

## ***Appendix 19-A***

*Murray River Coal Project: 2010 to 2013 Heritage Baseline  
Report*

MURRAY RIVER COAL PROJECT

**Application for an Environmental Assessment Certificate / Environmental Impact Statement**

HD Mining International Ltd.

# MURRAY RIVER COAL PROJECT 2010 to 2013 Heritage Baseline Report



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# MURRAY RIVER COAL PROJECT

## 2010 TO 2013 HERITAGE BASELINE REPORT

July 2014

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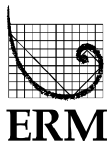
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Prepared for:



HD Mining International Ltd.

Prepared by:



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# Executive Summary

# Executive Summary

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HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a 6 million tonne per annum (6 Mtpa) underground metallurgical coal mine. The property is located approximately 12.5 km south of Tumbler Ridge, British Columbia within the Peace River Coalfield. The area has a long history of metallurgical grade coal mining, extracted mainly via open pit mining. HD Mining is proposing to access deeper zones of the coal field (600 to 1,000 m below surface) through underground mining techniques.

To support HD Mining's planning and development of the Project and to contribute to the environmental assessment process, environmental and socio-economic baseline studies were initiated by ERM Rescan. Project-specific studies began in 2010 and continued through 2013. Historical data from government sources and neighbouring projects, as well as traditional use and traditional knowledge information, have been incorporated into analysis when appropriate and available.

This report presents a cumulative summary of heritage sites in proximity to the Project. For the purposes of the baseline study, heritage sites are defined as tangible features, including archaeological sites, built heritage features, and paleontological sites. This report is primarily based on the results of the Archaeological Impact Assessments (AIAs) conducted for the Project under HCA Heritage Inspection Permits 2010-0279, 2012-0099, and 2013-0180.

The main objectives of the heritage baseline program were to:

- identify and evaluate any heritage sites within and adjacent to the local study area (LSA);
- identify and assess possible impacts from the proposed developments on any identified heritage sites; and
- assess the significance of any identified heritage sites in conflict with the proposed infrastructure footprint.

The LSA includes the Project's infrastructure footprint and the area above the longwall mining area where subsidence could occur. HD Mining has built buffers into their underground mine plan in order to avoid subsidence effects to existing surface infrastructure. There are two known archaeological sites (GgRg-5 and GgRg-8) within the LSA; however, they fall within these buffer areas. There are no known significant historic sites or paleontological sites within the LSA.

Within the broader regional study area (RSA) there are 86 known archaeological sites. Of these, 72 are prehistoric sites, 12 are historic sites, and two contain both prehistoric and historic features. No protected historic sites were noted within the RSA other than those captured as archaeological sites. There are known paleontological sites within the RSA.

The AIAs conducted for the heritage baseline program included extensive field survey of the infrastructure footprint, examination of surface exposures, and subsurface (shovel) testing. This included the assessment of several potential Project components that were previously under consideration but that have since been relocated or removed from the Project. During the AIAs, 1,710 shovel tests were conducted at 82 locations and one archaeological site GgRg-9 was located. GgRg-9 was avoided through Project redesign and is outside the current LSA. The potential subsidence area has not been subject to an AIA, as its exact location was not known at the time, and the baseline data on this area is primarily from a desk-based review.

# Acknowledgements

## Acknowledgements

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## 2010 TO 2013 HERITAGE BASELINE REPORT

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Appendix A. Archaeological Sites within the Regional Study Area

# Glossary and Abbreviations

## Glossary and Abbreviations

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Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

<b>Archaeological Impact Assessment (AIA)</b>	An assessment carried out under a <i>Heritage Conservation Act</i> Heritage Inspection Permit to determine the impact of a development on archaeological sites
<b>Archaeology Branch</b>	The Archaeology Branch (British Columbia Ministry of Forests, Lands and Natural Resource Operations) administers the <i>Heritage Conservation Act</i>
<b>BC</b>	British Columbia
<b>Blaze</b>	Trees were sometimes used to identify a trail and were sometimes marked by blazing (cutting a section of bark from the tree trunk)
<b>BP</b>	Before present (present = 1950 AD)
<b>CCR</b>	Coarse Coal Rejects
<b>CN</b>	Canadian National Railway Company
<b>CPP</b>	Coal Preparation Plant
<b>ERM Rescan</b>	In September 2012, ERM acquired Rescan Environmental Services Ltd. and is now doing business in Canada as ERM Rescan
<b>FAR</b>	Fire altered rock
<b>FSR</b>	Forest Service Road
<b>GPS</b>	Global Positioning System
<b>HCA</b>	<i>Heritage Conservation Act</i> (1996), the provincial law that authorizes and mandates British Columbia to manage heritage resources
<b>HD Mining</b>	HD Mining International Limited
<b>Heritage</b>	Heritage is defined as physical cultural heritage including archaeological sites, built heritage sites and paleontological sites
<b>Heritage Inspection Permit</b>	Heritage Inspection Permits are issued under Section 14 of the HCA subsequent to Archaeology Branch review and authorization
<b><i>in situ</i></b>	An artifact in its original place of deposition
<b>Lithics/Lithic debitage</b>	Stone tools and the waste material created during stone tool manufacturing
<b>LSA</b>	Local study area
<b>masl</b>	Metres above sea level
<b>Mtpa</b>	Million tonnes per annum
<b>Petroform</b>	An arrangement of rocks on the ground surface.
<b>Project, the</b>	The proposed Murray River Coal Project

<b>RAAD</b>	Remote Access to Archaeological Data; web based application maintained by the Province of British Columbia that enables authorized users to access data housed in the British Columbia Archaeological Site Inventory
<b>RSA</b>	Regional study area
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization

# 1. Introduction

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---

HD Mining International Ltd. (HD Mining) proposes to develop the Murray River Coal Project (the Project) as a 6 million tonne per annum (6 Mtpa) underground metallurgical coal mine. The property is located approximately 12.5 km south of Tumbler Ridge, British Columbia (BC; Figure 1-1), and consists of 57 coal licences covering an area of 16,024 ha. The Project is within the Peace River Coalfield, an area with a long history of metallurgical grade coal, mined mainly via open pits. HD Mining is proposing to access deeper zones of the coal field (600 to 1,000 m below surface) through underground mining techniques.

In October 2011, HD Mining submitted an application to the BC Ministry of Energy, Mines and Natural Gas and the BC Ministry of Environment, seeking permission to complete a bulk sampling program as part of property exploration. In March 2012, HD Mining received approval to conduct a 100,000 tonne bulk sample.

Beyond the bulk sample program, in order to develop a full mine at the proposed 6 Mtpa, the Project is subject to both the BC and Canadian environmental assessment processes. The development of any infrastructure for the full mine is not permitted before the requirements of these processes are met.

To support HD Mining's planning and development of the Project, and to contribute to the environmental assessment process, environmental and socio-economic baseline studies were initiated by ERM Rescan. Project-specific studies began in 2010 and have continued through 2013. Historical data from government sources and neighbouring projects, as well as traditional use/knowledge information, have been compiled and incorporated into the analyses when appropriate and available.

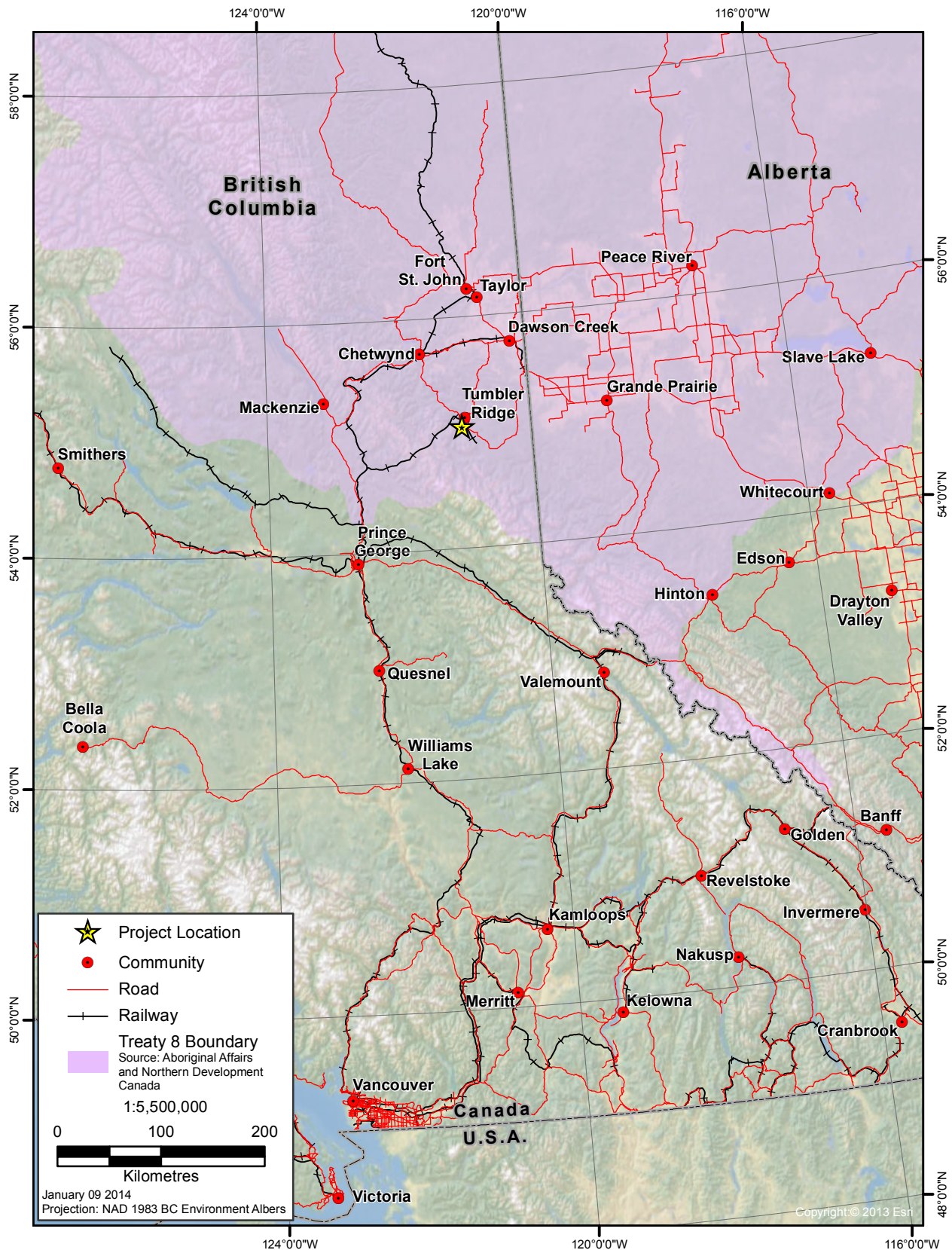
This report presents a cumulative summary of all information on heritage sites compiled to date for the Project. For purposes of this study heritage is defined as physical cultural heritage, including archaeological sites, built heritage sites, and paleontological sites. Establishing baseline information on heritage sites and identifying these sites within the regional and local study areas (RSA and LSA, respectively) is necessary in order to assess the potential Project effects on heritage, as required by both the *Canadian Environmental Assessment Act, 2012* (2012) and BC's *Environmental Assessment Act* (2002). Archaeological sites are automatically protected under BC's *Heritage Conservation Act* (HCA; 1996). As this report is a public document, it does not include maps showing the locations of archaeological sites which are protected under the HCA.

In order to help guide the scope of baseline studies, the RSA and LSA were developed (Figures 1-2 and 1-3). The RSA is intended to encompass an area beyond which Project effects would not be expected. It is also intended to be ecologically relevant based on the home range of key wildlife species known to inhabit the region. The LSA encompasses 1) the infrastructure footprint area within which direct effects from the Project's surface developments could occur, and 2) an area above the longwall mining area where there is potential for subsidence of the land surface to occur after underground mining of the area below has been completed.

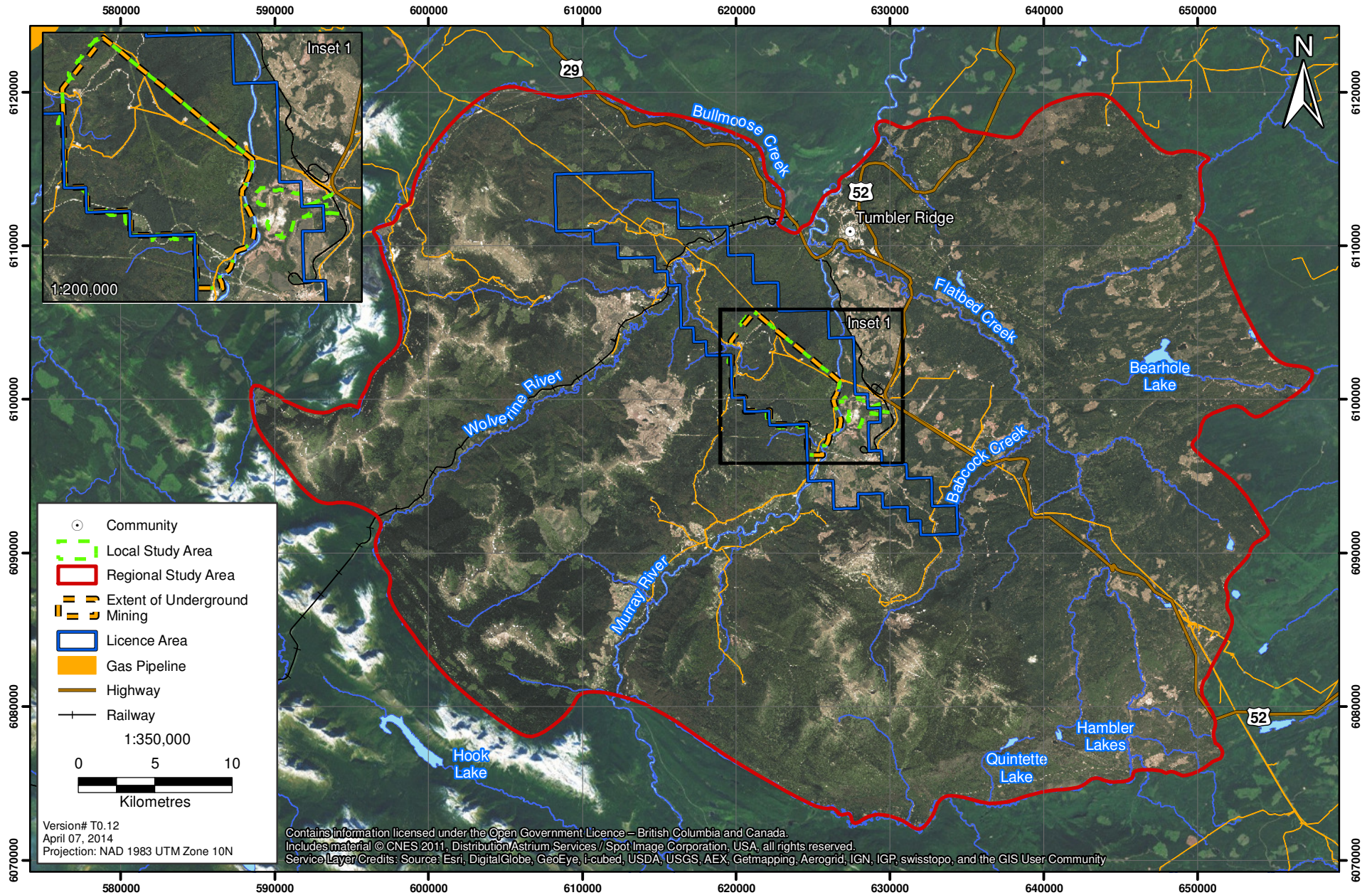
In previous years the proposed Project footprint encompassed areas that are no longer under consideration for the Project. Accordingly, there are areas that have been assessed which now fall outside of the LSA.



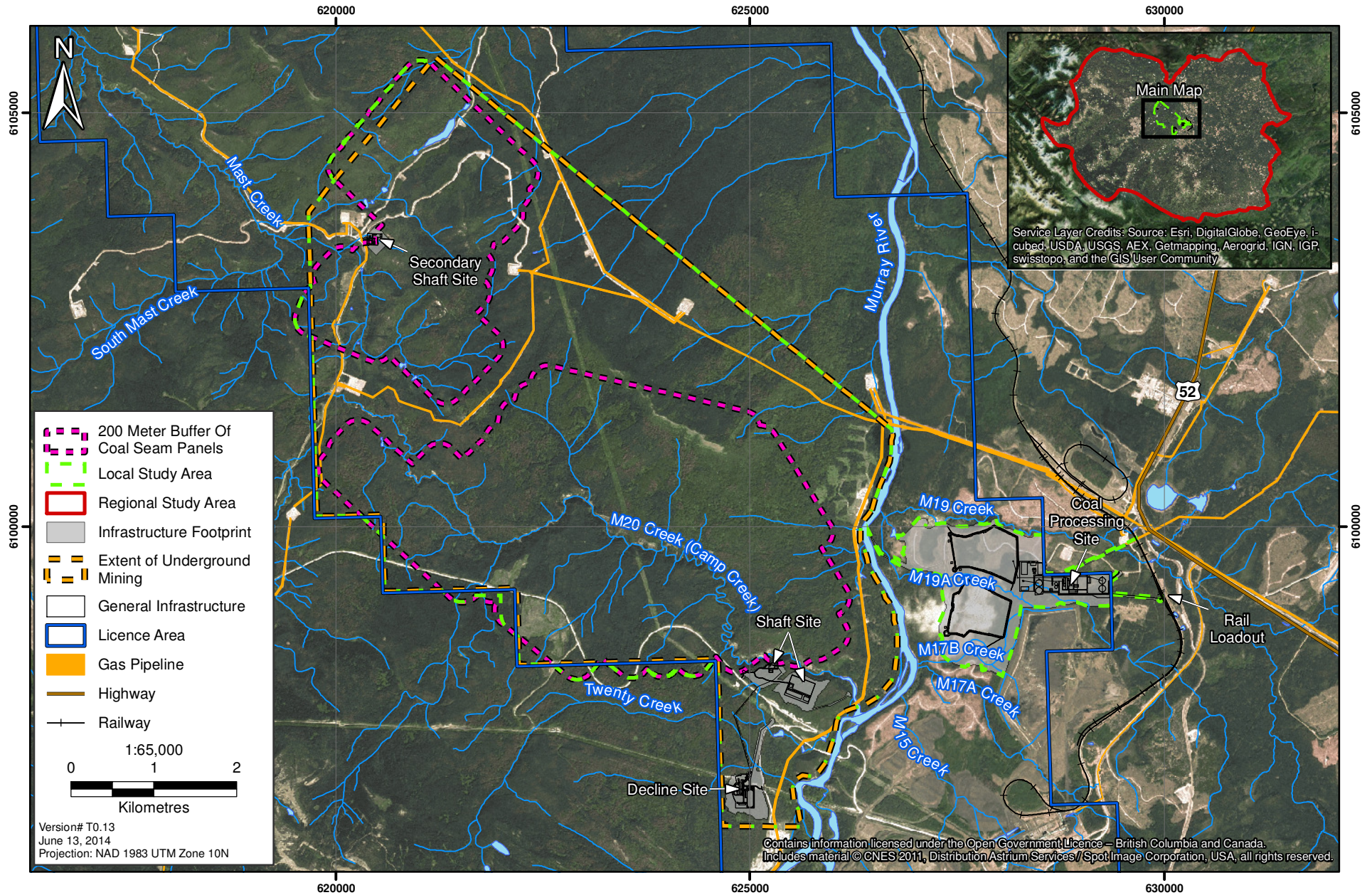
**Figure 1-1  
Project Area**



**Figure 1-2**  
**Regional Study Area**



**Figure 1-3**  
**Local Study Area**



The main objectives of the heritage baseline program were to:

- identify and evaluate any heritage sites within and adjacent to the LSA;
- identify and assess possible effects from the proposed developments on any identified heritage sites; and
- assess the significance of any identified heritage sites in conflict with the proposed infrastructure footprint.

The following chapters outline the available background information that supports the study (Chapter 2); a description of the methods and rationale used to identify sites and collect Project-specific data (Chapter 3); the results of data collection (Chapter 4); and a summary that synthesizes the key findings of the baseline program (Chapter 5).

## 2. Background Information

## 2. Background Information

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This section presents a summary of background information on the RSA and a summary of the literature review conducted during the baseline study.

### 2.1 APPLICABLE STANDARDS

Heritage sites are subject to a number of provincial and federal laws and regulatory frameworks. The ones most pertinent for the Project related to heritage are summarized below.

#### 2.1.1 *Heritage Conservation Act (Provincial)*

In BC, archaeological sites and significant heritage sites are protected by the HCA. The HCA automatically protects all archaeological sites that predate 1846. This includes as-yet unrecorded sites and archaeological materials from disturbed contexts. Burial sites and rock art sites are protected regardless of age, and historic ship and aircraft wreckage becomes protected two years after abandonment. Archaeological sites are non-renewable resources that are very susceptible to disturbance and are finite in number. Archaeological sites are protected for their historical, cultural, scientific, and educational value to the general public, local communities, and First Nations. Developments that involve excavation, movement, or disturbance of soils or removal of vegetation have the potential to negatively impact archaeological sites, if present. Impacts to archaeological sites must be avoided or managed by development proponents.

#### 2.1.2 *Environmental Assessment Act (Provincial)*

The BC *Environmental Assessment Act* (2002) enacts an environmental assessment process that considers the potential environmental, social, health, heritage, and economic effects of proposed major developments. The Heritage Branch, Ministry of Forests, Lands and Natural Resource Operations, defines BC's historic places (heritage) as "buildings, other structures, landscapes, historic districts, and other places of heritage value" (Heritage Branch 2013). Archaeological and paleontological sites are also considered as "heritage" under the *Environmental Assessment Act* (2002).

#### 2.1.3 *Canadian Environmental Assessment Act, 2012 (Federal)*

The *Canadian Environmental Assessment Act, 2012* (2012) requires an assessment of a project's effects on physical cultural heritage, defined in the *Canadian Environmental Assessment Act, 2012* as "structures, sites or things that are of historical, archaeological, paleontological or architectural significance."

#### 2.1.4 *Local Government Act (Provincial)*

Under the *Local Government Act* (1996), a local government may pass bylaws designating properties, buildings, and/or features within their jurisdiction as protected. The heritage designation protection is then formally given to the heritage site by the minister responsible for the HCA (1996).

#### 2.1.5 *Dawson Creek Land and Resource Management Plan (Provincial)*

The Project is within the Dawson Creek Land and Resource Management Plan area. The plan identifies three objectives for managing cultural heritage resources: to "recognize and conserve cultural heritage resources," "provide opportunities for the enjoyment of spiritual and cultural values," and "recognize and conserve significant natural heritage resources" (BC Ministry of Forests, Lands and Natural Resource Operations 1999).

### 2.1.6 British Columbia Fossil Management Framework (Provincial)

The Land Tenures Branch of the BC Ministry of Forests, Lands and Natural Resource Operations has implemented a fossil management framework in the province (Land Tenures Branch 2013). The established fossil management principles recognize the importance of fossils as heritage resources and make their scientific value the most important factor when making management decisions about fossils (Deputy Ministers' Committee on Environment and Resource Development 2004). The Province owns fossils found on Crown Land, and various provincial acts have policies and requirements for managing fossils, including the HCA, *Land Act* (1996), *Park Act* (1996), *Ecological Reserve Act* (1996), *Mineral Tenure Act* (1996), *Ecological Reserve Act* (1996), *Protected Areas of British Columbia Act* (2000), *Wildlife Act* (1996), and *Environmental and Land Use Act* (1996). Currently, mineral tenure holders who discover fossils during the course of their activities are encouraged by the Province to report the discovery to a local museum, university, or paleontology organization.

## 2.2 REGIONAL SETTING

### 2.2.1 Natural Setting

The paleoenvironmental conditions and the present biophysical environment of the RSA are described below.

#### 2.2.1.1 Paleoenvironment

During the Late Wisconsinan Glaciation (22,000 to 13,000 Before Present [BP]) the eastern slopes and foothills of the Rocky Mountains were covered by the Cordilleran Ice Sheet (Jackson et al. 1989). However, this glaciation was not spatially or temporally homogenous. Higher elevations likely remained ice free; nunatoks and other sparsely vegetated patches of land are known to have existed near Rocky Mountain House by 16,000 BP (Beaudoin, Wright, and Ronaghan 1996). However, gaps in the paleontological record (21,300 to 11,600 BP) suggest that the eastern slopes, even if ice free, may not have been suitable for habitation. Because the RSA is near the Cordilleran Ice Sheet's point of coalescence with the eastern Laurentide Ice Sheet, deglaciation may have occurred relatively early, between 12,000 and 11,500 BP (Jackson et al. 1989).

The early post-glacial environment of this area was dynamic, characterized by generally non-arboreal, tundra-like conditions vegetated with sedges and grasses. Forested areas at lower elevations were dominated initially by poplar (White 1983; Driver 1988; Beaudoin, Wright, and Ronaghan 1996). As the glaciers receded, low lands were inundated with meltwater, creating glacial lakes. Glacial Lake Peace covered much of the Peace River drainage up to a maximum elevation of approximately 840 metres above sea level (masl), with the latest stages of lake recession occurring from 13,500 to 10,000 BP (Beaudoin, Wright, and Ronaghan 1996). An arm of the lake may have stretched down the Murray River to at least as far south as Tumbler Ridge, as evidenced by deep Cordilleran till overlain by lacustrine silts (Woolf 1993). A bison skeleton recovered from delta deposits at 792 masl on the lower terrace of the Tumbler Ridge town site was radiocarbon dated to 10,380 BP and suggests that, by this time, Glacial Lake Peace had receded to this level and that bison were present (Woolf 1993).

By 9,900 BP a coniferous forest of spruce and pine had become established (Clague 1989; Beaudoin, Wright, and Ronaghan 1996). The Hypsithermal interval (circa 7,400 BP) marked a warmer period and an increase in pine, which was followed by a period of wetter climatic conditions during which the previously seasonal sloughs, ponds, and muskegs became permanent (White 1983; MacDonald 1987). Environmental conditions close to the modern boreal forest were established by 7,000 to 5,500 BP, which resulted in a decrease in bison and an increase in moose and elk (White 1983; MacDonald 1987; Fladmark 1996).

### 2.2.1.2 *Biophysical Environment*

The Project is within the Rocky Mountain Foothills physiographic region of BC (Holland 1976). It is classified as part of the Central Canadian Rocky Mountain Ecoregion, the Sub-Boreal Interior Ecoprovince, and the Hart Foothills Ecoregion (Demarchi 1995). The Hart Foothills are situated on the east side of the Rocky Mountains and consist of rounded mountains and wide valleys generally lower than the Rocky Mountains to the north and south. The Hart Foothills are in a relatively dry ecosection, a result of Arctic air stalling in this area. Immediately northeast of the Project is the Boreal Plains and Peace River Lowlands physiographic region, characterized by a more gentle topography of rolling hills and plateaus (800 to 1,100 masl).

The area is drained by northeast-flowing drainages that originate in the Rocky Mountains, including Flatbed Creek, Bullmoose Creek, Wolverine River, and Murray River. These four drainages merge into the Murray River near Tumbler Ridge. The Murray River then continues north, emptying into the Pine River near East Pine. The Pine River then flows north and east, joining the Peace River near the town of Taylor, BC.

South of Tumbler Ridge, the Murray River is an approximately 60-m-wide meandering river, incised into a floodplain between the higher remnants of benches from older floodplains. Through time the valley has undergone a process of flattening as the river has continued to rework the sand and gravel bed materials. North of its confluence with the Wolverine River, a study of tree ring data from the present floodplain indicated that there were no trees more than 150 years old, suggesting that the river may have encompassed the entire floodplain over approximately the past 200 years (Thompson, Berwick, Pratt & Partners 1978).

The RSA spans elevations from approximately 730 masl along the Murray River to 1,900 masl at the peak of Mount Babcock, and encompasses portions of the Boreal White and Black Spruce, Sub-Boreal Spruce, Engelmann Spruce-Subalpine Fir, and Boreal Altai Fescue Alpine biogeoclimatic zones (Meidinger and Pojar 1991). The LSA is entirely within the Boreal White and Black Spruce zone.

The Boreal White and Black Spruce zone covers most of northeastern BC. Upland forests are characterized by trembling aspen, white spruce, lodgepole pine, subalpine fir, birch, and balsam poplar. Large expanses of low-lying terrain are muskeg (peat wetlands) characterized by scrub forest of black spruce and tamarack (DeLong, Annas, and Stewart 1991). The climatic conditions are continental, with low precipitation and long, cold winters. Average temperatures at Chetwynd, about 100 km north of Tumbler Ridge, range from  $-10.7^{\circ}\text{C}$  in the winter to  $15.3^{\circ}\text{C}$  in the summer, and annual precipitation is 447.5 mm, approximately 38% of it falling as snow (Environment Canada 2011). Mammalian fauna observed in the Tumbler Ridge region include woodland caribou, Rocky Mountain elk, moose, mountain goat, mountain sheep, wolverine, fisher, marten, hoary marmot, black bear, grizzly bear, wolf, coyote, snowshoe hare, beaver, lynx, red fox, white-tail deer, mule deer, and cougar (Rescan 2011b). A number of bird species are also present, including ptarmigans, raptors, songbirds, and ducks (Rescan 2011b).

The RSA is part of the vast Arctic Ocean drainage system, and unlike the Pacific drainages immediately south and west of the Rocky Mountains, there are no anadromous fish such as salmon in the Project area. Fish species present in the Murray River include mountain whitefish, Arctic grayling, bull trout, northern pike, burbot, longnose sucker, slimy sculpin, longnose dace, finescale dace, and lake chub (Diversified Environmental Services 2011).

### 2.2.2 **Cultural and Historical Setting**

The Project is located within the area covered by Treaty 8, the treaty between the Crown and First Nations of northern Alberta, northeastern BC, northwestern Saskatchewan, and a southern portion of the Northwest Territories near Great Slave Lake (Treaty No. 8 1966; Plate 2.2-1). During the late



precontact period, the region was used by Sekani (*TseK'ehne*) and Beaver (*Dunne-za*; Denniston 1981; Ridington 1981). The Sekani and Beaver are two closely related cultural and linguistic groups; both are part of the Athapaskan language family, whose speakers inhabited a wide swath of the Canadian sub-Arctic at the time of European contact (Krauss and Golla 1981). Simon Fraser's journals describe encountering a group of "Meadow Indians" at Rocky Mountain Portage in 1806 (Fraser 1960). These "Meadow Indians," later described by Jenness as being from the upper reaches of Pine River, may have vacated the region by 1826, after attacks by the *Tsatene* (Jenness 1937). The cultural affiliation of this group is not certain, but survivors from Sekani bands expelled from the North Thompson by the Shuswap (*Secwepemc*) are thought to have been in the region between the 1790s and 1820s (Denniston 1981).



Plate 2.2-1. Treaty 8 boundaries (Library and Archives Canada 1900).

The cultural setting in the Peace River region changed rapidly during the late precontact and early contact periods (mid-1700s to 1900) as the westward expansion of the fur trade proceeded across Canada. By 1900 AD, several new Aboriginal peoples were present in the region, including the Cree, Saulteau, Iroquois, and Métis (Calverley 1980; Gillespie 1981). Today, the closest Indian Reserves to the Project belong to West Moberly First Nation and Saulteau First Nation (105 km northwest), and McLeod Lake Indian Band (125 km west). Additionally, there are also Cree and Métis communities at Kelly Lake (65 km northeast).

The history of the Peace River region has been summarized in Burley, Hamilton, and Fladmark (1996); Brody (1981); Calverley (1980); and Leonard (1995), while the Tumbler Ridge region is described by Helm (2000, 2008). The earliest Euro-Canadian presence in the upper Peace River was Alexander Mackenzie's 1793 AD expedition, the purpose of which was to find a route to the Pacific Ocean to facilitate the North West Company's expanding fur trade enterprise. Fur trading posts were quickly established along the Peace River: Rocky Mountain Portage House in 1804, near present-day Hudson's Hope; Rocky Mountain Fort in 1794, near the Moberly-Peace River confluence; and Fort D'Épinette in 1806, near present day

Fort St. John (Burley, Hamilton, and Fladmark 1996). Initially, both the North West Company and their rival, the Hudson's Bay Company, competed for business until 1821, when the former was subsumed by the latter in a merger. The Hudson's Bay Company and their fur trade business remained the focus of Euro-Canadian activity in the Peace River region throughout the 1800s.

The impact of the fur trade on Aboriginal life was profound. Preceding the actual arrival of the fur trade to the upper Peace River was the rapid westward expansion of the Cree during the mid-to-late 1700s. This expansion was spurred in part by the Cree's early acquisition of firearms, and the resulting displacement of the Beaver and Sekani from their previous territories westward toward the Rocky Mountains (Burley, Hamilton, and Fladmark 1996). During the 1800s, the social and economic organization of Beaver and Sekani bands became increasingly oriented towards exploiting opportunities presented by the fur trade (Brody 1981; Burley, Hamilton, and Fladmark 1996).

The late 1800s saw an influx of would-be miners, headed for the Klondike, travelling through the Peace River region. Beginning in 1899 AD, the Dominion government began negotiating Treaty 8 with the Aboriginal peoples of the region, initially as an attempt to prevent conflicts with miners. When the Canadian Pacific Railway was built to the west coast in the mid-1880s, the province allowed the Dominion Government to take control of 3.5 million acres of land north and east of the Rocky Mountains, known as the Peace River Block, to compensate the Canadian Pacific Railway for alienated or non-arable land in their 40-mile-wide Railway Belt, which surrounded the railway line wherever it was laid (Calverley 1980). In 1911, the Peace River Block, centred on present-day Fort St. John, was subdivided into quarter sections, and large scale and permanent agricultural settlement began (Leonard 1995). Homesteading near the confluence of the Wolverine and Murray rivers had begun circa 1910, with the arrival of homesteader Victor Peck. By 1920, there were about five families living in the area (Helm 2000).

The first written accounts of the Tumbler Ridge area are relatively recent. Some exploration of the surrounding areas occurred in the 1870s for railroad routes to the Pacific, including the Jarvis Pass by E.W. Jarvis in 1875 and the Pine Pass by Charles Horetzky in 1872, Alfred Selwyn in 1875, Joseph Hunter in 1877, and George Dawson in 1879 (Horetzky 1874; Selwyn 1877; Dawson 1881; Helm 2000; Macek 2006). Helm (2000) suggests that gold prospectors were operating near the confluence of the Murray and Bullmoose rivers by as early as 1896.

By the early 1900s, Métis living at Lac Ste. Anne and Flying Shot Lake, Alberta, had established traplines in the Murray, Flatbed, Redwillow, Wapiti, and Kistkatinaw river valleys (Andrews 1985). Circa 1910, two Métis families, led by Narcisse Belcourt and St. Pierre Gauthier, moved permanently to Kelly Lake, located just inside the BC border, approximately 65 km northeast of Tumbler Ridge. They were soon followed by several other families from Lac Ste. Anne, and today their descendants form the Métis and Cree community of Kelly Lake.

Several exploratory expeditions of the Tumbler Ridge region were undertaken in the early 1900s; these included timber-cruising by Spencer Tuck in 1907 (Calverley 1980; Helm 2000), surveys for the US Biological Survey by Prescott Fay in 1914 and John Holzworth in 1923 (Holzworth 1923; Helm 2000), and an oil and gas survey by Professor J. C. Gwillim in 1919 (Gwillim 1920). Between 1937 and 1938, the Monkman Pass Highway Association, an organization based in northwestern Alberta, attempted to construct a road over the Rocky Mountains via Monkman Pass, to facilitate the export of their agricultural products. Monkman Pass is one of the lower passes through the Rocky Mountains in northern BC, and the initial progress of road construction was met by locals with considerable excitement. However, after the onset of World War II, the government opted to construct a highway and rail route through Pine Pass instead, due to its proximity to the communities of Dawson Creek and Fort St. John (Robinson and Hocking 1982; Truax and Sheehan 1988; Helm 2000).

The recent history of the region has been largely driven by the development of coal mining, which resulted in the construction of the town of Tumbler Ridge in the early 1980s. Tumbler Ridge was purpose-built to serve the Bullmoose and Quintette mines. Today, the oil and gas, forestry, wind energy, and tourism industries are also important economic drivers (Helm 2000, 2008).

### 2.2.3 Archaeological Setting

This section describes the archaeological background of the RSA, including summaries of previous archaeological investigations that have been conducted and descriptions of archaeological sites listed on the Archaeology Branch's Archaeological Site Inventory.

Early post-glacial radiocarbon dates of organic material in northeastern BC confirm that the area was ice-free and potentially available to humans by approximately 12,000 to 11,000 BP (White 1983). Archaeological site HbRf-39, near Charlie Lake, 140 km north of the Project, is the earliest radiocarbon dated human occupation in BC, dated at 10,500 BP. Archaeological sites dating to the early Holocene have also been found near Pink Mountain (Wilson 1989) and Prince George (Burford et al. 2008). Artifacts found in secondary contexts in Williston Reservoir (Eldridge et al. 2008), the Lone Prairie, Fellers Heights, and Dawson Creek areas (Ball 1978), the Grande Prairie area (Beaudoin, Wright, and Ronaghan 1996), the Smoky and Wapiti river watersheds (Bussey 1987), and the Fort St. John area (Fladmark 1981) are also thought to represent early post-glacial settlement of this region.

#### 2.2.3.1 Locations of Historic Trails

A review of available literature indicates that several historic and Aboriginal trails may have passed through the RSA (Ball 1978; Stryd 1982a; Petro Canada Coal Division 1983; Helm 2000, 2008). Trails can be protected under the HCA if there is physical evidence of the trail (e.g., trail-bed/furrow) and evidence indicating that it predates 1846 AD.

The "Wapiti Trail" was a major travel route that ran down Flatbed Creek to the Wapiti and Smoky rivers (Stryd 1982a). A trail through Monkman Pass crossed the Rocky Mountains into the Fraser River watershed, via Monkman and Fontoniko creeks (see Section 2.2.2). A trail is described by Jenness's (1937) Sekani informants that ran from "from the headwaters of the Parsnip to the Wapiti," which may have been the Monkman Pass route, or another route further north, closer to McLeod Lake.

Ball (1978) describes the following:

*...an old Indian trail between Dawson Creek and the Wolverine...stretched between Dawson Creek to Fellers Heights, from there it led to Salt Creek and followed the Creek to the Murray River. It crossed the Murray in the vicinity of the Creek mouth and then followed the river southwards to the Wolverine and along the north bank of the Wolverine crossing the Bullmoose Creek near its mouth. It is reported that this trail continued towards Hook Lake but from there it is not known where it went.*

Additional Aboriginal trails in the Hambler and Quintette Lakes area have been recorded by Petro Canada (1983) and Stryd (1982a).

## 2.3 LITERATURE REVIEW

### 2.3.1 Archaeological Literature Review

The literature review conducted for the Project includes previous archaeological, ethnographic, and environmental studies, National Topographic System maps, and orthophotographs. These documents

were reviewed to provide an understanding of the archaeological setting of the RSA and LSA. A search of the Remote Access to Archaeological Data (RAAD) system was undertaken to identify sites listed on the Archaeological Sites Register located within the RSA.

The Project falls within the study area of an Archaeological Overview Assessment and archaeological potential model conducted for the Peace Forest District between 2007 and 2010 under Heritage Inspection Permit 2008-0333 (Eldridge et al. 2010). In addition, since the 1970s, proposed coal mines, oil and gas, wind energy, and forestry developments have been subject to archaeological assessments (Ball 1976 and 1978; Reeves 1977 and 1980; Apland 1981; Kennedy and Reeves 1982; Lifeways of Canada 1982; Poplin and Reeves 1982; Stryd 1982a and 1982b; O'Neill and Hrychuk 2002; Kessick and Hrychuk 2005; Killin and Hrychuk 2006; McKnight, Killin, and Hrychuk 2007; Farvaque 2008; Singer and Hrychuk 2008; Waters 2011). Other archaeological investigations previously conducted in the region have included Blacklaws (1981); Bussey (1981, 1987, 1994); Kulle and McCullough (1994); Biely and Little (1998); Butte, Primmer, and Hrychuk (2006); Killin, McKnight, and Hrychuk (2006); McKnight and Hrychuk (2006); McKnight et al. (2006); Himour, Wondrasek, and Watson (2007); Palmer (2008); and Wondrasek, Lewis, and Kasstan (2008). Archaeological Impact Assessments (AIAs) are also underway for Teck Resources Ltd.'s Quintette Coal Project (adjacent to the Murray River Coal Project) under permits 2011-0015 and 2012-0015; however, at this time the permit reports are not available.

First Nations' traditional knowledge studies for the Project were not available during the baseline study; however, background desk-based research was conducted from available public sources (Rescan 2012). Additional First Nations traditional knowledge will be reviewed and incorporated into Project planning and assessment as it becomes available.

### **2.3.2 Built Heritage Literature Review**

To help identify any potential heritage features in the RSA, a range of historic and contemporary sources were reviewed and a search of the Canadian Registry of Historic Places (Parks Canada 2013) was conducted.

Literature consulted included sources on the history of Tumbler Ridge and the surrounding area (Gwillim 1920; Holzworth 1923; Calverley 1980; Robinson and Hocking 1982; Andrews 1985; Truax and Sheehan 1988; Helm 2000, 2008), the District of Tumbler Ridge's Official Community Plan (District of Tumbler Ridge 2012), and many of the archaeological and ethnographic sources listed above in Section 2.3.1. Additionally, the BC Integrated Land and Resource Registry was consulted for information on trapping and guide-outfitting activities in the region, and the Tumbler Ridge Museum's displays at the Tumbler Ridge Community Centre were visited.

### **2.3.3 Paleontology Literature Review**

A desk-based review of geological maps of the LSA and a review of Tumbler Ridge's Peace Region Palaeontology Research Centre's library was conducted by palaeontologist Richard McCrea (2013; see Section 3.3 for additional information). The Peace Region Palaeontology Research Centre was established in 2003 "to document, study, assess, interpret, and protect the paleontological resources of British Columbia's Peace River Region" (Peace Region Paleontology Research Centre 2013).

## 3. Methodology

## 3. Methodology

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### 3.1 ARCHAEOLOGY

The archaeological study for the Project consisted of three AIAs under Heritage Inspection Permits 2010-0279, 2012-0099, and 2013-0180 (Rescan 2011a, 2013; ERM Rescan 2014).<sup>1</sup> The methodology employed during the AIAs was approved by the Archaeology Branch and is described in the permit applications. The general permit methodology used to identify archaeological resources is described below. The field survey focused on those areas within the proposed development footprint that was identified by HD Mining at the time of the assessment and that were identified in the field as having moderate or higher potential for containing archaeological sites.

#### 3.1.1 Background Research

A review of published information for the Project area and surrounding region was conducted prior to fieldwork. This included a review of ethnographic, historic, archaeological, and environmental literature, and a search of the BC Archaeological Site Inventory using the RAAD application. When available, First Nations land use and knowledge reports were reviewed. Environmental data from a variety of baseline studies conducted for the Project helped to inform the study.

#### 3.1.2 Assessment of Archaeological Potential

The archaeological potential of the area being examined was assessed based on the following factors:

- proximity to water sources or relict watercourses and previously recorded sites;
- the potential for an area to be used as a travel corridor;
- the presence of microtopographic features such as terraces, topographic rises (i.e., hillocks or knolls), and breaks-in-slope;
- the presence of level dry terrain;
- areas with southwest, south, and southeast aspects, and/or areas with good vantage over surrounding terrain;
- areas with high food resource values (e.g., mountain goat ranges and salmon-bearing streams);
- natural windbreaks or shelters (e.g., tree patches) in alpine and sub-alpine areas;
- the presence of snow or ice patches that have potential to contain preserved organic materials; and
- relevant local knowledge (if practicable).

Factors thought to constrain archaeological potential include: unbroken slope, steep or rough terrain, poorly drained ground, and massive disturbance areas such as avalanche chutes. Archaeological potential was determined judgmentally in the field using the aforementioned factors.

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<sup>1</sup> Copies of the final permit reports for Heritage Inspection Permits 2010-0279, 2012-0099 and 2013-0180 are on file at the Archaeology Branch. Please note that this baseline report is not an interim or final Heritage Inspection Permit report.

### 3.1.3 Survey Design

Field surveys were conducted in areas of the proposed development identified as having potential for the presence of archaeological resources during in-field assessment. Examination consisted of a combination of systematic and/or judgementally selected survey traverses. Systematic survey traverses followed compass bearings and/or flagged boundaries with crew members spaced at 5 to 20 m intervals, depending upon terrain and visibility constraints as well as the assessed archaeological potential of the area being examined. Additional judgementally selected survey traverses followed spatially restricted topographic features when considered appropriate. Ground surfaces were examined for trails, structures, artifacts, depressions, and other evidence of past human settlement and land use. Tree throws were examined for cultural materials. Bedrock exposures and boulders were inspected for pictographs and petroglyphs for the possible presence of seams of flakeable lithic raw materials.

### 3.1.4 Shovel Testing Design and Methodology

Shovel testing was conducted in areas identified during the in-field assessment as having potential for buried archaeological remains. Such areas included remnant river terraces, prominent knolls, areas near trails, and/or areas along the banks of streams. Shovel testing was also carried out in order to determine the vertical and horizontal extent of any identified deposits and to identify the nature, composition, and integrity of any subsurface deposits.

The number and location of shovel tests was judgementally determined on a case-by-case basis, dependent on ground cover, terrain and density of bush/forest, and development boundaries. Each test was at least 30 by 30 cm in size and penetrated both A and B soil horizons, and depending on the nature of the sediment accumulation and vegetation, continued until unweathered C horizon sediments or bedrock was encountered. Back dirt from tests was examined manually or screened through 6 mm mesh. Site boundaries were defined using a combination of the following observed, natural, and arbitrary limits.

- Natural boundaries were those defined by the extent of associated landforms (e.g., terrace or ridge) or a limiting natural feature (e.g., stream), as appropriate.
- Observed boundaries were those determined on the basis of the extent of archaeological materials or features, as observed in surface exposures, or through subsurface testing. Where subsurface testing was used to determine site boundaries, testing was conducted in cardinal directions emanating from the initial positive shovel test at 3 m to 5 m intervals until at least two negative shovel tests were completed. Where necessary, additional shovel tests (meeting the four tests per 100 m<sup>2</sup> standard) were conducted in order to establish complete coverage of the area on which the site was identified.
- Arbitrary boundaries were those that reflect artificial and/or administrative boundaries, such as property lines, cutblock boundaries, drill pad site boundaries, or the presence of existing impacts or developments.

All test locations were described in terms of the testable area, terrain, vegetation cover, and soil stratigraphy. All shovel tests were numbered sequentially, and the location of each shovel test was plotted on site maps. Descriptions of the soil matrices from all shovel test locations were recorded in field notes. Artifacts, including surface finds identified during field survey, and any other cultural materials encountered in shovel tests were recorded, photographed, and collected.

The archaeological site identified was recorded in field notes, photographed, and mapped by chain and compass. GPS coordinates were also taken. The location of the site was plotted on the development plans and National Topographic Series maps. The site has been recorded on BC Archaeological Site Inventory forms and entered into the BC Archaeological Sites Inventory and Provincial Heritage Register.

### 3.1.5 Significance Evaluation Scheme

The significance of the site recorded under this permit was determined using the checklist of criteria for site evaluation in the *British Columbia Archaeological Impact Assessment Guidelines* (Apland and Kenny 1998). The scientific, public, ethnic, economic, and (if applicable) historic significance of the site has been assessed (see Section 5.2).

### 3.1.6 Impact Assessment Scheme

The potential impact of the proposed development on archaeological sites has been assessed in reference to Appendix F of the *British Columbia Archaeological Impact Assessment Guidelines* (Apland and Kenny 1998; see Section 5.3).

### 3.1.7 Methods and Techniques for Data Analysis

All collected artifacts were catalogued, described, and compared to existing regional typologies. Appropriate metric attributes of artifacts were recorded. Lithic debitage was quantified and classified according to raw material, stage of manufacture, and technological attributes. Sites received descriptive and functional interpretations where possible, based on a typological and comparative analysis of observed artifacts and/or features. Analysis focused on a culture-historical framework and the functional and seasonal use of a site.

### 3.1.8 Curation

All artifacts collected will be curated by the Royal British Columbia Museum. No increment cores, wedges, or complete stem round samples were collected for dendrochronological analysis.

## 3.2 BUILT HERITAGE

The methodology employed to identify any possible historic features included a literature review (described above in Section 2.3.2), a search of the BC Integrated Land and Resource Registry, and a visit to the Tumbler Ridge Museum's displays at the Tumbler Ridge Community Centre. In addition, a search of the Canadian Registry of Historic Places (Parks Canada 2013) was conducted to identify the closest Designated Heritage Sites to the Project, and the District of Tumbler Ridge's Official Community Plan was reviewed to determine whether a Community Heritage Register had been established for the district. In addition, during the AIA field assessment, the proposed development footprint was surveyed for built heritage features.

## 3.3 PALEONTOLOGY

In 2013, a desk-based review was conducted by Richard McCrea (2013) of the Peace Region Palaeontology Research Centre to assess the potential for the Project to encounter fossils during the construction and operation phases. The review included a literature review, a discussion of geological formations found in and around the LSA, and a preliminary assessment of the potential for fossil discoveries in the geological formations present near the LSA.



## 4. Results

## 4. Results

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This section describes the results of the Heritage baseline study beginning with archaeology (Section 4.1), followed by built heritage (Section 4.2), and paleontology (Section 4.3).

### 4.1 ARCHAEOLOGY

The mine site development includes five main surface infrastructure areas that will be impacted during construction and operation including the Decline Site, Shaft Site, Coal Processing Site, Coarse Coal Rejects Piles, and Secondary Shaft Site. In addition to the surface infrastructure of the mine site development, the potential subsidence area was also considered during this study as underground longwall coal mining has the potential to result in subsidence of the land surface above it.

The following sections describe the results of the archaeological study of these five surface infrastructure areas. Note that the overall results of the AIAs can be found in the relevant permit reports (Rescan 2011a, 2013; ERM Rescan 2014). Because the Project design had not been finalized when AIAs were conducted, the AIAs assessed a larger area than the five areas described here, but did not completely assess some parts of the Project that were only confirmed after the assessments were conducted. These areas that require additional AIAs include the Secondary Shaft Site (Section 4.1.4), a segment of gas pipeline (Section 4.1.3.1), a segment of water discharge pipeline (Section 4.1.3.2), and potential subsidence areas (4.1.6).

#### 4.1.1 Decline Site

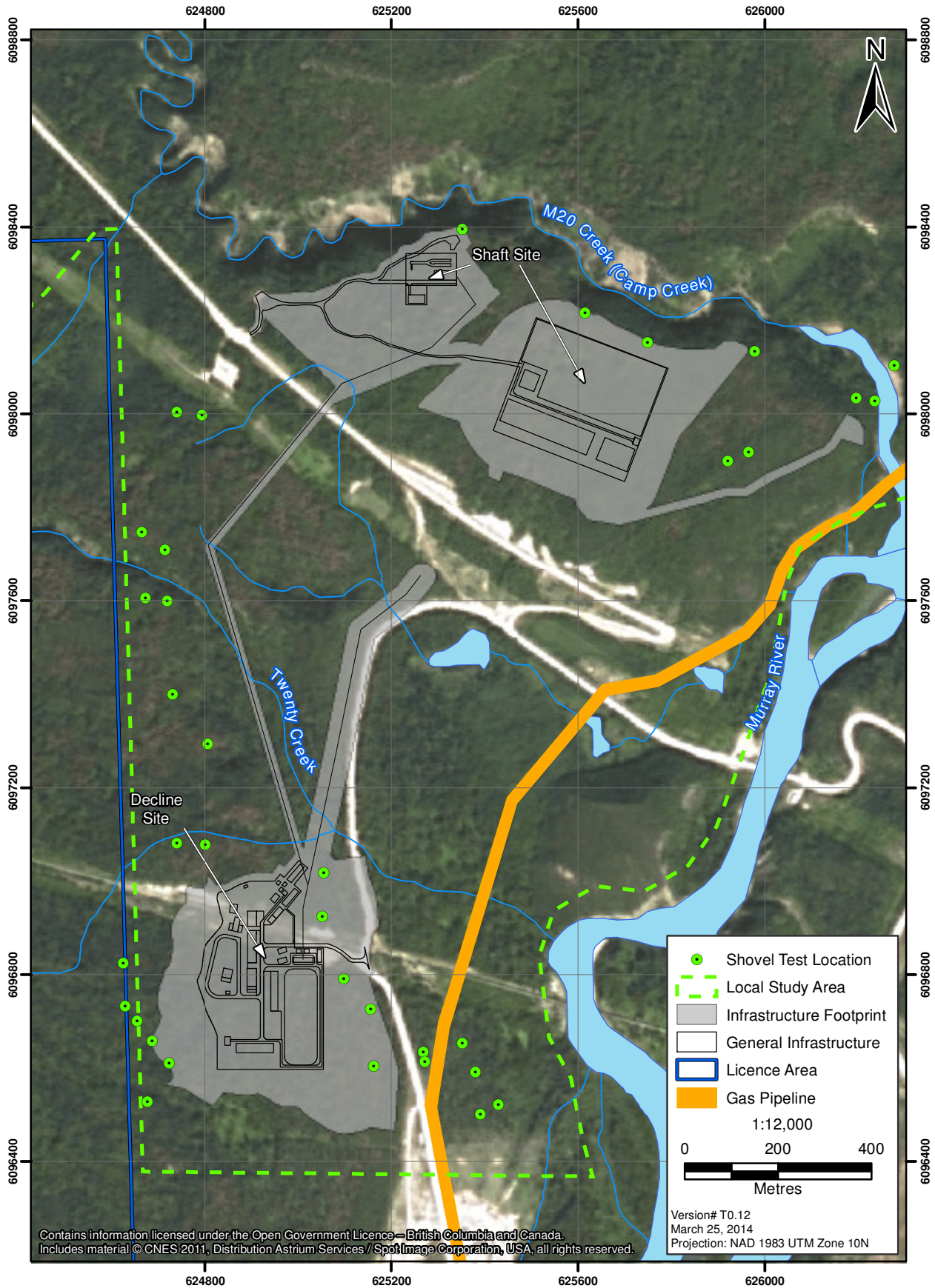
The Decline Site is a 450 m north-south by 350 m east-west area located on a flat terrace west of the Murray River at approximately 9 km along the Murray River Forest Service Road (FSR; Figure 4.1-1). The entire area was assessed under permit 2010-0279 (Plate 4.1-1). Facilities at the Decline Site will include the Service Decline portal, equipment assembly and maintenance shops, warehousing, a mine dry, an electric substation, natural gas storage tanks, a wood workshop, a boiler house and intake air heating system, office/administration buildings, a sewage treatment plant, top soil storage, and a sedimentation pond.



*Plate 4.1-1. Terrain within the Decline Shaft Area.*

Figure 4.1-1

Decline Site and Shaft Site



The terrain in the area is steep to gently sloping, east facing, and drained primarily by Twenty Creek; a deeply incised stream that flows east into the Murray River. Several other smaller, seasonal drainages were also noted. Vegetation within the area is comprised of a mature forest of lodgepole pine, white spruce and poplar, with some scattered subalpine fir and birch. Ground vegetation consists of Labrador tea, soapberry, Indian paintbrush, rosehip, dogwood, bunchberry, cow parsnip, and moss. Soils in the area are generally well-drained.

An area with moderate archaeological potential was identified, and shovel testing was conducted along the terrace edge and up slope of the Decline Site. A total of 139 shovel tests were conducted at four test locations but no cultural materials were located.

#### 4.1.2 Shaft Site

The Shaft Site is an area approximately 300 m north-south by 900 m east-west, located on a low rise west of the Murray River, south of M20 (Camp) Creek, and northwest of the intersection of the Murray River and Mast FSRs (Figure 4.1-1). The entire area was assessed under permit 2010-0279. Facilities at the Shaft Site will include ventilation fans, an electric substation and switching room, a drainage pump station, waste rock storage for sinking the declines and the shaft, a topsoil stockpile, a water treatment pond, and a sedimentation pond.

Vegetation within the area is comprised of a mature forest of lodgepole pine, white spruce and poplar, with some scattered subalpine fir and birch (Plate 4.1-2). An understory of dense willow is present in some areas. Ground vegetation consists of Labrador tea, soapberry, Indian paintbrush, rosehip, dogwood, bunchberry, cow parsnip, and moss. Soils in the area are generally well-drained. Areas of moderate archaeological potential overlooking Murray River and M20 Creek were subject to shovel testing. A total of 87 shovel tests were conducted at two shovel test locations but no cultural materials were identified.



Plate 4.1-2. Terrain at Shovel Test Location 8, within the Shaft Site.

### 4.1.3 Coal Processing Site

The Coal Processing Site, located to the east of Murray River, consists of three main areas: a large pad measuring approximately 1,100 m east-west by 360 m north-south, the Coarse Coal Rejects (CCR) piles that combined cover approximately 1,500 m north-south by 1,000 m east-west, and the Rail Loadout and an associated conveyor that extends approximately 650 m east from the pad to the Canadian National Railway Company (CN) line (Figure 4.1-2).

#### 4.1.3.1 The Coal Preparation Plant Pad

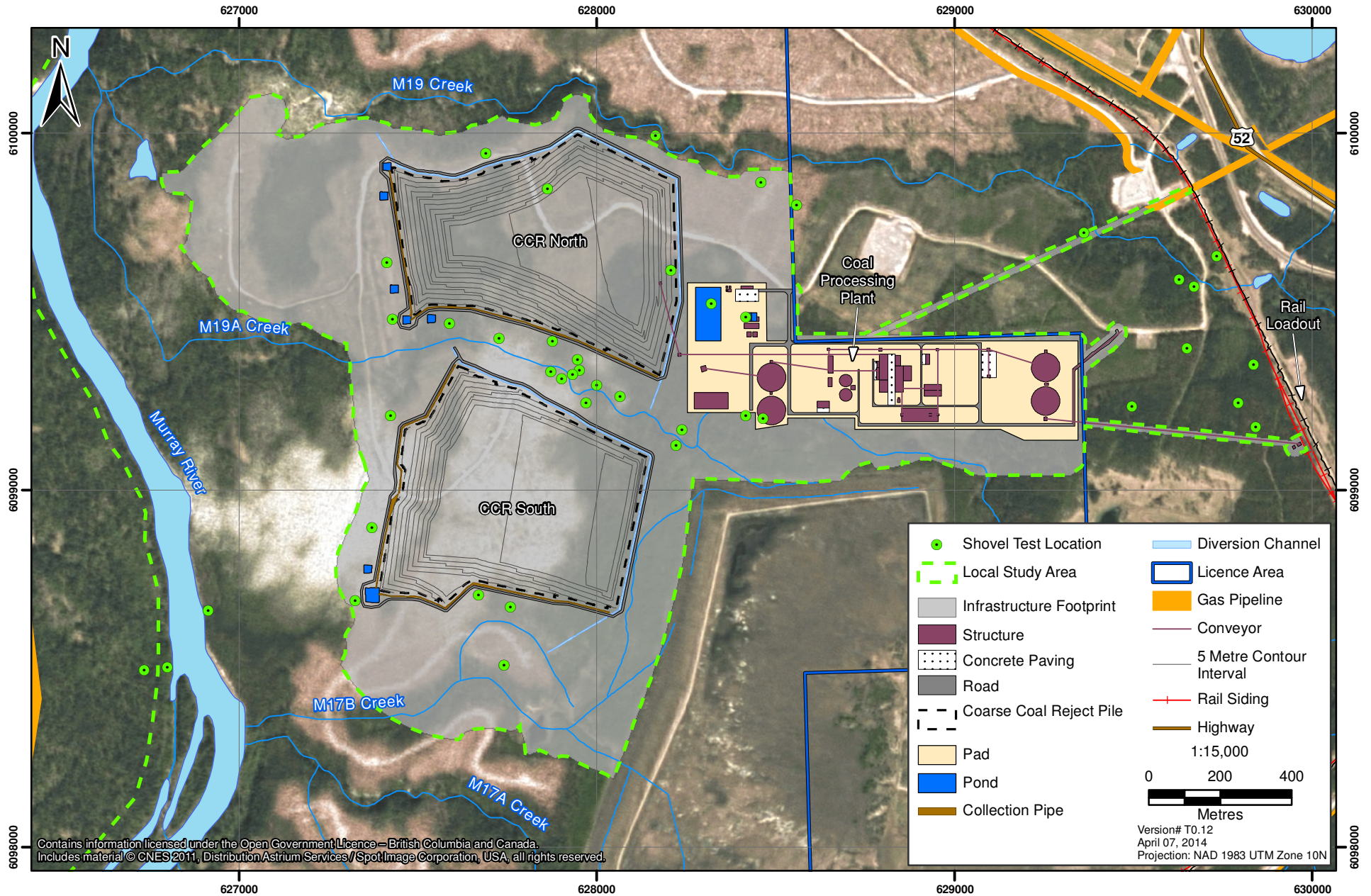
The pad will contain: the Coal Preparation Plant (CPP) with the production decline portal, coal storage, a screening and crushing plant, a coal washing plant, the thickener, conveyors and transfer towers, the flotation and filtration plant, a drying plant, the clean coal storage and middling coal storage, a power substation and distribution building, a maintenance workshop, a boiler house, an air compressor and reagents house, topsoil storage, the underground seepage water treatment, sewage water treatment and portable water treatment plants, the sedimentation pond, and the office/administration complex building.

The CPP pad is situated on relatively flat terrain that slopes gently down to the west (Plate 4.1-3). Much of the eastern portion of the pad is located within a cutblock replanted with pine. A forest of lodgepole pine, tamarack, and spruce is located within the eastern portions of the pad and along its southern edge. The archaeological potential of the area varies from low to moderate. Low potential areas are located within the replanted cutblock and in areas heavily disturbed by road and skid trail construction. Areas with moderate archaeological potential include those within the forest overlooking creeks to the south or lower lying terrain rising up from Murray River to the west. Within this area 34 shovel tests were conducted at four locations considered to have moderate archaeological potential. No archaeological materials were identified. Note that the in-field assessment of the gas pipeline that runs southwest to the CPP from has not been complete and requires further AIA to clear the area of archaeological concerns.



Plate 4.1-3. The interface between the forest and the replanted cutblock within the CPP pad.

**Figure 4.1-2**  
**Coal Processing Site**



#### 4.1.3.2 Coarse Coal Rejects Piles

The rejects from the coal preparation plant will be directed to a CCR area. Material will be transported to the CCR on an extensible conveyor, and then re-worked using heavy machinery. Two piles within the CCR are currently planned, with the toe of the piles set back from riparian areas of M19, M19A, and M17B creeks. A pipeline will discharge water from the CCR area into the Murray River between M19 and M19A creeks.

The CCR area is located immediately northwest of the Quintette Mine's existing tailings impoundment facility and 700 m east of the Murray River (Figure 4.1-2). Approximately 50% of the area is within recent cutblocks with minimal regrowth. The area is generally west sloping with a series of terraces that rise up from the Murray River. The forested areas are imperfectly or poorly drained, with hummocky or undulating relief. M19A Creek runs west-northwest through the area and is characterized by a deeply incised (about 5 to 10 m deep) gully (Plate 4.1-4). Forest cover consists of white spruce, subalpine fir, and pine, with black spruce and tamarack in marshes. Ground cover consists of moss, Labrador tea, huckleberry, fireweed, horsetail, kinnickinnick, and wild rose. There is dense deadfall throughout much of the forested portion of the area.



*Plate 4.1-4. View south of M19A Creek in the Coarse Coal Rejects area. Quintette Mine tailings dam is visible in background.*

The archaeological potential of the area varies from low to moderate, except where the pipeline discharges into the Murray River which has high potential. Low potential areas are sloped or marshy terrain and/or heavily disturbed areas from logging or road and skid trail construction. Areas with moderate archaeological potential include terrace edges overlooking creeks and lower lying terrain rising up from the Murray River to the west (Plate 4.1-5). Shovel testing was conducted in these areas. A total of 735 shovel tests were conducted at 26 locations considered to have moderate archaeological potential. No archaeological materials were identified within the area during shovel testing.

Note that the pipeline from the CCR area to the Murray River was added to the infrastructure footprint after the AIA was conducted and has not yet been subject to an in-field assessment.



*Plate 4.1-5. A shovel test area in a cutblock within the Coarse Coal Rejects area.*

#### *4.1.3.3 Rail Loadout*

The rail loadout immediately west of the CN line consists of a berm of gravels topped with grasses and alder. The associated conveyor extends west to the southeast corner of the CPP pad and crosses an area of low-lying moderately forested terrain with an overstorey of black spruce and lodgepole pine over wild rose, Labrador tea, moss, and grasses (Plate 4.1-6).



*Plate 4.1-6. Terrain along the rail loadout conveyor at Shovel Test Location 46.*



The archaeological potential of the area varies from low to moderate. Low potential areas include the uniformly gently-sloped areas within the forested area and heavily disturbed areas from logging or road and skid trail construction. Areas with moderate archaeological potential include the low knolls and rises within the forested area. A total of 54 shovel tests were conducted on low rises at three locations within 100 m of the rail loadout conveyor. No archaeological materials were identified. Six previously recorded sites (GgRf-2, GgRf-3, GgRf-4, GgRf-5, GgRf-6, and GgRf-10) are located within 250 m of the CN line. These sites are all situated on the opposite (east) side of the line, and will not be impacted by the Project.

#### 4.1.4 Secondary Shaft Site

The Secondary Shaft Site is located to the west of the Decline Site, near Mast Creek (Figure 4.1-3). It will include an intake shaft, a return air shaft, and ventilation fans. This area has not been subject to an AIA as its location has not been finalized; however, a desk-based review of the area, including potential modelling by Eldridge et al (2010) indicates that it has archaeological potential. Additional study, potentially including an AIA, may be required to determine whether there are any archaeological sites within it.

#### 4.1.5 Potential Subsidence Area

There is potential for subsidence of the land surface above the longwall mining area during Operation (Figure 4.1-4). This potential subsidence area was not included in the field assessments because the exact locations where subsidence would occur were not known at the time. For purposes of this baseline study, a desk-based review of the potential subsidence area has been conducted, including a review of RAAD and the *Peace Forest District Archaeological Overview Assessment* (Eldridge et al. 2010) that contains an archaeological potential model. That model indicates there are areas of low, moderate and high potential above the longwall mining area.

A review of RAAD identified two archaeological sites, GgRg-5 and GgRg-8, located above the longwall mining area. Site GgRg-5 is a prehistoric lithic scatter located on a small knoll overlooking an unnamed drainage. Site GgRg-8 is a prehistoric lithic isolated find located on a fluvial terrace immediately west of the Murray River. Both sites are located within buffered areas, meaning that subsidence is not anticipated at these sites. As more information on subsidence becomes available additional AIAs may be required in areas where subsidence effects are anticipated. As mentioned above, HD Mining has built buffer areas into their mine plan where longwall mining will be restricted in order to avoid potential effects to existing surface infrastructure so not all areas above the longwall mining area will experience subsidence.

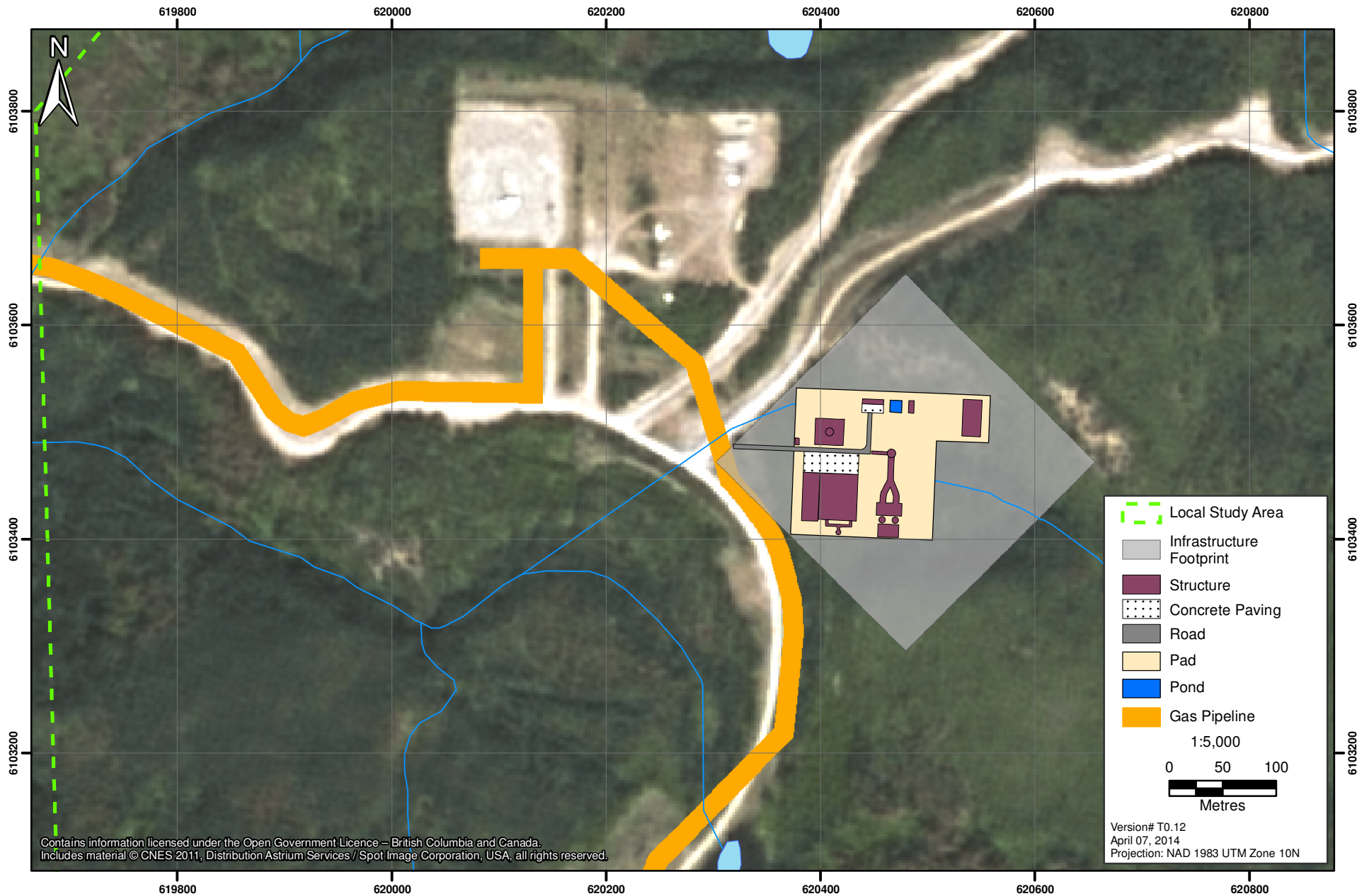
#### 4.1.6 Archaeological Sites

##### 4.1.6.1 Archaeological Sites within the Regional Study Area

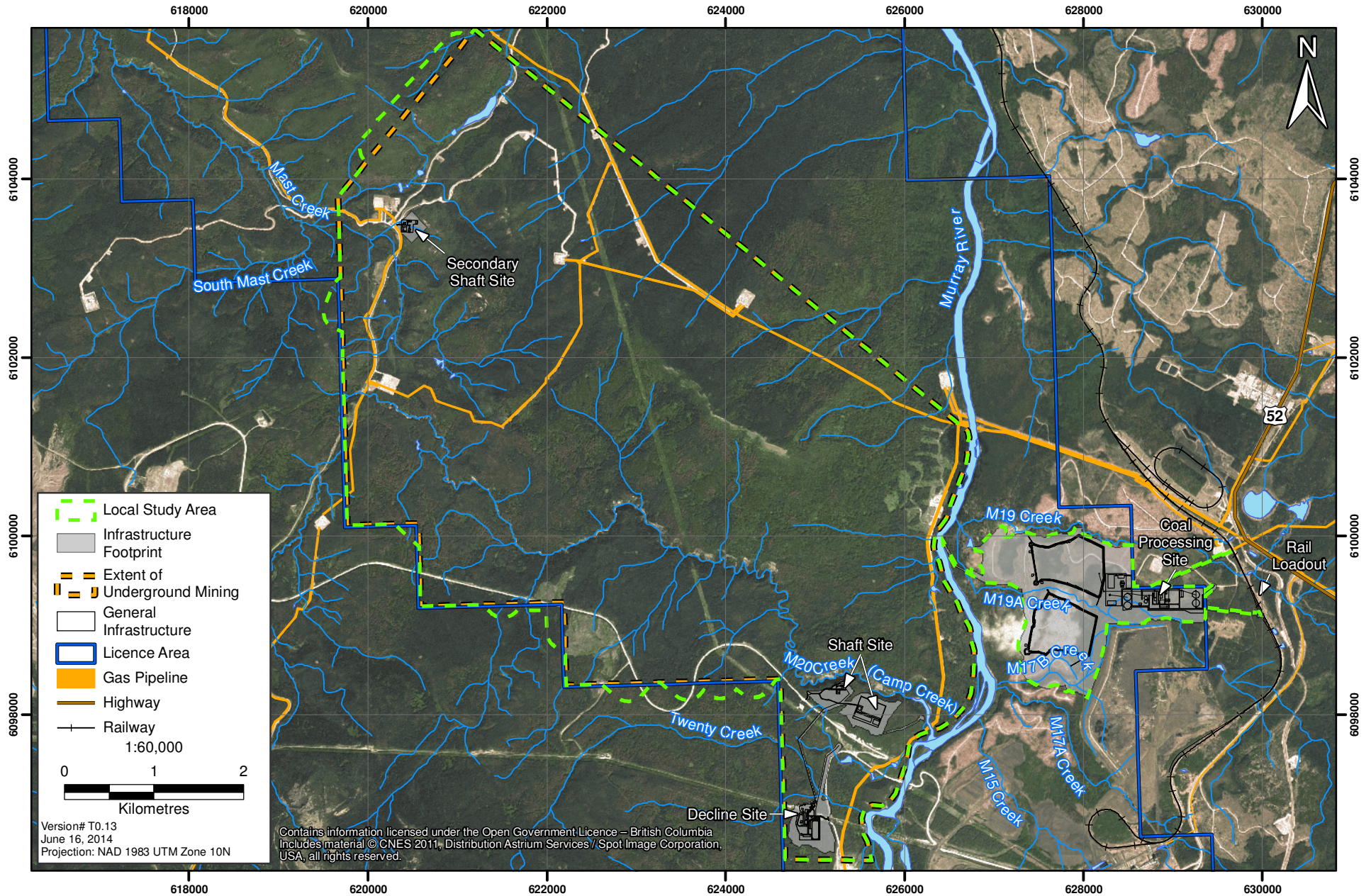
There are 86 known archaeological sites within the RSA (Appendix A). Of these, 72 are prehistoric sites, 12 are historic sites, and 2 contain both prehistoric and historic features. The prehistoric archaeological sites show a range of past activities. Most of these sites have low artifact density and few features and are related to transient use of the landscape for activities such as hunting and resource gathering.

Lithic scatters are the most common archaeological site types found in the RSA with 67 of the 86 sites containing lithic material. These sites range in size from isolated lithic finds to sites containing over 500 artifacts. Twenty-five of the lithic sites contain formed tools or retouched flakes, while the rest only contain debitage (Plate 4.1-7). Materials typically used for making stone tools in the region are chert, obsidian, quartzite, chalcedony, and basalt. One of these lithic sites also contained a rock-shelter, which could have been used as a campsite or as protection from the elements, although only one isolated flake was found at the site. Two lithic scatter sites were found in association with trails.

**Figure 4.1-3**  
**Secondary Shaft Site**



**Figure 4.1-4**  
**Extent of Underground Mining**



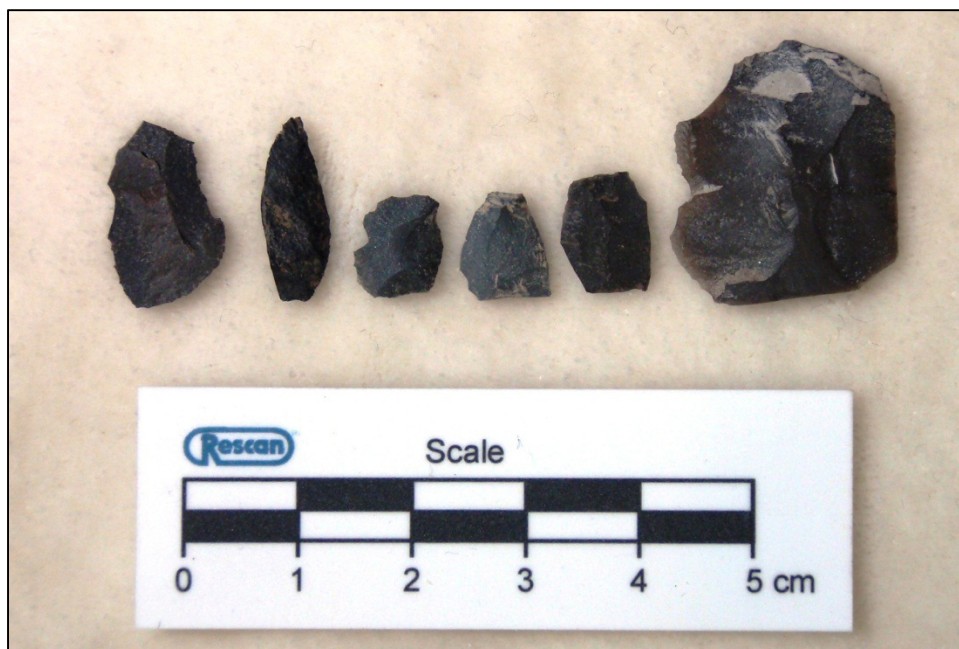


Plate 4.1-7. Lithic debitage found at site GgRg-9.

While lithic scatters were the most common site type, other prehistoric site types have also been found within the RSA. Faunal remains were found at five sites that are typically interpreted as associated with hunting activity. In one case, the faunal material was identified and determined to be from a small deer.

Four sites have fire altered rock (FAR) or hearth features. Fire altering occurs when rocks are heated in a fire and then crack or split during cooling and can be indicative of campfires or hearths. Often lithics or other site features are found in association with FAR.

Three sites within the RSA are interpreted as being campsites: one site contains a cultural depression and a circular petroform which is believed to be a tent ring, and two of the sites with hearth features also have a lithic assemblage and have been interpreted as temporary campsites. Additionally, one of the sites in the RSA, not identified as a campsite, contains a rock shelter which could provide protection from the elements and a view of the valley below. It is possible, therefore, that this site could also have been used as a camp location.

Twelve of the sites found in the RSA are historic. Six of the sites are historic trails, including four that are portions of the Hamblar Pack Trail. Culturally modified trees are associated with three of the trail sites. A further three sites contain only culturally modified trees. Two of these sites had bark-stripped lodgepole pines and the other site had two trees each with an arbourglyphs of a face carved into it. Two historic cabin sites are within the RSA, each containing the remains of several log cabins related to historic use of the area. Two of the historic sites also have prehistoric components: one of the trail sites has a small lithic scatter, and at one of the cabin sites a prehistoric bone awl was found. Finally, there is one burial site within the RSA, where Maggie Smith, a 12-year-old child, was buried sometime between 1914 and 1918.

#### 4.1.6.2 Archaeological Site Recorded during the Archaeological Impact Assessments

One archaeological site was recorded during the AIAs conducted for the Project, but the site has been avoided and is now outside of the LSA. Archaeological site GgRg-9, recorded under permit 2012-0099, is a prehistoric, surface and subsurface lithic scatter and trail, interpreted as two short-term camp sites

and/or hunting lookouts along part of a travel route along the Murray River. The site is situated on a bluff on the east side of the Murray River south of its confluence with Flatbed Creek. The boundaries include the observed extent of a distinct and continuous trail furrow and two associated lithic scatters.

A total of 13 artifacts were collected from site GgRg-9. The first lithic scatter consisted of 2 grey basalt flakes exposed along the trail furrow (Plate 4.1-8), and 11 grey basalt flakes and 1 grey basalt utilized flake were subsequently recovered from shovels tests. All artifacts identified at Lithic Scatter 1 were collected. The second lithic scatter consists of two dark grey basalt flakes exposed along the trail furrow. Both flakes were left *in situ*.



*Plate 4.1-8. View south of the trail as it passes through Lithic Scatter 1 at archaeological site GgRg-9. Surface find 1 was found near the base of the tree (bottom left).*

The trail is interpreted to be a pre-contact feature based on the lithic scatters identified along it. A seismic line, including many cut trees and stumps, runs through the site and the area may also have been used during the twentieth century. Additionally, part of the bluff has previously eroded into Murray River. Previously recorded historical trails are found within the RSA (Section 2.2.3.1) although it is not believed that this trail is one of them. It may, however, have connected to other trails in the past.

Although there is high potential for buried subsurface deposits all along the trail, shovel testing was only conducted within the proposed development boundaries (a conveyor alignment, no longer under consideration). Numerous additional areas within the site boundaries also have high archaeological potential for buried deposits; however, these were not subject to subsurface testing.

#### **4.1.6.3 Archaeological Sites within the Local Study Area**

There are two recorded archeological sites within the LSA; GgRg-5 and GgRg-8, both located within the potential subsidence portion of the LSA above the underground mine area. There are no recorded sites within the infrastructure footprint portion of the LSA.

Archaeological site GgRg-5 was recorded under Heritage Inspection Permit 2007-0062. GgRg-5 is located above the underground mine area; however, HD Mining has built buffer areas into their mine plan where longwall mining will be restricted in order to avoid potential effects to existing surface infrastructure. The site is within such a buffer area, and as such is at low risk of direct and indirect effects from disturbance due to subsidence during mine operations.

Archaeological site GgRg-8 was recorded in 2008 (not under permit) and then revisited in 2011 under Heritage Inspection Permit 2010-0095. GgRg-8 is located above the underground mine area; however, it is within a buffer area, and as such is at low risk of direct and indirect effects from disturbance due to subsidence during mine operations.

## 4.2 BUILT HERITAGE

No federally or provincially designated heritage sites were identified in the RSA. The closest designated heritage site to the RSA in the Canadian Registry of Historic Places is the Federal Building in the town of Dawson Creek, approximately 88 km north-northeast of the RSA (Parks Canada 2013).

A desk-based review of literature and other geographic data identified several potential built heritage features (trapline cabins) within the RSA. A series of trapline cabins belonging to Bill Warn were recorded by Bruce Ball along the Murray River (Ball 1978), and provincial data for Crown tenures in the Tumbler Ridge area also identifies several trapline cabins along the Murray River. One of the cabins was plotted near to the currently proposed development footprint along the west side of the Murray River, near the bulk sample area; however, this cabin could not be relocated during the 2011 AIA field assessment. It is possible that the cabin has collapsed, was dismantled, eroded into the Murray River, or that the available locational information is incorrect or inaccurate.

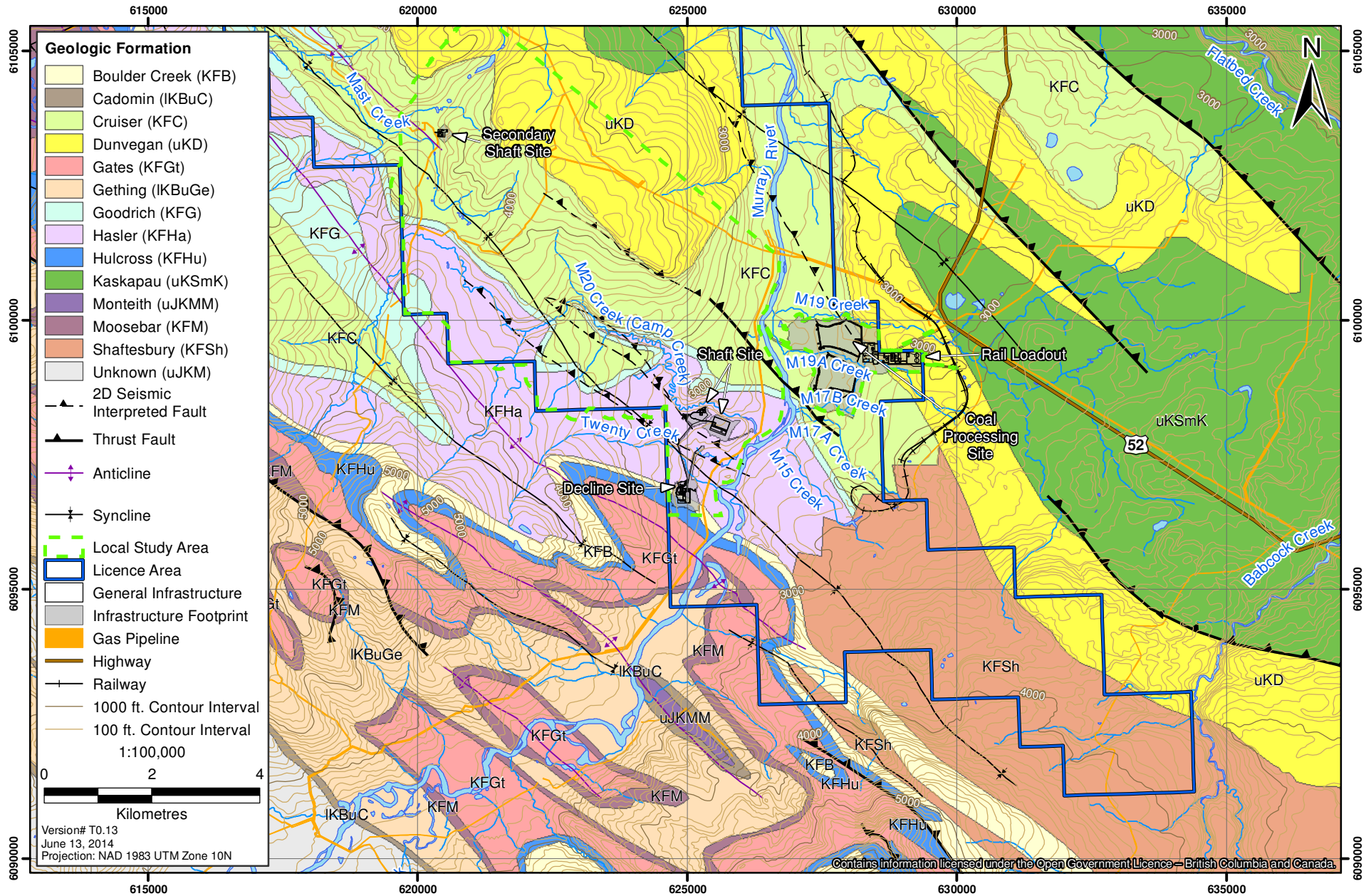
A historic homestead, occupied by early Euro-Canadian settlers John Terry and Kate Edwards (Helm 2000), is situated near the Wolverine River and Wolverine Plan site at far the north end of the RSA, outside of the LSA. The homestead is not a protected site, but the homestead is locally significant, and both John Terry and Kate Edwards have been the subject of Tumbler Ridge Museum exhibits.

## 4.3 PALEONTOLOGY

Northeastern BC contains the best record of fossil vertebrates in the province, with the Peace Region laying claim to both the largest marine reptile in the world, and one of the best records of fossil tracks in the world. The Tumbler Ridge Museum Foundation and the Peace Region Palaeontology Research Centre, along with other partners, have prepared an Expression of Interest to apply to have the area designated as a UNESCO Global Geo Park (Tumbler Ridge Aspiring Geopark Steering Committee 2013).

The geological formations within the LSA date to the late Jurassic and Cretaceous periods. The major sedimentary divisions include the Boulder Creek Formation, Hulcross Formation, Cruiser Formation, and Dunvegan Formation (Figure 4.3-1). These primarily consist of marine and terrestrial sedimentary strata. These strata are well known as sources of “important fossil vertebrate, invertebrate, and plant specimens” (McCrea 2013); however, some types of plant and invertebrate fossils are commonly found in the region and are less significant. The Dunvegan Formation has yielded a variety of bird, reptile, and dinosaur fossil tracks, including those of theropods, ornithopods, and ankylosaurs. Vertebrate bone fossils have also been recovered, although this is rare (McCrea 2013). Overall, the preliminary assessment rates the potential for the presence of fossils in the LSA as high. No paleontological sites were identified during the field AIA; however, the area is largely forested and no bedrock exposures were encountered.

**Figure 4.3-1**  
**Geology in the Local Study Area**



## 5. Summary



## 5. Summary

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The 2011, 2012, and 2013 baseline heritage studies, including both the desk-based study and field assessments, have identified 86 archaeological sites within the RSA. All of these sites are legally protected by the HCA. One of the archaeological sites (GgRg-9) was identified during the AIA conducted under HCA permit 2012-0099 for the Project. This site has since been avoided through Project redesign and is not within the current Project LSA.

There are two known archaeological sites (GgRg-5 and GgRg-8) within the LSA; however, they fall within mine buffer areas and will not be impacted. Based on the studies conducted to date it is unlikely that as-yet unrecorded archaeological sites are present within the portions of the LSA that have been subject to an AIA. However, there is the potential that as-yet unrecorded sites may be present within portions of the LSA that have not been subject to an AIA, including the potential subsidence area and secondary shaft site. The potential subsidence area and secondary shaft site contains areas of low, moderate, and high potential. It is anticipated that as more information on the risk of subsidence becomes available, additional heritage studies may be required for these areas.

No significant built heritage features or paleontological sites have been identified within the LSA; however, there is high potential for the presence of fossils in the LSA.

## References

## References

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

1966. Treaty No. 8, Made June 21, 1899 and Adhesions Reports, etc. Reprinted from the 1899 edition. Ottawa: Queen's Printer.
1996. *Ecological Reserve Act*, RSBC. C. 103.
1996. *Environmental and Land Use Act*, RSBC. C. 117.
1996. *Heritage Conservation Act*, RSBC. C. 187.
1996. *Land Act*, RSBC. C. 245.
1996. *Local Government Act*, RSBC. C. 323.
1996. *Mineral Tenure Act*, RSBC. C. 292.
1996. *Park Act*, RSBC. C. 344.
1996. *Wildlife Act*, RSBC. C. 488.
2000. *Protected Areas of British Columbia Act*, SBC. C. 17.
2002. *Environmental Assessment Act*, SBC. C. 43
2012. *Canadian Environmental Assessment Act, 2012*, C. 19, s. 52.
- Apland, B. C. 1981. *British Columbia Rail Anzac to Quintette Branch Line Heritage Resources Impact Assessment*. HCA Permit 1981-0023. Report on file with the Archaeology Branch, Victoria, BC.
- Apland, B. C., and R. Kenny. 1998. *British Columbia Archaeological Impact Assessment Guidelines: Revised Edition*. Ministry of Sustainable Resource Management, Archaeology and Forests Branch. Report on file with the Archaeology Branch, Victoria, BC.
- Andrews, G. S. 1985. *Métis Outpost: Memoirs of the First Schoolmaster at the Métis Settlement of Kelly Lake, B.C. 1923-1925*. Victoria, BC: Pencrest Publishers.
- Ball, B. 1976. *Archaeological Investigations in the Northeast Coal Study Area*. Report on file with the Archaeology Branch.
- Ball, B. 1978. *A Report on Archaeological Impact Assessment for the Northeast Coal Study: The NEC Heritage Project 1977-1978*. HCA Permit 1977-0007. Report on file with the Archaeology Branch, Victoria, BC.
- BC Ministry of Forests, Lands and Natural Resource Operations. 1999. *Dawson Creek Land and Resource Management Plan*. [http://archive.ilmb.gov.bc.ca/slrp/lrmp/fortstjohn/dawson\\_creek/docs/dawson\\_creek\\_lrmp\\_march\\_1999.pdf](http://archive.ilmb.gov.bc.ca/slrp/lrmp/fortstjohn/dawson_creek/docs/dawson_creek_lrmp_march_1999.pdf) (accessed February 2013).
- Beaudoin, A. B., M. Wright, and B. Ronaghan. 1996. Late Quaternary Landscape History and Archaeology in the 'Ice-free Corridor': Some Recent Results from Alberta. *Quaternary International* 32:113-126.
- Biely, A. and J. Little. 1998. *Archaeological Impact Assessment Chetwynd Forest Industries Cut Blocks*. HCA Permit 1998-299. Report on file with the Archaeology Branch, Victoria, BC.

- Blacklaws, R. W. 1981. *Stage II Detailed Heritage Impact Assessment of the Teck Mining Corporation Bullmoose Property Northeast Coal Region*. HCA Permit 1981-0032. Report on file with the Archaeology Branch, Victoria, BC.
- Brody, H. 1981. *Maps and Dreams: Indians and the British Columbia Frontier*. Vancouver, BC: Douglas & McIntyre.
- Burford, A., F. Craig, R. Farvacque, and N. Jackman. 2008. An Early Cordilleran Assemblage from the Nechako-Fraser Basin. In *Projectile Point Sequences in Northwestern North America*. Eds. R. L. Carlson and M. P. R. Magne. 293-302. Burnaby, BC: Archaeology Press, Simon Fraser Univ.
- Burley, D. V., J. S. Hamilton, and K. R. Fladmark. 1996. *Prophecy of the Swan: The Upper Peace River Fur Trade of 1794-1823*. Vancouver, BC: UBC Press.
- Bussey, J. 1981. *Summary Report: Heritage Field Reconnaissance B.C. Hydro and Power Authority Distribution Circuits, Tumbler Ridge Substation to Proposed Highway*. HCA Permit 1981-0005. Report on file with the Archaeology Branch, Victoria, BC.
- Bussey, J. 1987. *Heritage Resource Impact Assessment, Deep Basin, Northeast British Columbia*. HCA Permit 1987-0006. Report on file with the Archaeology Branch, Victoria.
- Bussey, J. 1994. *Archaeological Investigations in Northeastern British Columbia for Canadian Hunter Exploration Ltd., 1994*. HCA Permit 1994-0004. Report on file with the Archaeology Branch, Victoria.
- Butte, E., M. Primmer, and B. Hrychuk. 2006. *Archaeological Impact Assessment Final Report, Allnorth Consultants Ltd.'s Grizzly Ridge Sand and Gravel Project*. HCA Permit 2006-0208. Report on file with the Archaeology Branch, Victoria, BC.
- Calverley, D. H. 1980. *History is Where You Stand: A History of the Peace*. <http://www.calverley.ca> (accessed May 2011).
- Clague, J. J. 1989. Quaternary geology of the Canadian Cordillera. In: *Geology of Canada and Greenland*. Ed. R. J. Fulton. Ottawa, ON: Geological Survey of Canada.
- Dawson, G. M. 1881. *Geological Survey of Canada, Report of Progress 1879-80*. Ottawa, ON.
- DeLong, C., R. M. Annas, and A. C. Stewart. 1991. Boreal White and Black Spruce Zone. In *Ecosystems of British Columbia*. Eds. D. Meidinger and J. Pojar. Victoria, BC: Research Branch, BC Ministry of Forests.
- Demarchi, D. A. 1995. *An Introduction to the Ecoregions of British Columbia*. Ministry of Environment Lands and Parks, Victoria, BC.
- Denniston, G. 1981. Sekani. In *Handbook of North American Indians*. Vol.6, Subarctic. Ed. J. Helm. Washington, DC: Smithsonian Institute.
- Deputy Ministers' Committee on Environment and Resource Development. 2004. Fossil Management Principals. [http://www.for.gov.bc.ca/land\\_tenures/documents/fossils/consultation/FOSSIL\\_MANAGEMENT\\_PRINCIPLES.pdf](http://www.for.gov.bc.ca/land_tenures/documents/fossils/consultation/FOSSIL_MANAGEMENT_PRINCIPLES.pdf). (accessed February 2013).
- District of Tumbler Ridge. 2012. *District of Tumbler Ridge Official Community Plan, Bylaw No. 584, 2005*. <http://www.tumbleridge.ca/LinkClick.aspx?fileticket=m4m8PlT9Q-s%3d&tabid=112> (accessed January 2012).
- Diversified Environmental Services. 2011. Murray River Coal Development Fisheries Habitat Assessment. Prepared for HD Mining International Ltd. by Diversified Environmental Services: Fort St. John, BC.

- Driver, J. C. 1988. Late Pleistocene and Holocene Vertebrates and Paleoenvironments from Charlie Lake Cave, Northeast British Columbia. *Canadian Journal of Earth Sciences*, 25: 1545-1553.
- Eldridge, M., J. Brunnsden, R. Eldridge, and A. Parker. 2008. *BC Hydro 2008 Williston Dust Abatement Project: Archaeological Impact Assessment*. HCA Permit 2008-0179. Report on file with the Archaeology Branch, Victoria, BC.
- Eldridge, M., S. Gamble, D. G. Howe, A. Parker, A. H. Styrd, and V. Thiesson. 2010. *Peace Forest District Archaeological Overview Assessment*. HCA Permit 2008-0333. Report on file with the Archaeology Branch, Victoria, BC.
- Environment Canada. 2011. *Canadian Climate Normals or Averages 1971-2000*. National Climate Data and Information Archive. [http://climate.weatheroffice.gc.ca/climate\\_normals/index\\_e.html](http://climate.weatheroffice.gc.ca/climate_normals/index_e.html) (accessed February 2013).
- ERM Rescan. 2014. *Murray River Coal Project: Archaeological Impact Assessment Final Report, Heritage Conservation Act Permit 2013-0180*. Prepared for HD Mining International Ltd. by ERM Rescan: Vancouver, BC.
- Farvaque, R. 2008. *Archaeological Impact Assessment of Peace River Coal Inc., Roman Mountain Mine*. HCA Permit 2007-0320. Report on file with the Archaeology Branch, Victoria, BC.
- Fladmark, K. 1981. Paleoinian Artifacts from the Peace River District. In *Fragments of the Past: British Columbia Archaeology in the 1970s*. Ed. K. Fladmark. *BC Studies* 48:124-135.
- Fladmark, K. 1996. The Prehistory of Charlie Lake Cave. In *Early Human Occupation of British Columbia*. Eds. R. L. Carlson and L. Dalla Bona. Vancouver, BC: UBC Press.
- Fraser, S. 1960. *The Letters and Journals of Simon Fraser: 1806-1808*. Ed. W. Kaye Lamb. Toronto, ON: Macmillan.
- Gillespie, B. 1981. Territorial Groups Before 1821: Athapaskans of the Shield and Mackenzie Drainage. In *Handbook of North American Indians*. Vol.6, Subarctic. Ed. J. Helm. Washington, DC: Smithsonian Institute.
- Gwillim, J. C. 1920. *Report of Oil Survey in the Peace River District, 1919*. BC Department of Lands. Victoria, BC: Queens Printer.
- Helm, C. 2000. *Beyond Rock and Coal: The History of the Tumbler Ridge Area*. Tumbler Ridge, BC: MCA Publishing.
- Helm, C. 2008. *Exploring Tumbler Ridge*. Tumbler Ridge, BC: Publishing Division, Tumbler Ridge News.
- Heritage Branch. 2013. Heritage Conservation / Preservation Overview. <http://www.for.gov.bc.ca/heritage/overview.htm> Heritage Branch, British Columbia Ministry of Forests, Lands and Natural Resource Operations (accessed February 2013).
- Himour, B., R. Wondrasek, and B. Watson. 2007. *Archaeological Impact Assessment for the SemCAMS Redwillow ULC Redwillow Pipeline Project b-33-G/93-P-03 (British Columbia) to the BC/Alberta Border*. HCA Permit 2007-0252. Report on file with the Archaeology Branch, Victoria, BC.
- Holland, S. S. 1976. *Landforms of British Columbia: A Physiographic Outline*. Bulletin 48. British Columbia Department of Mines and Petroleum Resources: n.p.
- Holzworth, J. W. 1923. *Report on Trip Taken in August, September and October, 1923 by John W. Holzworth in Northeastern British Columbia in the Interests of the United States Biological Survey on the Subject of Mountain Sheep and Caribou Distribution*. Smithsonian Institution Archives.

- Horetzky, C. 1874. *Canada on the Pacific: Being an Account of a Journey from Edmonton to the Pacific by the Peace River Valley; and of a Winter Voyage along the Western Coast of the Dominion; with Remarks on the Physical Features of the Pacific Railway Route and Notices of the Indian Tribes of British Columbia*. Montreal, QC: Dawson Brothers, Publishers.
- Jackson, L., Jr., N. Rutter, O. Hughes, and J. Clague. 1989. Glaciated Fringe. In *Quaternary Geology of Canada and Greenland*. Ed. R. Fulton. 63-68. Ottawa, ON: Geological Survey of Canada.
- Jenness, D. 1937. *The Sekani Indians of British Columbia*. Bulletin No. 84, Anthropological Series No. 20. Ottawa, ON: National Museum of Canada.
- Kennedy, M, and B. O. K. Reeves. 1982. *Final Report Stage III Heritage Resource Impact Management Studies, Monkman Coal Project, Northeastern British Columbia*. HCA Permit 1981-0011. Report on file with the Archaeology Branch, Victoria, BC.
- Kessick, S. and B. Hrychuk. 2005. *Archaeological Impact Assessment, Western Canadian Coal Corp.'s Wolverine Coal Mine Project*. HCA Permit 2003-0227. Report on file with the Archaeology Branch, Victoria, BC.
- Killin, S. D. and B. Hrychuk. 2006. *Archaeological Impact Assessment Final Report, Western Canadian Coal Corporation's Hermann Mine Project*. HCA Permit 2005-0376. Report on file with the Archaeology Branch, Victoria, BC.
- Killin, S. D., S. McKnight, and B. Hrychuk. 2006. *Archaeological Impact Assessment Final Report Volume I, Canadian Forest Products Ltd. FL A57332 Blk F9033*. HCA Permit 2006-015. Report on file with the Archaeology Branch, Victoria, BC.
- Krauss, M. E. and V. K. Golla. 1981. Northern Athapaskan Languages. In *Handbook of North American Indians*. Vol.6, Subarctic. Ed. J. Helm. Washington, DC: Smithsonian Institute.
- Kulle, B. J. and E. J. McCullough. 1994. *Archaeological Impact Assessment Westcoast Energy Inc. Pine River Expansion Project*. HCA Permit 1993-0074. Report on file with the Archaeology Branch, Victoria, BC.
- Land Tenures Branch. 2013. *Fossil Management in British Columbia*. Land Tenures Branch, British Columbia Ministry of Forests, Lands and Natural Resource Operations. [http://www.for.gov.bc.ca/Land\\_Tenures/fossil\\_management/index.html](http://www.for.gov.bc.ca/Land_Tenures/fossil_management/index.html) (accessed February 2013).
- Leonard, D. W. 1995. *Delayed Frontier: The Peace River Country to 1909*. Calgary, AB: Edmonton and District Historical Society.
- Library and Archives Canada. 1900. Department of Indian Affairs, no. 29858 10. MIKAN no. 3842345. Treaty 8 Boundaries Map.
- Lifeways of Canada. 1981. *Monkman Coal Project, Stage II Report, Volume 5 Heritage Resource Detailed Impact Assessment*. HCA Permit 1980-0011. Report on file with the Archaeology Branch, Victoria, BC.
- MacDonald, G. 1987. Postglacial Development of the Subalpine-Boreal Transition Forest of Western Canada. *Journal of Ecology*, 75:303-320.
- Macek, A. 2006. *The Early Years of the Canadian Pacific Railway in BC*. <http://canyon.alanmacek.com/index.php/Surveying/#1875> (accessed February 2013).
- McCrea, R. T. 2013. Preliminary Assessment of the Palaeontological Potential of the Murray River Coal Project Study Area (NTS 93P). Prepared for HD Mining International Ltd.: n.p.

- McKnight, S., and B. Hrychuk. 2006. *Archaeological Impact Assessment Final Report, SemCAMS Central Alberta Midstream Wapiti West Pipeline Project (BC)*. HCA Permit 2005-0397. Report on file with the Archaeology Branch, Victoria, BC.
- McKnight, S., S. D. Killin, and B. Hrychuk. 2007. *Archaeological Impact Assessment Final Report, Western Canadian Coal Corporation's Wolverine Project New Disturbance Area, Perry Creek 3.0*. HCA Permit 2006-0373. Report on file with the Archaeology Branch, Victoria, BC.
- McKnight, S., S. Killin, B. Hrychuk, and E. Butte. 2006. *Archaeological Impact Assessment Final Report Volumes 1 and 2, Canadian Forest Products Ltd. Fl A57332 Blk F9001 and F90*. HCA Permit 2006-0244. Report on file with the Archaeology Branch, Victoria, BC.
- Meidinger, D. and J. Pojar, Eds. 1991. *Ecosystems of British Columbia*. Research Branch, BC Ministry of Forests: Victoria, BC.
- O'Neill, C. and B. Hrychuk. 2002. *Pre-Impact Archaeological Assessment, Western Canadian Coal Corp.'s Wolverine Coal Mine Project*. HCA Permit 2001-0331. Report on file with the Archaeology Branch, Victoria, BC.
- Palmer, A. 2008. *Final Archaeological Impact Assessment Report of the Proposed Wapiti Power Development Project, Tumbler Ridge, BC*. HCA Permit 2006-0387. Report on file with the Archaeology Branch, Victoria, BC.
- Parks Canada. 2013. *Canadian Register of Historic Places*. <http://www.historicplaces.ca/en/home-accueil.aspx> (accessed January 2013).
- Peace Region Palaeontology Research Centre. 2013. *Peace Region Paleontology Research Centre*. <http://www.prprc.com/> (accessed June 2013).
- Petro Canada Coal Division. 1983. *The Land Use and Occupancy System of the Métis Trappers of Kelly Lake, British Columbia*. Calgary, AB: Petro Canada Coal Division.
- Poplin, E. and B. O. K. Reeves. 1982. *Final Report Stage II Heritage Resource Impact Assessment, Quintette Coal Project*. HCA Permit 1981-0019. Report on file with the Archaeology Branch, Victoria, BC.
- Reeves, B. O. K. 1977. *Archaeological Overview and Selective Reconnaissance Denison Coal Limited Quintette Development Area*. HCA Permit 1977-0034. Report on file with the Archaeology Branch, Victoria, BC.
- Reeves, B. O. K. 1980. *Draft Report Stage II Heritage Resource Detailed Impact Assessment, Monkman Coal Project, Northeastern British Columbia*. HCA Permit 1980-0011. Report on file with the Archaeology Branch, Victoria, BC.
- Rescan. 2011a. *Murray River Underground Coal Mine Project: Archaeological Impact Assessment Final Report, Heritage Conservation Act Permit 2010-0279*. Prepared for HD Mining International Ltd. by Rescan Environmental Services Ltd.: Vancouver, BC.
- Rescan. 2011b. *Murray River Coal Project: 2011 Wildlife Characterization Baseline Report*. Prepared for HD Mining International Ltd. by Rescan Environmental Services Ltd.: Vancouver, BC.
- Rescan. 2012. *Murray River Coal Project: Traditional Knowledge and Traditional Use Desk-Based Research Report*. Vancouver, BC: Prepared for HD Mining International Ltd. by Rescan Environmental Services Ltd.: Vancouver, BC.
- Rescan 2013. *Murray River Coal Project: Archaeological Impact Assessment Final Report, Heritage Conservation Act Permit 2012-0099*. Prepared for HD Mining International Ltd. by Rescan Environmental Services Ltd.: Vancouver, BC.

- Robinson, M. and D. Hocking. 1982. *The Monkman Pass and Trail, A Brief History*. Calgary, AB: Petro-Canada Coal Division.
- Ridington, R. 1981. Beaver. In *Handbook of North American Indians*. Vol.6, Subarctic. Ed. J. Helm. Washington, DC: Smithsonian Institute.
- Selwyn, A .R. C. 1877. *Geological Survey of Canada, Report of Progress 1875-1876*. Geological Survey of Canada: Ottawa, ON.
- Singer, K. and B. Hrychuk. 2008. *Archaeological Impact Assessment Final Permit Report: Kennecott 2007 Murray River Test Holes*. HCA Permit 2007-0165. Report on file with the Archaeology Branch, Victoria, BC.
- Stryd, A. H. 1982a. *Monkman Project Monkman Creek Rail Spur Stage I-II Heritage Impact Assessment*. HCA Permit 1982-0015. Report on file with the Archaeology Branch, Victoria, BC.
- Stryd, A. H. 1982b. *Monkman Coal Project Infrastructure, Stages I and II Heritage Impact Management Assessment for Ancillary Developments*. HCA Permit 1982-0015. Report on file with the Archaeology Branch, Victoria, BC.
- Thompson, Berwick, Pratt & Partners. 1978. *Physical Plan, Tumbler Ridge, Northeast Sector, B. C.* Prepared for the BC Ministry of Municipal Affairs and Housing by Thompson, Berwick, Pratt & Partners: Victoria, BC.
- Truax, M. F. and B. F. Sheehan. 1988. *People of the Pass*. Beaverlodge, AB: Beaverlodge and District Historical Association.
- Tumbler Ridge Aspiring Geopark Steering Committee. 2013. *Tumbler Ridge Aspiring Geopark*. Expression of Interest submission for a UNESCO Global Geo Park dated October 2013. Accessed February 2014 (<http://www.trmf.ca/TRAG%20Submission%20to%20UNESCO.pdf>).
- Waters, C. 2011. *Thunder Mountain Wind Project Archaeological Impact Assessment*. HCA Permit 2008-0303. Report on file with the Archaeology Branch, Victoria, BC.
- White, J. 1983. *Late Quaternary Geochronology and Palaeoecology of the Upper Peace District, Canada*. PhD diss., Department of Archaeology, Simon Fraser University.
- Wilson I. R. 1989. The Pink Mountain Site (HhRr-1): An Early Prehistoric Campsite in Northeastern BC. *Canadian Journal of Archaeology*, 13:51-57.
- Wondrasek, R., W. Lewis, and S. Kasstan. 2008. *Archaeological Impact Assessment for the SemCAMS Redwillow ULC Redwillow Pipeline Project b-33-G/93-P-03 (British Columbia) to the BC/Alberta Border*. HCA Permit 2008-0245. Report on file with the Archaeology Branch, Victoria, BC.
- Wolf, K. E. 1993. *Radiocarbon Chronology for Glacial Lake Peace*. M.Sc. thesis, Department of Geography, Simon Fraser University.



# Appendix A

## Archaeological Sites within the Regional Study Area

## Appendix A. Archaeological Sites within the Regional Study Area

Borden Number	Site Class	Site Type	Comments	Permit Number
GeRe-1	Prehistoric	Lithic Scatter; Fire Altered Rock; Faunal Remains;	The site consists of one black chert, bifacial knife, one black chert, unifacially retouched flake, one split, quartzite cobble, and fire cracked rock. The site was later excavated, yielding 201 artifacts, the majority of which were debitage; materials included black cherts, black/grey siltstones, and multi-coloured quartzites. Two additional retouched flakes and one end scraper fragment were also recovered. Calcined bone fragments were also recovered, some of which was identified as small deer.	1980-011; 1981-011
GeRe-2	Prehistoric	Fire Altered Rock	The site consists of two small fire cracked rock spalls and 2 fire reddened cobbles.	1980-011
GeRe-7	Prehistoric	Lithic Scatter; Fire Altered Rock	The site consists of 5 pieces of fire cracked rock. The site was later excavated, yielding 71 artifacts, including 2 scrapers, several cores, and debitage. Material types included grey and brown chert, quartzite, siltstone, obsidian, and conglomerate.	1980-011; 1981-011
GeRe-8	Historic	Trail	The site consists of a historic trail. The site is located in the Kinuseo Creek drainage and runs from the confluence of Hambler and Flatbed creeks to Five Cabin Creek.	1982-015
GeRe-9	Prehistoric	Faunal Remains	The site consists of a cluster of burnt and calcined bone fragments (left in situ) observed in a shovel test. The site is located on a knoll, along the terrace edge west of the Kinuseo Creek and Flatbed Creek Basin.	1981-11
GeRe-10	Prehistoric	Hearth	The site consists of one hearth feature, including a cluster of cobbles, charcoal, one piece of fire broken rock, and red stained earth; no materials were collected. The site is located on a knoll on the north side of Kinuseo Creek canyon.	1981-011
GeRe-11	Prehistoric	Lithic Scatter; Faunal Remains	The site consists of 550+ lithics of various materials and faunal remains, all collected. The site is located west of Kinuseo Creek.	2005-406
GeRe-15	Prehistoric	Lithic Scatter	The site consists of 9 flakes (collected). The site is located west of Kinuseo Creek.	2006-173
GeRe-16	Prehistoric	Lithic Scatter	The site consists of 26 pieces of debitage (collected). The site is located west of Kinuseo Creek.	2006-173
GeRe-17	Prehistoric	Lithic Scatter; Hearth	The site consists of 50+ flakes (collected) of material types, including chert and quartzite, and fire cracked rock. The site is located east of Honeymoon Creek.	2008-349
GeRf-1	Prehistoric	Isolated Lithic Find	The site consists of a single end scraper.	1976-004
GeRf-2	Historic	Cabin	The site consists of the remains of 2 log cabins and several associated outhouse and earth-removal pits; surface historical debris is also present. The Hambler Creek pack trail runs just south of the site. The site is located on a small fluvial terrace along upper Quintette Creek. The cabins, which were used in winter during the trapping season, were built in the 1930s or early 1940s and were abandoned in the 1950s.	1982-015
GeRf-3	Historic	Trail	The site consists of a single CMT (cambium-stripped lodgepole pine). The tree is approximately 110-150 years old and debarking probably occurred 30-40 ago. The CMT is along the Hambler pack trail, located on the shore of Quintette Lake.	1982-015
GeRf-4	Prehistoric	Lithic Scatter	The site consists of a lithic scatter of 46 artifacts, including black and grey chert flakes, some with retouch, white quartzite flakes, and several basalt flakes. The site is located on a low rise of land along the edge of Quintette Lake.	1982-015

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Borden Number	Site Class	Site Type	Comments	Permit Number
GeRf-5	Historic	Trail	The site consists of a single CMT (cambium-stripped lodgepole pine). The tree is between 100 and 130 years old, and debarking likely occurred approximately 40 years ago. The site is located along the Hambler pack trail, on the shore of Quintette Lake.	1982-015
GeRf-6	Historic	Trail	The site consists of a single CMT (cambium-stripped lodgepole pine). The tree is approximately 100 years old, and debarking likely occurred 30-40 years ago. The site is located along the Hambler pack trail, on the shore of Quintette Lake.	1982-015
GeRf-7	Historic	Trail	A section of the Hambler pack trail, which once connected Flatbed Creek with the Five Cabin site.	1982-015
GeRf-8	Prehistoric	Lithic Scatter; Faunal Remains	The site consists of 550+ lithics of various material types, and faunal remains; all materials were collected. The site is located on a terrace north of Kinuseo Creek.	2005-406
GeRf-9	Prehistoric	Lithic Scatter	The site consists of 101 flakes recovered from shovel tests, and one flake and one hammerstone recovered from surface exposures; artifacts are of various lithic material types. All artifacts were collected. The site is located near the confluence of an unnamed creek and Kinuseo Creek. There is heavy surface disturbance throughout the site from previous road construction and deactivation.	2005-406
GeRf-10	Prehistoric	Isolated Lithic Find	The site consists of one basalt flake (collected). The site is located north of Kinuseo Creek, on a terrace on the bank of an unnamed tributary.	2005-406
GeRf-11	Prehistoric	Isolated Lithic Find	The site consists of one broken unifacial tool (collected), possibly a drill or knife, of black chert with thin white bands. The site is located east of Quintette Creek within an existing wellsite.	2006-173
GeRf-12	Prehistoric	Lithic Scatter	The site consists of six flakes (collected) of various materials. The site is located on the side of Five Cabin Creek.	2008-349
GeRg-1	Prehistoric	Lithic Scatter	The site consists of a lithic scatter of 5 flakes.	1976-004
GeRg-2	Prehistoric	Lithic Scatter	The site consists of two chert flakes (collected). The site is located north of Kinuseo Creek.	2006-173
GfRe-1	Prehistoric/ Historic	Habitation Site; Faunal Remains	The site consists of five log cabins located on the side of Hambrook Creek. One bone awl was found and collected as well. According to Ball the cabins were built at the turn of the century and occupied seasonally until at least the end of WWI.	1977-007
GfRe-2	Prehistoric	Faunal Remains	The site consists of one bone awl (collected) found on the ground surface.	1977-007
GfRe-3	Prehistoric	Cultural Depression	The site consists of a cultural depression/circular petroform. The site is located on a small terrace on the east side of a meadow on Hambrook Creek.	1977-007
GfRe-4	Historic	Habitation Site	The site is an historic settlement known as Callahaison Flats. The site consists of the remains of 4-5 log cabins, and a variety of associated features such as outdoor earth ovens, outhouse pits, and earth-removal pits; historical debris is also present. The site is located in an open fluvial terrace along the north side of Hambler Creek.	1982-015
GfRe-5	Historic	Burial	The burial site of Maggie Thomas. The site consists of an unmarked grave situated in a small clearing along Hambler Creek. Maggie Thomas died at age 12 while her family was residing at nearby Callahaison Flats (site GfRe-4) sometime between 1914 and 1918.	1982-015
GfRe-6	Historic	CMT site	The site consists of one CMT (cambium-stripped lodgepole pine) from the early 1900s located on a terrace above Flatbed Creek upstream from the mouth of Hambler Creek. The site post-dates the introduction of metal tools, is between 80 and 150 years old, but its exact antiquity is unknown; the debarking probably occurred between 50 and 100 years ago.	1982-015

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Borden Number	Site Class	Site Type	Comments	Permit Number
GfRe-7	Prehistoric	Isolated Lithic Find	The site consists of a single flake of orange-brown translucent chalcedony near the confluence of Flatbed Creek and an unnamed tributary.	1982-015
GfRe-8	Prehistoric	Lithic Scatter	The site consists of one grey chert flake fragment and one black chert biface fragment recovered from underneath the litter mat. The site is located at the edge of a terrace overlooking Flatbed Creek.	1982-015
GfRe-9	Prehistoric/ Historic	Lithic Scatter; Trail	The site consists of 4 grey chert flakes, one grey chalcedony flake, and one white chalcedony flake fragment; all artifacts were recovered from underneath the litter mat. The site is located at the edge of a terrace overlooking Flatbed Creek to the west; a historic pack trail runs along the terrace edge through the site, however, no culturally modified trees were observed.	1982-015
GfRe-10	Prehistoric	Lithic Scatter	The site consists of 7 grey-black chert flakes, one yellow quartzite retouched flake fragment, one yellow quartzite flake, and one white quartzite flake. The site is located on a terrace above an unnamed creek flowing into Flatbed Creek.	1982-015
GfRe-11	Historic	Trail	The site consists of a historic transportation trail. The site is located at the confluence of Hambler and Flatbed Creeks, and runs along Hambler Creek to Five Cabin Creek.	1982-015
GfRe-12	Prehistoric	Isolated Lithic Find	The site consists of a single black quartzite flake. The site is located on a ridge; a game trail runs along the top of the ridge.	2008-303
GfRe-13	Prehistoric	Lithic Scatter	The site consists of 5 black chert flakes and one grey-brown chert flake. The site is located on a small knoll overlooking black spruce muskeg. The site is associated with a natural travel corridor between ridges separating Flatbed and Hambrook creeks.	2008-303
GfRe-14	Prehistoric	Isolated Lithic Find	The site consists of a single black quartzite flake (reburied). The site is located on a high point at the north end of a ridge overlooking Calamagrostis Flats, Hambrook Creek, and the surrounding landscape.	2008-303
GfRf-1	Prehistoric	Isolated Lithic Find	The site consists of a single quartzite chopper (collected) exposed in the road edge. The site is located on a knoll north of Babcock Creek.	1977-034; 2009-174
GfRf-2	Prehistoric	Lithic Scatter	The site consists of black and grey chert flakes (collected) on surface exposures. The site is located on a prominent knoll/ridge on the side of Babcock Creek.	1977-034; 2009-174
GfRf-3	Prehistoric	Lithic Scatter	The site consists of a quartzite side scraper and flakes (collected) exposed in an exploration road. The site is located on the edge of a high terrace on the southern side of Babcock Creek.	1977-034; 2009-174
GfRf-4	Prehistoric	Lithic Scatter	The site consists of five pieces of quartzite debitage on a surface exposure, and two chert flakes recovered from subsurface tests. The site is located on a knoll overlooking Babcock Creek.	1981-019
GfRf-5	Prehistoric	Isolated Lithic Find	The site consists of a single white quartzite flake recovered from a bulldozer cut. The site is located on a broad terrace above Murray River.	1981-019
GfRf-6	Prehistoric	Lithic Scatter	The site consists of three grey chert flakes (collected), and one piece of core shatter (left in situ). The site is located on a break in slope on a high ridge on side of a tributary of Babcock Creek. The site has been heavily disturbed.	1992-018; 2009-174
GfRf-7	Prehistoric	Lithic Scatter	The site consists of dark chert and grey and red quartzite flakes, some utilized and retouched.	2004-310
GfRf-8	Prehistoric	Isolated Lithic Find	The site consists of one dark green/black obsidian flake (collected). The site is located on a knoll in a patch of muskeg.	2004-310

**Appendix A. Archaeological Sites within the Regional Study Area**

<b>Borden Number</b>	<b>Site Class</b>	<b>Site Type</b>	<b>Comments</b>	<b>Permit Number</b>
GfRf-9	Prehistoric	Lithic Scatter	The site consists of one black chert utilized flake, one scraper and one core fragment of grey quartzite, and 11 pieces of chert and quartzite debitage; all artifacts were collected. The site is located on a large bedrock ridge northwest of Babcock Creek.	2004-310; 2009-174
GfRf-10	Prehistoric	Isolated Lithic Find	The site consists of one utilized quartzite chopper (collected) located on a low rise on a steep-sided knoll.	2004-310
GfRf-11	Prehistoric	Lithic Scatter	The site consists of two pieces of chert debitage and one backed triangular quartzite knife. The site is located on the top of a steep sided knoll.	2004-310
GfRf-12	Prehistoric	Lithic Scatter	The site consists of seven pieces of chert and shale debitage. The site is located on the top of a moderately steep-sided, east to west trending ridge.	2004-310
GfRf-13	Prehistoric	Petroform	The site consists of one ovate petroform constructed of loose rocks, representing either a cairn or a cache. The feature is at the foot of a bedrock ridge forming the peak of Roman Mountain.	2007-320
GfRf-14	Prehistoric	Lithic Scatter	The site consists of one grey quartzite utilized flake/scraper and one black chert retouched flake. The site is located on a break in a gentle slope, overlooking a gully.	2007-320
GfRf-15	Prehistoric	Lithic Scatter	The site consists of one quartzite chopper, a grey quartzite retouched flake, and a white chert retouched flake on gravel exposures, and four brown chert retouched flakes recovered from subsurface testing. The site is located on an open plateau and vegetated trough on the southern slopes of Roman Mountain.	2007-320
GfRf-16	Prehistoric	Rock Shelter; Isolated Lithic Find	The site consists of a rock shelter, and one utilized, grey quartzite flake recovered from subsurface testing. The site is located near the summit of Roman Mountain; the shelter offers protection from winds, and a view of the slope of Roman Mountain and the valley below.	2007-320
GfRf-17	Prehistoric	Lithic Scatter	The site consists of two chert flakes, and two retouched flakes, one obsidian and one black chert. The site is located at the end of a high ridge near Babcock Creek.	2007-320
GfRf-18	Prehistoric	Lithic Scatter	The site consists of two grey quartzite flakes (collected). The site is located on a terrace overlooking Babcock Creek.	2007-320; 2009-174
GfRf-19	Prehistoric	Isolated Lithic Find	The site consists of one dark shale utilized flake. The site is located in a clearing at the base of a bedrock ridge.	2007-320
GfRf-20	Prehistoric	Isolated Lithic Find	The site consists of one grey quartzite utilized flake on a gravel/bedrock exposure. The site is located on a bedrock ridge at the base of Roman Mountain.	2007-320
GfRf-21	Prehistoric	Isolated Lithic Find	The site consists of one white chert retouched flake. The site is located on a break in slope on a bedrock ridge running up the side of Roman Mountain.	2007-320
GfRf-22	Prehistoric	Lithic Scatter	The site consists of two retouched, split pebbles (collected). The site is located on Quintette Mountain, on a terrace overlooking a small drainage.	2011-015
GfRf-24	Prehistoric	Isolated Lithic Find	The site consists of one modified basalt split pebble (collected). The site is located on Babcock Mountain, on a terrace overlooking a small drainage.	2011-0015
GfRf-26	Prehistoric	Sub-surface Lithics	The site is located on Babcock Mountain, on a raised, flat area that overlooks a small drainage.	2011-015
GgRe-1	Prehistoric	Isolated Lithic Find	The site consists of a single split and worked black chert pebble with cortex and use-wear. The site is located on an level area on an undulating ridge above a terrace of Hambrook Creek.	2008-303

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Borden Number	Site Class	Site Type	Comments	Permit Number
GgRe-2	Prehistoric	Lithic Scatter	The site consists of 38 black/grey chert flakes, 2 grey quartzite flakes, 1 grey chalcedony flake, 1 black basalt flake, and 1 black basalt unifacially retouched flake (broken in two pieces). The site is located near the shore of Bearhole Lake.	2008-375
GgRf-1	Historic	CMT site	The site consists of 8 barked stripped, lodgepole pine trees. The site is located on level terrain in a small valley near Quality Creek.	1998-299
GgRf-2	Prehistoric	Lithic Scatter	The site consists of four pieces of chert and siltstone debitage (collected). The site is located on a gently sloping ridge.	2004-310
GgRf-3	Prehistoric	Isolated Lithic Find	The site consists of 1 piece of chert debitage (collected). The site is located on the edge of a moderately steep-sloped ridge.	2004-310
GgRf-4	Prehistoric	Isolated Lithic Find	The site consists of 1 piece of quartzite debitage (collected). The site is located on a ridge, near a moderately steep, southern slope.	2004-310
GgRf-5	Prehistoric	Lithic Scatter	The site consists of 2 pieces of debitage (one white quartzite decortication and one tertiary retouch flake of grey siltstone). The site is located on a low knoll. Road built on the west side of site impacting a 4 x 10 m low potential area.	2004-310, 2008-346
GgRf-6	Prehistoric	Isolated Lithic Find	The site consists of 1 piece of quartzite debitage (collected). The site is located on a low knoll.	2004-310
GgRf-7	Prehistoric	Isolated Lithic Find	The site consists of one black chert flake. The site is located on a low knoll.	2006-076
GgRf-8	Prehistoric	Lithic Scatter	The site consists of black chert debitage (surface and subsurface; collected). The site is located on a low knoll.	2006-076
GgRf-9	Prehistoric	Isolated Lithic Find	The site consists of 1 pink/grey quartzite, decortication flake (collected). The site is located on a low knoll.	2006-076
GgRf-10	Prehistoric	Lithic Scatter	The site consists of three black chert flakes collected from one subsurface test. The constructed road runs through the western edge of the site.	2004-310, 2007-0188
GgRg-1	Historic	Arbournlyph	The site consists of two tree carvings and an oval ring of stones, approximately 2 m in diameter. One carving is of a face in the trunk of a tree, and the other is in a fallen tree. The site is located on the bank of Flatbed Creek.	1976-004
GgRg-2	Prehistoric	Isolated Lithic Find	The site consists of one isolated basalt flake on the east side of Murray River.	1981-023
GgRg-3	Prehistoric	Isolated Lithic Find	The site consists of one large, retouched, black chert flake located on a terrace of Two Creek near its confluence with the Wolverine River. Site was disturbed by logging.	1987-006
GgRg-4	Prehistoric	Isolated Lithic Find	The site consists of one grey chert flake. The site is located on the bank of the Wolverine River.	2005-158
GgRg-5	Prehistoric	Lithic Scatter	The site consists of a small subsurface lithic scatter of 1 basalt flake, 1 grey siltstone flake, 3 grey chert flakes, 1 grey siltstone biface, and 1 grey chert retouched flake. The site is located on a small knoll overlooking an unnamed drainage.	2007-062
GgRg-6	Prehistoric	Isolated Lithic Find	The site consists of one grey chalcedony flake (collected). The site is located on the bank of the Murray River.	2007-072
GgRg-7	Prehistoric	Lithic Scatter	The site consists of two chalcedony flakes (collected). The site is located on a terrace of the Murray River.	2007-072
GgRg-8	Prehistoric	Isolated Lithic Find	The site consists of 1 tertiary flake of green translucent obsidian (left in situ). The site is located west of the Murray River.	2007-072
GgRg-9	Prehistoric	Lithic Scatter; Trail	Trail and lithic scatter. The site is located along a cutbank on the east side of the Murray River.	2012-099
GgRh-1	Prehistoric	Isolated Lithic Find	The site consists of one black chert side scraper and is located on the ground surface adjacent to the Wolverine River airstrip.	1981-019
GgRh-2	Prehistoric	Isolated Lithic Find	The site consists of an isolated, subsurface flake located on a terrace near the side of Perry Creek.	2005-158
GgRh-3	Prehistoric	Lithic Scatter	The site consists of nine black chert flakes (collected). The site is located on a well drained ridge.	2005-158