area of the TSF will be cleared prior to physical construction and installation of facilities associated with the TSF (with merchantable timber sold, but no grubbing or removal of non-merchantable timber), it will provide habitat similar to that of a recent forestry clear-cut. A number of migratory bird species, including Common Nighthawk (a SAR) are known to make use of such areas for nesting and feeding. The construction of the TSF starter embankments, and the establishment of stockpiles and storage areas, has the potential to disturb these species without planned avoidance mitigation, if they are using the area as habitat. The physical construction of Project facilities will result in the loss of previously cleared habitat through the installation of physical facilities including buildings, structures and stockpile areas. This may result in interaction with bird and/or wildlife species if they are using this area prior to physical construction.

Construction of the new 138 kV transmission line and associated infrastructure will include widening of the existing ROW by 25 m and clearing of the new ROW, resulting in the loss of terrestrial habitat, though already fragmented due to the presence of the 50 m-wide corridor for the existing 345 kV transmission line. Realignment of the existing 345 kV transmission line will also contribute to a moderate increase in habitat fragmentation along the new alignment.

Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads will interact with wildlife populations in a manner similar to those which occur during Physical Construction of the Transmission Lines and Associated Infrastructure. Existing linear clearings will potentially be widened, and new linear access roads will be cleared, resulting in a loss of terrestrial habitat and a moderate increase in habitat fragmentation. Access roads will have an approximately 25 m-wide ROW. In areas where multiple linear infrastructure are planned such as an access road next to one or two transmission lines, or a transmission line and access road is proposed to follow an existing linear feature (*i.e.* the 345 kV transmission line), the width of these combined linear features will range from 50 m to a maximum 100 m. The maximum 100 m width will only be warranted where the realigned 345 kV transmission line will be paralleled by the 138 kV transmission line and the realigned Fire Road, a 3.5 km distance located south of the open pit.

As the TSF will expand in size as the Project progresses, interactions between the Terrestrial Environment and Mine Waste and Water Management will continue during Operation. In particular, this activity involves the progressive construction of TSF embankments, with increasing height over the life of the mine. Loss of habitat and/or the loss of access to suitable habitat for local wildlife populations may occur. Though all clearing activities will have been completed, the remaining open habitat may be populated by some terrestrial species (including migratory birds) at the time of expansion of the TSF

and the embankments. A change in wildlife populations in the immediate vicinity of the TSF will occur to a lesser extent upon the expansion of this facility during Operation as compared with Construction, due to ongoing site disturbances and the cleared habitat present.

8.6.4.2 Mitigation of Project Environmental Effects

Project planning, design, and the application of known and proven mitigation measures will be implemented as part of the Project to avoid or minimize environmental effects. Final decisions on mitigation measures will be made by Northcliff in consultation with experts, and where appropriate, the regulatory authority. The ESMS for the Project (Appendix D) outlines the environmental protection measures to be followed by the Project. The following general mitigation measures will be employed to avoid or reduce potential environmental effects of the Project on the Terrestrial Environment:

- avoidance of, to the extent feasible, known locations of wildlife SAR and SOCC;
- minimization of the loss or fragmentation of mature forest habitat and interior forest;
- co-location of linear facilities, where possible, to other linear disturbances to minimize the environmental effects of fragmentation;
- minimization of linear corridor width/footprint and clearing to extent practicable;
- minimization of size of temporary work spaces;
- limiting clearing and grubbing to infrastructure footprint to that which is necessary;
- maintenance of natural buffers around wetlands and riparian zones;
- use of down-lighting, a technique of directing night lighting downward so as not to attract migrating birds;
- an Avifauna Management Plan (AMP) to address incidental take;
- establishment of buffers and protection of active migratory bird nests until fledging, upon their discovery in work areas;
- scheduling of clearing activities outside the breeding season of migratory birds (when possible);
- flag environmentally sensitive areas prior to commencement of clearing and construction;
- development of a wildlife awareness program for Construction and Operation;
- permitting the development of shrub vegetation along transmission lines (to the extent practical) to promote their use by wildlife;
- rehabilitate access routes that are no longer needed;
- proper storage of food and waste on site so as to avoid the attraction of wildlife to the Project;
- use of approved noise arrest mufflers on all equipment to reduce potential environmental effects of noise;

- implementation of various dust control measures; and
- vehicle operation at appropriate speed and yielding to wildlife.

Perhaps of greatest importance, Northcliff will work with NBDNR and Crown licensees and sub-licensees to communicate information about the Project footprint and schedule for habitat alteration so that it can be factored into broader forest management and other related wildlife management initiatives in the region. Project design mitigation includes those design features that will minimize potential environmental effects on birds and their habitat. This includes the avoidance of habitats, minimization of habitat loss and fragmentation, and the use of habitat buffers where possible. It also includes the use of bird-friendly structures and infrastructure, such as the use of down-lighting.

An AMP will be developed and submitted to CWS for approval prior to construction, and will address mitigation for the protection of migratory birds. The AMP will be a stand-alone document comprising a part of the ESMS that will include:

- a Project overview;
- a schedule of Project activities;
- regulatory context;
- baseline information on key avifauna species (*i.e.*, SAR and SOCC);
- mitigation measures, including:
 - general mitigation measures designed to reduce the likelihood of interaction during clearing and other construction activities;
 - general awareness mitigation measures (considerations personnel should be aware of that may identify an active nest); and
 - directed survey protocols for avifauna surveys that should be completed by ornithologists in areas of potential habitat within or near the PDA prior to construction activities;
- procedures for active nests; and
- reporting procedures when AMP is implemented.

A Project-specific EPP will be developed for the Project prior to the start of Construction as part of the ESMS. Activities such as handling and storage of fuel and other hazardous materials are regulated by law and the Project will comply with all applicable standards and regulations, guidelines and reference documents. As appropriate, mitigation measures identified herein will be incorporated in the EPP.

The Reclamation and Closure Plan for remediating the mine site and associated infrastructure will establish procedures for decommissioning infrastructure or facilities (*e.g.*, access roads, transmission lines). Owing to the open pit nature of the Project, restoration of the mine footprint upon Decommissioning, Reclamation and Closure is unlikely to result in complete reversal of the environmental effects associated with the Project; however, the site will be re-vegetated and thus some terrestrial habitat will be created and restored. The Reclamation and Closure Plan will give careful

consideration to specific objectives that will support the establishment of terrestrial habitat with characteristics that support the local populations of wildlife, particularly those that may have been affected by the Project.

8.6.4.3 Characterization of Residual Project Environmental Effects

The following provides a summary of the magnitude of Project-related change in measurable parameters for residual environmental effects of the interactions carried forward.

8.6.4.3.1 Habitat

Within the portion of the PDA that will be covered by the mine site, 95% of the land area is currently occupied by semi-natural vegetation communities, with the remainder being comprised of anthropogenic habitats associated with existing roads and infrastructure. The majority of land-cover types identified for direct disturbance by the Project (*i.e.*, that which is within the PDA) are upland forests and wetlands.

The Project will result in a loss of approximately 1,109 ha of forest habitat within the mine site portion of the PDA, and 80 ha of forest habitat within the transmission line corridor, for a total of 1,189 ha of forest habitat lost to the Project. The age and distribution of the lost vegetation varies, but it will be made up of approximately 75% softwood, 21% hardwood, and 4% mixedwood forest. This loss of habitat would be localized to the specific footprint of the Project facilities. Approximately 100 ha of forest habitat will be converted over time to an open pit, and up to approximately 820 ha will over time be covered by the TSF. The total loss of forest habitat of 1,189 ha represents less than 0.05% of the RAA for all habitat types. The LAA contains 15,425 ha of forest habitat, or 1% of the RAA. The vegetation removal would occur during Construction (*i.e.*, during Site Preparation, Physical Construction and Installation of Project Facilities, Physical Construction of Transmission Lines and Associated Infrastructure, and Physical Construction of Realigned Fire Road, New Site Access Road, and Internal Site Roads) when the ground is cleared in preparation for the Project related infrastructure. The potential environmental effects of a portion of this loss of forest habitat within the PDA (approximately 17%) will be reversible as the forest/habitat that was removed will be re-vegetated during Decommissioning, Reclamation and Closure and allowed to return to near pre-Project conditions in areas that are not occupied by the TSF or the open pit.

Eight interior forest stands are located at least in part within the PDA. The PDA will reduce the area of interior forest intersected by the LAA by 127 ha or 4%, predominately in the vicinity of the mine site. While the data is not available to compare this directly to the amount of interior forest in the RAA, extrapolating the proportion of interior forest in the vicinity of the LAA to the approximate area of forest in the RAA, the loss of interior forest represents less than 0.05% of the interior forest within the RAA. This loss would continue for the life of the Project, and an additional 50-75 years following Decommissioning, Reclamation and Closure until a portion of the land is replaced with mature forest.

One stand of OFWH (a 44.5 ha stand classified as Old Mature Mixedwood Habitat; OMWH) will be crossed by the realigned 345 kV transmission line and Fire Road alignments. Up to approximately 3 ha (or 7%) of this stand will be disturbed by the Project. Another 7 ha (or 3%) of the remaining affected stands of OFWH (including OMWH and Old Spruce Fir Habitat; OSFH) would be cleared along the new

138 kV transmission line to parallel the existing 345 kV transmission line. These areas collectively represent 0.02% of the 2012 total area targeted for OMWH and OSFH in the RAA by NBDNR (2009).

Within the draft Conservation Forest layer, Dear Wintering Areas (DWAs) are identified as having one of three statuses:

- inactive (portion of a) DWA, but retained as a DWA as part of Conservation Forest;
- active existing DWA from the 2007 forest management plan; or
- active new DWA (2012).

One DWA (Napadogan Brook) is located near the edge of the LAA to the northwest of the mine site, however is unlikely to be affected by the Project as it is outside of the PDA. There are four DWAs along the new 138 kV electrical transmission line (Nashwaak, Upper Grand John, Crowhill Road, and Crowhill West), and another within the LAA for the transmission line but that will not be crossed by the Project (Lake Brook). The widening of the existing 345 kV electrical transmission line ROW to accommodate the 138 kV transmission line would result in the clearing of 7.2 ha spread over the four DWAs, or 0.8% of the DWAs within the LAA, and a much lower percentage of the DWAs in the RAA.

There are no existing Protected Natural Areas (PNAs), or proposed candidate PNAs within the mine site portion of the PDA. However, candidate PNA #183, a 712 ha area near East Branch Nashwaak River which extends as far east as Nashwaak Road, is just within 1.38 km from the northern extent of the relocated 345 kV transmission line but will not be disturbed by the relocation. A proposed candidate PNA (#150) is crossed at its western end by the existing 345 kV transmission line (at the crossing of the Nashwaak River) that is to be widened by 25 m to accommodate the new 138 kV transmission line. The habitat modification represents 5 ha (or 0.12%) of the 4,478 ha area of the candidate PNA.

Overall, the total amount of OFWH, DWA, and/or candidate PNAs within the PDA (and thus directly affected by the Project) is 14.3 ha, 11.3 ha of which is along the new 138 kV transmission line.

The loss of terrestrial habitat could potentially reduce the availability of habitat used by bird SAR or SOCC that have been recorded in or near the PDA. While no direct mortality of SAR or SOCC due to the Project is expected with planned mitigation, potential habitat for these species will be removed but the extent of removal will be small in comparison to available habitat in and near the LAA and RAA. There are no features of the terrestrial habitat within the PDA affected by the Project that would eliminate habitat for SAR or SOCC that is not available elsewhere (and, in fact, abundant) in the RAA.

8.6.4.3.2 Wildlife

Canada Warbler was recorded in 2011 within the mine site portion of the PDA as a probable breeder, and in 2012 in the LAA along the transmission line as a possible breeder. During the 2011 breeding bird surveys, 24 male Canada Warblers were observed within the LAA near the mine site (11 of which were within the PDA), and six were observed in 2012 in the LAA along the 138 kV transmission line corridor. There were another 22 records of male Canada Warbler outside the LAA in 2011. This species was detected in a wide range of forest ages and types including sapling mixedwood, sapling

softwood, mature softwood, and riparian areas, all typically associated with watercourses or wetlands. All but one of the Canada Warbler observations were within 150 m of a watercourse, and 93% were within 100 m of conservation forest, with the remainder located near other wet mature forest wetland habitats or in sapling-aged softwood forest. Habitat similar to those where Canada Warblers were detected is found throughout the LAA and surrounding landscape in areas that will not be developed as part of the Project. The Canada Warbler is found within a wide variety of habitat types that are common throughout Central New Brunswick (MBBA 2012). MBBA point count results in New Brunswick suggest that the western half of the Valley Lowlands Ecoregion and the southern portion of the Madawaska Uplands of the Central Uplands Ecoregion (along with the north-central portion of the Northern Uplands) have a higher incidence of Canada Warbler than the rest of New Brunswick. Surveys conducted in suitable breeding habitat in and around the LAA would indicate that not all available habitats are typically occupied by Canada Warbler in the local area, and therefore it is expected that any individuals displaced from habitat as a result of the Project are likely to find suitable nesting habitat nearby. As such, changes to the population of Canada Warblers are not expected as a result of the Project.

During 2011 breeding bird surveys, 17 Olive-sided Flycatcher males were recorded in the LAA of which seven were recorded in the PDA (in the area of the TSF). Another nine were recorded outside the LAA. A single male was observed incidentally near the transmission line in 2012. This species was most often associated with edge areas in forested buffers of nearby watercourses and wetlands, and 77% of the 2012 observations were located within 100 m of a conservation forest habitat. The Olive-sided Flycatcher is most often found in regenerating coniferous forests, such as those habitats within previously clear-cut areas, and mature forests. The Project is likely to displace some individuals from habitat within the PDA. However there is adequate suitable habitat available outside the PDA for these displaced individuals. Not all potential nesting sites of Olive-sided Flycatcher were occupied in any one year, and therefore there is likely to be available habitat for the displaced individuals within the LAA and beyond. Accordingly, changes to the population of Olive-sided Flycatcher are not expected as a result of the Project.

During the 2011 bird survey program, eight Common Nighthawks were detected within the LAA, and an additional eleven were detected in nearby areas during point counts. An additional six individuals were recorded incidentally within the LAA, and five more were noted outside the LAA. An individual male was detected near the existing transmission line south of the LAA in 2012. This species was consistently observed near or over recently clear cut and regenerating forest. Considering the positive association of Common Nighthawk with regenerating clear cuts (MBBA 2012), and the continued harvesting of New Brunswick's forests, thus the abundance of regenerating forest habitats, the Project is unlikely to result in changes to the population of Common Nighthawk.

Rusty Blackbird was recorded less often than the above species, with limited sightings recorded during field surveys within the LAA and surrounding areas. Eleven Rusty Blackbirds were observed in the LAA in 2011 at four locations. An observation was made during 2008 field work within a wetland associated with the West Branch Napadogan Brook, 0.5 km west of the TSF. Another 15 individuals were recorded outside the LAA in 2008 and 2011 at six locations. In 2012, five Rusty Blackbirds were detected within 200 m of two point counts surveyed along the proposed 138 kV transmission line corridor. Additional incidental observations were made by the wetland field crew in late June. All observations were made within or near riparian wetland habitats and beaver ponds. Habitat similar to

those where Rusty Blackbirds were detected is found throughout the LAA and surrounding landscape in areas that will not be developed as part of the Project. Most riparian wetlands are incorporated in conservation forest identified on Crown land throughout the RAA, and beaver activity is common in the landscape. MBBA point count results in New Brunswick suggest that portions of the Valley Lowlands Ecoregion and much of the Madawaska Uplands of the Central Uplands Ecoregion (along with the southern portion of the Northern Uplands) surrounding and north of the LAA have a higher incidence of Rusty Blackbird than the rest of New Brunswick. Surveys (including point counts and incidental observations in wet habitats) conducted in suitable breeding habitat in and around the LAA would indicate that not all available habitats are typically occupied by Rusty Blackbird in the local area, and therefore it is expected that any individuals displaced from habitat as a result of the Project are likely to find suitable nesting habitat nearby. As such, changes to the population of Rusty Blackbird are not expected as a result of the Project.

Overall, for these four bird species, while habitat will be lost within the PDA as a result of the Project, the presence of remaining suitable habitats in the LAA and surrounding areas of the RAA are expected to accommodate any displaced individuals. Similarly, standard mitigation addressing the protection of migratory bird nests will be implemented in order to prevent the loss of any individuals during Construction activities involving habitat alteration. The standard mitigation measures include the avoidance of breeding season when scheduling clearing activities, and the establishment of a buffer around any nests that are discovered until fledging.

Canada lynx are wide ranging and populations are linked to the populations of its prey species, in particular snowshoe hare. Results of track transect surveys in the LAA and a winter aerial survey in the LAA and surrounding areas indicate lynx (and their prey) are found in the LAA and throughout surrounding areas. Forest management on Crown land favouring the persistence of mature forest in the landscape, including the selection of conservation forest (*i.e.*, Old Forest Wildlife Habitat), and the protection of buffers along watercourses and waterbodies, and a distribution of forest age classes across the landscape, will favour the persistence of Canada lynx, as both mature stands for denning, and mid-successional stands for their main prey are provided. Canada lynx are relatively wide ranging and have relatively high dispersal capabilities. While one or two female Canada lynx home ranges likely overlap the LAA, there is similar habitat available in the surrounding area that contains the variety of habitats used by Canada lynx for foraging and denning, and the loss of the PDA is unlikely to affect the regional population of this species.

Surveys in the PDA in 2011 and 2012 identified several species of herpetiles present in or near the PDA. While the loss of wetland habitats within the PDA will likely involve the loss of a portion of the local populations of herpetiles, the affected species are common and secure in the province, and the reduction in local populations will not affect the sustainability of the populations within the RAA.

With respect to ecological health, as determined by the Human Health and Ecological Risk Assessment (HHERA, Section 7.7), predicted ecological health risks were identified for certain ecological receptors in relation to arsenic, copper, manganese, thallium, vanadium, and zinc exposure. However, the predicted ecological health risks to terrestrial wildlife (which in some cases are localized) are generally related to pre-existing baseline metal concentrations in the environment, and the Project-related contribution to these environmental effects is negligible. For semi-aquatic wildlife (*i.e.*, American mink, American black duck, and belted kingfisher), predicted ecological health risks were identified for certain receptors in relation to thallium and vanadium exposure. Ecological health risks in relation to thallium

were identified for the American black duck, and ecological health risks in relation to vanadium were identified for both the American black duck and the belted kingfisher. Health risks associated with thallium and vanadium can be related to an increase in predicted surface water concentrations due primarily to modelled seepage from the TSF toward a few small tributaries of West Branch Napadogan Brook. However, these ecological health risks are expected to be localized and as such are not expected to result in population-level adverse environmental effects.

For all other species of wildlife, while wildlife habitat will be lost as a result of the Project, the extent of this lost habitat will be small in comparison to the remainder of the RAA, and some will be restored during Closure of the Project. The availability of habitat for sustaining healthy populations of these species in the RAA is not limiting, and there will be suitable habitat in areas outside of the PDA to continue to support healthy populations of wildlife including mammals, herpetiles, and birds.

8.6.5 Assessment of Cumulative Environmental Effects

In addition to the Project environmental effects discussed above, an assessment of the potential cumulative environmental effects was conducted for other projects and activities that have potential to cause environmental effects that overlap with those of the Project, as identified in Table 8.6.6. Table 8.6.7 below presents the potential cumulative environmental effects to the Terrestrial Environment, and ranks each interaction with other projects or activities as 0, 1, or 2 with respect to the nature and degree to which important Project-related environmental effects overlap with those of other projects or activities that have been or will be carried out.

Table 8.6.7 Potential Cumulative Environmental Effects to the Terrestrial Environment

Other Projects or Activities With Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects
	Change in Wildlife Populations
Past or Present Projects or Activities That Have Been Carried Out	
Industrial Land Use (Past or Present)	0
Forestry and Agricultural Land Use (Past or Present)	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (Past or Present)	1
Recreational Land Use (Past or Present)	1
Residential Land Use (Past or Present)	0
Potential Future Projects or Activities That Will Be Carried Out	
Industrial Land Use (Future)	0
Forestry and Agricultural Land Use (Future)	1
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons (Future)	1
Recreational Land Use (Future)	1
Planned Residential Development (Future)	0
Cumulative Environmental Effects	
Notes:	
Cumulative environmental effects were ranked as follows:	
0 Project environmental effects do not act cumulatively with those of other projects or activities that have been or will be carried out.	
1 Project environmental effects act cumulatively with those of other projects or activities that have been or will be carried out, but are unlikely to result in significant cumulative environmental effects; or Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects but will not measurably change the state of the VEC.	
2 Project environmental effects act cumulatively with those of other projects or activities that have been or will be carried out, and may result in significant cumulative environmental effects; or Project environmental effects act cumulatively with existing significant levels of cumulative environmental effects and may measurably change the state of the VEC.	

No interactions between the environmental effects of the Project and those of past, present, or future Industrial Land Use or Residential Land Use are anticipated, and as such their interactions with the Terrestrial Environment have been ranked as 0 in Table 8.6.7. Industrial Land Use within the RAA is limited both spatially and in extent to a few sawmills located at sufficiently distal locations to the Project that their environmental effects on the Terrestrial Environment would not possibly overlap spatially to an extent that a measurable adverse cumulative environmental effect on the Terrestrial Environment would be expected to occur. Residential Land Use, though common in some areas of the RAA, is most prevalent in urban areas that are located far away from the LAA. There are no residential developments planned for the vicinity of the mine site portion of the LAA, and the co-location of the new 138 kV transmission line alongside the existing 345 kV transmission line would not be expected to cause a measurable overlap with any residential developments occurring along the transmission line corridor. The environmental effects of these other past, present, or future activities and those of the Project do not act cumulatively; as such, their interaction with the Terrestrial Environment is ranked as 0 in Table 8.6.7, their cumulative environmental effects with those of the Project on the Terrestrial Environment are rated not significant, and they are not discussed further.

The environmental effects of other projects or activities that could potentially overlap with the environmental effects of the Project on the Terrestrial Environment (and thus ranked as 1 in Table 8.6.7) include:

- past, present or future Forestry and Agricultural Land Use;
- past, present or future Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons; and
- past, present or future Recreational Land Use.

Past, Present, or Future Forestry and Agricultural Land Use may have environmental effects on the Terrestrial Environment that overlap with those of the Project. Forestry activities have occurred in much of the RAA for several decades, and will continue to occur for the foreseeable future. Agricultural activity in the RAA is found primarily in the southern end of the new 138 kV transmission line where private land is located (*i.e.*, small-scale residential farming, primarily) as well as in the agricultural “potato belt” along the St. John River valley in Carleton and Victoria counties (*i.e.*, major farming activity to produce crops for food processing plants). These agricultural lands are currently largely active, however, and no new agricultural developments are known to be planned. The bulk of the agricultural activity in the RAA occurs in the St. John River valley, but these activities are sufficiently distant from the Project that their environmental effects on the Terrestrial Environment would not possibly overlap spatially to an extent that a measurable adverse cumulative environmental effect on the Terrestrial Environment would be expected to occur.

While these past or present activities have likely affected the current terrestrial populations (*i.e.*, plant communities and wildlife populations) present in the RAA at some time in the past, they are common and long-standing practices throughout the province. In particular, forest harvesting and other activities on Crown land are strictly managed by NBDNR through provincial objectives and standards that are revisited and updated every five years (NBDNR 2005) for many variables including vegetation communities, fish and wildlife habitat, timber and wood supply, and recreation and aesthetics. As such, this active management and frequent revisiting of these objectives every five years is intended to

ensure that forestry activities do not substantively affect wildlife. Though both past or present forestry and agricultural land use have resulted and will result in a change in forested habitat and a (potentially temporary) loss of mature forested habitat, and even though the Project will also result in these changes, the magnitude of the loss is not expected to be so great that the sustainability of wildlife populations in general or wildlife SAR or SOCC are adversely affected in a significant way within the RAA, due to the active management of wildlife and associated protection measures in NBDNR's forest management program. Therefore, the Project in combination with other past, present, or future Forestry and Agricultural Land Use are not expected to have a significant adverse residual cumulative environmental effect on the Terrestrial Environment.

According to an Indigenous Knowledge Study (IKS) carried out for the Sisson Project (Moccasin Flower Consulting 2013), the land and resources in the RAA have been, and will likely continue to be, used for traditional purposes by Aboriginal persons. With respect to the Terrestrial Environment, this includes activities such as hunting and trapping wildlife as well as timber harvesting (note: other plants are discussed in the Vegetated Environment VEC, Section 8.7; the use of aquatic resources including fishing is discussed in the Aquatic Environment VEC, Section 8.5). These activities have been long-standing, and are believed to be conducted at reasonable, sustainable levels. Any change in terrestrial habitat which may result from the Project in combination with the environmental effects of past, present or future Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons on the Terrestrial Environment is not expected to be such that the sustainability of wildlife populations is adversely affected within the RAA. The Project in combination with past, present, or future Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons is therefore not expected to result in a significant adverse residual cumulative environmental effect on the Terrestrial Environment.

Recreational Land Use, including trail development and all-terrain vehicle (ATV) and snowmobile use, has and will continue to occur within the RAA. The portion of land affected by the Project is small in comparison to that available in the RAA for the purpose of these recreational activities, such that the environmental effects of the Project in combination with those associated with past, present or future Recreational Land Use for trail development and ATV use are not expected to be significant. Hunting of bear, moose, and deer, and trapping of furbearing mammals also takes place within the RAA. Hunting and trapping of wildlife within the RAA is a provincially regulated and licensed activity, and the take of animals is monitored by NBDNR. These activities may have some environmental effects on wildlife populations through the removal of habitat, or harvesting of wildlife; however, even when combined with the Project, is not expected to affect the sustainability of wildlife populations and/or wildlife SAR or SOCC within the RAA. Species that are hunted and trapped are common and secure to the extent that provincial licensing of such activities permit them to occur and these species are abundant throughout the RAA. Therefore, the Project in combination with other past, present or future Recreational Land use is not expected to result in a significant adverse residual cumulative environmental effect on the Terrestrial Environment.

8.6.6 Determination of Significance

8.6.6.1 Residual Project Environmental Effects

Habitat will be lost as a result of the Construction and subsequent Operation of the Project, but some habitat restoration will occur upon Decommissioning, Reclamation and Closure as Project elements are removed and some re-vegetation of disturbed areas is carried out. Wildlife habitat types within the LAA are common and found throughout Central New Brunswick, and no habitat will be lost that is unique to the region or that is critical for the survival of a wildlife SAR or SOCC population in the LAA, RAA or province. Managed conservation areas including interior forest, deer wintering areas, old forest wildlife habitat, protected natural areas (existing and proposed) will not be affected in a substantive way by the Construction and subsequent Operation of the Project. Secure species of birds, mammals and herpetiles which are or may be present in the PDA and/or LAA, and not limited by their habitat requirements, will not be adversely affected by the Project presence in the RAA. Species of SAR (Canada lynx, Bald Eagle, Common Nighthawk, Olive-sided Flycatcher, Canada Warbler, and Rusty Blackbird) and several species of SOCC have been recorded in or near the PDA, but they are not likely to be affected substantially by the Project activities. The Project will not cause the decline of populations of a secure or non-secure wildlife species such that their survival in the RAA and New Brunswick, respectively, is jeopardized.

Adverse environmental effects of the Project on wildlife will be avoided through a number of mitigation measures including timing restrictions on clearing and minimizing footprints, among other mitigation measures (see sub-section 8.6.4.2). With the proposed mitigation and environmental protection measures, the residual environmental effects of a Change in Wildlife Populations arising from the Project on the Terrestrial Environment during all phases are rated not significant. This conclusion has been determined with a high level of confidence as a result of careful Project design and planning in combination with the existence and application of well-established and proven mitigation and environmental protection measures.

8.6.6.2 Residual Cumulative Environmental Effects

The cumulative environmental effects of a Change in Wildlife Populations arising from the Project in combination with other projects or activities that have been or will be carried out will be limited in extent and in spatial or temporal overlap, and the viability of wildlife populations in New Brunswick and the RAA will not be substantively reduced or altered as a result of those potential overlapping cumulative environmental effects. Mitigation measures, including the management of forestry activities by NBDNR for the protection of wildlife, will minimize the environmental effects to wildlife populations such that they are not substantive. Accordingly, the residual cumulative environmental effects of a Change in Wildlife Populations arising from the Project in combination with other projects or activities that have been or will be carried out are rated not significant. This determination has been made with a high level of confidence, given the limited temporal and spatial nature of these potential overlapping residual cumulative environmental effects and the expected effectiveness of planned mitigation. .

8.6.7 Follow-up or Monitoring

No follow-up is recommended to verify the environmental effects prediction or the effectiveness of mitigation for the Terrestrial Environment. No monitoring programs are recommended for the Terrestrial Environment.