



**Sisson Project:**

**Baseline Heritage Resources Technical Report**

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## ABOUT THIS DOCUMENT

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	PURPOSE OF THIS TECHNICAL REPORT .....	1
1.2	OVERVIEW OF TECHNICAL REPORT .....	2
1.3	ORGANIZATION OF THIS TECHNICAL REPORT .....	5
<b>2.0</b>	<b>REGULATORY SETTING AND METHODOLOGY .....</b>	<b>6</b>
2.1	REGULATORY SETTING .....	6
2.2	METHODOLOGY .....	8
2.2.1	Background Research and Communication .....	8
2.2.1.1	Built Heritage Resources .....	8
2.2.1.2	Palaeontological Resources.....	8
2.2.1.3	Archaeological Resources .....	9
2.2.2	Field Assessment .....	11
2.2.2.1	High/Medium Potential Zones .....	12
2.2.2.1.1	Saturation Level.....	15
2.2.2.1.2	Slope .....	15
2.2.2.1.3	Depth to Surface Rock and Surface Conditions .....	15
2.2.2.1.4	Vegetation Density.....	15
2.2.2.1.5	Judgment of Stantec.....	16
2.2.2.2	Low Archaeological Potential .....	16
<b>3.0</b>	<b>HERITAGE RESOURCES – AN OVERVIEW .....</b>	<b>17</b>
3.1	NEW BRUNSWICK HISTORICAL OVERVIEW.....	17
3.1.1	Central New Brunswick Pre-Contact Period.....	17
3.1.1.1	Palaeo-Indian Period .....	17
3.1.1.2	Archaic Period .....	18
3.1.1.3	Maritime Woodland Period.....	18
3.1.2	New Brunswick Historic Period .....	20
3.1.2.1	Infrastructure.....	21
3.1.2.2	Subsistence .....	21
3.1.2.3	Communities and Settlement in the LAA.....	22
3.2	GEOLOGY .....	24
3.2.1	Surficial Geology .....	24
3.2.2	Bedrock Geology .....	24
3.3	PALAEONTOLOGICAL RESOURCES.....	27
3.4	BUILT HERITAGE RESOURCES .....	27
3.5	ARCHAEOLOGICAL RESOURCES.....	28
3.6	IDENTIFIED GAPS IN DATA .....	29
<b>4.0</b>	<b>SUMMARY OF 2011 FIELD INVESTIGATIONS.....</b>	<b>30</b>
4.1	OVERVIEW.....	30
4.2	SUMMARY OF RESULTS.....	30
4.2.1	Summary of Field Examinations .....	33
4.2.1.1	Open Pit Area .....	33
4.2.1.2	Waste Rock Storage Area.....	33
4.2.1.3	Tailings Storage Facility .....	34
4.2.2	Summary .....	36

**5.0 REFERENCES..... 37**  
5.1 LITERATURE CITED ..... 37  
5.2 PERSONAL COMMUNICATIONS..... 40

**LIST OF TABLES**

Table 2.1 Experts and Agencies Contacted as part of Background Research ..... 10  
Table 4.1 Summary of Areas Assessed..... 34

**LIST OF FIGURES**

Figure 1.1 Project Location ..... 3  
Figure 2.1 Areas Assessed..... 13  
Figure 3.1 Bedrock Geology ..... 25  
Figure 4.1 Recommended Archaeological Shovel Testing Locations..... 31

**LIST OF APPENDICES**

Appendix A: List of Acronyms and Units  
Appendix B: Archaeological Potential Map

## **1.0 INTRODUCTION**

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This document is the Baseline Heritage Resources Technical Report prepared by Stantec Consulting Ltd. (Stantec) as background information for the Environmental Impact Assessment (EIA) for the Sisson Project (the Project), proposed by Northcliff Resources Ltd. (Northcliff) near Napadogan, New Brunswick.

The Project consists of a conventional open pit tungsten and molybdenum mine, ore processing plant, and associated facilities located on provincial Crown land approximately 10 km southwest of the community of Napadogan, New Brunswick, and approximately 60 km northwest of the city of Fredericton (Figure 1.1).

### **1.1 PURPOSE OF THIS TECHNICAL REPORT**

In the context of this Technical Report, Heritage Resources refers to any physical remnants found on top of and/or below the surface of the ground that provide information on past human use of, and interaction with, the physical environment, as well as any evidence that relates to the natural history of the area. This includes resources of historical, cultural, archaeological, palaeontological, and architectural significance. Heritage Resources is divided into three sub-disciplines:

- built heritage resources (*i.e.*, buildings, other structures, landscapes and districts of heritage value because of their historic, cultural, or architectural significance);
- palaeontological resources (*i.e.*, fossils); and
- archaeological resources (*i.e.*, surface or sub-surface evidence of human occupation or use).

Heritage Resources has been identified as a valued environmental component (VEC) to be assessed as part of the EIA for the Project due to the importance of heritage resources to the public, provincial officials, and First Nations. Characterization of existing baseline conditions is essential background information for the EIA of the Project. Thus, the purpose of this Technical Report is to describe the existing heritage resources near the Project as applicable, and identify a means of determining the presence/absence of previously unknown heritage resources within the PDA.

In this Technical Report, known heritage resources and the methodology for identifying any as-yet unidentified heritage resources are described. Further, the results of the field assessment of the potential for heritage resources to be present within the Project Development Area (PDA) are summarized.

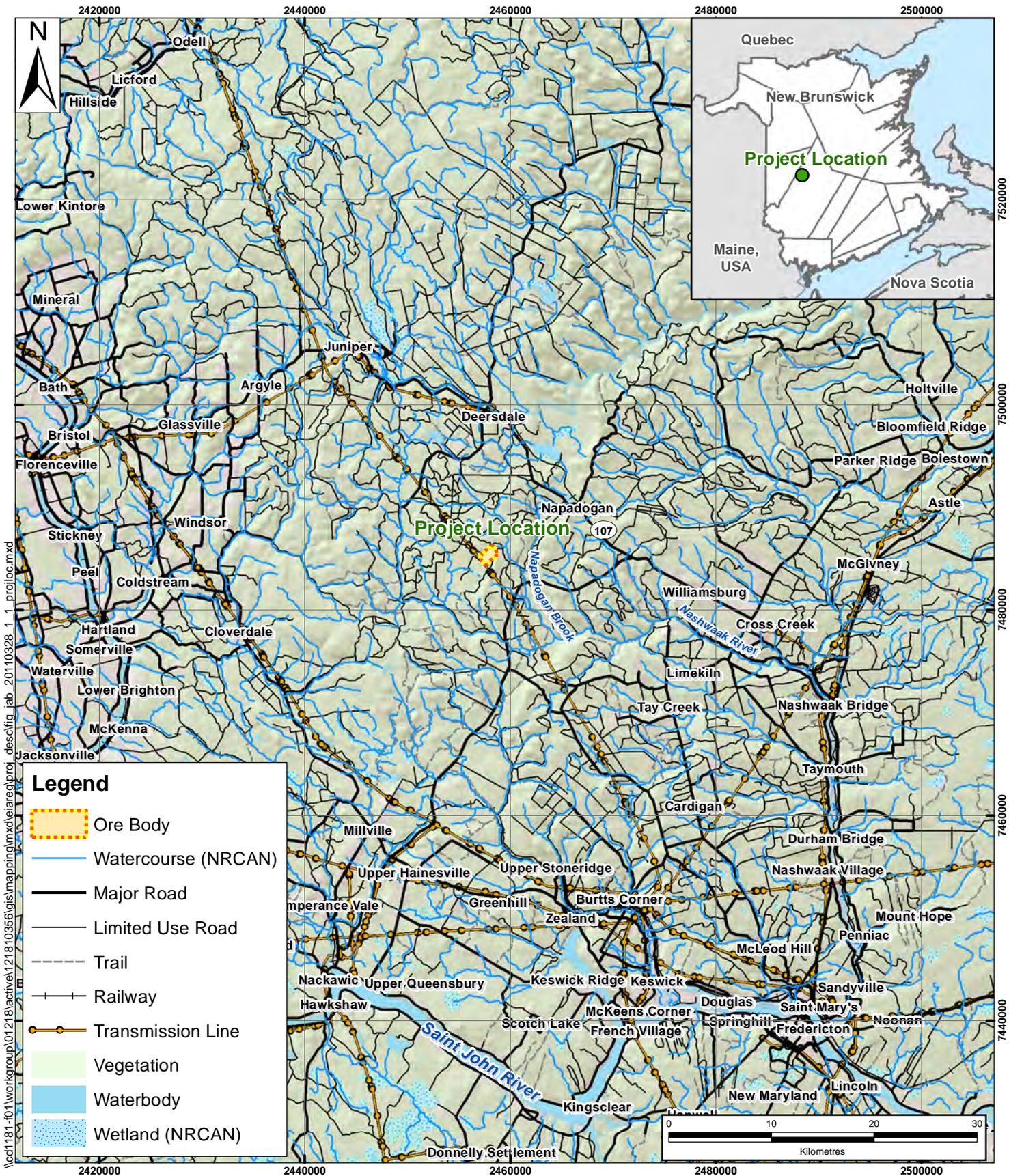
The spatial boundaries for the characterization of Heritage Resources discussed in this Technical Report are based on the following terms as defined in the Terms of Reference for the EIA of the Project (Stantec 2012):

- The **Project Development Area (PDA)** is the most basic and immediate area of the Project. For this Technical Report, the PDA is defined as the area of physical disturbance associated with the construction and operation of the Project, and consists of an area of approximately 1,200 hectares that includes the area of physical disturbance associated with the Open Pit Area, processing facility, storage areas, tailings storage facility (TSF), and related facilities. The PDA also includes access roads and a transmission line to the Project, the specific area of which will be determined and assessed in the EIA Report.
- The **Local Assessment Area (LAA)** is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. The LAA includes the PDA and any adjacent areas where Project-related environmental effects may reasonably be expected to occur. Since the potential environmental effects on Heritage Resources are limited to the construction footprint for the Project, for this Technical Report, the LAA is essentially the same as the PDA. However, for an understanding of the broader historical context within which the Project is located, the LAA also includes the villages, communities and general area surrounding the PDA, including how the PDA may have been used by people living in the surrounding areas.
- The **Regional Assessment Area (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 RAA depends on physical and biological conditions and the type and location of other past, present or reasonably foreseeable projects or activities that have been or will be carried out. For this Technical Report, the RAA is defined as Central New Brunswick.

## 1.2 OVERVIEW OF TECHNICAL REPORT

This Technical Report describes the existing known heritage resources within the PDA, and identifies a method for assessing areas of the PDA that have been determined to have elevated potential for heritage resources and for confirming to the extent possible that there are no heritage resources present in those areas considered to have low potential for heritage resources, based on background research, desktop modeling and the field assessment conducted in 2011.

As part of this Technical Report, background research was undertaken to ascertain the presence of any known heritage resources and to evaluate through a field assessment, the potential for any as-yet undiscovered heritage resources to exist within the PDA that could be affected by construction activities associated with the Project. In addition to background research, the determination of the potential presence of unknown heritage resources is based on recommendations for a pre-construction sub-surface examination (*i.e.*, shovel testing) in areas of elevated archaeological potential. The potential for construction activities to cause environmental effects to heritage resources will be assessed in the EIA Report on the basis of the identified presence or potential presence of heritage resources within the PDA.



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**Legend**

- Ore Body
- Watercourse (NRCAN)
- Major Road
- Limited Use Road
- Trail
- Railway
- Transmission Line
- Vegetation
- Waterbody
- Wetland (NRCAN)

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC PROJECT AND SHOULD NOT BE USED FOR OTHER PURPOSES.					
<h2 style="margin: 0;">Project Location</h2> <p style="margin: 0;">Sisson Project</p> <p style="margin: 0;">Napadogan, N.B.</p>		Scale: 1:500,000	Project No.: 121810356	Data Sources: SNB NRCAN, ESRI	Fig. No.: 1.1
Client: Northcliff Resources Ltd.		Date: (dd/mm/yyyy) 26/01/2012	Dwn. By: JAB	Appd. By: DLM	<p style="margin: 0;"><b>Stantec</b></p>



### **1.3 ORGANIZATION OF THIS TECHNICAL REPORT**

The remainder of this Technical Report is presented in four sections, as follows.

- Section 2.0 describes the regulatory setting for the assessment of Heritage Resources as well as the methodology used for defining the baseline conditions of these resources within the PDA. The methodology implemented during the field assessment for Heritage Resources is also presented.
- Section 3.0 is an overview of the results of the background research undertaken to determine known heritage resources within the PDA as well as a gap analysis for the PDA.
- Section 4.0 provides a summary of the field assessment conducted in 2011 to collect information to address the needs identified in the gap analysis.
- Section 5.0 provides the references consulted as part of the work.

Additional supporting documentation, including a list of List of Acronyms and Units, and the Archaeological Potential Map provided by Archaeological Services, New Brunswick Department of Culture, Tourism and Healthy Living, is provided in the Appendices.

## 2.0 REGULATORY SETTING AND METHODOLOGY

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This section describes the regulatory setting for the assessment of Heritage Resources, and the methodology used for establishing the baseline conditions relating to these resources within the PDA. The methodology used for the field assessment for Heritage Resources is also presented.

### 2.1 REGULATORY SETTING

Heritage Resources in New Brunswick are regulated under the New Brunswick *Heritage Conservation Act*. This Act defines a number of items relating to heritage in the Province, the protection these resources are afforded, permitting requirements for those doing research on and/or encountering these resources, and penalties for those who violate the conditions in the Act.

The regulatory management of Heritage Resources falls under the New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport), and is administered by its Heritage Branch. The mandate of the Heritage Branch is to coordinate and support those activities in the Province designed to promote heritage awareness and to protect and preserve heritage resources as well as to develop provincial policy and legislative framework for the protection and preservation of heritage assets, including archaeological resources. The Branch also manages and maintains provincial heritage databases, and coordinates cultural resource management through administration of provincial legislation, including archaeological permitting, participation in environmental reviews, and land use policy and planning (New Brunswick Department of Culture, Tourism and Healthy Living, n.d.). Within the Heritage Branch are the offices of Historic Places, the New Brunswick Museum, and Archaeological Services, the mandates of which are defined briefly below.

- Historic Places promotes increased awareness and stewardship of New Brunswick's built Heritage Resources. Built Heritage Resources can include buildings, other structures, landscapes and districts. Historic Places also administers provincial involvement in the recognition, commemoration and designation of historic places in New Brunswick (New Brunswick Department of Culture, Tourism and Healthy Living, n.d.).
- The New Brunswick Museum (NBM) serves both as the provincial museum and as the administrator of all activities related to palaeontology in New Brunswick. The NBM's Board of Directors reports to the Minister of Culture, Tourism and Healthy Living. In addition to maintaining fossil collections and extensive palaeontological databases, the NBM issues permits for field research to qualified professionals as well as interested amateurs (New Brunswick Department of Culture, Tourism and Healthy Living, n.d.).

- Archaeological Services is responsible for the management of the Province's archaeological heritage. This responsibility includes protecting, preserving, and interpreting New Brunswick's non-renewable archaeological resources, maintaining the archaeological sites database, collections management, heritage resource impact assessment, salvage, and liaison with First Nations on heritage issues. In addition, Archaeological Services is responsible for issuing permits to archaeological researchers (New Brunswick Department of Culture, Tourism and Healthy Living, n.d.). Any field work for the purpose of investigating a location for potential archaeological resources requires a permit to be issued to a qualified archaeological professional.

The assessment for heritage resources by undertaking archaeological, palaeontological, or built heritage research in New Brunswick is known as a Heritage Assessment. The industry that has developed to conduct a Heritage Assessment is known as “cultural resource management.” The conduct of a Heritage Assessment is governed by Guidelines issued under the New Brunswick *Heritage Conservation Act* that defines the requirements of, and methodologies for, conducting such assessments. The Guidelines, entitled “Guidelines for Conducting Heritage Impact Assessments in New Brunswick” (Archaeological Services 2009), among other things:

- define heritage resources;
- outline the roles and responsibilities of those undertaking the Heritage Assessment;
- present guidance on the required steps necessary to complete a Heritage Assessment;
- indicate necessary reference material to be examined prior to undertaking the field assessment;
- state the minimum requirements for issuance of Archaeological Field Research Permits (AFRP);
- present criteria for determining high, medium, and low archaeological potential; and
- present criteria for evaluating heritage resource significance.

Federally, the assessment of heritage resources is required based on their inclusion in the definition of environmental effect within the *Canadian Environmental Assessment Act (CEAA)*: “...any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance...”. Guidance for this assessment under *CEAA* is provided in the document entitled “Reference Guide on Physical and Cultural Heritage Resources (April 1996)” (CEA Agency 1996). This guidance document describes, among other things:

- the key principles for assessing heritage resources; and
- a framework for evaluating the potential environmental effects of a project on Cultural Heritage Resources (CEA Agency 1996).

## **2.2 METHODOLOGY**

### **2.2.1 Background Research and Communication**

Prior to initiating the field assessment, Stantec gathered information on the existing knowledge of the area near the Project for Heritage Resources (including built heritage resources, palaeontological resources, and archaeological resources). Background research and communication with key knowledge holders was conducted to determine the documented presence of any known heritage resources within or near the PDA, as well as determine the likelihood of encountering any heritage resources within the PDA. Further discussion of the methods used for this research is provided below with respect to each sub-discipline. Results of this research and communications are presented in Section 3.0.

#### **2.2.1.1 Built Heritage Resources**

Information regarding known built heritage resources and the potential presence of such resources was sought from various sources. These included:

- correspondence with Historic Places Section of the New Brunswick Department of Culture, Tourism, and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport) to obtain a listing of known built heritage resources in the vicinity of the Project generally and in the PDA specifically;
- a review of various historical literature sources; and
- a review of past (1945, 1951, 1954) and recent (1981, 2011 (Google Earth)) aerial photography.

Stantec contacted a representative from Historic Places to obtain information on the presence of any known heritage buildings or structures within the PDA that might be affected by Project activities. In addition to contacting individuals within government, Stantec reviewed various provincial and federal lists of registered heritage buildings including the Canadian Register of Historic Places and the New Brunswick Register of Historic Places (*i.e.*, the New Brunswick component of the Canadian Inventory of Historic Buildings).

Stantec also sought to identify local historical societies that may have specialized knowledge of the history or culture of the area.

#### **2.2.1.2 Palaeontological Resources**

Stantec contacted representatives from the Natural Science Section for the New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport) as well as from the University of New Brunswick's Geology Department regarding the presence of any known palaeontological (fossil) resources with the PDA. Discussion also sought to determine if any of the bedrock types within the PDA are known to (or could) contain significant fossils.

### 2.2.1.3 Archaeological Resources

Stantec consulted a variety of information sources to determine existing knowledge for archaeological resources in the PDA, and to gather information that would assist in the determination of any areas of the PDA that may hold previously undiscovered archaeological resources. This also aided in Stantec's understanding of the general and specific history of the PDA. The research included the following activities:

- A review of archaeological potential maps (Appendix B) of areas determined by Archaeological Services to hold high and medium potential for Pre-Contact Period archaeological sites (Archaeological Potential Map, Appendix B) based on anthropological, geographic, and geological data. The term "elevated archaeological potential" is used to denote areas determined by Archaeological Services to have high or medium archaeological potential, where high archaeological potential is defined as being from 0-50 m from a watercourse, and medium archaeological potential is defined as 50-80 m from the watercourse. Areas within 100 m of the confluence of watercourses are also noted as having elevated archaeological potential.
- A review of the provincial archaeological sites database for any known archaeological sites within or near the PDA.
- Meetings with representatives from Archaeological Services.
- A review of a variety of published, unpublished, and on-line works on relevant local history and environment, and previous archaeological work carried out in the area, including but not limited to: Historic Sites in the Province of New Brunswick (Ganong 1899a), Place Names of Atlantic Canada (Hamilton 1996), Our Landscape Heritage: The Story of Ecological Land Classification in New Brunswick (NBDNR 2007), Generalized Surficial Geology Map of New Brunswick (Rampton 1984), and Geographical Names of New Brunswick (Rayburn 1975).
- Regional experts (e.g., New Brunswick Department of Natural Resources (NBDNR)) were contacted and asked if they had any additional knowledge relevant to this Technical Report.
- Review of various documents found in the New Brunswick Archives.
- A meeting with two Aboriginal knowledge holders identified by the Woodstock First Nation.

Stantec obtained the Archaeological Potential Map (Appendix B) from Archaeological Services, and reviewed it with staff at Archaeological Services. Stantec also met with Archaeological Services prior to initiating the field assessment to review the field assessment survey methods to be employed and the results of background research, and to discuss the elevated archaeological potential areas and proposed approach for assessing the low archaeological potential areas.

Several regional experts were contacted regarding additional historical information near the PDA, and the potential historical presence of large water bodies or lakes (e.g., post-glacial lakes) within the PDA, since these water bodies appear to be a selection criterion for Palaeo-Indian habitation sites. These experts included representatives from the New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport) (Historic Places

Section); NBDNR (Surficial Mapping Section); and University of New Brunswick (Geology Department). Section 3.0 of this report presents the results of the discussions with these representatives.

A meeting was held with two Aboriginal knowledge holders from the Woodstock First Nation, as identified to Stantec by Woodstock First Nation leadership as potentially having knowledge of the Project area, in order to obtain additional information. The results of the archaeological survey were presented to the knowledge holders who were asked if they had any information that could assist the archaeological assessment of the PDA. The knowledge holders provided information on relatively recent activity within the PDA (e.g., hunting and trapping); however, they indicated they were not aware of any information regarding the potential existence of burials, settlements or archaeological resources within the PDA. No additional information specific to the PDA was provided by the knowledge holders.

Table 2.1 provides a list of experts and agencies consulted in the background research component for built heritage, palaeontological, and archaeological resources.

**Table 2.1 Experts and Agencies Contacted as part of Background Research**

<b>Name of Expert</b>	<b>Affiliation</b>	<b>Date(s) Contacted</b>	<b>Purpose/Topic Discussed/Information Received</b>
Mr. Scott Finley	Project Executive, Historic Places Section – New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport)	August 19, 2011	Built heritage resources in or near the PDA.
Dr. Randall Miller	Curator, Natural Sciences Section – New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport)	December 14, 2011	Known paleontological resources in the PDA; potential presence of fossils.
Dr. Adrian Park	Geology Department – University of New Brunswick, Fredericton	December 8, 2011	Potential presence of fossils in the PDA, surficial and bedrock geology of the PDA.
Mr. Brent Suttie	Project Executive, Archaeological Services – New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport)	June 27, 2011	Archaeological potential map, known archaeological resources in the PDA, elevated archaeological potential areas; archaeological permitting, field assessment methodology.
Mr. Allen Seaman	Surficial Mapping Section – New Brunswick Department of Natural Resources	July 6, 2011 / November 24, 2011	Discussion of New Brunswick surficial geology and the potential for post-glacial lakes formed in the PDA during the melting of the Younger Dryas glacier.
Dr. Bruce Broster	Geology Department – University of New Brunswick, Fredericton	November 24, 2011	Discussion of New Brunswick surficial geology and the potential for post-glacial lakes formed in the PDA during the melting of the Younger Dryas glacier.
Ms. Jane Fullerton	Chief Executive Officer, New Brunswick Museum, New Brunswick Department of Culture, Tourism and Healthy Living (formerly the New Brunswick Department of Wellness, Culture and Sport)	February 16, 2012	Request for additional historical societies near PDA, no additional information obtained.

**Table 2.1 Experts and Agencies Contacted as part of Background Research**

Name of Expert	Affiliation	Date(s) Contacted	Purpose/Topic Discussed/Information Received
Ms. Jennifer Cormier	Geoscience Information Officer, Clients, Services and Information Section – New Brunswick Department of Natural Resources	February 14, 2012	Request for mineral reports produced for PDA.
Mr. Ronald Shaw	Manager, Resource Allocation Section, New Brunswick Department of Natural Resources	February 14, 2012	Discussion on past mineral exploration in/near the PDA.
Ms. Kellie Blue-McQuade	Executive Director – Carleton County Historical Society	February 21, 2012	Request for information on mining history and/or historical societies near LAA.
Steven Grant	Woodstock First Nation	September 13, 2012	Request for information related to First Nation use of PDA.
Clark Polches	Woodstock First Nation	September 13, 2012	Request for information related to First Nation use of PDA.

**2.2.2 Field Assessment**

During the summer of 2011, a field assessment of the PDA was conducted to assess the potential for archaeological resources to be present within the PDA (Figure 2.1). The goal of the field assessment was to make recommendations on the need for, and placement, of shovel tests relative to the areas identified by Archaeological Services as having elevated archaeological potential and to identify and record any heritage resources encountered within the PDA.

Based on the requirements set out in the “Guidelines for Conducting Heritage Impact Assessments in New Brunswick” (Archaeological Services 2009) (“the Guidelines”), the shoreline areas of all watercourses within the PDA were identified as having elevated potential to contain archaeological resources, regardless of the size of the watercourse, which is defined as follows:

- high archaeological potential (hereinafter referred to as the high potential zone):
  - 0-50 m from the watercourse bank; or
  - 100 m from the confluence of any two watercourses; and
- medium archaeological potential (hereinafter referred to as the medium potential zone):
  - 50-80 m from the watercourse bank.

This was confirmed by the Archaeological Potential Map (Appendix B) provided by Archaeological Services, based on analysis undertaken by the Province with regard to the potential for archaeological sites to be present in a given location. These high and medium potential zones were investigated during the field assessment. All other areas were considered to have low potential for archaeological resources. In compliance with these Guideline requirements, Stantec undertook a visual field assessment (*i.e.*, walkover) of the shorelines of all watercourses within the PDA for the elevated potential zones to determine if shovel testing in these areas was warranted and/or practical. A visual

assessment of a sample of areas of low archaeological potential was also conducted, as required by the Guidelines.

The PDA was divided into those areas of elevated archaeological potential (*i.e.*, high or medium), and those areas of low archaeological potential. The field assessment methodology differed for these two areas, as described below.

### **2.2.2.1 High/Medium Potential Zones**

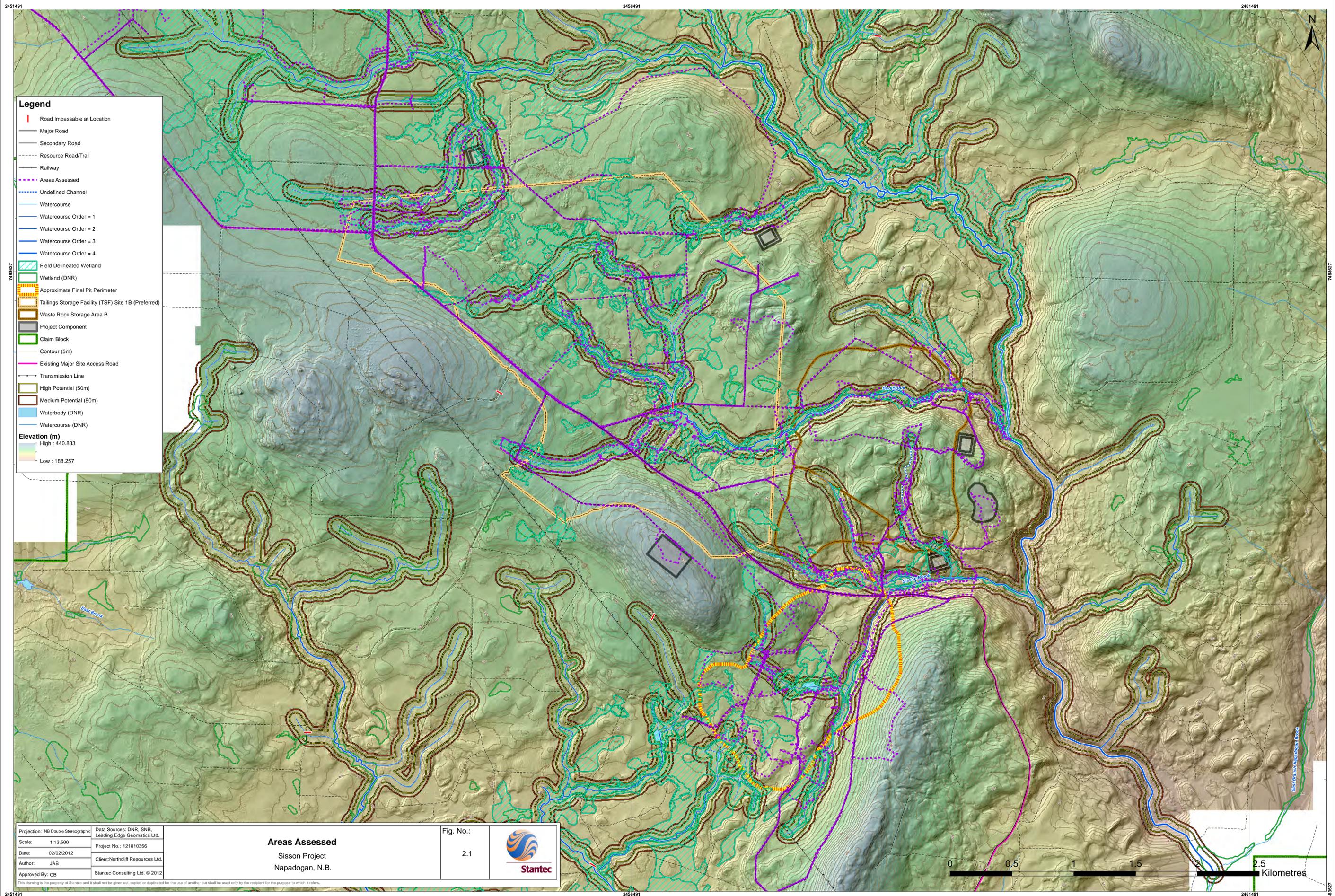
The field assessment of the areas identified as having elevated (*i.e.*, high and medium) archaeological potential involved traversing the entire length of both sides of all watercourse shorelines, crisscrossing within the elevated archaeological potential zone on either side of the watercourse. Maps generated for the assessment displayed all watercourses within the PDA and outlined the high and medium potential zones. This field assessment also included an examination beyond the elevated archaeological potential zone if it appeared to Stantec that any terracing or similar topographical features were present and warranted further investigation. Any new, unmapped watercourses encountered during the field assessment were also assumed to have elevated archaeological potential within the 80 m boundary and were mapped and assessed accordingly. The Stantec field team walked the 80 m elevated archaeological potential zone (and beyond as warranted) noting surface conditions and any factors relevant to the heritage resources assessment.

In areas confirmed through walkover assessment as having high or medium potential, Archaeological Services assumes that if the ground can be dug by an individual with a shovel, then shovel testing is required, unless information on the ground conditions are presented that would otherwise eliminate the potential for heritage resources to be present. Ground conditions that would eliminate the requirement for shovel testing include very steep slopes or very wet ground, for example.

In addition to archaeological potential as confirmed by the field assessment, the recommendations for shovel testing were based on the following:

- the physical condition of the ground such as saturation level, slope, depth to surface rock, and surface conditions;
- vegetation density and the practicality of being able to implement the shovel testing recommendations; and
- judgment of Stantec.

These criteria are discussed below.



**Legend**

- Road Impassable at Location
- Major Road
- Secondary Road
- - - Resource Road/Trail
- Railway
- Areas Assessed
- Undefined Channel
- Watercourse
- Watercourse Order = 1
- Watercourse Order = 2
- Watercourse Order = 3
- Watercourse Order = 4
- Field Delineated Wetland
- Wetland (DNR)
- Approximate Final Pit Perimeter
- Tailings Storage Facility (TSF) Site 1B (Preferred)
- Waste Rock Storage Area B
- Project Component
- Claim Block
- Contour (5m)
- Existing Major Site Access Road
- Transmission Line
- High Potential (50m)
- Medium Potential (80m)
- Waterbody (DNR)
- Watercourse (DNR)

**Elevation (m)**

- High : 440.833
- Low : 188.257

Projection: NB Double Stereographic	Data Sources: DNR, SNB, Leading Edge Geomatics Ltd.
Scale: 1:12,500	Project No.: 121810356
Date: 02/02/2012	Client: Northcliff Resources Ltd.
Author: JAB	Stantec Consulting Ltd. © 2012
Approved By: CB	

**Areas Assessed**  
Sisson Project  
Napadogan, N.B.

Fig. No.:  
2.1





### 2.2.2.1.1 Saturation Level

Areas with wet, saturated ground conditions are not often subject to shovel testing as the presence of groundwater at or near the ground surface indicates a low likelihood that such an area would have been suitable for habitation for a significant period, and thus in these cases, it is unlikely that shovel testing would result in the discovery of archaeological resources. Existing provincial wetland maps, aerial photography, and LiDAR (light detection and ranging) data interpretation were used to determine the extent of wetlands within the PDA, and subsequently verified by field visits by recognized wetland delineators. While this information is helpful to assist the archaeological team in planning and conducting the field assessment, the wetland information did not necessarily define locations where shovel testing will be conducted. The recommendation for shovel testing was based on the ability to dig a certain area based on the surface and sub-surface conditions, regardless of the wetland interpretation.

### 2.2.2.1.2 Slope

According to the Archaeological Potential Map (Appendix B) provided by Archaeological Services, archaeological resources are unlikely to be found in areas with steep slopes (defined as slopes that exceed 35% or approximately 20°). While this is a guideline and archaeological sites have been found in locations where the slopes exceeded these values, a 35% slope was generally used along with other topographical features as a criterion for determining recommendations for shovel testing. In addition, the surrounding ground conditions were considered in this determination as it is anticipated that people will tend to seek the best place for a camp site in a given area. Therefore, in some locations, shovel testing recommendations are based on the knowledge that more suitable ground conditions exist in close proximity to a marginal area (*i.e.*, an area with slope above 35% as indicated on the Archaeological Potential Map (Appendix B)) and verified during the field assessment.

### 2.2.2.1.3 Depth to Surface Rock and Surface Conditions

The presence of a rocky glacial till at the surface in areas with virtually no soil development usually resulted in a recommendation for a reduced level of effort for shovel testing, as it would not be possible to place shovel test pits within these types of soil conditions. Further, under such conditions, it would not be anticipated that archaeological resources would be present. Hence, areas with prevalent surface rock or no soil cover were identified as not being recommended for shovel testing.

### 2.2.2.1.4 Vegetation Density

Recent forestry activities in the PDA have significantly altered the surface vegetation in terms of both vegetation species and density and waste woody surface debris, and have made it virtually impossible to place shovel test pits without significant effort being made to remove this vegetation or woody material. Even in regenerating forest, if one were able to clear these areas of standing surface vegetation or felled trees such that these areas were passable for the Study Team, the density of stumps (small as they may be) and the presence of roots would make shovel testing all but impossible.

In such areas, archaeological monitoring during any ground breaking construction activities is often used in lieu of shovel testing. It is possible that sporadic shovel testing could be achieved in some locations within these areas, but not to the level prescribed by the Guidelines or that would be satisfactory for determining the presence or confirming the absence of archaeological resources in

these areas. In such areas it may be recommended that archaeological monitoring be implemented during any ground breaking construction activities. Shovel testing will be attempted in these locations and some success may be achieved, however likely not to the level that would be satisfactory for determining the presence or confirming the absence of archaeological resources in these areas.

#### **2.2.2.1.5 Judgment of Stantec**

Professional judgment of a qualified archaeologist, based on his/her classical training as well as several years of in-field experience and expertise in carrying out Heritage Assessments, is an important component to the identification and confirmation of elevated archaeological potential and associated shovel testing, mitigation, and follow-up work. While the Archaeological Potential Map and related decision-making regarding ground conditions reduces the subjectivity of shovel testing decision along the margins of watercourses, the experience and professional judgment of the archaeologist is vital to the evaluation process, based on first hand observation of conditions in the field. This is important for the assessment of both those areas of elevated archaeological potential as well as those areas determined to have low archaeological potential. In addition to ensuring that decisions are properly documented and in compliance with the spirit and requirements of the Act and the Guidelines, as part of a field assessment, a qualified archaeologist considers landforms, soils, vegetation, and material culture and relates these to an understanding of their relationship to human use and occupation at various time periods in the past. Shovel testing recommendations can then be made immediately, based on a consideration of these specific site conditions. Further, the qualified archaeologist is also best able to describe the setting in a manner that will convey a proper understanding of the area to heritage regulatory staff, and to document the rationale for recommendations on the placement of shovel tests.

#### **2.2.2.2 Low Archaeological Potential**

All areas within the PDA not assigned an interpretation of elevated (*i.e.*, high or medium) archaeological potential are assumed to have low potential. A review of the Guidelines and correspondence with Archaeological Services staff prior to the field assessment determined that a reasonable sampling (walkover) of areas of low potential was required to fulfill this requirement. Stantec proposed that all woods roads and bordering grounds criss-crossing the PDA would be assessed and any other areas having topographical attributes warranting investigation (*e.g.*, lithic outcrops, vantage points) would be investigated during the field assessment.

## 3.0 HERITAGE RESOURCES – AN OVERVIEW

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This section provides a brief historical overview of New Brunswick with a particular emphasis on Central New Brunswick, as well as the results of the background research undertaken to determine known heritage resources within the PDA. Identified gaps in data for the PDA arising from the background research that helped to focus the scope of the required field investigations for 2011 are also discussed.

### 3.1 NEW BRUNSWICK HISTORICAL OVERVIEW

A brief historical overview of Central New Brunswick is provided below which includes both the Pre-Contact Period (*i.e.*, up to the settlement of the area by Europeans), and the Historic Period (*i.e.*, European settlement to the mid-20<sup>th</sup> Century).

It is noted that the overview of the Pre-Contact Period history is intended to be a general description of known past occupation by Aboriginal peoples, and that further details in this area may arise through a Traditional Use Study to be carried out for the Project. This information is intended to complement, and not to pre-judge or replace, the observations and results of an eventual Traditional Use Study to be conducted for the Project.

#### 3.1.1 Central New Brunswick Pre-Contact Period

While community-based knowledge from oral histories can be used to discern information on past life-ways of First Nations peoples, the most widely used method for gathering information on the Pre-Contact Period in New Brunswick is through archaeological research. Archaeologists working in the Maritimes Provinces commonly divide the Pre-Contact Period into three general cultural periods (Deal and Blair 1991):

- the Palaeo-Indian Period (approximately 11500 to 9000 years Before Present (BP));
- the Archaic Period (9000-2800 BP); and
- the Maritime Woodland Period (2800-500 BP).

Several important changes in settlement, technology, and subsistence patterns that occur within these broadly defined periods have been documented through archaeological research and are included in the discussion below (Stantec 2010).

##### 3.1.1.1 Palaeo-Indian Period

Palaeo-geological research has shown that the area of Central New Brunswick within which the PDA is located was still glaciated with re-advancing ice sheets, in particular those of the Younger Dryas until approximately 10500 BP. Rapidly rising sea levels followed by glacial melting inundated low lying areas of the province and contributed to the formation of a large inland water body in south central New Brunswick, covering much of the area now known as Grand Lake and surrounding area up to about 8000 years ago. This lake did not extend as far north as the PDA, thus the landforms within the PDA

would have been available for use by people after the final retreat of the Younger Dryas glaciers (Seaman, A. Personal communications, July 6 and November 24, 2011, and February 21, 2012).

The recent discovery of Palaeo-Indian archaeological sites (11500-9000 BP) in southern New Brunswick has allowed for the development of a preliminary model for predicting the location of palaeo-shorelines and other features potentially used by Palaeo-Indian people moving into this area. In Maine and Nova Scotia, Palaeo-Indian archaeological sites are most frequently located on well-drained, sandy to silty-sand soils of marine or lacustrine origin along lake, river, pond, or bog edges (Bonnichsen *et al.* 1993).

As part of the ongoing research on the surficial geology of New Brunswick, an examination of the PDA by staff from NBDNR has not located any lacustrine sediments within the PDA. Thus, it is very likely no post-glacial lakes formed in the PDA during the melting of the Younger Dryas glaciers (Seaman, A. and Broster B. Personal communications, November 24, 2011). Communication with staff from Archaeological Services who have examined the results of the Palaeo-Indian shoreline predictive model for the PDA also found there are no currently identified palaeo-shorelines and hence, currently no high potential areas for Palaeo-Indian archaeological sites have been predicted in the PDA (Suttie, B. Personal communication, February 14, 2012).

#### **3.1.1.2 Archaic Period**

The Archaic Period (9000-2800 BP) is further subdivided into the Early, Middle and Late/Terminal Archaic, based on technological changes identified in the archaeological records from sites from these time periods. Presently, there has been no Early Archaic period sites (9500-7500 BP) found in New Brunswick (Suttie 2005). Middle Archaic Period sites (7500-6000 BP) are very few in numbers, and tend to be located on the floodplains of major watercourses, and on the margins of lakes and wetlands (Suttie 2005; Tuck 1993). Late Archaic Period sites (6000-3800 BP) in New Brunswick are by far the most well represented of Archaic sites, having also been found similarly on the floodplains of major watercourses, and on the margins of lakes and wetlands (Allen 2005; Suttie 2005).

Artifact assemblages from the Archaic Period are frequently dominated by ground stone and at the end of this period there is evidence for the introduction of ceramics. This Period is also well known for elaborate burials and cemeteries. Little is known about settlement systems during this time, but Blair's (2004) re-examination of several Terminal Archaic components on the Lower Saint John River suggests that groups practiced "seasonally circumscribed residential mobility" (Blair 2004). Given the lack of major watercourses and lakes within the PDA, it would not be anticipated that Archaic Period archaeological sites would be found within the PDA.

#### **3.1.1.3 Maritime Woodland Period**

During the Maritime Woodland Period (Woodland Period) (approximately 2500-500 BP), the climatic and environmental conditions of New Brunswick were near those of the present. The majority of archaeological sites in the province have been dated to this period, largely based on cultural sequences for lithic and ceramic evidence (Petersen and Sanger 1993; Rutherford 1993).

The environmental settings in which Woodland sites have been found vary widely. The Woodland artifact assemblage is identified by the presence of low-fired ceramics and chipped stone artifacts, as well as evidence in settlement and subsistence patterns for decreasing mobility. At the beginning of the Woodland Period, artifact assemblages reflect an emphasis on relatively informal tools fashioned from locally available volcanics and cherts, gradually shifting to an increasing use of local quartz, quartzite, and cherts (Blair 2004; Rutherford 1993).

While undoubtedly the peoples from all Pre-Contact time periods were the ancestors of the First Nations Peoples currently living in the Province, it is in the Woodland Period that archaeologists begin to identify this population as the direct descendants of the Wolastoqiyik (Maliseet) and Mi'kmaq peoples currently living in New Brunswick. As the PDA is located in the Nashwaak River watershed that is part of the larger St. John River watershed, it is within the traditional territory of the Wolastoqiyik people. Much of the subsistence efforts of the Wolastoqiyik (Maliseet) were focused on major river systems, as this was a primary mode of travel. Villages and camp sites, as well as other types of sites were located throughout the St. John River watershed (Wallis and Wallis 1957). Historic and ethnographic documents describing the Wolastoqiyik peoples, as well as Wolastoqiyik understanding of themselves, indicate that they were highly mobile, coming together in large groups during the summer and then dispersing into smaller units in the winter (Blair 2004; Erickson 1978; Ganong 1899a; Wallis and Wallis 1957). Gardens were planted and tended at villages, with frequent trips to important fishing and shell fishing locations throughout the spring and summer. This high level of mobility was facilitated by the use of birch bark canoes on watercourses (Blair 2010:35; Ganong 1899a:6, 22). During the winter months, smaller groups focused on large mammal hunting, specifically moose and bear (Erickson 1978). Summer villages during the early Post-contact Period were recorded at multiple locations throughout the Province. Small camp sites are documented and are anticipated all along the Province's major river systems and along most, if not all, of its tributaries (Ganong 1899a). Smaller camp sites from this time period have also been identified along many of the small tributaries.

Wolastoqiyik people used the rivers and streams as their "highways", travelling up the smallest of watercourses to access food and other resources. Travelling over land forms from tributaries of one watershed into another watershed led to the establishment of portage routes. Portage routes, in particular those between watersheds, were a vital component of trade and communication within and outside of the area now referred to as New Brunswick. The ends of these portage routes demonstrate a high occurrence of archaeological sites. Historic records indicate the presence of one such portage route that passes near the Project site (Ganong 1899b; Morris 1784). Ganong (1899b) notes a portage route located between the Napadogan and Miramichi Lakes. The reported route connects the Nashwaak River system to the Miramichi River from the East Branch Napadogan Brook and Napadogan Lake. From this lake there would be a relatively easy portage to Miramichi Lake and hence into the Miramichi River. No maps are available to positively locate this portage route; however, the route is indicated on the Morris map of 1784 which states, "...only three mile portage between the Head of this [Nashwaak] River and the South Western Branch of the River Merrimiche..." (Morris 1784), which approximately matches the distance between the Napadogan and Miramichi Lakes.

Amateur archaeologist and historical author George Frederick Clark also made reference to the proximity of the Miramichi and Napadogan lakes in his writings (1963). This portage route would have been located over 3 km from the PDA. Additional research could not identify any evidence of a portage route within the PDA. A review of the watercourses located within the PDA could not identify any

logical or more accessible route than the one described by Ganong (1899) as a means to access the Miramichi River system. Thus, it was determined that the portage route is not likely located within the PDA.

Archaeologists know little about settlement patterns during the Late Woodland period; although there is some archaeological evidence that groups may have shifted from a more logistical to residential mobility strategy (Blair 2004; Burke 2000), perhaps much like what has been documented during the historic period, meaning that people moved from one living location to another, in seeking out resources, rather than gathering resources and bringing them to a central living area.

The late Pre-Contact/early Contact Period (or proto-historic period) in the Maritimes region generally begins in the early 17<sup>th</sup> Century, with the arrival of Samuel de Champlain to the area now known as Saint John in 1604. The extent to which indigenous groups living on the St. John River system had direct contact with Europeans during the 17<sup>th</sup> Century is not known; however, Bourque (1973) suggested that the presence of Europeans (including those who came seasonally in small numbers) fundamentally altered indigenous settlement and subsistence patterns. European settlement of the region during the 18<sup>th</sup> and 19<sup>th</sup> Centuries, and the introduction of wage economy, further contributed to significant changes in settlement and subsistence (Bourque 1973) of the Wolastoqiyik. The shifts in seasonal use of the coast and interior caused many Wolastoqiyik to leave their coastal settlements altogether and join others at major interior villages such as the Meductic on the St. John River (Burke 2000).

Though there is a rich and long period of habitation, local and regional travel, trade, and resource extraction by Pre-Contact peoples living throughout the area now known as New Brunswick, the background research completed and the information gathered indicates limited potential for significant archaeological sites within the PDA. There are currently no areas identified within the PDA that have high potential for Palaeo-Indian archaeological sites and given the lack of major watercourses, it would also not be anticipated that Archaic Period archaeological sites would be found within the PDA. The location of some Maritime Woodland Period archaeological sites identified in other areas of New Brunswick (*i.e.*, in interior locations along small tributaries), indicates that there is potential for some watercourse banks within the PDA to contain Pre-Contact archaeological resources.

### **3.1.2 New Brunswick Historic Period**

Following Samuel de Champlain's first arrival to the mouth of the St. John River in 1604, the French (Acadians) were the first Europeans to settle in areas now known as New Brunswick in the 1600s. They tended to settle mainly along the New Brunswick coast and/or along the shorelines of major rivers leading to or in proximity to the coast, and are not anticipated to have travelled or settled in any place close to the PDA.

By 1600, ancestors of the Mi'kmaq and Wolastoqiyik-Passamaquoddy First Nations people had inhabited New Brunswick for over 10000 years. There were an estimated 35000 Mi'kmaq in the year 1500 but due to the first European contacts and disease, the number of Mi'kmaq people was estimated to decline to 3500 in as little as 100 years (Wynn 1981). The same decline would be expected of the Wolastoqiyik populations. By the 1750s, the First Nations people no longer comprised the majority of the population within the area now known as New Brunswick.

The European-derived population of New Brunswick increased steadily during the early 19<sup>th</sup> Century. It grew from 25000 in 1805 to 74000 in 1824. By 1851, there were almost 200,000 settlers in the province (Wynn 1981).

### **3.1.2.1 Infrastructure**

The Wolastoqiyik and the Mi'kmaq had well-developed transportation routes along New Brunswick's waterways (Leroux 2008) which were also used by the European settlers who started arriving in the 17<sup>th</sup> Century. The Loyalists settled throughout New Brunswick starting in 1784 and with that, roads started to reach out from one community to the next. These roads were built close to and followed rivers in order to facilitate the logging activities in the surrounding forests as a key area of economic activity. The challenges around building roads (and eventually railroads) in New Brunswick were mainly due to the hilly topography criss-crossed by lakes, bogs, and fast-flowing streams and rivers (Frink 1997). The face of the countryside was transformed as villages, dwellings, barns, roads, and bridges were built.

The arrival of the railway opened up the interior of New Brunswick to new settlement and business opportunities. The railway age officially began in the Maritimes in 1876 when the first train ran along the Intercolonial Railway from Halifax to Rivière-du-Loup (Soucoup 2010). In 1910, construction of the first railway near the PDA was initiated. The National Transcontinental Railway (NTR) was completed in 1912. The 402 km (250 mile) stretch through New Brunswick ran from Moncton to Chipman, and north to McGivney, Napadogan, Juniper, Plaster Rock, Grand Falls, and Edmundston.

During World War I, the federal government combined the NTR into the Intercolonial Railway operations throughout eastern Canada, and in 1918 a new government railway was launched. Canadian National Railway emerged in 1918 and became the operator of a vast network of private railways that had been acquired with federal funds by the Canadian Government Railways (Soucoup 2010). In 1919, the Intercolonial Railway was engulfed by the emerging national railway system, the Canadian National Railway (Frink 1997).

### **3.1.2.2 Subsistence**

As of the mid-18<sup>th</sup> Century New Brunswick was still almost completely forested. Extensive white pine-hemlock-northern hardwood forest dominated New Brunswick in pre-European times and largely survived until the last decades of the 18<sup>th</sup> Century (Wynn 1981). Two-hundred years ago, agriculture and the fishery were becoming the main economic drivers in New Brunswick; however, this changed and the timber industry dominated as soon as Napoleon Bonaparte severed Britain's timber source in the Baltic—after which large timber logs began being harvested, squared and shipped from New Brunswick to Britain (Soucoup 2011). The rich forests and resources within New Brunswick offered many opportunities to supply the needs of overseas markets.

The majority of the early 19<sup>th</sup> Century settlers were farmers, but the lucrative business of shipping sawn timber to Britain saw many shift their activities from agriculture towards a career in the timber industry. Farm clearing in New Brunswick remained an ongoing process though, and in the mid-18<sup>th</sup> Century, more than 250,000 hectares of land in New Brunswick were being cleared for farming. Pine rich forests close to rivers and streams were the immediate targets for wood. Lumbermen favored the watersheds of New Brunswick's largest, least-obstructed rivers and streams for log conveyance from forest to

sawmill, and by 1835, most tributaries of the Miramichi and St. John Rivers had been used for timber conveyance (Wynn 1981). By the 1890s, most of New Brunswick's rivers were used extensively for hauling and floating logs and lumber to market.

Lumbering offered an opportunity for the common man in New Brunswick to improve his way of life. Countless New Brunswick farmers contributed to the development of the timber trade by combining the seasonal employment of farming and lumbering (Wynn 1981). Some lumbermen would work year-round, and others were part-time farmers as well. They would plant their gardens in the spring and peel or cut pulp until haying season in July. Becoming part of the early lumber camps was controversial as the rise of the timber industry was seen as destructive to agriculture and settlement efforts. Although many were critical of the influence of lumbering on the agricultural settler, a visiting agricultural chemist, J.F.W. Johnston noted that in York County, "almost all the farmers in this neighbourhood were lumberers before they were farmers, and it was lumbering [that] they got their farms stocked" (Wynn 1981).

Lumber mills were built along waterways emptying into the St. John River, and general stores soon appeared (Ketchum n.d.). Lumber camps were built near the logging sites and some of the larger operations would have multiple buildings which would accommodate cooking, sleeping, dining and have a separate carpentry and blacksmith shop. Logging camps were often built in proximity to a nearby stream and/or by the cutting grounds. Smaller operations would often have a single structure that would serve multiple functions. Some early lumber camps had built-in stone fireplaces used for cooking while later, stoves were hauled in and facilitated the cooking of the camp food (Soucoup 2010). Prior to World War I, the logging camps were generally operated by the lumber companies and workers received room and board in addition to a small wage. Around 1900, many loggers were cutting railroad ties and being paid by the cord (Soucoup 2010).

In the mid-19<sup>th</sup> Century, intermittent settlements followed the Nashwaak Valley to the Cardigan and Tay settlements and to the village of Stanley. Beyond these settlements, however, towards the LAA, "there stretched almost unbroken forest" (Wynn 1981). A survey crew working in the LAA in the 1860s was lost as the crew members found "not an eye in the wooded landscape" to provide orientation and they could "make nothing of the country except for boundless forests" (Wynn 1981).

### **3.1.2.3 Communities and Settlement in the LAA**

There are several small communities located in the region around the Project. These include but are not limited to Napadogan, Juniper, Maple Grove Station, Williamsburg, Currieburg, Boyds Corner, Stanley, Cross Creek, Deersdale, and Half Moon. These communities are located either along the Canadian National Railway line or along the Royal Road (Route 107) (NBDNR 2007). Stanley, Maple Creek, Cross Creek and Williamsburg were villages established by the New Brunswick & Nova Scotia Land Company (CRM 2008), a company chartered in 1831 to purchase large tracks of land with the promise of infrastructure development including: roads, mills, and towns to derive profit for prominent English shareholders by reselling purchased land to settlers (Elliott 2005). Stanley was named after the president of the New Brunswick & Nova Scotia Land Company who was responsible for settlement in the area *circa* 1833 (Hamilton 1996). Napadogan, the community located nearest to the Project, was named after Napadogan Brook, and was reportedly originally spelled Napudogan. W.F. Ganong attributes the word to the Maliseet *Napudaagun*, [possibly] meaning "brook to be followed", in travelling to nearby Miramichi Lake (as cited by Hamilton 1996; Rayburn 1975). An Indigenous Knowledge Study

conducted for the Project indicated that “Napadogan” may also relate to the Maliseet word for “to kill something”, or, *nkedon’kewagen* meaning “my hunting ground” (Speck and Hadlock 1946:362).

To the north of the PDA, along Route 107 is Juniper, a community built on the “backbone of the forestry industry” (Falls Brook Centre n.d.). The community of Juniper was established in August 1914 after two lumbermen (George Gilmore and George Foster) built a sawmill on the north bank of the South Branch Southwest Miramichi River for softwood lumber (Hamilton 1996; Stone 1953). Prior to the construction of this sawmill, there is little evidence of important forestry activities in the area and there were few inhabitants in the community (Stone 1953). Just after the sawmill was established, George Gilmore and Guy Welch brought the first horse drawn road grader into Juniper with two teams of horses (Stone 1953). In 1915, James Kidd (J.K.) Flemming and his partner Charles Rogers purchased the business from Gilmore and Foster. The company began to flourish and people working in the mill began to build homes in Juniper.

Juniper’s post office was constructed in 1918, after Juniper was established as a lumbering centre by James Flemming and Alexander Gibson (Rayburn 1975). Before Juniper was settled, there were no documented inhabitants in the area; however Stone (1953) noted that when building of the Intercolonial Railroad started in 1905, “*the first inhabitants lived at a place called Sparkle [Juniper?] and [residents] Mr. and Mrs. Sweet cooked for a gang of men employed on the railroad while Mr. Sweet ran lines.*” A review of an historic atlas map from 1878 confirms the lack of settlement in the area at that time. There are no communities indicated on the map, no rail lines, and what roads are indicated that come from communities along the St. John River to the west, end before they reach the area of the Project (Dawson 2005).

A review of recent and historical aerial photographs indicates little more than mineral exploration and forestry for the last 50 to 60 years within Juniper and the surrounding communities as well. The history of modern mineral exploration at the Sisson property spans the time period from the mid-1950s through to the present. The level of ground disturbance within the PDA is directly related to forestry and logging activities and past exploratory mining-related surveys conducted. In 1959, in conjunction with York Mining Co., Nashwaak Pulp and Paper contracted Canadian Aero to conduct an airborne electromagnetic survey over a large area including the present claim group (Cullen and Herrington 2009). The follow-up work included line-cutting and ground geophysics, resulting in trenching and soil sampling in multiple areas. These ground disturbing activities were noted during the field assessment (Stantec 2012).

The PDA has experienced extensive clear cut harvesting and subsequent forest regeneration carried out of varying degrees over the last 30 years (Cullen and Herrington 2009). Large areas of relatively recent clear cutting exist in the immediate vicinity of the PDA (Cullen and Herrington 2009). The potential for future mine development in the PDA is estimated to be “advantageously situated” due to its “current undeveloped state, proximity to good road, rail and electrical grid systems and relative proximity to government, business and work force population centers” (Cullen and Herrington 2009:9).

Although New Brunswick in general and many areas in the vicinity of the PDA have a rich history in agriculture, forestry and mining, the PDA itself has not experienced settlement and associated subsistence during the Historic Period. The timber industry was well established in communities southeast of the PDA such as Stanley, but historic records and atlases do not indicate much development north of Stanley prior to the 20<sup>th</sup> Century. There is no evidence of logging camps or

forestry mills in or near the PDA, and a review of historic aerial photographs taken in 1945 do not show any remnants of old structures within the PDA. Therefore, based on the background research, the Project is not anticipated to encounter any significant, unknown Historic Period resources.

### **3.2 GEOLOGY**

The surface and bedrock geology of an area contribute to the understanding of its potential to harbour heritage resources, particularly for palaeontological and archaeological resources.

The bedrock geology of the PDA was reviewed and contact made with the Curator of the New Brunswick Museum and staff from the University of New Brunswick Geology Department to confirm if there are any known fossil localities and the likelihood of encountering palaeontological resources within the PDA during Construction. Additionally, maps of surficial geology were reviewed as surficial geology may provide insight into past human use of an area (and thus potential presence of archaeological or built heritage resources).

#### **3.2.1 Surficial Geology**

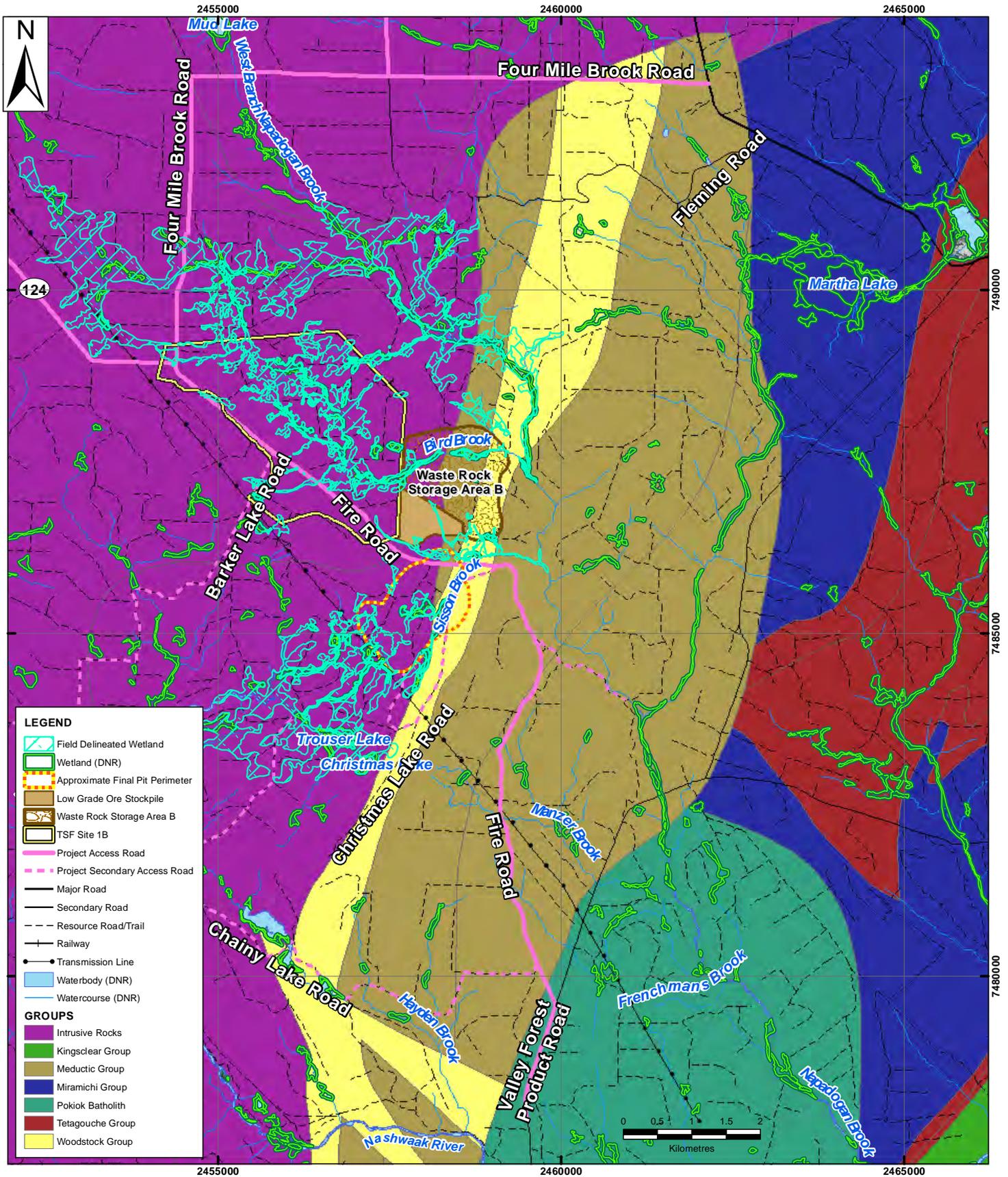
The southwest portion of New Brunswick is dominated by a single basal till (morainal) unit which consists of basal melt out tills, lodgement tills, and deformation tills that were deposited during glaciation (Rescan™ 2008). The PDA is mainly overlain by a blanket and veneer till consisting of: loamy lodgment till; some lodgment till, sand, gravel; and rubble. The thickness of the till varies between <0.5 (thin veneer) to over 5 m thick (blanket till) with approximately 25% of clasts that are boulder sized (Rampton 1984).

#### **3.2.2 Bedrock Geology**

The four main bedrock units within the PDA are shown on Figure 3.1 and summarized in Table 3.1.

**Table 3.1 Summary of Bedrock Geology Information**

<b>Bedrock (Figure 3.1)</b>	<b>Description</b>
Howard Peak Granodiorite	Grey, medium-grained, foliated, hornblende-biotite granodiorite locally grading to gabbro; cataclastic granite is abundant along the western margin of the pluton.
Meductic Group	The Meductic Group includes, in ascending order: <ul style="list-style-type: none"> <li>• Porten Road Formation - mainly light greyish pink, porphyritic rhyolitic flows and breccia;</li> <li>• Eel River Formation - mainly greyish green andesitic breccia and stratified volcanoclastic rocks;</li> <li>• Oak Mountain Formation – mainly dark green, porphyritic basaltic flows and bedded hyaloclastite; and</li> <li>• Belle Lake Formation – light grey to olive-green, feldspathic wacke interstratified with medium to dark grey shale.</li> </ul>
Baskahegan Lake Formation/Woodstock Group	Light grey to light green, medium- to thick-bedded quartzite; grey to greenish grey, thin- to medium-bedded quartz wacke; olive green silty shale and minor red sandstone and shale. The wacke beds are normally graded with laminated tops and locally exhibit load casts, current ripples, and flame structures.
Nashwaak Formation	Light grey to light pink, medium-grained, equigranular to seriate, biotite granite, grading northward into muscovite-biotite granite. A small area of garnetiferous muscovite-bearing granite occurs on Spruce Peak (NTS 21 J/06E) on the southern margin of the pluton. Hornblende is locally present in the biotite granite along the Southwest Miramichi River (NTS 21 J/10W).



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

<h2>Bedrock Geology</h2> <p>Sisson Project</p> <p>Napadogan, N.B.</p>	Scale:	Project No.:	Data Sources:	Fig. No.:	 <p><b>Stantec</b></p>
	1:75,000	121810356	NBDNR, SNB NHN, NB Aquatic Data Warehouse Imagery Provided By: NBDNR Google Earth Pro		
Client:	Date:	Dwn. By:	Appd. By:		
Northcliff Resources Ltd.	02/02/2012	JAB	DM		



### 3.3 PALAEOLOGICAL RESOURCES

Background research on palaeontological resources included a review of existing maps produced by NBDNR (2008) in consultation with the Natural Science Section of the NBM. The sedimentary rock units within the PDA are from the Cambrian to Early Ordovician Periods. The Early Ordovician Meductic Group in the PDA is comprised of igneous formations within the Meductic Group which do not contain fossils, and the Porten Road Formation which is primarily a porphyritic rhyolitic flow and breccia, which do not contain fossils (Miller, R. Personal communication, December 14, 2011). The Belle Lake Formation of the Meductic Group is fossil-bearing and known to contain graptolite fossils (Fyffe *et al.*, 1983); however, it is located outside of the PDA. The Cambrian-Early Ordovician Woodstock Group in the PDA includes the Baskahegan Lake Formation, a grey to green turbiditic sandstone and shale with minor red sandstone and shale. The Woodstock Group resembles the Grand Pitch Formation of central Maine, which contains the Cambrian trace fossil *Oldhamia* (Neuman 1984). The proposed 138 kV transmission line crosses eight mapped geologic units including the Shin Formation (Lower Carboniferous); Minto Formation (Upper Carboniferous); Burtts Corner Formation (Silurian); Hawkshaw Granite (Devonian); Belle Lake Formation (Ordovician); Porten Road Formation (Ordovician); Baskahegan Lake Formation (Cambrian-Ordovician); and Howard Peak Granodiorite (Devonian).

According to the most recent Department of Natural Resources published geology map, Plate 2006-7, no fossil localities are indicated in the PDA (Miller, R. Personal communication, December 14, 2011). There are no fossil reports in records in the immediate vicinity of the Project including along the 138 kV transmission line.

Dr. Randall Miller, Curator, Natural Science Section of the NBM was contacted to obtain general information on palaeontological resources within the PDA, to confirm if any fossil localities have been identified, or are likely to be present within the PDA. Dr. Miller confirmed that the trace fossils such as *Oldhamia* are known to exist within the Woodstock Group bedrock formation, but it is unknown if they exist within the Sisson ore body. Macrofossils such as graptolite fossils in Ordovician and Silurian rocks would generally occur in thin shale beds and are potentially sparsely distributed in the bedrock units encountered along the transmission line, but are often very difficult to recognize in the field. The most probable fossil occurrences, if they occur, would be in the Minto Formation where plant fossils can be locally abundant. While Upper Carboniferous plant fossils can be common in the Province, associated invertebrate and vertebrate fossils are always considered rare and would require further investigation if encountered (Miller 2013).

### 3.4 BUILT HERITAGE RESOURCES

A review of the various documents, knowledge of the general history of the area as well as a review of past and recent aerial photographs indicated that buildings or structures of architectural significance, or any structure that would be associated with a significant historical event for local, New Brunswick or Canadian history, are unlikely to be found within the PDA.

A search of the register of Canada's Historic Places indicates there are no registered built heritage places in or around the PDA (CRHP 2012). The closest registered Historic place is a Welsh Chapel (ca. 1856) between the communities of Tay Mills and Hamtown Corner along Route 610, approximately 8 km east of the 138 kV electrical transmission line. In 1989, the Canadian Inventory of Historic Buildings identified two structures in the community of Napadogan, including the old railway office (constructed in 1908) and the "old round house" (ca. 1908), both of which are located outside of the PDA. At that time, both structures were standing and the old round house was being used for wood-mill purposes, although the current state of both buildings is unknown (CIHB 2011; Finley, S. Personal communication, June 14, 2012).

There are no National Parks or National Historic Sites in or near the vicinity of the PDA (Parks Canada 2008).

The remains of an old dam at Otter Brook Canyon in the Deersdale District, documented as part of the JDI Unique Areas Program (J.D. Irving, Limited n.d.) are located near a canyon that was created by water erosion from Otter Brook. The dam may have been created as part of a series of small dams used to facilitate log drives during the peak of the timber industry. This dam is located approximately 10 km away from the Project site, and due to the isolated nature of the dam and small watercourse, it is not anticipated that a sawmill would be associated with this feature.

In summary, in concert with various experts consulted as part of the back ground research, Stantec did not find any records of built heritage resources or any buildings of architectural or historical significance within, or immediately near, the PDA. It is more likely that any buildings or structures that may be present in the PDA, if applicable, would be associated with forestry or recreational activities (e.g., hunting and fishing). If buildings were found, these were evaluated during the field assessment to determine if they were a heritage resource.

### **3.5 ARCHAEOLOGICAL RESOURCES**

As part of the background research for the field assessment for the Project, Stantec conducted an archaeological site search at Archaeological Services in June 2011 to identify known archaeological sites within the PDA, and to determine the potential for unknown archaeological resources to be present in the PDA. Stantec was provided with the Archaeological Potential Map (Appendix B) of the PDA compiled by Archaeological Services, which was reviewed for archaeological sites and the known presence of heritage resources. The map indicated that there are no known archaeological sites within the PDA; however, it must be acknowledged that no professional archaeological survey of this area had even been undertaken. The Archaeological Potential Map did indicate that the lands bordering all watercourses in the PDA, within a distance of 80 m (and 100 m at watercourse confluences) of the watercourses have been determined to have an elevated (high or medium) potential for archaeological resources. Based on the requirements of the Guidelines (Archaeological Services 2009), these areas require an assessment to determine the level of shovel testing warranted for these areas. A visual assessment of low potential areas was also required by the Guidelines.

### **3.6 IDENTIFIED GAPS IN DATA**

The background research undertaken by Stantec did not identify any areas in particular that were considered to have elevated potential for archaeological resources beyond the watercourse 80 m (100 m at watercourse confluences) boundaries. Based on the background research, there is potential for, likely, Maritime Woodland Period archaeological sites to exist along the shorelines of the small tributaries with the PDA. All other areas were considered to have low potential for archaeological resources. Thus, Stantec proposed to undertake a visual assessment of the shorelines of all watercourses within the PDA for at least the 80 m elevated potential zone (and 100 m at confluences) to determine if shovel testing in these areas was warranted and/or practical as well as a visual assessment of a sample of low potential areas.

## 4.0 SUMMARY OF 2011 FIELD INVESTIGATIONS

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### 4.1 OVERVIEW

Following the Guidelines (Archaeological Services 2009), Stantec undertook a field assessment in the PDA to determine the potential presence of unknown heritage resources. The field assessment consisted of a surface examination of all watercourse banks and their allocated archaeological potential zones (as determined by Archaeological Services Archaeological Potential Map, Appendix B), and additional areas considered to potentially have elevated archaeological potential as determined by Stantec (Section 2.2). In addition, several areas that were considered to have low archaeological potential were assessed within the PDA (as discussed with Archaeological Services) (Suttie, B. Personal communication, June 14, 2011) such as existing woods roads and wooded areas adjacent to the roads, topographically prominent areas (*i.e.*, vantage points), bedrock outcrops, and areas subjected to previous ground disturbance (*e.g.*, geotechnical testing areas with exposed sub-surface conditions).

The goals of the field assessment (Figure 2.1) were to:

- make recommendations on the need for and placement of shovel tests relative to the areas previously identified as having elevated archaeological potential;
- confirm the determination of low archaeological potential for all other areas;
- make any shovel testing recommendations for those areas as warranted; and
- identify and record any heritage resources encountered while completing the field assessment.

As part of construction of the Project, land formations within the PDA will likely be affected, such that archaeological resources that might be present would likely be disturbed as a result of Project construction activities.

The text below presents a general summary of the results of the field assessment. Detailed information on the surface conditions observed and the shovel testing recommendations for the PDA are presented in the Heritage Impact Assessment Report for the Sisson Project (Stantec 2012).

### 4.2 SUMMARY OF RESULTS

Approximately 50 km of elevated potential shoreline were assessed during the walkover conducted for the field assessment. Various other locations were examined in addition to the watercourses and associated archaeological potential zones. The sections below describe the general summary of field assessment results and shovel test pit locations (Figure 4.1). Figure 4.1 specifies areas of elevated archaeological potential recommended for shovel testing. Within areas proximal to watercourses, the high potential zones are within 50 m of a watercourse and medium potential zones are between 50 m and 80 m of a watercourse.

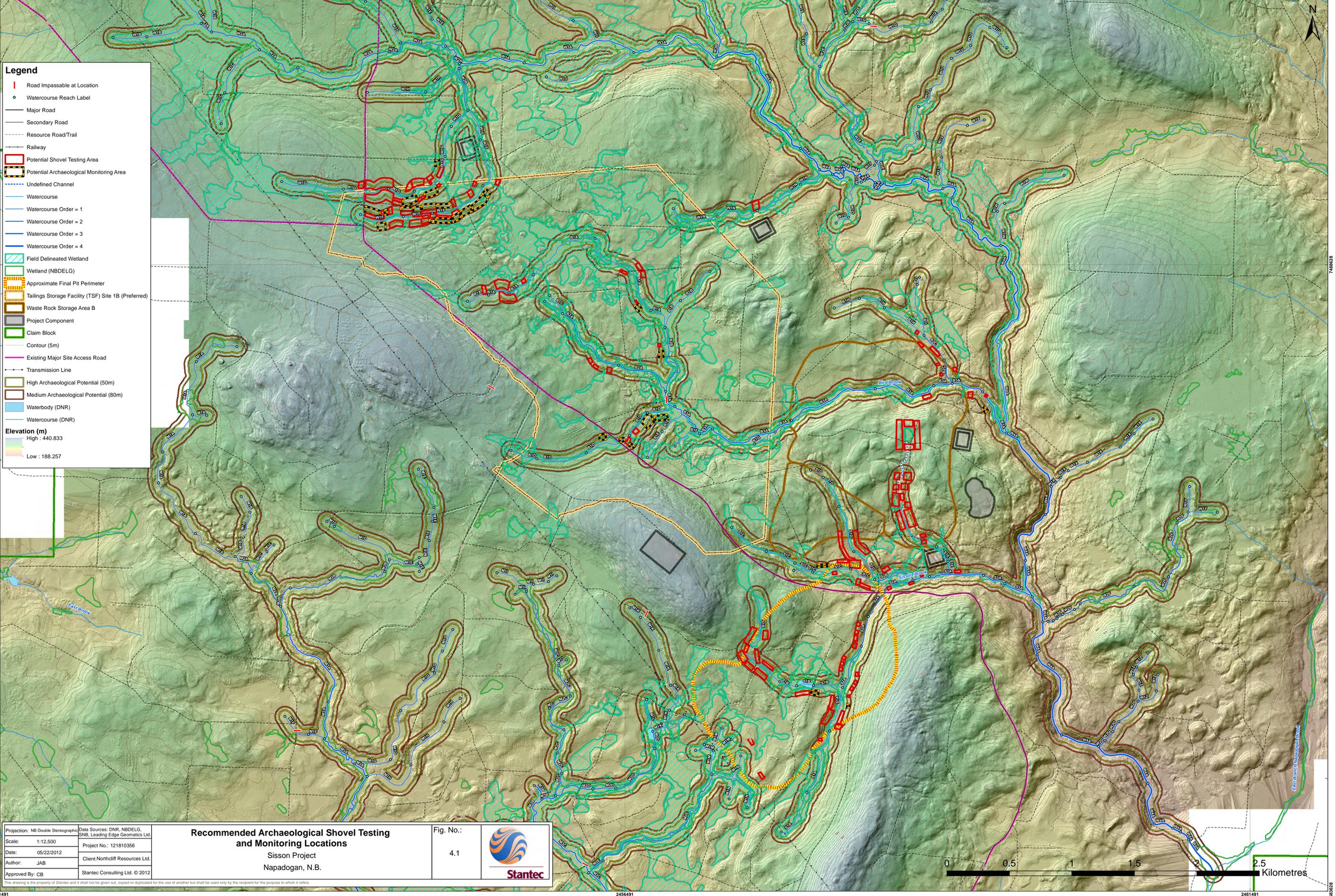
**Legend**

- Road Impassable at Location
- Watercourse Reach Label
- Major Road
- Secondary Road
- - - Resource Road/Trail
- Railway
- Potential Shovel Testing Area
- Potential Archaeological Monitoring Area
- - - Undefined Channel
- Watercourse
- Watercourse Order = 1
- Watercourse Order = 2
- Watercourse Order = 3
- Watercourse Order = 4
- Field Delineated Wetland
- Wetland (NBDELG)
- Approximate Final Pit Perimeter
- Tailings Storage Facility (TSF) Site 1B (Preferred)
- Waste Rock Storage Area B
- Project Component
- Claim Block
- Contour (5m)
- Existing Major Site Access Road
- Transmission Line
- High Archaeological Potential (50m)
- Medium Archaeological Potential (80m)
- Waterbody (DNR)
- Watercourse (DNR)

**Elevation (m)**

High : 440.833

Low : 188.257



Projection: NB Double Stereographic	Data Sources: DNR, NBDELG, SNB, Leading Edge Geomatics Ltd.
Scale: 1:12,500	Project No.: 121810356
Date: 05/22/2012	Client: Northcliff Resources Ltd.
Author: JAB	Stantec Consulting Ltd. © 2012
Approved By: CB	

**Recommended Archaeological Shovel Testing and Monitoring Locations**

Sisson Project  
Napadogan, N.B.

Fig. No.:  
4.1






The Study Team typically consisted of two archaeologists walking within the 80 m archaeological potential zone on either side of a watercourse (and beyond as warranted) and making observations on surface and soil conditions, vegetation, level of recent anthropogenic disturbance, and any other factors relevant to the heritage resources assessment. A hand-held Global Positioning System (GPS) was used to confirm the location of watercourses, that the full 80-100 m areas were covered as part of the field assessment, and to record the tracking of the Study Team (Figure 2.1). It should be noted that only one GPS unit was used per team, and thus the GPS track does not completely represent the breadth of the spatial coverage of the field assessment.

Generally, much of the terrain surrounding the watercourses within the high and medium potential zones revealed extensive wet, saturated and rocky ground conditions and/or steep slopes unsuitable for shovel testing. Many other areas exhibited dense vegetation and slash where shovel testing is not possible without significant vegetation removal. Ground conditions that are considered too wet and not suitable for shovel testing are often characterized by low lying areas with standing pools of water or forested wetland with a thin veneer of mossy, forest floor with virtually no soil development.

#### **4.2.1 Summary of Field Examinations**

##### **4.2.1.1 Open Pit Area**

Shovel testing recommendations are concentrated along the following watercourses: S1A, S2A, S1C, S2B, S3A, and S1B (Table 4.1). These testable areas are generally where there was a break in the slope resulting in flatter and dryer ground conditions and in small isolated spots where some shovel testing is possible within and between larger areas not suitable for shovel testing. There are several sections of dryer and more level ground along the west bank of Sisson Brook where previous geotechnical testing/investigations has occurred resulting in heavily disturbed ground conditions. The exposed till resulting from the geotechnical testing was examined by the Study Team and no cultural material was identified. Shovel testing is recommended in the small sections (~20x30 m) in between the geotechnical testing areas where the ground conditions remain suitable for shovel testing and no till is exposed.

Various other locations within the elevated archaeological potential zone within the Open Pit Area were also determined to be suitable for shovel testing (Table 4.1).

Multiple topographically elevated locations were identified on LiDAR data within the area to be covered by the Open Pit Area and were assessed even if they were beyond the elevated archaeological potential zone to determine if they warranted shovel testing. The topographically elevated location in the southwest section of the Open Pit Area is recommended for shovel testing due to its vantage point that overlooks other high potential areas.

##### **4.2.1.2 Waste Rock Storage Area**

Several locations in the Waste Rock Storage Area were identified for shovel testing that presented multiple criteria for high potential areas. One such location consists of a large heath wetland with an excellent vantage point. Due to the vantage point, suitable ground conditions, and presence of the likely former water body, shovel testing is recommended for this area.

Another location consists of a small 2-3 m ledge that runs parallel to watercourse B3A. The ledge comes to an abrupt stop and the topography drops to water level next to a pool that appears naturally created by a bedrock ledge within the watercourse. A large quartzite rock adjacent to a bedrock outcrop at the water's edge was collected and examined to determine if it was an artifact. The quartz does not appear to have been manipulated, however; the quality of the quartz may have provided a good tool making material. Additional bedrock outcrops in vicinity to the quartzite rock contained quartz veins that may also have provided tool making material. This small area approximately 10 m back from the natural pool where the terrain is elevated, dry and level compared with the remainder of surrounding areas within the 80 m elevated potential zone. This area is suitable for shovel testing.

Various other locations within the elevated archaeological potential zone within the Waste Rock Storage Area were also determined to be suitable for shovel testing (Table 4.1).

**4.2.1.3 Tailings Storage Facility**

There are multiple areas along most of the watercourses assessed recommended for shovel testing (Table 4.1) based on criteria presented in the Guidelines. Areas with the largest concentrations of suitable ground conditions for shovel testing within the 80 m elevated archaeological potential zone include: watercourses B1D, W1F, and W1G, however archaeological monitoring during construction may be recommended in multiple areas along sections of W1F and W1G after shovel testing is attempted due to the very dense slash and vegetation. The sections recommended for archaeological monitoring include areas that have been clear cut and areas where the regenerating tree vegetation is extremely dense.

A wood foundation was identified on the south side of W1F extending approximately 15 m from the watercourse edge for approximately 30 m in length along the watercourse. This location appears to have been used as a hunting camp and likely dates to the 1950s or 1960s based on associated artifacts within and in proximity to the foundation (e.g., Red Rose tea tin, Coca Cola sign, glass, various clothing items). Based on the criteria presented in the Guidelines, this site is not considered to be a Heritage Resource; however, due to the relatively dry and level ground conditions shovel testing is recommended as a result of the potential for Pre-Contact Period archaeological resources.

**Table 4.1 Summary of Areas Assessed**

Watercourse Reach or Area	Surface/Shoreline conditions	Shovel Testing Recommended?
<b>OPEN PIT AREA</b>		
<b>Sisson Brook and Tributaries</b>		
S1A	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
S2A	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
S1C	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
S2B	Wet, riparian wetland, rocky ground - some testable areas scattered throughout this reach.	Yes
S3A	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes

**Table 4.1 Summary of Areas Assessed**

<b>Watercourse Reach or Area</b>	<b>Surface/Shoreline conditions</b>	<b>Shovel Testing Recommended?</b>
S1B	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
M1M and M1M Lower Reach	Wet, rocky ground, riparian wetland - no testable areas in this reach.	No
Tributary to M1N	Large, wide riparian wetland - no testable areas in this reach.	No
M1K	Wet area - no shovel testing recommendation.	No
<b>Elevated Area</b>		
Southwest Section of Open Pit Area	Low potential area, however, good vantage point - recommend test at 10 m intervals for two rows (at each landform).	Yes
East Section of Open Pit Area	Steep slope – no shovel testing recommendation.	No
<b>Woods Road</b>		
West of Sisson Brook	No shovel testing recommendation.	No
<b>WASTE ROCK STORAGE AREA</b>		
Bird Brook, B3A	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
Tributary to Sisson Brook, S1D	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
Tributary to S1D, Unmapped Watercourse	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
Tributary to Bird Brook, B2C	Wet, steep slopes, rocky ground, dense vegetation/slash - some testable areas of flat ground with good vantage over Bird Brook. A number of testable areas throughout this area.	Yes
Vantage Point of Bird Brook (Heath Wetland)	Excellent vantage over Bird Brook valley and its tributaries, as well as close proximity to potential former open water body. Open relatively flat ground throughout. Recommend shovel testing.	Yes
Tributary to Sisson Brook, S1E	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
<b>TAILINGS STORAGE FACILITY (OPTION 1b)</b>		
B1D	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
Bird Brook, B1C, B2A	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
B3A	Wet, riparian areas, forested wetland and rocky ground conditions.	No
B1B	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
B2B to Confluence of B3A	Wet and rocky ground conditions, standing surface water with a few isolated areas suitable for sporadic shovel testing.	Yes
B1A	Wet ground conditions as the areas bordering fluctuate between riparian wetland and forested wetland. Some areas suitable for shovel testing.	Yes
B1E	No defined channel. Bordering ground is wet and rocky - no shovel testing recommendation.	No
B1F	Wet ground conditions- forested wetland, standing water – no shovel testing recommendation.	No
W1N	Wet ground conditions- forested wetland, standing water, steep slopes - some sporadic shovel testing.	Yes

**Table 4.1 Summary of Areas Assessed**

<b>Watercourse Reach or Area</b>	<b>Surface/Shoreline conditions</b>	<b>Shovel Testing Recommended?</b>
W1F	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
W1G	Wet, steep slopes, rocky ground, and dense vegetation/slash - some testable areas scattered throughout this reach.	Yes
<b>Elevated Area</b>		
East Section of Tailings Storage Facility	Low archaeological potential. Large granite cobbles on surface, wet ground conditions - no shovel testing recommendations.	No

**4.2.2 Summary**

Taken as a whole, the PDA generally has a low potential for archaeological resources, outside of the areas of high and medium potential along the watercourse shorelines. Even in most of those areas, the ground conditions are generally poor as a result of the presence of surface water, steep slopes, surface glacial till, and/or surface rock.

Most of the watercourses within the PDA are small, very rocky with numerous small waterfalls, and would likely not be navigable by any kind of watercraft—though it is acknowledged that navigability alone is not a determining factor in archaeological potential.

The terrain is fairly rugged throughout the PDA and many areas, including the shorelines along the larger watercourses, are very challenging to traverse, even on foot. Thus, while it is possible that Pre-Contact peoples may have used the general area for resource extraction, hunting, and food gathering, it is unlikely that large Pre-Contact Period habitation sites were established within the PDA.

The use of the PDA during the Historic Period appears to be limited to recreational hunting and fishing, and resource extraction in the form of forestry, and some mineral exploration drilling. All evidence identified during the background research and the field assessment indicates that most of these activities have taken place within the last 100 years. These areas were identified by the presence of various garbage dumping areas consisting of piles of discarded tin cans; however, all appear to be food waste likely from logging operations from the 1950s and 1960s. Due to their relatively recent date, these locations do not meet the definition of a heritage resource (Archaeological Services 2009).

Despite the overall rugged nature of the area, shovel testing is recommended in a limited capacity throughout the PDA. The specific recommendations of the number of shovel test pits are documented in the Heritage Impact Assessment Report (Stantec 2012) and will be presented to Archaeological Services for their review and approval prior to the start of shovel testing. It must be cautioned that these recommendations are subject to review and the approval of Archaeological Services, and are not to be considered as final until that approval is received.

The complete results of the 2011 field assessment undertaken as part of this work are documented in a report to be submitted to Archaeological Services entitled “Heritage Assessment for the Sisson Project” (Stantec 2012).

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# **Appendix A**

List of Acronyms and Units



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## LIST OF ACRONYMS AND UNITS

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Acronym/Unit	Definition
AFRP	Archaeological Field Research Permit
BP	Before Present
CEA Agency	Canadian Environmental Assessment Agency
CEAA	<i>Canadian Environmental Assessment Act</i>
CRHP	Canadian Register Historic Places
EIA	Environmental Impact Assessment
km	kilometre
LAA	Local Assessment Area
LiDAR	light detection and ranging
m	metre
NBM	New Brunswick Museum
PDA	Project Development Area
RAA	Regional Assessment Area
TSF	tailings storage facility
VEC	valued environmental component



# **Appendix B**

Archaeological Potential Map





