

# Chapter 16 – Physical and Cultural Heritage Assessment

Crown Mountain Coking Coal Project  
Application for an Environmental Assessment Certificate /  
Environmental Impact Statement

# Table of Contents

16.	Physical and Cultural Heritage Assessment	16-1
16.1	Introduction	16-1
16.1.1	Regulatory and Policy Setting	16-2
16.2	Scope of the Assessment	16-3
16.2.1	Valued Components and Measurement Indicators	16-3
16.2.2	Indigenous and Stakeholder Consultation	16-4
16.2.3	Assessment Boundaries	16-4
16.2.3.1	Spatial Boundaries	16-4
16.2.3.2	Temporal Boundaries	16-10
16.2.3.3	Administrative Boundaries	16-11
16.2.3.4	Technical Boundaries	16-11
16.3	Existing Conditions	16-11
16.3.1	Regional and Local Overview	16-11
16.3.1.1	Archaeological and Historical Setting	16-12
16.3.1.2	Palaeontological Setting	16-14
16.3.2	Archaeology Baseline Program (Archaeological Impact Assessment)	16-14
16.3.2.1	Methods	16-14
16.3.2.2	Results	16-18
16.4	Project Effects Assessment	16-37
16.4.1	Thresholds for Determining Significance of Residual Effects	16-37
16.4.2	Project Effects	16-37
16.4.2.1	Project Interactions	16-37
16.4.3	Discussion of Potential Effects	16-43
16.4.3.1	Change in Palaeontological Resources due to Ground Disturbance Activities	16-43
16.4.3.2	Change in Archaeological Resources due to Ground Disturbance Activities	16-43
16.4.3.3	Transboundary Effects	16-47
16.4.4	Mitigation Measures	16-47
16.4.4.1	Mitigation Measures for Change in Palaeontological Resources due to Ground Disturbance Activities	16-47
16.4.4.2	Mitigation Measures for Change in Archaeological Resources due to Ground Disturbance Activities	16-48
16.4.4.3	Summary of Mitigation Measures for Physical and Cultural Heritage	16-50
16.4.5	Characterization of Residual Effects, Significance, Likelihood, and Confidence	16-50
16.4.5.1	Determination of Significance	16-55
16.4.5.2	Likelihood and Confidence	16-55
16.4.5.3	Summary of Residual Effects Assessment	16-55
16.5	Cumulative Effects Assessment	16-58
16.5.1	Overview of Residual Effects	16-58
16.5.2	Assessment Boundaries	16-58
16.5.3	Identifying Past, Present, and Reasonably Foreseeable Projects and/or Activities	16-58
16.5.4	Identification of Cumulative Effects	16-59

16.5.5	Mitigation for Cumulative Effects .....	16-59
16.5.6	Summary of Cumulative Effects Assessment.....	16-60
16.6	Follow-up Strategy .....	16-60
16.7	Summary and Conclusions.....	16-61
16.8	References .....	16-62

## Figures

Figure 16.2-1:	Project Footprint and Archaeological Local Study Area (LSA).....	16-9
Figure 16.3-1:	AOA Polygons within the Archaeological Local Study Area .....	16-13
Figure 16.3-2:	Archaeological Impact Assessment Program Study Areas within the Archaeological LSA (Phases I - III) .....	16-16
Figure 16.3-3:	Archaeological Potential Areas within the Archaeological LSA (Phase I Study Area).....	16-31
Figure 16.3-4:	Archaeological Potential Areas within the Archaeological LSA (Phase II Study Area).....	16-32
Figure 16.3-5:	Archaeological Potential Areas within the Archaeological LSA (Phase III Study Area) .....	16-33
Figure 16.3-6:	Archaeological Sites Identified within the Archaeological LSA (Phase I Study Area) .....	16-34
Figure 16.3-7:	Archaeological Sites Identified within the Archaeological LSA (Phase II Study Area) .....	16-35
Figure 16.3-8:	Archaeological Sites Identified within the Archaeological LSA (Phase III Study Area) ....	16-36
Figure 16.4-1:	Archaeological Sites in the Project Footprint.....	16-53

## Tables

Table 16.1-1:	Legislation, Regulations, and Guidelines Pertaining to Physical and Cultural Heritage .....	16-3
Table 16.2-1:	Summary of Consultation Feedback on Physical and Cultural Heritage.....	16-5
Table 16.2-2:	Temporal Boundaries for the Effects Assessment for Physical and Cultural Heritage .....	16-10
Table 16.3-1:	Archaeological Overview Assessments.....	16-15
Table 16.3-2:	Baseline Archaeological Program Phases and Associated Study Areas.....	16-15
Table 16.3-3:	Summary of Archaeological Sites Assessed within the Archaeological LSA.....	16-21
Table 16.4-1:	Project-Physical and Cultural Heritage Interaction Matrix and Ranking .....	16-37
Table 16.4-2:	Potential Effects on Physical and Cultural Heritage .....	16-42
Table 16.4-3:	Summary of Potential Project Effects on Archaeological Sites in the Project Footprint and Archaeological LSA.....	16-44
Table 16.4-4:	Summary of Proposed Mitigation Measures Related to Physical and Cultural Heritage .....	16-51
Table 16.4-5:	Summary of Residual Effects on Archaeological Resources.....	16-56

## Appendices

- Appendix 16-A. Archaeological Impact Assessment Reports for the Crown Mountain Coking Coal Project
- Appendix 16-B. Crown Mountain Coking Coal Project Preliminary Fossil Impact Assessment

# 16. Physical and Cultural Heritage Assessment

## 16.1 Introduction

This chapter describes the assessment of Project effects on archaeological resources (materials and sites) and physical and cultural heritage and any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance, hereafter referred to as “physical and cultural heritage” for brevity. Although the Application Information Requirements (AIR; Environmental Assessment Office [EAO], 2018 refers to the archaeological resources discipline Valued Component (VC) as archaeological resources (materials and sites), for the purposes of this assessment, the archaeological resources (material and sites) VC is included within the assessment on physical and cultural heritage (as identified in the Guidelines for the Preparation of an Environmental Impact Statement for the Crown Mountain Coking Coal Project [EIS Guidelines; Canadian Environmental Assessment Agency, 2015] and is referred to as archaeological resources, where appropriate. Physical and cultural heritage resources (e.g., artifacts, objects, or places) are distinguished from other lands and resources by the value placed on upon them (Canadian Environmental Assessment Agency, 2015). The value of physical or cultural heritage resources may originate from their:

- Association with important aspect(s) of human history or culture;
- Historical, archaeological, paleontological, or architectural significance; or
- Association with a particular group’s practices, traditions or customs (Canadian Environmental Assessment Agency, 2015).

Any Project involving ground disturbance has the potential for interaction with physical and cultural heritage. Archaeological resources (materials and sites) including artifacts (i.e., lithic artifacts, faunal remains, fire-altered rock) and features (i.e., a constellation of artifact contexts [e.g., burials, hearths, roasting pits]) are largely contained to surficial and relatively shallow subsurface matrices (i.e., topsoil and mineral soil), whereas palaeontological objects (i.e., fossils) tend to be found in underlying matrices (i.e., bedrock). Accordingly, the Construction and Pre-Production phase of the Project has the greatest potential for interaction with physical and cultural heritage, as it is during this phase that the majority of the ground disturbance and earth moving activities will take place. The discovery, systematic recovery,

and interpretation of these resources can provide valuable information about previous human activity occurring within the landscape (in the case of archaeological objects), or natural history and evolution of flora and fauna in earlier eras (in the case of palaeontological objects); however, the disruption or destruction of these non-renewable resources can result in a non-reversible Project effect.

Physical and cultural heritage, including archaeological resources has been selected as a VC because of its importance to the people of the Elk Valley and British Columbia as a whole, and because these resources are recognized and managed by provincial regulatory agencies, and potentially affected Indigenous peoples have an interest in the preservation and management of physical and cultural heritage related to their history and culture.

The preservation and management of archaeological resources is very important to Indigenous peoples, as these resources (particularly pre-contact artifacts) are direct connections to their ancestors, history, culture, and traditions. Relevant findings that can be attributed to Indigenous peoples are also considered within the assessment of Project effects on Aboriginal and Treaty rights and interests in Chapters 23 to 31.

The physical and cultural heritage VC has linkages with other VCs; these effects are primarily assessed in the following chapters:

- Chapter 8: Soil and Terrain Assessment; and
- Indigenous Communities discussed in Chapters 23 through 31.

### 16.1.1 Regulatory and Policy Setting

Archaeological resources that pre-date A.D. 1846 (i.e., pre-contact artifacts) located on both public and private lands, and sites containing rock art, human burials, and wreckage of ships and aircraft, are automatically protected within the Province of British Columbia (B.C.) from both intentional and inadvertent disturbance by the Heritage Conservation Act (HCA; Heritage Conservation Act, 1996); disturbance must not occur without a permit. Built historical and palaeontological sites may be protected by law and are identified as requiring consideration in the environmental assessment (EA) as per the Canadian Environmental Assessment Act (CEA Act) 2012.

Legislation, regulations, and guidelines pertaining to the protection of physical and cultural heritage are listed in Table 16.1-1. The primary legislative mechanism for the protection of heritage resources (defined because of their historical, cultural, scientific, and educational value to communities, Indigenous groups, and the public) is the Heritage Conservation Act (1996) administered by the B.C. Archaeology Branch (British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development [FLNRORD]). Archaeological resources and sites are protected by the HCA through designation as “provincial heritage sites”, or through automatic protection by virtue of being of particular historical or archaeological value (FLNRORD, 2021). Protected archaeological sites may not be altered (i.e., changed in any manner) without a permit issued by the Minister or designate. Furthermore, the Province of B.C. may enter into a specific formal agreement with Indigenous communities under the HCA to conserve and protect heritage sites and heritage objects that represent the cultural heritage of Indigenous peoples.

Table 16.1-1: Legislation, Regulations, and Guidelines Pertaining to Physical and Cultural Heritage

Legislation/Guideline Name	Year	Description
Federal		
Canadian Environmental Assessment Act	2012	Sets out the requirements for the assessment of effects on physical and cultural heritage and on any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance.
Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archeological, Paleontological or Architectural Significance under the Canadian Environmental Assessment Act, 2012	2015	Supports the implementation of CEA Act, 2012 provisions related to the effects of any changes to the environment on physical and cultural heritage or on any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance and provides preliminary guidance on how to conduct assessments (Canadian Environmental Assessment Agency, 2015).
Provincial		
Heritage Conservation Act	1996	Protects and manages the disturbance of archaeological and significant heritage sites within the province.
Mines Act	1996	Requires a mine to submit a plan for the conservation and protection of “cultural heritage resources” that will be impacted by the mine and gives the chief inspector the power to require a security to protect or mitigate damage to cultural heritage resources as a condition of a permit.
Land Act	1996	Defines the Crown’s right to obtain fossils from any part of the land and transfer ownership or grant the right to remove fossils from Crown land, and designate protection to Crown land for the protection of heritage resources.
Mineral Tenure Act	1996	Defines the land on which a free miner may not enter or will be under restricted usage rights or suspension of operations, including a protected heritage property unless authorized by the Minister responsible.
Fossil Management Framework	2010	Implemented by the Land Tenures Branch of the B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. Supports specimen protection, impact prevention, and access management. It is administered under the Land Act, Heritage Conservation Act, and Mineral Tenure Act (FLNRORD, 2010).
British Columbia Archaeological Resource Management Handbook	1990; revised 2018	Provides a summary of the Archaeological Impact Assessment and review process in B.C. for projects that are subject to environmental impact assessment (FLNRORD 2018).

## 16.2 Scope of the Assessment

### 16.2.1 Valued Components and Measurement Indicators

The physical and cultural heritage VC includes heritage objects defined under the HCA as: “whether designated or not, personal property that has heritage value to British Columbia, a community or an aboriginal people” and heritage sites as: “whether designated or not, land, including land covered by water, that has heritage value to British Columbia, a community or an aboriginal people”. As noted in the

AIR (EAO, 2018) refers to the archaeological resources discipline valued component (VC) as archaeological resources (materials and sites), for the purposes of this assessment, the archaeological resources (material and sites) VC is included within physical and cultural heritage and referred to as archaeological resources, where appropriate.

As outlined in EIS Guidelines (Canadian Environmental Assessment Agency, 2015), the physical and cultural heritage assessment must also consider:

- Physical objects (e.g., middens, culturally-modified trees, historic buildings);
- Sites or places (e.g., burial sites, sacred sites, cultural landscapes); and
- Attributes (e.g., language, beliefs).

## 16.2.2 Indigenous and Stakeholder Consultation

NWP engaged with Indigenous groups and conducted consultation with public stakeholders and regulators. A summary of all consultation and engagement activities undertaken to date is presented in Chapter 4. A summary of consultation feedback specific to archaeological resources is presented in Table 16.2-1, including information obtained from the Ktunaxa Nation Council (KNC) that was used in the identification of issues and the overall assessment process and proposed mitigation measures. Additional feedback received from the KNC related to Project design is discussed in Chapter 2.

## 16.2.3 Assessment Boundaries

### 16.2.3.1 Spatial Boundaries

Three spatial boundaries were considered in the physical and cultural heritage assessment: the Project footprint, the Archaeological Local Study Area (LSA), and the Archaeological Regional Study Area (RSA). The Archaeological LSA was delineated through a combination of natural geographical and arbitrary boundaries in proximity conceptual engineering plans and the Project footprint. The paleontology desktop assessment was completed with the Project footprint only. The Project footprint and Archaeological LSA are shown in Figure 16.2-1. As detailed in Chapter 5, Table 5.3-2, the spatial boundaries for the physical and cultural heritage VC have changed from the study areas presented in the AIR. A discussion on the spatial boundaries used in the assessment is provided below.

The Project footprint is the most basic and immediate area of the Project and consists of the area of physical disturbance (i.e., ground disturbance, lay down areas, etc.) associated with the Project and encompasses all anticipated Project components, both temporary and permanent, covering approximately 13 square kilometres (km<sup>2</sup>) or 1,283 hectares (ha). The centre of the Project is positioned approximately 12 kilometres (km) northeast of the District of Sparwood and approximately 5 km west of the provincial boundary between B.C. and Alberta. The Project footprint is the area of physical disturbance associated with the Project and consists of the proposed surface extraction areas (three pits - North Pit, East Pit, and South Pit); mine rock management areas; mine infrastructure and support facilities, including the plant area (raw coal stockpile area and processing plant); clean coal transportation route; rail loadout facility and rail siding; and ancillary facilities (i.e., water supply, power supply, natural gas supply, water, sewage treatment, fuel storage and explosives storage). All watersheds in the Project footprint are located on the western side of the Continental Divide. The Project footprint is located within portions of two watersheds, Grave Creek and Alexander Creek. The majority of the Project footprint is located within the

Table 16.2-1: Summary of Consultation Feedback on Physical and Cultural Heritage

Topic	Feedback Received*:				Consultation Feedback	Feedback Source	Response or Actions Identified
	IG	G	P/S	O			
Potential impacts to archaeological sites	✓				Archaeological impacts (specifically the Grave Prairie area).	Comment received from the Ktunaxa Nation Council (KNC) during a meeting with NWP on November 17, 2014.	NWP acknowledged archaeological concerns within Grave Prairie and is committed to working with the KNC on infrastructure locations.
Potential impacts to burial sites and archaeological resources			✓		Potential human remains in the area. NWP needs to ensure these sites are protected, in addition to archaeological resources in the Grave Creek Canyon.	Comments received from local community members during the Public Open House on May 25, 2016.	NWP recognizes the importance of protecting archaeological and cultural resources and is committed to working with the KNC on infrastructure locations.
Location of Project infrastructure	✓				Concerns on the location of some of the Project infrastructure at Grave Prairie where there are known archaeological and cultural values.	Comment received from the KNC during the September 13, 2016 Waste Rock Layering Strategy Working Group Meeting.	NWP acknowledged archaeological concerns within Grave Prairie and is committed to working with the KNC on infrastructure locations.
Location of Project infrastructure	✓				Concerns regarding proposed rail infrastructure within Grave Prairie.	Comment received from the KNC during a Project meeting on December 14, 2016.	NWP acknowledged archaeological concerns within Grave Prairie and is committed to working with the KNC on infrastructure locations.
Location of Project exploration/infrastructure	✓				KNC expressed some concern regarding the geology holes proposed under the second Notice of Work (NOW #2), as they represent a potential expansion to the resource area. In particular, concerns regarding proposed rail infrastructure within Grave Prairie.	Comment received from the KNC during a meeting to discuss NWP's submittal of two NOW on March 12, 2018.	NWP worked with KNC to consider alternate locations for the Rail Loadout outside of the Grave Prairie area.

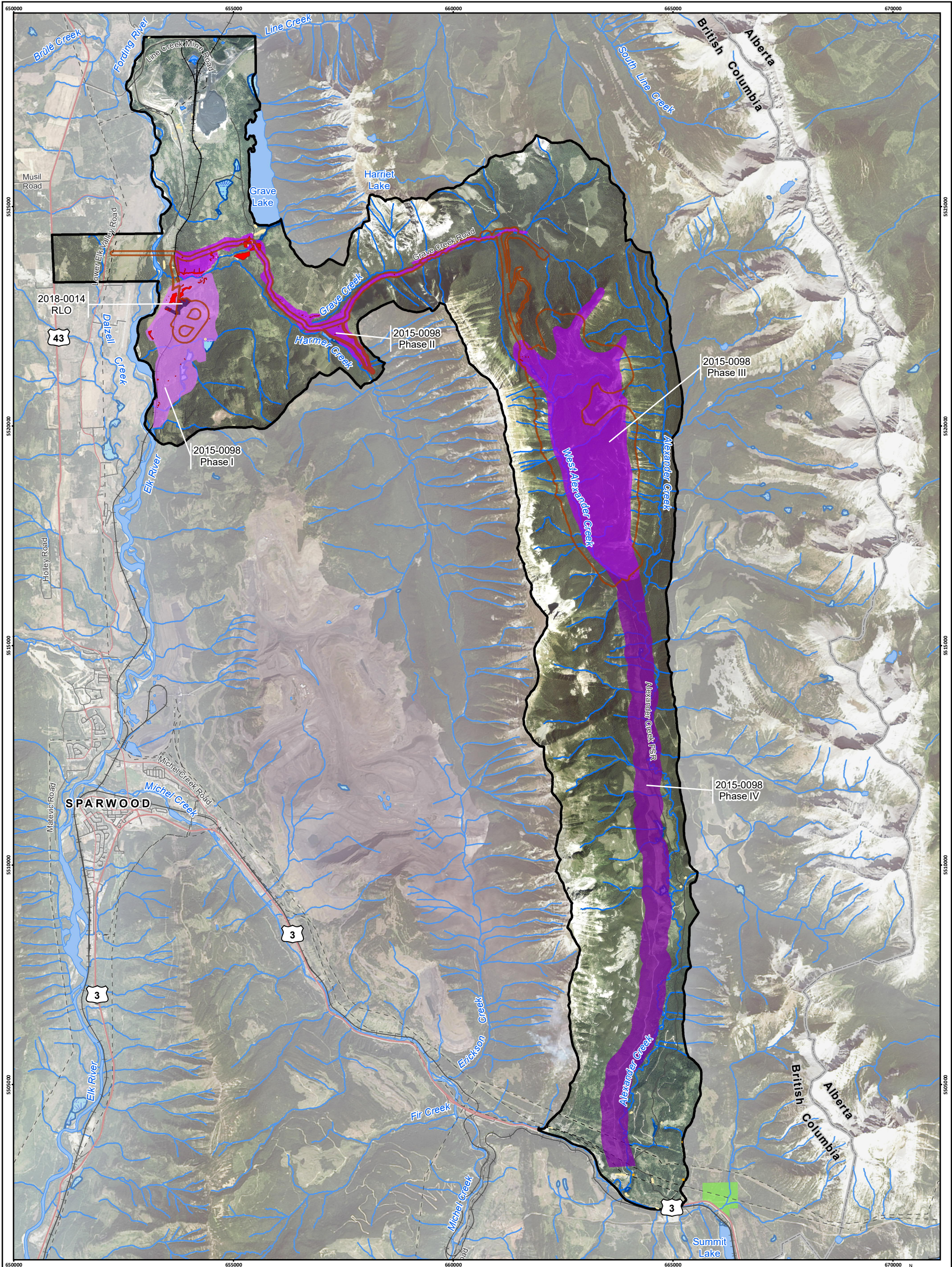
Topic	Feedback Received*:				Consultation Feedback	Feedback Source	Response or Actions Identified
	IG	G	P/S	O			
Location of Project exploration/infrastructure	✓				Concerns regarding exploration in the Grave Prairie and Upper Grave Creek Area due to results of preliminary archaeological field work showing the area is much richer in cultural resources than previously recorded.	Letter sent to FLNRORD from the KNC on July 23, 2018 regarding the NWP NOW Vicinity of Sparwood and Permit Amendment for Grave Prairie and Upper Grave Creek	NWP organized field trips to the Grave Prairie area in 2018 and 2020 and provided the KNC with results of all Archeological Impact Assessments conducted for the Project. NWP is committed to working closely with the KNC on infrastructure locations.
Testing of suspected burial sites	✓				The KNC does not approve of intrusive testing or the disturbance of suspected burials to confirm that they are indeed burials or to develop “mitigation” strategies.	Letter sent to FLNRORD from the KNC on July 23, 2018 regarding the NWP NOW Vicinity of Sparwood and Permit Amendment for Grave Prairie and Upper Grave Creek	NWP and Tipi Mountain Eco-Cultural Services agreed they would not conduct intrusive testing in areas where they believe ancestral remains to be located during the field component of the archaeological assessment (ca. 2017-2020).
Archaeological Impact Assessment	✓				The KNC requested the results of the Archaeological Impact Assessment conducted in the Crown Mountain area in summer/fall 2018, including potential impacts and recommendations for mitigation.	Letter sent to FLNRORD from the KNC on July 23, 2018 regarding the NWP NOW Vicinity of Sparwood and Permit Amendment for Grave Prairie and Upper Grave Creek	NWP provided the KNC with results of all Archeological Impact Assessments conducted for the Project.
Proposed Rail Loadout locations	✓				The three alternate locations for the Rail Loadout proposed to the KNC in summer 2018 appear to be outside the Grave Prairie cultural landscape. However, these areas may have other environmental or archaeological values that are currently unknown and that could be impacted by the	Letter sent to NWP from the KNC on January 25, 2019 regarding the Rail Loadout location	NWP organized field trips to the Grave Prairie area in 2018 and 2020 and provided the KNC with results of all Archeological Impact Assessments conducted for the Project. NWP is committed to working closely with the KNC on infrastructure locations.

Topic	Feedback Received*:				Consultation Feedback	Feedback Source	Response or Actions Identified
	IG	G	P/S	O			
					proposed Project. Therefore, the KNC want to see the results of environmental and archaeological impact assessments for whichever alternative is proposed, as a part of the Environmental Assessment process. These studies will also confirm whether the proposed locations are outside of the Grave Prairie cultural landscape.		
Importance of aligning oral and archaeological resources	✓				The KNC noted the importance of aligning oral and archaeological resources, for this area as traditional use indicates movement corridors along Grave Creek, to the top of Crown Mountain, and to the prairies. The oral history needs to be recorded so the effects assessment is properly done for Project.	Comment received from the KNC during a meeting to discuss archaeology on June 15, 2020	NWP provided the KNC with results of all Archeological Impact Assessments conducted for the Project and is committed to working with the KNC to understand potential effects to archaeological resources.
Location of the Rail Loadout					Based on the preliminary results of the archaeological assessment, it is recommended that the proposed road used to access the Rail Loadout be situated in the previously disturbed footprint of a current road, which comes in from the west, crosses the existing rail line and turns south towards the rail loop. That being said, this location may still have environmental or archaeological values that are currently unknown and that could be impacted. Therefore, the KNC would want to see the results of	Letter sent to NWP from the KNC on November 12, 2020	NWP provided the KNC with results of all Archeological Impact Assessments conducted for the Project and is committed to working closely with the KNC on infrastructure locations.

Topic	Feedback Received*:				Consultation Feedback	Feedback Source	Response or Actions Identified
	IG	G	P/S	O			
Location of the Clean Coal Stockpile	✓				<p>environmental and archaeological impact assessments as a part of the Environmental Assessment process.</p> <p>The location of the clean coal stockpile conveyor alignment over Grave Creek and Grave Prairie to the Rail Loadout is not acceptable.</p>	Comment received from the KNC in March 2020	NWP moved the clean coal stockpile location based on this guidance.
Location of the Clean Coal Stockpile Access Road	✓				<p>Conduct a follow-up archaeology program to assess construction of a new clean coal stockpile access road versus using a previously disturbed area.</p>	Comment received from the KNC in October 2020	A follow up archaeology program was completed in 2020 to assess the clean coal access road. The findings of the program were reviewed in the field with KNC staff, which ruled out the new construction option. KNC staff proposed using an existing road, which was adopted for the EA.

Note:

\*IG = Indigenous Group (group specified in column); G = Government (provincial or federal agencies); P/S = Public/Stakeholder (Interest group, local government, tenure and license holders, members of the public); O = Other



**Crown Mountain Coking Coal Project**

**Figure 16.2-1**  
Project Footprint and Archaeological Local Study Area

**LEGEND**

- Archaeological Local Study Area
- Project Footprint
- New and Revised Archaeological Site Boundary
- Registered Archaeological Sites (2021)**
- Pre-contact Archaeological Site
- Historical Archaeological Site

**Permit Areas**

- Permit 2015-0098 Crown Mtn Phase I
- Permit 2015-0098 Crown Mtn Phase II
- Permit 2015-0098 Crown Mtn Phase III
- Permit 2015-0098 Crown Mtn Phase IV
- Permit 2018-0014 Crown Mtn RLO
- Highway

- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area
- British Columbia/Alberta Border

0 2 4  
Kilometres

Scale 1:80,000

Map Drawing Information:  
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada. Imagery Provided By Landsat 8 (Aug 2018), and GeoBC Ortho Imagery (Aug 2016).

Map Created By: JL  
Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N



Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

Alexander Creek watershed, while the rail loadout facility and access roads leading to the mine are located within the Grave Creek watershed.

The Archaeological LSA corresponds to the area that was subjected to assessment during the Project archaeology baseline program. The Archaeological LSA covers an area of approximately 117 km<sup>2</sup> or 11,653 ha. The Archaeological LSA is defined to the:

- North: naturally by the height-of-land that defines the upper portion of the Grave Creek drainage (Phase II), and arbitrarily to the north-northwest to include the terrain that is the west of Grave Lake and along the lower segment of the Line Creek drainage in proximity to its confluence with the Fording River (Phase I);
- West: naturally by segments of the Elk River that are in the locality of Grave Prairie (Phase I) and the height-of-land that defines the north-south trending Erickson Ridge within the Alexander Creek valley (Phases III and IV). Note that a westward trending utility corridor (i.e., feeder lines) is also present to the west, and connects the Project (Phases I and II) with existing hydro-electrical and natural gas infrastructure components that are in proximity to Highway #43;
- South: arbitrarily by a variable buffer zone from the development footprint (Phase I) within the locality of Grave Prairie, naturally by the height-of-land that defines the middle section of the Grave Creek drainage (Phase II), and arbitrarily by Highway #3 within the Summit Creek drainage that is west of Crowsnest Pass (Phase IV); and
- East: naturally by lesser-sloped terrain along the base the Alexander Creek valley before it exponentially ascends eastward to the Continental Divide (Phase IV).

The Archaeological RSA is spatially equivalent to the Archaeological LSA, as physical and cultural heritage are potentially affected largely by direct disturbance, and as such a comparison between direct potential disturbance and the regional area is not necessary. This RSA provides the spatial boundaries for the cumulative effects assessment.

### 16.2.3.2 Temporal Boundaries

Temporal boundaries include the time periods during which the Project is anticipated to result in potential effects on VCs (British Columbia Environmental Assessment Office [EAO], 2013). The temporal boundaries considered in the assessment include the temporal limits of the Project in terms of its Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases. The temporal boundaries of the Project used in the effects assessment include the timing of Project phases and activities as outlined in Table 16.2-2. Additional details on the Project phases and activities are provided in Chapter 3.

Table 16.2-2: Temporal Boundaries for the Effects Assessment for Physical and Cultural Heritage

Phase	Project Year	Length of Phase (Years)
Construction and Pre-Production	1 – 2	2
Operations	3 – 17	15
Reclamation and Closure	18 – 19	2
Post-Closure	20 – 34	15

### 16.2.3.3 Administrative Boundaries

Administrative boundaries refer to the limitations imposed on the assessment by political, economic, or social constraints and consider the jurisdiction in which the Project is located. The Project falls within the resource management area boundaries of the B.C. Ministry of Forests, Lands, Natural Resources Operations and Rural Development Rocky Mountain District in Kootenay Region 4, as well as the boundaries of the Kootenay Boundary Land Use Plan, the Elk Valley Official Community Plan, and the Alexander Creek Access Management Area. Importantly, the Project is also located within the traditional territory of Indigenous communities. Information about Indigenous communities considered in this Application/EIS are provided in Chapters 23 to 31.

### 16.2.3.4 Technical Boundaries

Technical boundaries represent constraints imposed on the assessment due to limitations in the ability to predict the effects of the Project (EAO, 2013). Technical boundaries correspond to Project boundaries used as data sources for assessments. The assessment of physical and cultural heritage has technical limitations through the methods used to gather information or predict and determine the presence of potential physical and cultural heritage. These pertain to the limitations relating to: the availability of information on known physical and cultural heritage; the ability to predict the presence or confirm the absence of physical and cultural heritage resources within a given location; and the methods used for conducting the physical and cultural heritage resource surveys (i.e., the archaeology baseline program).

## 16.3 Existing Conditions

### 16.3.1 Regional and Local Overview

The Project is located in the Elk Valley, within the front ranges of the southern Rocky Mountains in south-eastern B.C. The Elk Valley stretches more than 180 km from the mouth of the Elk River at Lake Koocanusa in the south, north to its headwaters in Elk Lakes Provincial Park near the Continental Divide along the B.C.-Alberta border (George et al., 1987; Elk Valley Cumulative Effects Management Framework [EV-CEMF] Working Group, 2018). The Elk Valley forms part of the Continental Ranges of the Rocky Mountains. Various forms of forestry (cultural modification and harvesting of trees) and maintenance of the ecosystem (broadcast burns) were conducted by Indigenous inhabitants. The quarrying and procurement of raw lithic material (siliceous mudstone, siliceous siltstones, cherts [Banff Formation, High Rock Range, and Etherington), siliceous argillite, and quartzite) by Indigenous inhabitants has been occurring in the Elk Valley for multiple millennia (I. Tamasi, personal communication, September 28, 2021). Current land uses in the area include: residential; recreational (e.g., hunting, all-terrain vehicle [ATV] trails, fishing, hiking, etc.); exploration; resource extraction; industrial; transportation; rangeland; agriculture; and forestry. Contemporary forestry, agriculture, and mining activity in the East Kootenay region have been ongoing for well over a century, with coal being the dominant resource extracted in the area. Additional information on land uses within the region can be referenced in Chapter 1 and Chapter 19.

The Project is situated in an area of steep topography of the Front Ranges Rocky Mountains of B.C. The relief on the Project footprint generally ranges from 1,850 m to 2,200 m above mean sea level (m asl). A variety of natural habitats are present in the region, and are discussed in more detail in Chapter 13. These habitats were important aspects of the land that influenced the movements of game animals and pre-contact Indigenous peoples. According to Choquette (2012; 2014), some of the grasslands, such as those

at high elevations, are relics of more extensive earlier Holocene communities while others, in particular those which occupy Neoglacial floodplain terraces, are more recent by definition of the age of the landforms upon which they are situated. The emergence of previously non-existent grazing range is hypothesized to have been instrumental in the expansion of bison, an immensely important resource to pre-contact Indigenous peoples, into the middle Elk River drainage area during the late Holocene arid interval (Choquette, 2012).

Watercourses and other waterbodies, as well as the confluences of two waterbodies, are generally considered to be linked with high potential for the presence of archaeological resources due to ancient people's reliance on freshwater during spring, summer, and fall seasons (Archer CRM, 2009) for practicing their traditional activities (e.g., fishing) as well as a means of conveyance. Key watercourses in the Archaeological LSA include the Elk River, Michel Creek, Alexander Creek, West Alexander Creek, Harmer Creek, and Grave Creek. Waterbodies in the immediate vicinity include Grave Lake, Harriet Lake, Mite Lake, and Barren Lake. The Elk River has many significant tributaries, including the Fording River, Line Creek, Wigwam River, and Michel Creek. More detailed information on the watercourses and wetlands within the Archaeological LSA can be referenced in Chapter 10.

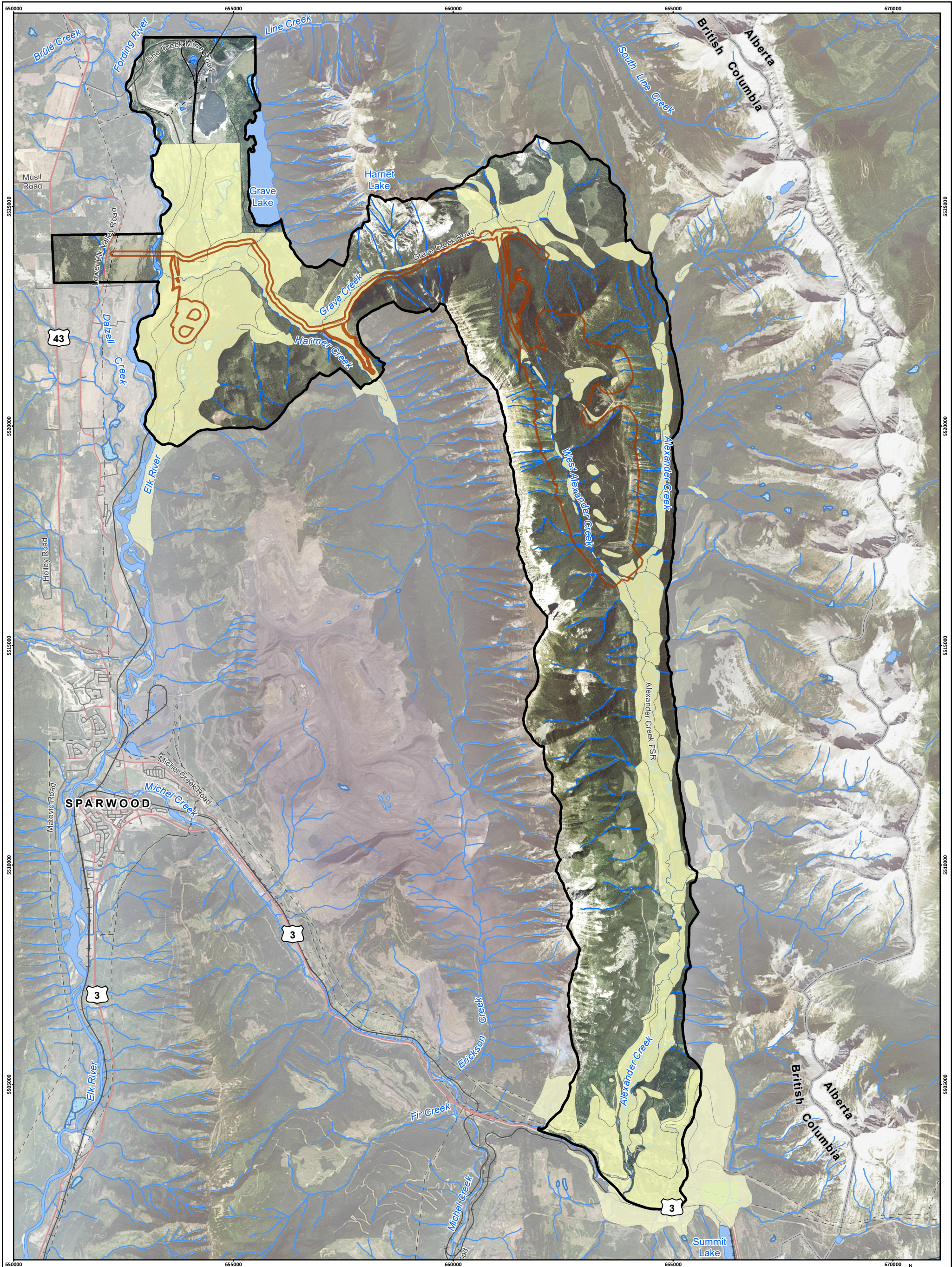
#### 16.3.1.1 Archaeological and Historical Setting

According to the Archaeological Overview Assessments (AOA) completed for the Project (Choquette, 2012; 2014) the physiography of a region influences the movements of both animals and humans. Choquette (2014) states: "the north-south troughs represented by the valleys of Alexander Creek and the Elk Valley naturally made these travel corridors, the two of them connected by Grave Creek. In addition, the Continental Divide, which bounds much of the LSA on the east, is breached by Racehorse, Deadman, Phillips, and Crowsnest passes connecting to the foothills and plains further east" (Choquette, 2014, p.11).

Previous archaeological assessments within the Archaeological LSA are numerous, and have primarily been associated with forestry-related development situated within Managed Forest 27 and the adjacently located Provincial forest lands within Landscape Units C20 and C38 of the [former] Cranbrook Forest District, which is now encompassed by the Rocky Mountain Natural Resource District. The first documented archaeological survey in the middle Elk River drainage was conducted by Wayne T. Choquette (1973), which resulted in the recording of 16 historical sites (i.e., postdating A.D. 1846) and 76 pre-contact sites (i.e., predating A.D. 1846 artifacts).

As a result of the multi-year, phased approach to the archaeological assessment for the Project (from 2017 to 2019), conducted under Heritage Inspection Permit (HIP) 2015-0098, 28 pre-contact archaeological sites were discovered and nine previously recorded pre-contact archaeological sites were updated. A supplementary archaeological assessment was completed on a revised location for the Rail Loadout (RLO) Facility of Phase I under Multi-Assessment Permit. In total, 110 archaeological potential polygons are situated within or partially overlap with the Archaeological LSA (Figure 16.3-1). A small archaeological program was undertaken for the Crown Mountain Weather Station and no archaeological resources were recovered/identified.

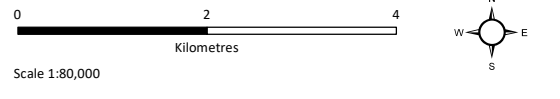
Refer to the Archaeological Impact Assessment reports provided in Appendix 16-A for additional details.



**Crown Mountain Coking Coal Project**

**Figure 16.3-1**  
AOA Polygons within the Archaeological Local Study Area

LEGEND	
<span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span>	Archaeological Potential Area (AOA)
<span style="display:inline-block; width:15px; height:15px; border:2px solid black;"></span>	Archaeological Local Study Area
<span style="display:inline-block; width:15px; height:15px; border:2px solid orange;"></span>	Project Footprint
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px solid orange;"></span>	Highway
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px solid red;"></span>	Arterial/Collector Road
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px solid grey;"></span>	Local/Resource Road
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px dashed grey;"></span>	Railway
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px dashed black;"></span>	Transmission Line
<span style="display:inline-block; width:15px; height:15px; background-color:blue;"></span>	Waterbody
<span style="display:inline-block; width:15px; height:15px; background-color:lightblue;"></span>	Wetland
<span style="display:inline-block; width:15px; height:15px; background-color:lightgreen;"></span>	Provincial Park/Protected Area
<span style="display:inline-block; width:15px; height:15px; border:1px solid grey;"></span>	British Columbia/Alberta Border
<span style="display:inline-block; width:15px; height:15px; border-bottom:2px solid blue;"></span>	Watercourse



Scale 1:80,000

Map Drawing Information:  
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada. Imagery Provided By Landsat 8 (Aug 2018), and GeoBC Ortho Imagery (Aug 2016).

Map Created By: JL  
Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N



Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

### 16.3.1.2 Palaeontological Setting

Palaeontological resources (fossils) are natural occurrences consisting of or containing remains, traces, or imprints of a plants, animals, or bacteria preserved in the Earth's crust. These resources are contained in bedrock and may occur near the ground surface or relatively deep. Palaeontological resources are typically associated with specific bedrock types, and generally, sedimentary rocks from basins in B.C. (Royal British Columbia Museum, 2021). The bedrock geology in the vicinity of the Project consists of a series north-south striking, upturned, and steeply dipping Palaeozoic sedimentary strata that include the Rocky Mountains, Banff, Etherington, and Fernie formations.

Background research on palaeontological resources included a review of published geological reports and the B.C. Government restricted fossil database (Aeon Paleontological Consultants Ltd., 2021; Appendix 16-B). The coal-bearing Mist Mountain Formation and the Morrissey Formation underlie the proposed mining areas on the top of Crown Mountain. Additional bedrock formations of Jurassic to Mississippian age are present along the conveyor route and transportation corridor in the West Alexander Creek and Grave Creek valleys. The bedrock is covered by unconsolidated sediments in some areas (Aeon Paleontological Consultants Ltd., 2021).

A paleontology field assessment was not conducted because fossils resources are generally anticipated to occur deep below ground surface. As described in the Preliminary Fossil Impact Assessment (Aeon Paleontological Consultants Ltd., 2021), the Mist Mountain Formation is comprised of sandstone, siltstone, mudstone, shale, and coal seams of latest Jurassic to earliest Cretaceous times and is known to be fossil-bearing. Fossils encountered in this formation at Teck's Line Creek Operations approximately 15 km north of the Project, Teck's Coal Mountain Operations approximately 35 km south of the Project, and in the Crowsnest Pass area about 20 km south of the Project include dinosaur trackways, plant fossils, and impressions of logs. The Morrissey Formation is comprised of sandstones from latest Jurassic times and is known to be fossil-bearing. Fossils encountered in this formation at Teck's Line Creek and Coal Mountain Operations, at Tent Mountain approximately 30 km southwest of the Project, and near Fernie approximately 50 km southwest of the Project include ammonites and other marine fossils, as well as impressions of logs. The Fernie Group is comprised of primarily dark grey shales deposited during the Jurassic period and is known to be fossil-bearing. Fossils encountered in the Fernie Group include ammonites along the Elk and Fording Rivers, other marine invertebrates such as molluscs, and remains of marine vertebrates. Pre-Jurassic units along the Grave Creek Road consist of marine shale, siltstone, sandstone, or dolomite depending on the group. Fossils have been reported from these units in mountains that flank the Elk River valley, including brachiopods, corals, bryozoans, and mollusc shells.

## 16.3.2 Archaeology Baseline Program (Archaeological Impact Assessment)

### 16.3.2.1 Methods

This section provides a summary of the archaeological assessment methods used by a professional archaeologist and the archaeological field team to conduct the baseline archaeology program (i.e., Archaeological Impact Assessments) for the Project within the Archaeological LSA, which is equivalent to the Archaeological RSA. For more detailed descriptions of the methods used during the archaeological baseline program, refer to the Archaeological Impact Assessment reports presented in Appendix 16-A.

The archaeology baseline program was conducted under Heritage Conservation Act Section 12.2 Heritage Inspection Permit 2015-0098, and subsequently Multi-Assessment Permit 2018-0014, and commenced with a desktop review of applicable AOAs and archaeological potential polygons and previous archaeological inspections, to identify locations where archaeological sites have been previously recorded in proximity to the Project footprint. A number of Project-specific and regional archaeological overview assessments were previously completed by Wayne Choquette. These overview assessments addressed the potential for pre-contact archaeological sites and identified locations where there was increased potential to discover pre-contact archaeological material. These documents greatly assisted in completing the field inspection. Applicable AOAs include, but are not limited to, those listed in Table 16.3-1.

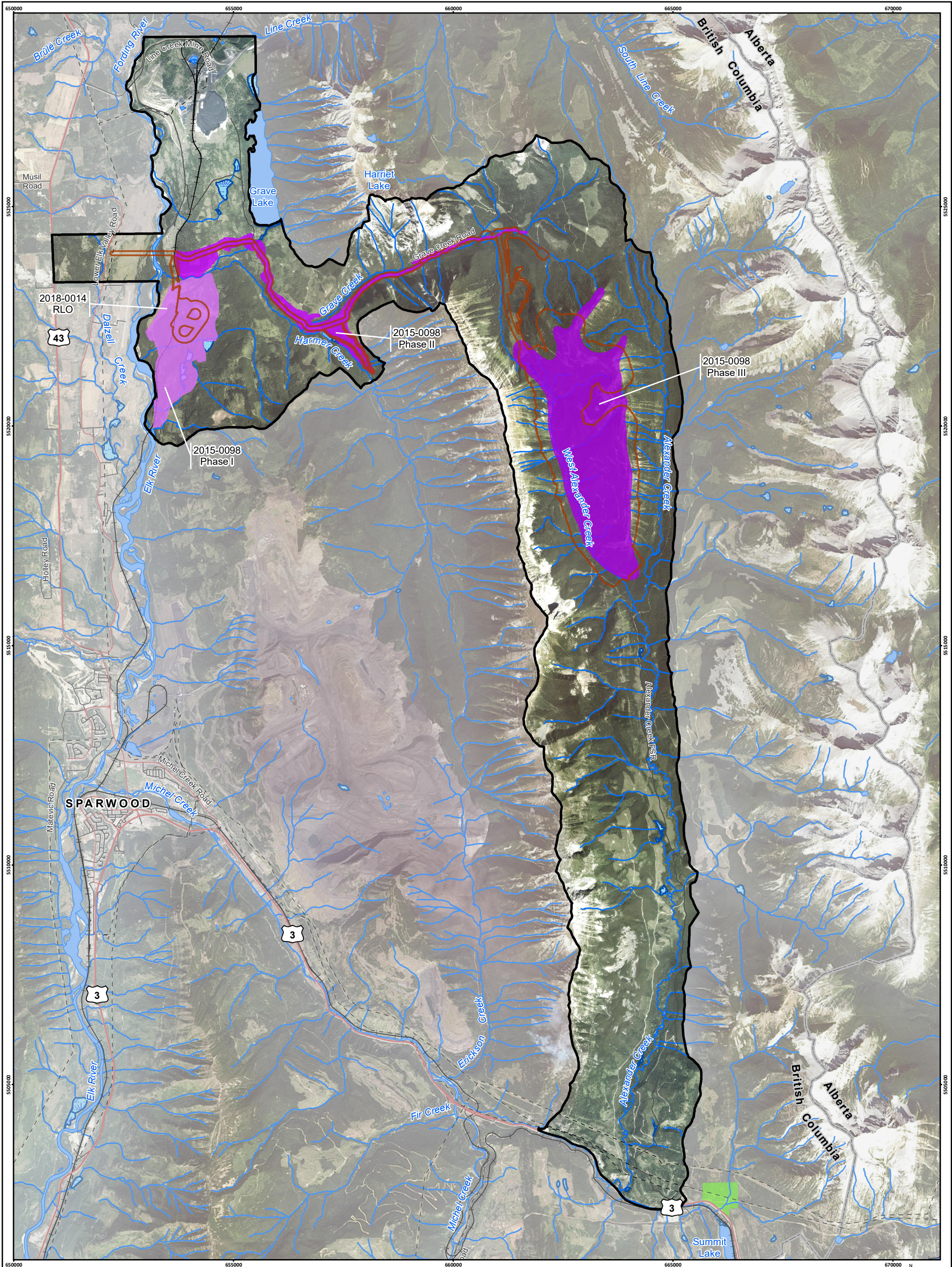
Table 16.3-1: Archaeological Overview Assessments

Archaeological Overview Assessment	Year	Citation
Archaeological Overview Assessment of the Crown Mountain Coal Project Local Study Area	2014	Choquette, 2014.
Archaeological Overview Assessment of the Crown Mountain Coal Project	2012	Choquette, 2012
Archaeological Overview Assessment of Landscape Unit C20	2008	Choquette, 2008
Archaeological Overview Assessment of Managed Forest 27	2004	Choquette, 2004
Archaeological Overview Assessment of Landscape Unit C38	1997	Choquette, 1997

Due to the large size of the Archaeological LSA, the archaeological assessment focused on a buffer (100 m) from the evolving Project footprint, and did not encompass the Archaeological LSA in its entirety. Where required, the systematic methods used to conduct the archaeological baseline assessments were adjusted (based on professional judgment) where there were naturally occurring constraints specific to each phase study area (e.g., steep/inaccessible terrain, roadways, etc.). The archaeological baseline program phases are described in Table 16.3-2, and the study areas associated with each phase are shown in Figure 16.3-2. The Phase IV study area comprising the Secondary Transportation Corridor in the Alexander Creek valley has yet to be subjected to any form of archaeological assessment.

Table 16.3-2: Baseline Archaeological Program Phases and Associated Study Areas

Baseline Program Phase	Location within Project Footprint	General Location	Year(s) of Assessment
Phase I	Railway Siding/Loop and Loadout Facility	Grave Prairie (Elk River Valley)	2017, 2019, and 2020
Phase II	Transportation Corridor	Grave Prairie to Crown Mountain (Grave Creek/Canyon)	2017 and 2018
Phase III	Mine Site	Crown Mountain (Alexander Creek and West Alexander Creek Valleys)	2018 and 2019



**Crown Mountain Coking Coal Project**

**Figure 16.3-2**  
Archaeological Impact Assessment Program Study Areas within the Archaeological LSA (Phases I - III)

**LEGEND**

- Permit 2015-0098 Crown Mtn Phase I
- Permit 2015-0098 Crown Mtn Phase II
- Permit 2015-0098 Crown Mtn Phase III
- Archaeological Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area
- British Columbia/Alberta Border

0 2 4  
Kilometres

Scale 1:80,000

Map Drawing Information:  
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada. Imagery Provided By Landsat 8 (Aug 2018), and GeoBC Ortho Imagery (Aug 2016).

Map Created By: JL  
Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N



Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

#### 16.3.2.1.1 Reconnaissance Survey

The field component of the archaeological assessment commenced with reconnaissance surveys (i.e., ground-truthing exercises) within and adjacent to delineated archaeological potential polygons (Choquette 2012; 2014) within the Archaeological LSA, and in particular within or in proximity to (i.e.,  $\pm$  100 m) the Project footprint. The reconnaissance also involved visits to known, previously recorded archaeological sites situated within the Archaeological LSA to update the existing inventory and familiarize the archaeological field crew of the regional site types, artifact types, and preferential raw lithic material types. In the absence of an archaeological potential polygon, judgmental reconnaissance routes were implemented to verify the presence or absence of archaeologically-salient microtopography within the landscape that would warrant subsurface inspection methods.

The vehicle-assisted, pedestrian-based reconnaissance included visual and manual sorting (i.e., shovel and 6 millimetre [mm] [1/4"] mesh) to inspect natural exposures (e.g., tree throws, incised run-off channels, game trails, bedrock outcrops, and sparsely vegetated ground surfaces) and anthropogenic disturbance (e.g., road grades, off-road vehicle trails, berms, slope/ditch cuts) for exposed pre-contact cultural material, and to identify areas of high archaeological potential that required subsurface inspection (i.e., shovel testing).

#### 16.3.2.1.2 Sub-surface Inspection

Upon the identification of archaeologically-salient microtopography (e.g., terraces, benches, knolls/prominences, and ridges), subsurface inspection, primarily in the form of shovel testing (35 centimetres [cm] x 35 cm) and supplemented by evaluative testing (1.0 m x 1.0 m), was implemented to confirm or refute the presence of pre-contact archaeological material. Shovel tests were systematically excavated in 5 to 10 cm arbitrary levels with flat-bladed shovels and assisted by manual trowelling. All manually-excavated sediment associated with subsurface inspection was sorted with 6 mm (1/4") mesh. Intervals and patterns of shovel tests within each shovel test location were variable based on natural and anthropogenic constraints. While linear-shaped landforms were subject to transects of shovel tests, grid-like test patterns were applied to both horizontally-expansive and microtopographic features.

#### 16.3.2.1.3 Assessment of Ancestral Burials and Suspected Human Remains

A non-intrusive survey was conducted throughout the eastern portion of the grassland area that overlapped or infringed upon the conceptual mine plan (ca. 2017) in small groups (two to three individuals) who identified potential burial mounds. Once the Project footprint was traversed, peripheral terrain was then visually inspected for the presence of mounds. Upon the completion of the surface inspection, attributes of each identified mound were then reviewed one-by-one as a crew and involved a discussion to determine if each mound was suspected to be a burial or mounding could be attributed to natural or contemporary disturbance. When in doubt, mounds were recorded to err on the side of caution.

In consultation with Indigenous representatives from Ktunaxa Nation Council and Shuswap Indian Band, no form of archaeological inspection was conducted within the vicinity of suspected burial mounds. Due to the presence and suspected distribution of burial mounds, the Project layout was continually shifted to accommodate these areas.

### 16.3.2.2 Results

The following sections provide a summary of the baseline archaeological program results related to identified landforms within each baseline study area that would have influenced pre-contact movements and occupational habits, identified High Archaeological Potential (HAP) areas, and field identified archaeological resources through sub-surface (shovel) testing. For additional details related to the results of the baseline archaeological program, refer to the Archaeological Impact Assessment reports presented in Appendix 16-A.

#### 16.3.2.2.1 Landforms of Influence for Pre-contact Peoples

##### Archaeology Baseline Program Phase I (Railway Siding/Loop and Loadout Facility)

The Phase I development footprint encompasses a portion of an extensive cultural landscape that contains distinct geomorphology, which influenced pre-contact occupational habits and land use patterns. The landscape within the Phase I study area is relatively consistent, and encompasses a portion of the north-south trending Elk River valley where a mantle of stratified sand, silt, and clay (fine sediment deposition within Glacial Lake Elk) is present over the gravelly-till plain.

The level treads of the Holocene Epoch formed terraces, benches, and microtopographic features offer localities for campsites and ancillary activity. Although those landforms with southward solar aspect would have been favourable for seasonal occupation for multiple millennia, pre-contact occupation most likely peaked during the Middle Period (ca. 8,000 to 2,000 years ago) when hydrological baselines were relatively higher than present (i.e., kettle depressions and wetlands contained standing water). As a result of repeated use of this locality for both seasonal resource procurement and intra-mountain travel, an extensive artifact scatter formed throughout this landscape.

##### Archaeology Baseline Program Phase II (Transportation Corridor)

The Phase II development footprint is characterized by a linear transportation corridor that bisects a portion of an extensive cultural landscape that contains distinct geomorphology, which is expected to have influenced pre-contact occupational habits and land use patterns. The landscape within the Phase II study area is variable, and can be classified into three geomorphological categories including the following.

- **Grave Creek Canyon:** The upper portion of the Phase II study area is a relatively prominent east-west trending, deeply-incised canyon that contains an upper segment of the Grave Creek drainage. Although this portion of the landscape is relatively rugged, some kame, lacustrine, and alluvial terracing is present along mid- to lower-elevations of the canyon, which are influenced by the highly dynamic floodplain of Grave Creek. The terraces within the canyon would have facilitated pre-contact travel, a factor that continues into the contemporary era (evidenced by the routes of resource roads and locations of landings, push-outs, and cut blocks). Portions of this pre-contact landscape are no longer present or reasonably accessible (i.e., deeply buried by deposition), which constrains the contemporary interpretation of Indigenous use of the canyon. Currently recorded archaeological sites within the canyon and in proximity to the outlet consist of small artifact scatters that are interpreted as transient, short-term campsites associated with the travel corridor. It is suspected that the northern side of the canyon would have been the most suitable route for pre-contact travel, primarily based on the southerly solar aspect.

- Delta: The middle portion of the Phase II study area is a relatively irregular and consistently sloped landscape that has origins from a delta(s), which likely first formed within proglacial pondage and subsequently in Glacial Lake Elk. Subsequent erosion throughout the Holocene Epoch would have dissected the surficial topography of the delta and resulted in the formation of ridges and small benches, which are focal points for both pre-contact resource procurement and would have influenced travel routes. Currently recorded archaeological sites within the delta portion of the study area are likely associated with resource procurement, but also have an association with the aforementioned travel corridor. This association is evidenced by the recovery of multiple shards of a pre-contact ceramic vessel from site DIPq-12 that has attributes that can be associated with the Old Woman's Complex and has been previously defined within the plains region and eastern slopes of the Rocky Mountains, which may indicate a travel direction and implications for pre-contact trade, possibly between two differing cultures.
- Till Plain and Fluvial Terracing: The lower portion of the Phase II study area encompasses the bottom of the north-south trending Elk River valley where a mantle of stratified sand, silt, and clay (i.e., fine sediment deposition within Glacial Lake Elk) is present over the gravelly-till plain along terraces. The level treads of the terraces offer localities for campsites and, in particular those with southern solar aspects, would have been favourable for seasonal occupation for multiple millennia, with the frequency of occupation increasing when hydrological baselines were higher than present within the Middle Period.

#### Archaeology Baseline Program Phase III (Mine Site)

Within the Phase III study area, the landscape has been arbitrarily categorized into three categories: ridgeline (with saddles, passes, and prominences), drainage bottom (with fluvial nodes, drainage confluences, and potential terrace development), and transition zone (variable slope with scattered structural benches and potential terrace development).

- Ridgeline: Although the north-south striking, western dipping bedrock-controlled crest of Crown Mountain is the most prominent topographic feature within the Phase III study area, a few radial ridgelines, formed through faulting, are also present and offer routes of least resistance for both human travel and animal movement to/from the West Alexander drainage basin. Navigable access/egress routes to the crest of Crown Mountain are present to the south and north. The ridgelines present routes of least resistance where transient occupation may have resulted in the deposition of trail litter. Prominences along the ridgelines offer vantage points that may have been utilized for hunting and navigational purposes, and potentially, the most prominent locations may have been suitable for ceremonial activity (e.g., vision quest). Lower elevation segments along the crest of Crown Mountain (e.g., saddles and passes) offer relatively sheltered and more spatially-expansive landforms that are suitable for transient campsites or seasonal base camps associated with resource procurement.
- Valley Bottom: Based on the dynamic environment caused by the frequent erosion and displacement of organic material, the West Alexander Creek Valley is considered a secondary travel corridor, and any pre-contact archaeological material that may remain along the valley bottom would be deeply buried (i.e., beyond the reach of shovel testing) or contained within placer deposits that lack any cultural context.

- Transition Zone: The most abundant landscape classification within the Phase III study area is the transition zone, which largely consists of variable, mountainous slope with potential for structural benches, minor prominences, and some terrace development, which have been delineated as AOA Polygons. While the presence of archaeological sites along the crest of Crown Mountain indicates pre-contact use and occupation of the general locality, the sporadic deposition of cultural material (i.e., trail litter) based on ad hoc activity within a transition zone would be extremely difficult, if not impossible to inspect for, and the potential to discover these sparse and isolated sites through systematic inspection is extremely low.

#### 16.3.2.2.2 High Archaeological Potential (HAP) Areas

Throughout the Archaeological LSA, there were various HAP areas noted during the baseline archaeology program. Table 16.3-3 provides a summary of the HAP areas identified within each of the baseline archaeological program study phases. Refer to Figure 16.3-3 to Figure 16.3-5 for a depiction of the archaeological potential areas per study area within the Archaeological LSA.

#### 16.3.2.2.3 Archaeological Sites and Sub-surface Field Investigation Summary

During the baseline archaeological program, numerous archaeological sites and artifacts were identified within the Archaeological LSA through the field reconnaissance (walkover) and sub-surface (shovel and evaluative) testing. Table 16.3-3 provides a summary of the archaeological sites identified and assessed, and Figure 16.3-6 to Figure 16.3-8 depict their locations by study phase within the Archaeological LSA. For more details regarding the archaeological sites identified within the Archaeological LSA, refer to the Archaeological Impact Assessment reports provided in Appendix 16-A.

Although the results of the baseline archaeological inventory and AIA conducted on Phases I, II, and III under Heritage Inspection Permit 2015-0098, and components of Phase I that were subsequently assessed under Multi-Assessment Permit 2018-0014 have wrapped up, subsequent inspections (i.e. shovel testing) will be required on areas within the Project's mine plan that have yet to be subjected to any form of archaeological assessment (e.g. Phase IV, utility corridor west of the Elk River, and recently defined clearing limits of the mine plan).

Table 16.3-3: Summary of Archaeological Sites Assessed within the Archaeological LSA

Archaeological Site	Site Type	Site Information Summary	Permit Number
Phase I - Railway Siding/Loop and Loadout Facility (Figure 16.3-6)			
DkPr-12	Pre-contact, Cultural Material, Surface Lithics and Fire-Altered Rock Pre-contact, Feature, Petroform (cairn)	Substantial update to the site area, now measuring 135 m by 36 m, that was originally discovered in 1973. Subsurface inspection was not implemented due its distance from the Project footprint. Surficial inspection resulted in the collection of 27 lithic artifacts and a bone fragment, and the documentation of multiple specimens of fire-altered rock. Additionally, the remnants of the petroform (i.e., cairn) observed in 1973 were relocated.	1973-0004 (recording); 2015-0098 (update)
DkPr-13	Pre-contact, Cultural Material, Surface Lithics and Fire-Altered Rock	Substantial update to the site area, now measuring 111 m by 85 m, that was originally discovered in 1973. Subsurface inspection was not implemented due its distance from the Project footprint. Surficial inspection resulted in the collection of five lithic artifacts. Additionally, fire-altered rock was documented, but the determination of a pre-contact context constrained by contemporary hearth features associated with recreational activity (i.e., camping).	1973-0004 (recording); 2015-0098 (update)
DkPr-18	Pre-contact, Ancestral Remains (burial mound)	Locational update to a 'probable burial site' that was originally discovered in the late-1960s or early-1970s and recorded via hearsay information ca. 1973. The revised location of the [historical or pre-contact] burial is beyond the Project footprint, and was identified through background research (i.e., site records) and in-field landscape analysis. The buffered site area, measuring 50 m by 50 m, was delineated with guidance from the B.C. Archaeology Branch and is to be considered provisional to inform future inspection(s). The locality was solely subjected to a surficial inspection, and a defined burial mound was not observed due to the density of groundcover vegetation and the presence of deadfall.	1973-0004 (recording); 2015-0098 (update)
DkPr-34	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	A large size site area (132 m x 83 m) delineated as five polygons (A – E) that are situated on the undulating tread of a prominent north-south trending terrace level that is north of Black Creek. The landscape has been truncated by previous railway construction and was subsequently disturbed by forestry activity. Thirteen shovel tests produced positive results with the collection of 19 lithic artifacts and documentation of multiple specimens of fire-altered rock from 5 to 30 cm below surface.	2015-0098

Archaeological Site	Site Type	Site Information Summary	Permit Number
DkPr-35	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	Relatively small site area (20 m x 14 m) situated on a benched slope-break with a southern solar aspect, situated mid-way up the southern terminus of a prominent north-south trending ridge. Five shovel tests produced positive with the collection of three lithic artifacts and the documentation of fire-altered rock from 1 to 30 cm below surface; the inspection of this site should be considered provisional.	2015-0098
DkPr-36	Pre-contact, Cultural Material, Surface Lithics	Relatively small site area (21 m x 18 m) based on the fortuitous discovery and collection of seven lithic artifacts (i.e., utilized spalls of sandstone) that were strewn along the ground surface near the southern terminus of a prominent ridge; this landform would have facilitated pre-contact travel. Due to the distance of this site from the Project footprint, subsurface inspection was not implemented, and therefore, the delineated site area should be considered provisional. The presence of a uniform artifact type indicates a specific pre-contact activity occurred in the locality of the site, and further research is required.	2015-0098 (recording)
DkPr-37	Pre-contact, Cultural Material, Subsurface Lithics	A relatively small site area (18 m x 13 m) situated on a gently sloping terrace level situated immediately west of a wetland and along the north-northeastern base of north-south trending ridge. Three shovel tests produced positive results with the collection of four lithic artifacts from 5 to 25 cm below surface. Game trails converge in the locality and pre-contact activity may have been associated with ambush-style hunting practices. The inspection of this site should be considered provisional, and further subsurface inspection is required.	2015-0098 (recording)
DkPr-38	Pre-contact, Cultural Material, Subsurface Lithics	A moderate size site area (37 m x 10 m) situated on a low elevation, rounded-profile ridge, located immediately west of and slightly above a wetland. Two positive shovel tests and the inspection of a tree throw resulted in the collection of three lithic artifacts from 1 to 15 cm below surface. Game trails converge in the locality and pre-contact activity may have been associated with ambush-style hunting practices. The inspection of this site should be considered provisional, and further subsurface inspection is required.	2015-0098 (recording)
DkPr-39	Pre-contact, Cultural Material, Subsurface Lithics	A moderate size site area (34 m x 28 m) situated on a remnant portion of a knoll that was previously truncated in the west by railway construction, and subsequently impacted during the construction of a road grade. Nine positive shovel tests resulted in the collection of 21 lithic artifacts from 5 to 30 cm below surface.	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
DIPr-8	<p>Pre-contact, Cultural Material, Surface/Subsurface Lithics, Faunal, and Fire-Altered Rock</p> <p>Pre-contact, Ancestral Remains (burial mounds)</p>	<p>Significant update to a site that was originally discovered and recorded under 1973-0004. The site now measures 656 m by 495 m, and has been delineated as ten discrete polygons (A – J) that encompasses a portion of the grassland within Grave Prairie and adjacent micro-topographic features (e.g., terrace margins, elevated terrain, and knoll). The preliminary surface inspection of this locality focused on the grassland portion of Grave Prairie, and resulted in the identification of approximately 97 linear-shaped mounds that have been recorded, with input from Indigenous communities and the B.C. Archaeology Branch, as suspected ancestral burials; this includes 64 mounds to the west of the railway tracks (site Polygon A), 31 mounds along the eastern side of the railway tracks (site Polygon B) and two isolated mounds (site Polygons D &amp; E) identified to the west of Valley Road. Note that these totals should be considered provisional and is not an exhaustive tally for burial mounds in this locality.</p> <p>Site Polygons A – E were delineated under 2015-0098, and site Polygons F-J were subsequently delineated under 2018-0014. Although no form of intrusive inspection was conducted on or in the vicinity of suspected burial mounds, a total of 142 shovel tests were excavated on elevated terrain to the south-southeast of the grassland area and were implemented to delineate the site areas. As a result of the surficial and subsurface inspection, 65 lithic artifacts and 765 faunal remains were collected, and multiple specimens of fire-altered rock were documented down to 55 cm below surface. The density of faunal remains is suggestive of a campsite where large, resident ungulates (e.g., bison) were butchered. Future investigation of this site is required.</p>	<p>1973-0004 (recording); 2015-0098 (update); 2018-0014 (update)</p>
DIPr-80	Pre-contact, Cultural Material, Subsurface Lithics and Faunal	A small site area (29 m x 10 m) situated at the eastern terminus of a west-northwest to east-southeast trending terrace level that is positions north of a minor drainage. Two positive shovel tests resulted in the recovery of two lithic artifacts and 15 faunal remains from 15 to 30 cm below surface.	2015-0098 (recording); 2018-0014 (revisit)
DIPr-81	Pre-contact, Cultural Material, Subsurface Lithics	A small site area (19 m x 12 m) situated on a rounded-profile knoll defined by steeply sloping scarp in all directions and situated within moderately undulating terrain that generally descends westward. Three positive shovel tests and one tree throw resulted in the recovery of nine lithic artifacts from 10 to 30 cm below surface.	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
DIPr-82	Pre-contact, Cultural Material, Subsurface Lithics and Fire-Altered Rock	A large site area (220 m x 144 m) delineated as four discrete polygons (A – D) that encompass level to gently undulating treads and well-defined margins of relatively low elevation benches and elevated terracing along the southern side of Grave Creek. Twenty-nine positive shovel tests resulted in the collection of 47 lithic artifacts and the documentation of fire-altered rock from 1 to 40 cm below surface.	2015-0098 (recording)
DIPr-83	Pre-contact, Lithic	Small site area (5 m x 5 m) based on a buffer zone surrounding an isolated lithic artifact (surficial context) that was previously exposed along the eastern side of the railway. Shovel testing within the vicinity of the artifact rendered negative results and there is potential for the artifact to have been shifted by previous development (i.e., railway construction/maintenance activity).	2018-0014 (recording)
DIPr-84	Pre-contact, Lithic	Small site area (5 m x 5 m) delineated as a buffer zone surrounding a shovel test that contained an isolated biface fragment (i.e., tool) at 15 to 20 cm below surface. The site is situated within a stand of secondary timber (i.e., previously logged terrain) that is south of a minor drainage that seasonally flows westward.	2018-0014 (recording)
DIPr-85	Pre-contact, Cultural Material, Subsurface Lithics, Faunal, and Fire-Altered Rock  Pre-contact, Ancestral Remains (burial mounds)	Relatively large site area (146 m x 80 m) delineated by two polygons (A – B) within an eastern portion of an expansive grassland and the gently sloping tread of a terraced margin upslope to the east. The systematic subsurface inspection that was completed resulted in the collection of 34 lithic artifacts and five faunal specimens, and the documentation of fire-altered rock from 1 to 45 cm below surface.  Additionally, three rock and five earthen mounds were discovered and provisionally defined as suspected burial mounds, with input from Indigenous communities and the B.C. Archaeology Branch. Subsequent to the discovery of the burial mounds, the inspection of this site and the adjacent landscape was terminated; therefore, the site area and interpretation of this site should be considered provisional. No form of intrusive inspection was implemented on or within the immediate vicinity of suspected burial mounds.	2018-0014 (recording)
Phase II: Transportation Corridor (Figure 16.3-7)			
DkPq-19	Pre-contact, Cultural Material, Subsurface Lithics	Small size site area (15 m x 10 m) situated on a faintly-defined terrace/bench to the northeast of Harmer Creek. The subsurface inspection completed revealed an	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
		inconsistent matrix amongst rocky outcrops, and resulted in the collection of four lithic artifacts from 5 to 30 cm below surface.	
DkPq-20	Pre-contact, Cultural Material, Subsurface Lithics and Faunal Remains	Moderate size site area (34 m x 10 m) situated on a terraced margin that overlooks Harmer Creek to the southwest. Subsurface inspection resulted in the collection of three lithic artifacts and two faunal remains from 5 to 20 cm below surface.	2015-0098 (recording)
DIPq-8	Pre-contact, Cultural Material, Surface/Subsurface Lithics and Fire-Altered Rock	Significant update to a previously recorded site discovered in 2006, with the revised site area, measuring 470 m by 40 m, defined by four discrete polygons (A – D) that delineate portions of an elevated terrace level to the northeast of Grave Creek. Previous road construction and logging activity has resulted in sporadic and linear disturbance. A total of 37 lithic artifacts were recovered and two fire-altered rocks were documented down to a depth of 20 cm below surface. The subsurface inspection focused on portions of the terrace that were in proximity to the development footprint, but the majority of the landform remains un-inspected for archaeological deposits; therefore, the site area and interpretations should be considered provisional.	2006-0154 (recording); 2015-0098 (update)
DIPq-10	Pre-contact, Cultural Material, Subsurface Fire-Altered Rock and Faunal Remains	Small size site area (20 m x 13 m) occupying the medial portion of an elevated terrace level situated along the southern side of Grave Creek Canyon. Previous disturbance through construction of the Grave Creek Road is present and may have truncated the site to the south. Subsurface inspection in this locality resulted in the collection of seven faunal remains and the documentation of ten specimens of fire-altered rock from 5 to 20 cm below surface.	2015-0098 (recording)
DIPq-11	Pre-contact, Cultural Material, Subsurface Lithics	Small size site area (13 m x 9 m) that is delineated by the limits of a northward-trending spur along the margin an elevated terrace level that is to the south of Grave Creek. Previous logging activity has resulted in sporadic disturbance within this portion of the landscape and may have truncated the site area to the south. The subsurface inspection resulted in the collection of nine lithic artifacts from 10 to 20 cm below surface.	2015-0098 (recording)
DIPq-12	Pre-contact, Cultural Material, Subsurface Lithics and Ceramic Shards	Moderate size site area (66 m x 10 m) situated on the southern end of elevated, relatively prominent terraced margin overlooking and to the northeast of Grave Creek. Although the locality of the site has been partially impacted by previous road construction, logging activity, and sediment extraction, subsurface inspection on remnant portions of the landform resulted in the collection of three lithic	2015-0098 (recording)

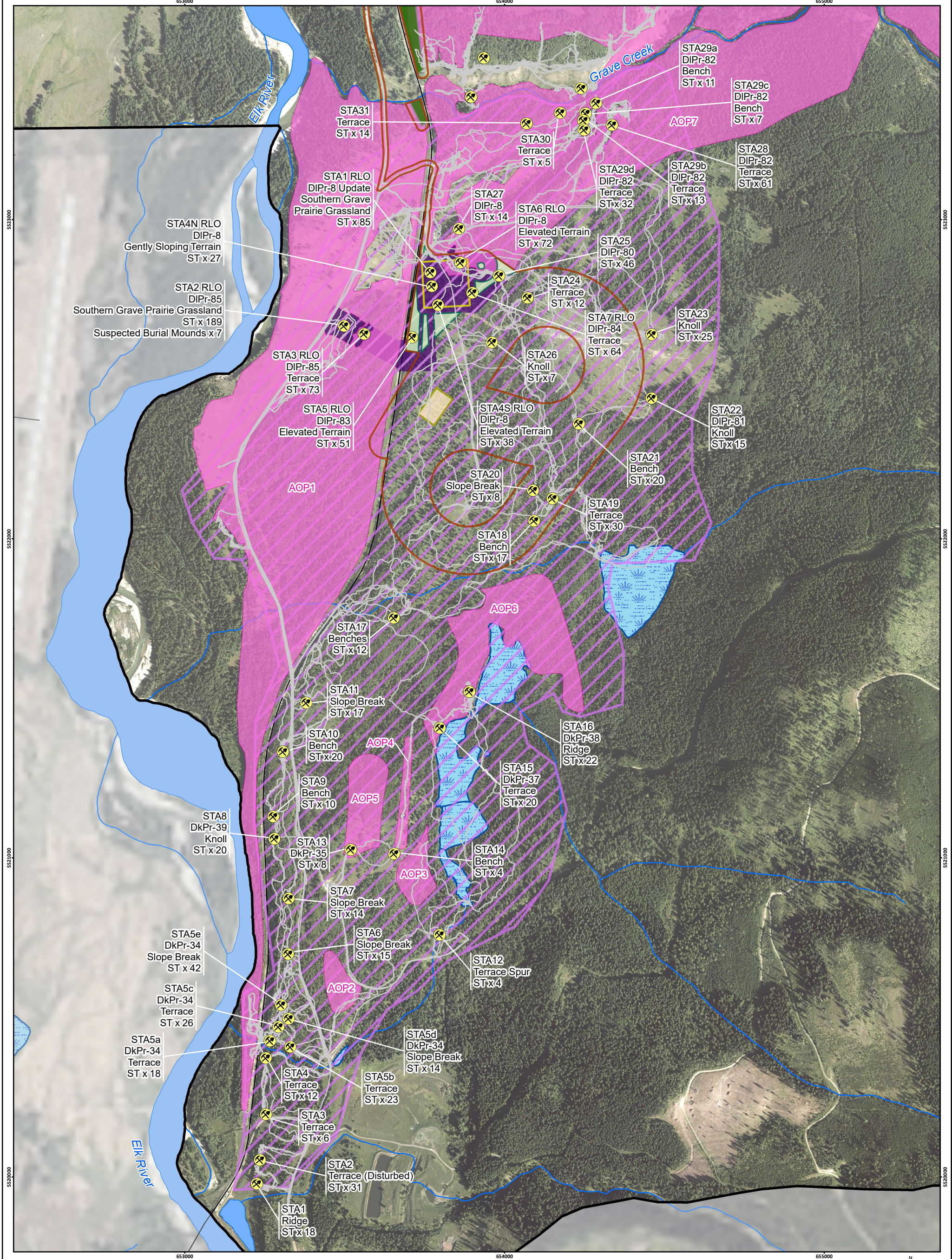
Archaeological Site	Site Type	Site Information Summary	Permit Number
		artifacts and recovery of 12 shards of a pre-contact ceramic vessel (Old Woman's Complex [1200 – 200 years ago]) from 1 to 20 cm below surface. A subsequent evaluative test (i.e., an evaluative unit) placed to recover additional shards and document the distribution of the fragmented pre-contact ceramic vessel rendered negative results. Due to the significance of this site and the unique artifact type (i.e., ceramic shards, which is the first documented discovery in southern B.C.), additional investigation(s) is required within the locality of this site.	
DIPq-13	Pre-contact, Cultural Material, Subsurface Lithics	Small size site area (16 m x 15 m) situated at the northern end of elevated, relatively prominent terraced margin overlooking and to the northeast of Grave Creek. Systematic subsurface inspection resulted in the collection of five lithic artifacts from 1 to 25 cm below surface.	2015-0098 (recording)
DIPr-42	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Fire-Altered Rock, and Faunal Remains  Pre-contact, Ancestral Remains (burial mounds)	Substantial update to a site that was originally discovered in 2005. The revised site area, now measuring 700 m by 200 m, is delineated as six discrete polygons (A – F) that occupy portions of a triangular-shaped terrace level and associated, adjacently located microtopographic features (e.g., nested terracing) to the south of the outlet drainage of Grave Lake. The extensive subsurface inspection program that was conducted within this locality resulted in the collection of 208 lithic artifacts and 23 faunal specimens, along with the documentation of fire-altered rock down to a depth of 35 cm below surface.  Within site Polygon A, 3-4 linear mounds were observed in 2005, but at the time were not documented as suspected ancestral burial mounds; the update under 2015-0098 provided rationale for revising the site and identifying the potential for burial mounds to be present for future inspection/investigation.	2005-0154 (recording); 2015-0098 (update)
DIPr-43	Pre-contact, Cultural Material, Surface/Subsurface Lithics	Substantial update to a site that was originally discovered in 2005, and the revised site area, now measuring 248 m by 145 m, is now delineated by four polygons (A – D) that occupy portions of a prominent knoll and associated, adjacently located microtopographic features (e.g., nested terracing) to the north of the outlet drainage of Grave Lake and in proximity to its confluence with Grave Creek. Site Polygon D has been decapitated from Polygon C through previous road construction (i.e., Harmer Road and an un-named branch road) The extensive	2005-0154 (recording); 2015-0098 (update)

Archaeological Site	Site Type	Site Information Summary	Permit Number
		subsurface inspection program that was conducted within this locality resulted in the collection of 62 lithic artifacts down to a depth of 30 cm below surface.	
DIPr-46	Pre-contact, Cultural Material, Subsurface Lithics, Faunal Remains and Fire-Altered Rock	Substantial update to a site that was originally discovered in 2006 and now encompasses a site area that was previously recorded as site DIPr-45 (also recorded in 2006, and now defined as site DIPr-46 - Polygon B). The site area, now measuring 295 m by 143 m, currently encompasses four discrete site polygons (A – D); this site area should be considered provisional and further shovel testing will be required on elevated terrain to the north-northwest of the outlet drainage of Grave Lake. Site Polygon D has been decapitated from Polygons A and B through previous road construction (i.e., Harmer Road). The extensive subsurface inspection program that was conducted within the locality of the site resulted in the collection of 63 lithic artifacts down to a depth of 35 cm below surface.	2006-0154 (recording); 2015-0098 (update)
DIPr-65	Pre-contact, Cultural Material, Subsurface Lithic and Fire-Altered Rock	Small site area (5 m x 5 m) defined by a buffers zone around a positive shovel test. The site is located within gently sloped terrain that descends southward from the crest of a relatively prominent knoll (i.e., site DIPr-43 – Polygon A) and located to the north of Grave Creek. The provisional inspection of the site resulted in the collection of an isolated lithic artifact and three specimens of fire-altered rock from 5 to 10 cm below surface.	2015-0098 (recording)
DIPr-66	Pre-contact, Cultural Material, Subsurface Lithic	Small site area (5 m x 5 m) defined by buffer zone around a positive shovel test. The site is located on a small, rounded-profile bench and located to the north of Grave Creek. The provisional inspection of the site resulted in the collection of an isolated lithic artifact at 5 to 10 cm below surface.	2015-0098 (recording)
DIPr-67	Pre-contact, Cultural Material, Subsurface Lithic	Small site area (5 m x 5 m) defined by buffer zone around a positive shovel test. The site is located on the northern terminus of a north-south trending terrace with a gently rounded margin with a western solar aspect. The inspection of the site resulted in the collection of an isolated lithic artifact at 15 to 20 cm below surface.	2015-0098 (recording)
DIPr-68	Pre-contact, Cultural Material, Subsurface Lithics	Small to moderate size site area (32 m x 24 m) that occupies a faintly defined, rounded knoll amongst undulating slope that generally descends westward. The site is located immediately to the north of and was truncated by previous road construction (i.e., Harmer Road). The subsurface inspection resulted in the collection of six lithic artifacts from 5 to 25 cm below surface.	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
DIPr-69	Pre-contact, Cultural Material, Subsurface Lithics	Small size site area (13 m x 10 m) that occupies a portion of a north-south trending ridge defined by a terraced margin to the west. The provisional subsurface inspection program conducted within the locality of the site resulted in the collection of two lithic artifacts from 5 to 20 cm below surface.	2015-0098 (recording)
DIPr-75	Pre-contact, Cultural Material, Surface/Subsurface Lithics, Faunal Remains and Fire-Altered Rock  Pre-contact, Cultural Material, Surface, Quarry	Very large size site area (610 m x 190 m) that is currently delineated as multiple polygons (A - F) that occupy the tread of an elevated terrace level and lower elevation benches in proximity to (north of) Grave Creek. A well-defined terrace margin has been truncated to the west during the construction of the railway and was sporadically disturbed by previous road construction. Natural and anthropic exposures along the scarp revealed the presence of high-quality raw lithic materials (i.e., siliceous mudstone and High Rock Range chert) that were favourable for the production of stone tools. Procurement of raw lithic material was confirmed through the recovery of debitage associated with lithic reduction strategies (i.e., workshop). Although provisional, due to the size and extent of the landform, the surficial and subsurface inspection conducted resulted in the collection of 300 lithic artifacts and 36 faunal remains and the documentation of multiple specimens of fire-altered rock down to a depth of 45 cm below surface. An expansive area of high archaeological potential was defined to the north of the site.	2015-0098 (recording)
DIPr-76	Pre-contact, Cultural Material, Subsurface Lithics	Small site area (19 m x 10 m) situated within the medial portion of a north-south trending gently rounded profile ridge that terminates at a terraced margin that overlooks the outlet drainage of Grave Lake in proximity to its confluence with Grave Creek. The landscape encompassing the site has been previous logging activity and the associated disturbance was documented. The provisional subsurface inspection conducted in this locality resulted in the collection of two lithic artifacts from 1 to 10 cm below surface.	2015-0098 (recording)
DIPr-77	Pre-contact, Cultural Material, Subsurface Lithics	Small site area (23 m x 6 m) situated on an east-west trending, bench along a terraced margin that overlooks the outlet drainage of Grave Lake in proximity to its confluence with Grave Creek. The landscape encompassing the site has been previous logging activity and the associated disturbance was documented. The provisional subsurface inspection conducted in this locality resulted in the collection of three lithic artifacts from 5 to 20 cm below surface.	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
DIPr-78	Pre-contact, Cultural Material, Subsurface Lithic	Small site area (5 m x 5 m) defined by a positive shovel test excavated on gently sloping terrain that descends southward towards the outlet drainage of Grave Lake. The provisional inspection of this locality resulted in the collection of an isolated lithic artifact at 5 to 10 cm below surface.	2015-0098 (recording)
Phase III: Mine Site (Figure 16.3-8)			
DkPq-11	Pre-contact, Cultural Material, Surface Lithic	Revisitation of the site to implement subsurface inspections (i.e., shovel testing) within the previously delineated site area that measures 30 m by 15 m, and encompassed the location of an isolated, surficial lithic artifact that was discovered in 2012 and subsequently recorded in 2013. Although an extensive subsurface inspection was implemented, no further pre-contact artifacts were recovered.	2013-0077 (recording); 2015-0098 (update)
DkPq-15	Pre-contact, Cultural Material, Subsurface Lithics	Large size site area (106 m x 60 m) and delineated as three discrete polygons (A – C) that are situated along the prominent margin of an expansive terrace level that has a southerly solar aspect and overlooks the confluence of area of West Alexander and Alexander Creeks. The subsurface inspection conducted in this locality resulted in the collection of 13 lithic artifacts from 15 to 40 cm below surface.	2015-0098 (recording)
DkPq-16	Pre-contact, Cultural Material, Subsurface Lithics	Small size site area (5 m x 5 m) within a relatively wide saddle that is situated between two relatively prominent peaks that are along an east-west trending segment of the ridgeline that defines Crown Mountain. Subsurface inspection (i.e., shovel testing) resulted in the collection of one lithic artifact at 5 to 10 cm below surface, and subsequent evaluative testing (i.e., evaluative unit) resulted in the collection of a second lithic artifact at the same depth. The site is within a locality that was not identified with archaeological potential within the previously completed archaeological overview assessments (Choquette, 2012; 2014).	2015-0098 (recording)
DkPq-17	Pre-contact, Cultural Material, Surface/Subsurface Lithics & Fire-Altered Rock	Large site area (213 m x 121 m) delineated as five polygons (A – E) that are situated level to variably-sloped terrain within a high elevation pass that connects the West Alexander Creek valley [south] and a tributary of Grave Creek [north]. The surficial and subsurface inspection, including an evaluative unit, resulted in the collection of 62 lithic artifacts and the documentation of 112 specimens of fire-altered rock down to 30 cm below surface. Through evaluative testing, the remnants of a hearth were discovered; although soil samples were collected, they were subsequently deemed unsuitable for radiometric analysis.	2015-0098 (recording)

Archaeological Site	Site Type	Site Information Summary	Permit Number
DkPq-18	Pre-contact, Cultural Material, Subsurface Lithic	Small size site (5 m x 5 m) defined by a buffer zone around a positive shovel test situated within the medial portion of a north-south trending terrace along the eastern side of the West Alexander Creek valley. The subsurface inspection implemented resulted in a single positive shovel test and the collection of one lithic artifact at 15 to 20 cm below surface.	2015-0098 (recording)

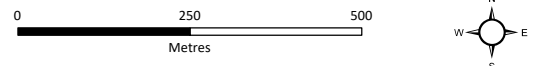


**Crown Mountain Coking Coal Project**

**Figure 16.3-3**  
Archaeological Potential Areas within the Archaeological LSA (Phase I Study Area)

**LEGEND**

- Subsurface Test Location
- Traverse
- Archaeological Potential Area
- Phase I Study Area
- Archaeological Local Study Area
- Project Footprint
- Clean Coal Stockpile and Truck Dump
- Loading Bin
- Clearing
- Additional Area
- Local/Resource Road
- Railway
- Watercourse
- Waterbody
- Wetland
- British Columbia/Alberta Border



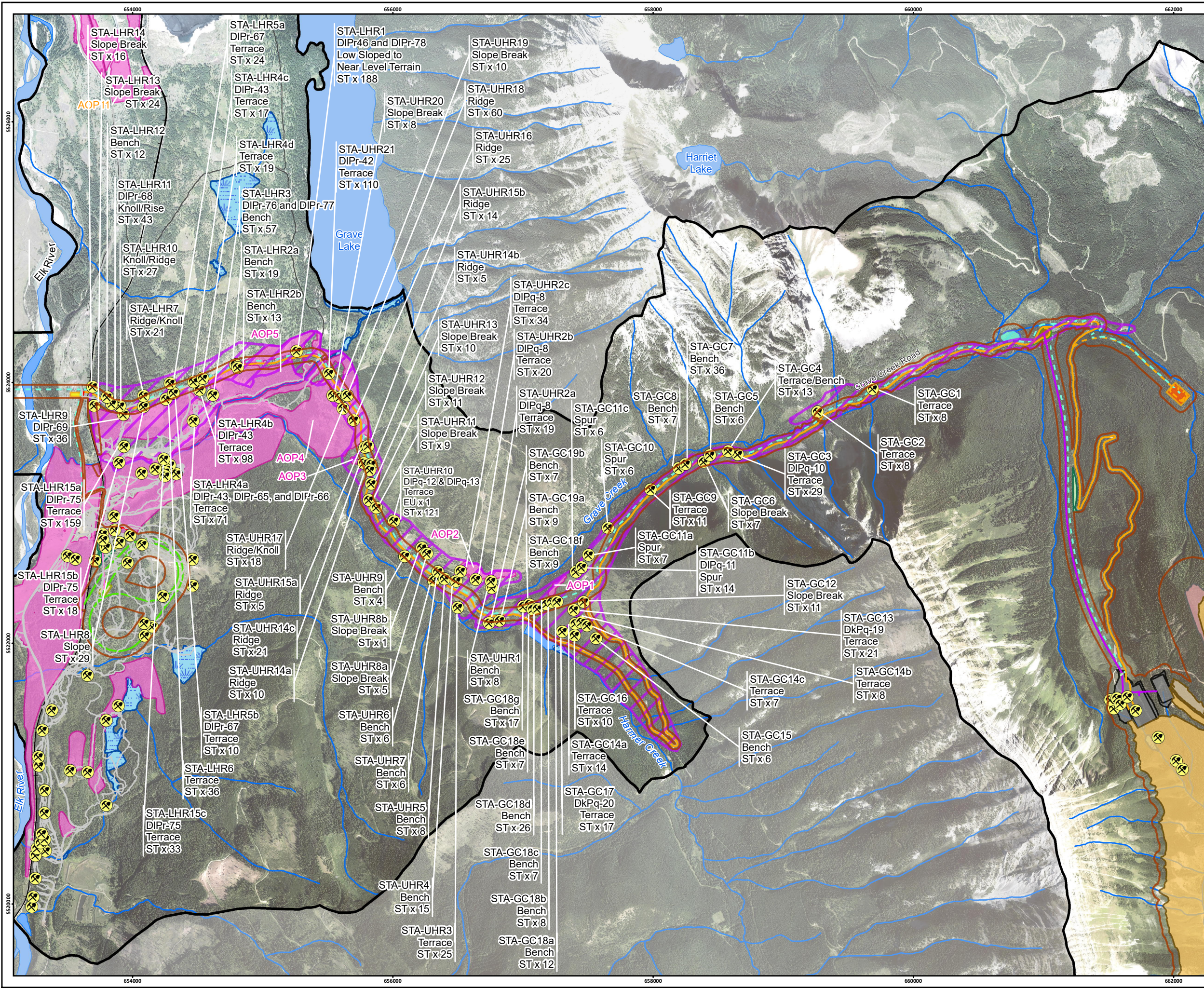
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Map Coordinate System: NAD 1983 UTM Zone 11N



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Date: 2021-10-27



**Crown Mountain Coking Coal Project**

**Figure 16.3-4**  
Archaeological Potential Areas within the Archaeological LSA (Phase II Study Area)

**LEGEND**

- Subsurface Test Location
- Traverse
- Archaeological Potential Area
- Phase II Study Area
- Archaeological Local Study Area
- Project Footprint
- Clean Coal Haul Road/Site Access
- Explosive Storage Access/Facility Road
- Rail Loadout Road
- Rail Loop
- Service Corridor
- Coal Process Plant Conveyor
- Coal Process Plant Duct
- Train Loadout Conveyor
- Waste Dump
- Mined Area
- Clean Coal Stockpile and Truck Dump
- Overflow Coal Stockpile
- Soil Stockpile Area
- Explosive Storage Facility/Pad
- Loading Bin
- Plant Site/ROM Stockpile Area
- Powerline-Site Power
- Water Reservoir
- Dam
- Clearing
- Additional Area
- Local/Resource Road
- Railway
- Watercourse
- Waterbody
- Wetland
- British Columbia/Alberta Border



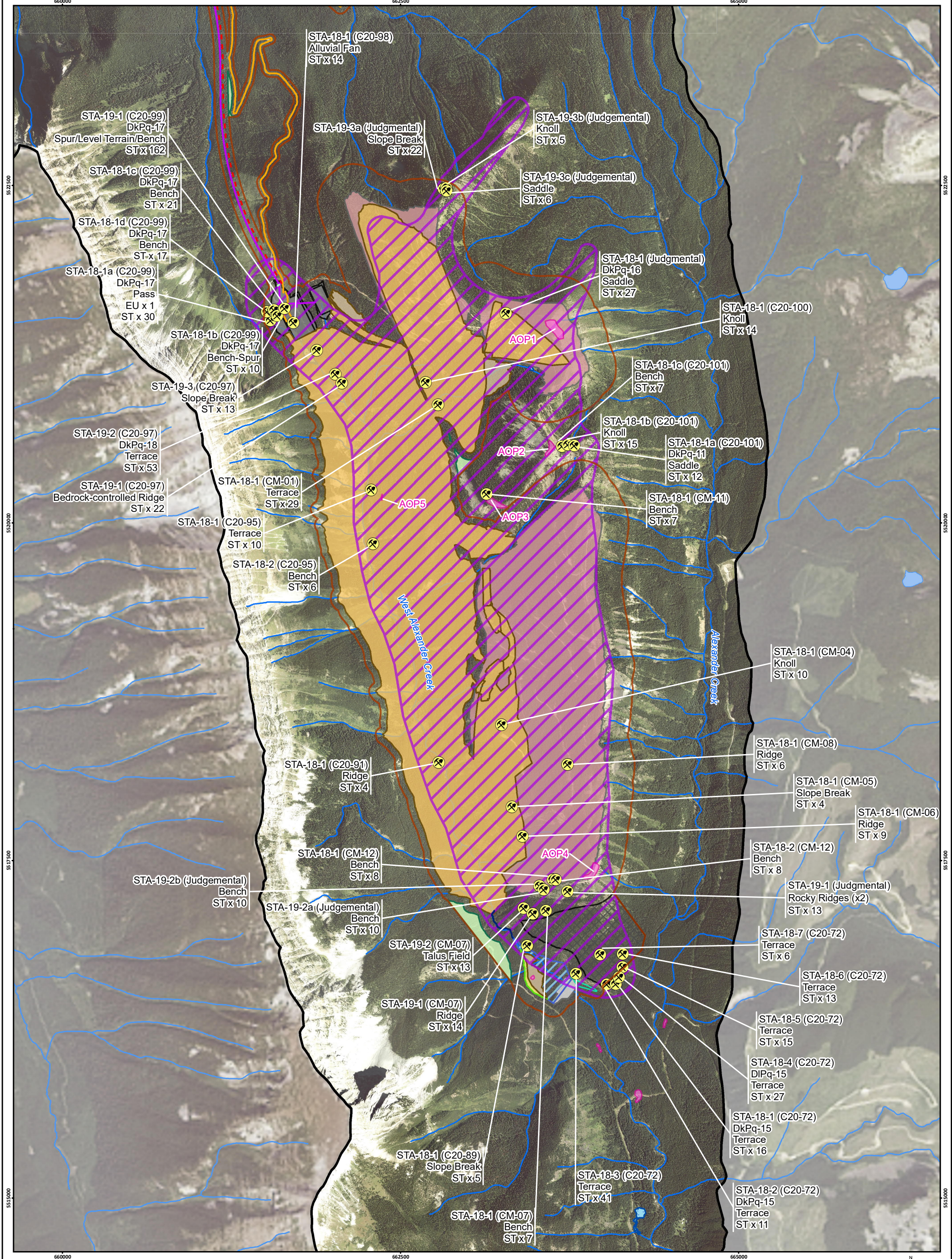
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**Crown Mountain Coking Coal Project**

**Figure 16.3-5**  
Archaeological Potential Areas within the Archaeological LSA (Phase III Study Area)

**LEGEND**

- |                                 |                               |                                  |
|---------------------------------|-------------------------------|----------------------------------|
| Subsurface Test Location        | Plant Site\ROM Stockpile Area | Clean Coal Haul Road\Site Access |
| Archaeological Potential Area   | Main Sediment Pond            | Service Corridor                 |
| Phase III Study Area            | Dam                           | Coal Process Plant Conveyor      |
| Archaeological Local Study Area | Spillway                      | Coal Process Plant Duct          |
| Project Footprint               | Diversion Ditch               | Watercourse                      |
| Waste Dump                      | Additional Area               | Waterbody                        |
| Mined Area                      | Contingency Area              | Wetland                          |
| Soil Stockpile Area             | Channel to Ultimate Pond      | British Columbia/Alberta Border  |
| Explosive Storage Facility\Pad  |                               |                                  |

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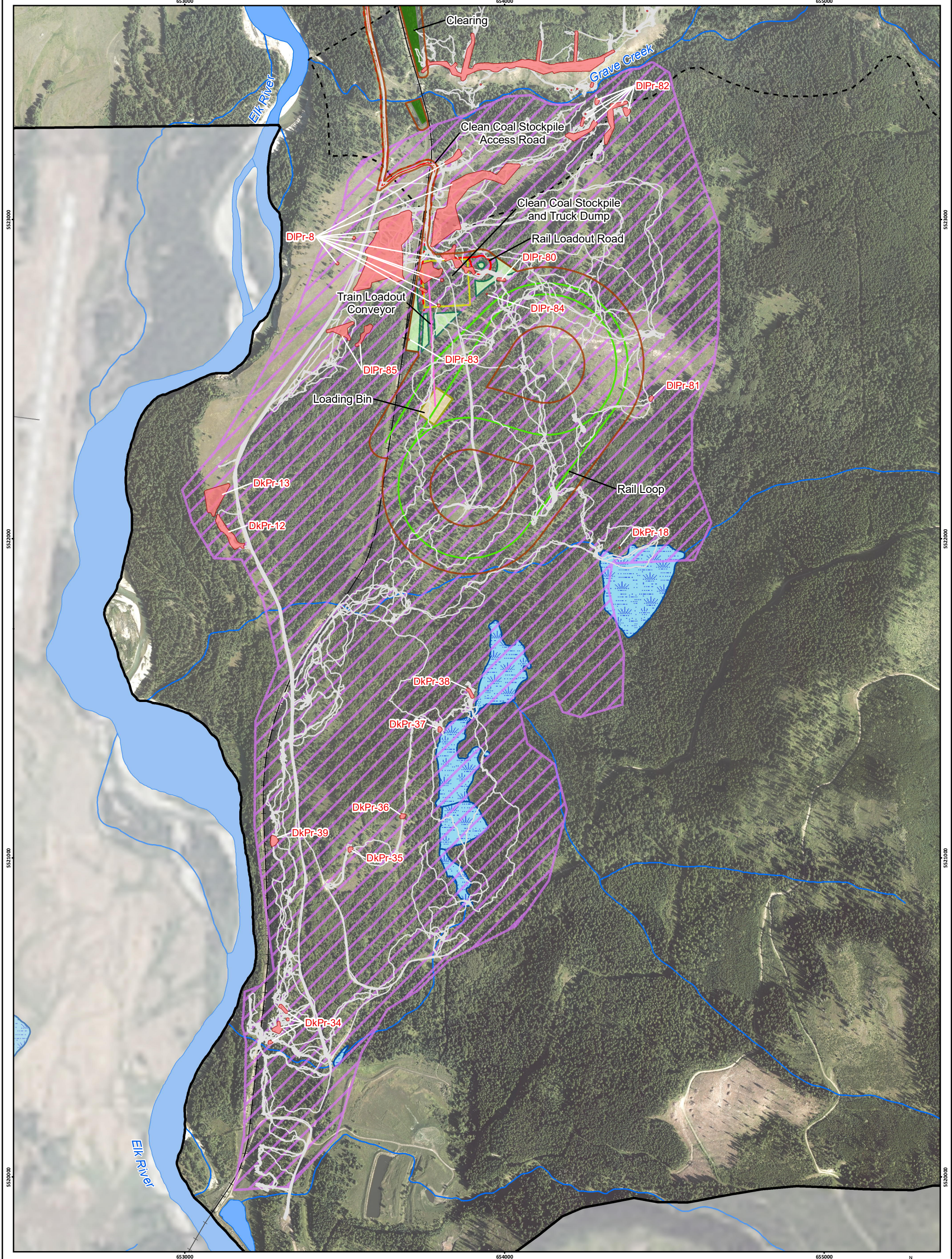
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Date: 2021-10-27

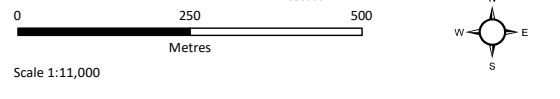


**Crown Mountain Coking Coal Project**

**Figure 16.3-6**  
Archaeological Sites Identified within the Archaeological LSA (Phase I Study Area)

**LEGEND**

- |  |                        |                                    |
|--|------------------------|------------------------------------|
| — Traverse                                     | ■ Clearing             | ■ Waterbody                        |
| ■ New and Revised Archaeological Site Boundary | ■ Additional Area      | ■ Wetland                          |
| ■ Phase I Study Area                           | — Rail Loadout Road    | --- Watershed                      |
| ■ Archaeological Local Study Area              | — Rail Loop            | □ British Columbia/ Alberta Border |
| ■ Project Footprint                            | - - - Service Corridor |                                    |
| ■ Clean Coal Stockpile and Truck Dump          | — Train Loadout        |                                    |
| ■ Loading Bin                                  | — Local/Resource Road  |                                    |
|  | — Railway              |                                    |
|  | — Watercourse          |                                    |



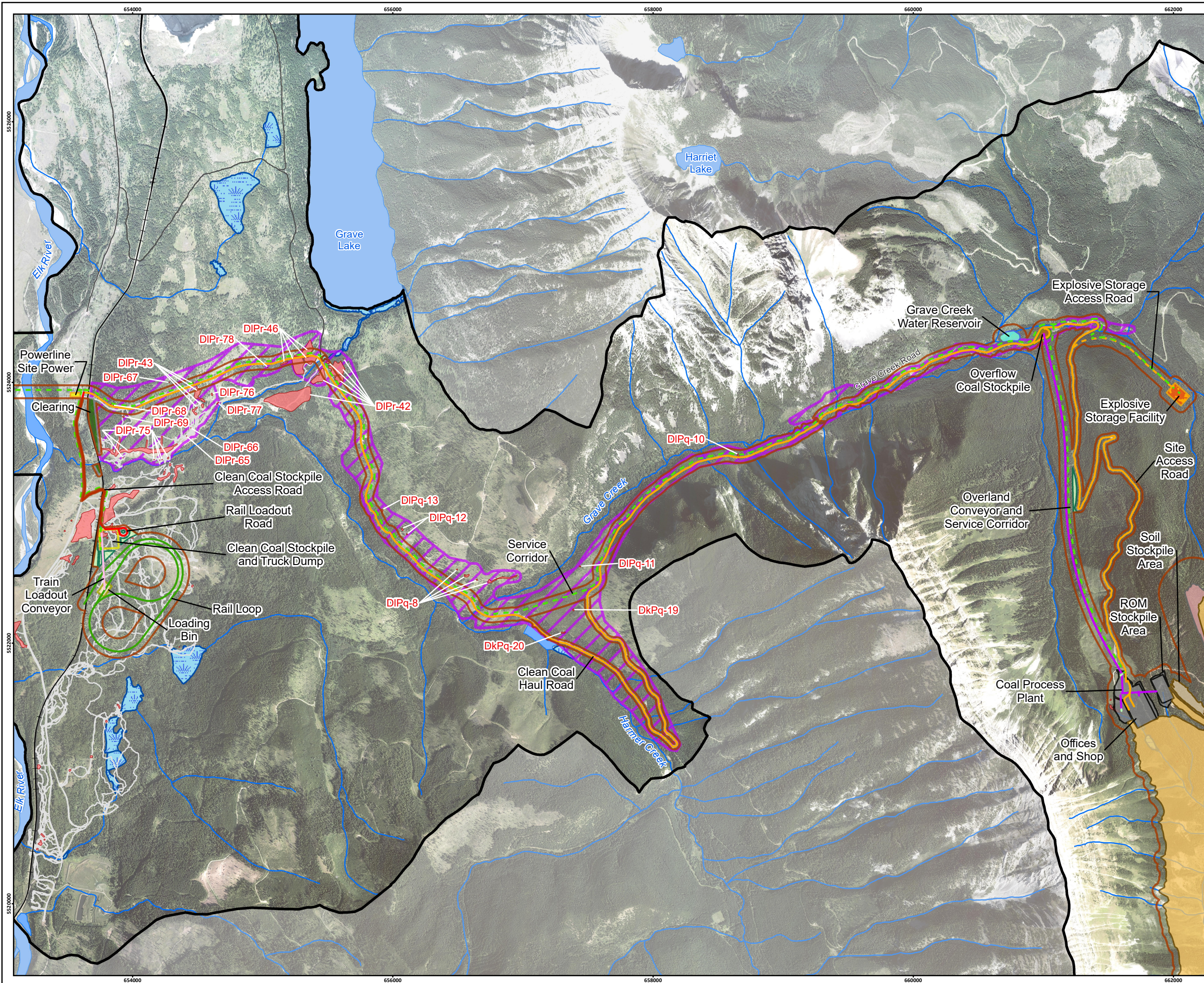
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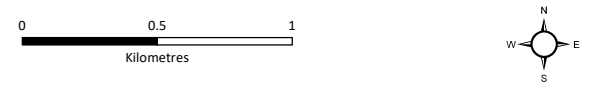


**Crown Mountain Coking Coal Project**

**Figure 16.3-7**  
Archaeological Sites Identified within the Archaeological LSA (Phase II Study Area)

**LEGEND**

— Traverse	Explosive Storage Facility/Pad
New and Revised Archaeological Site Boundary	Loading Bin
Phase II Study Area	Plant Site/ROM Stockpile Area
Archaeological Local Study Area	Powerline-Site Power
Project Footprint	Water Reservoir
Clean Coal Haul Road/Site Access	Dam
Explosive Storage Access/Facility Road	Clearing
Rail Loadout Road	Additional Area
Rail Loop	Local/Resource Road
Service Corridor	Railway
Coal Process Plant Conveyor	Watercourse
Coal Process Plant Duct	Waterbody
Train Loadout Conveyor	Wetland
Waste Dump	British Columbia/Alberta Border
Mined Area	
Clean Coal Stockpile and Truck Dump	
Overflow Coal Stockpile	
Soil Stockpile Area	

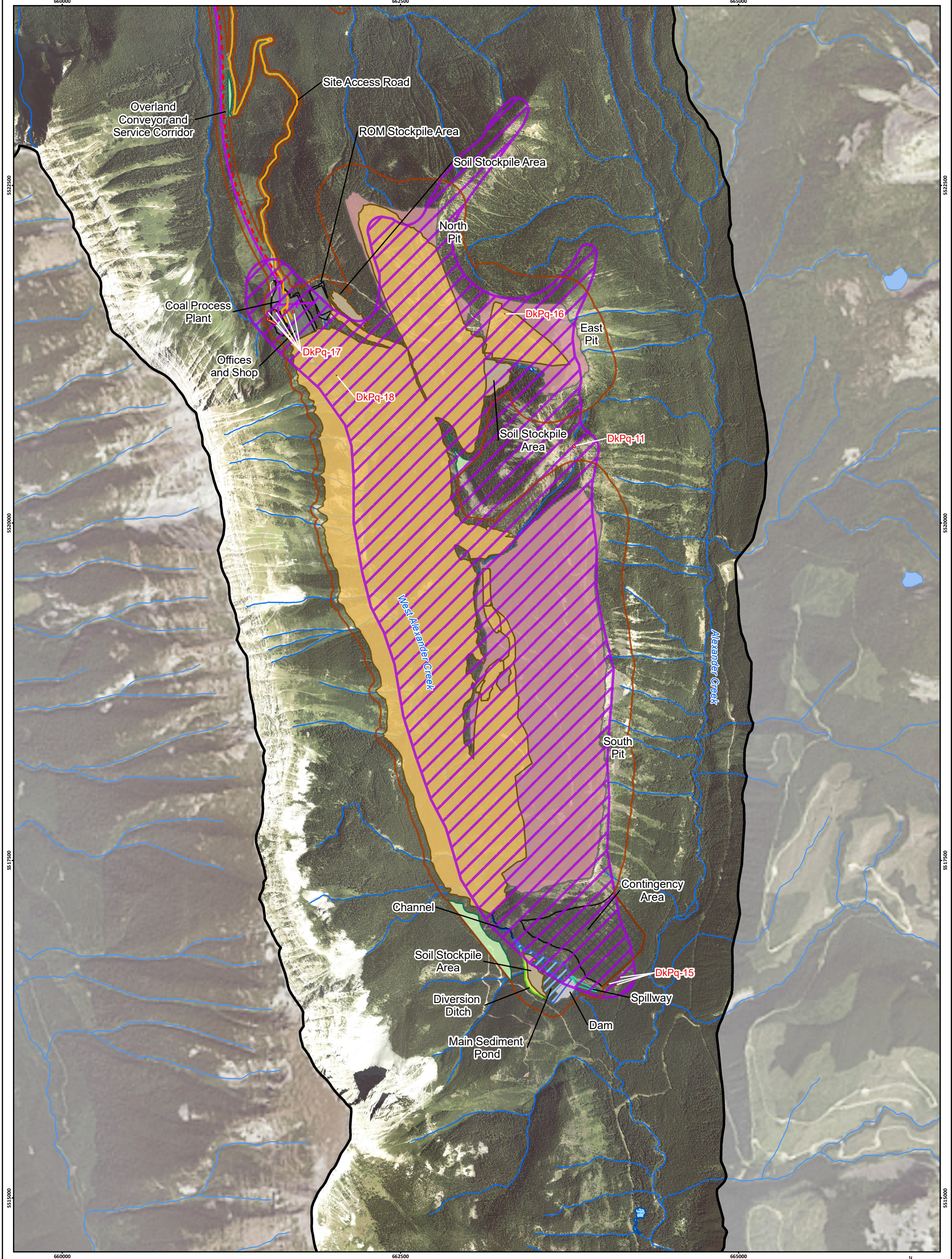


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Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N

Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

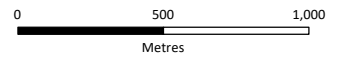


**Crown Mountain Coking Coal Project**

**Figure 16.3-8**  
Archaeological Sites Identified within the Archaeological LSA (Phase III Study Area)

**LEGEND**

- |  |                               |                                   |
|--|-------------------------------|-----------------------------------|
| New and Revised Archaeological Site Boundary | Plant Site\ROM Stockpile Area | Clean Coal Haul Road\ Site Access |
| Phase III Study Area                         | Main Sediment Pond            | Service Corridor                  |
| Archaeological Local Study Area              | Dam                           | Coal Process Plant Conveyor       |
| Project Footprint                            | Spillway                      | Coal Process Plant Duct           |
| Waste Dump                                   | Diversion Ditch               | Watercourse                       |
| Mined Area                                   | Additional Area               | Waterbody                         |
| Soil Stockpile Area                          | Contingency Area              | Wetland                           |
| Explosive Storage Facility\Pad               | Channel to Ultimate Pond      | British Columbia/ Alberta Border  |



Scale 1:26,000

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Map Created By: JL  
Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N



Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

## 16.4 Project Effects Assessment

The following sections outline the potential Project interactions with physical and cultural heritage, as well as a discussion on the potential Projects effects on physical and cultural heritage.

Based on publicly-available resources, there are no buildings or structures of architectural significance located within the Project footprint. The dilapidated remains of a cabin in site DIPr-80 (Ph1) is of low significance and is not offered any legislated protection. Additionally, sites DkPr-18 and DIPr-82 have a low historical significance (Table 16.3-3). All other sites within the Archaeological LSA do not have any historical or architectural significance. Therefore, historical and architectural resources (i.e., “any structure, site, or thing that is of historical or architectural significance”, as per Section 5(1)(c) of CEA Act, 2012 are not discussed further in this assessment. Consequently, this effects assessment focuses only on archaeological resources and palaeontological resources.

As discussed in Section 16.2.3.1, the Archaeological LSA is spatially equivalent to the Archaeological RSA; therefore, information presented in this section applies to both the LSA and RSA.

### 16.4.1 Thresholds for Determining Significance of Residual Effects

A significant adverse residual effect on physical and cultural heritage is one that results in a permanent Project-related disturbance to, or destruction of, all or part of an archaeological or palaeontological resource that is considered to be of increased importance due to factors such as: rarity, cultural significance, or research opportunities, and that cannot be adequately or feasibly mitigated or compensated.

### 16.4.2 Project Effects

#### 16.4.2.1 Project Interactions

Project activities during the Construction and Pre-Production, Operations, Reclamation and Closure, and Post-Closure phases have the potential to affect physical and cultural heritage (i.e., archaeological and/or palaeontological resources). Key Project activities that are expected to interact with physical and cultural heritage, with a potential for adverse effects, are presented in Table 16.4-1. Specific details on Project activities and components are discussed in Chapter 3.

Table 16.4-1: Project-Physical and Cultural Heritage Interaction Matrix and Ranking

Project Phase	Project Component	Description of Activities	Physical and Cultural Heritage
Construction and Pre-Production	Transportation	Use of Highway 43, Line Creek Mine Road, Valley Road, and Grave Creek Road by highway transport trucks, light duty vehicles, and crew busses to transport personnel, materials, and consumable items	I
	Logging of Merchantable Timber	Merchantable timber will be logged from the infrastructure and pre-production development footprint	III

Project Phase	Project Component	Description of Activities	Physical and Cultural Heritage
	Clearing and Grubbing	After the merchantable timber has been removed, the remaining vegetation will be cleared and grubbed from the infrastructure and pre-production development footprint	III
	Stockpiling Wood Waste	Wood waste will be stockpiled on site and used for reclamation as a source of coarse woody debris	I
	Quarry for Construction Materials	Excavation of road bed materials from the North Pit footprint for use on Grave Creek Road	III
	Water Management or Water Management Structures	Water management structures to support initial construction activities will be built prior to soil being salvaged from the run of mine (ROM) and plant site	III
		Interim Sediment Pond will be built prior to the soil removal and stockpiling from the pit access road and initial phase of the North Pit	III
		Grave Creek Reservoir will be constructed to act as a back-up source of process water	III
	Soil Salvage	Soil will be salvaged from the footprint of the infrastructure	III
	Road Upgrading and Construction	Branch C Road will be widened and upgraded to facilitate construction and mine traffic to plant site area	III
		Grave Creek Road will be widened to facilitate the clean coal haul	III
		A new road will be constructed off the Valley Road to access the rail loadout for construction and operation	III
	Linear Infrastructure	Installation of the powerline	III
		Installation of the natural gas line	III
	Overland Conveyor	Clearing, grubbing, and construction of overland conveyor from the plant site to Grave Creek Road	III
	Coal Handling Process Plant Construction	Excavating and pouring of foundation	III
		Transportation of materials and personnel to site	I
		Constructing of the Coal Handling Process Plant (CHPP)	I
		Commissioning of the CHPP	I
	Workshop / Mine Dry Construction	Excavating and pouring of foundations	III
		Transportation of materials to site	I
		Construction of workshop / mine dry	I
		Equipment wash bay and heavy equipment parking	I
		Administration, first aid, and mine dry building	I
		Diesel tank farm	I
		Warehouse	I
	Potable water system	I	

Project Phase	Project Component	Description of Activities	Physical and Cultural Heritage
		Septic system	I
		Water supply pipelines from Grave Creek and West Alexander Creek	I
		Commissioning of the facilities	I
	Explosives Factory Construction	Construction of the explosives factory	I
	Rail Loadout Construction	Excavation and preparation of the rail bed	III
		Excavation and preparation of foundation stockpiling and coal handling systems	III
		Transportation of materials and personnel to site	I
		Construction of rail loadout	III
		Connection to the CP Forcing Sub-line	I
		Commissioning of the rail loadout	I
	Labour	Hiring of personnel for the mine, CHPP operations, administration, and coal haul	I
		Training of personnel	I
	Construction Waste Materials	Collection and transfer to a recycling facility or other approved facility	I
Operations	Transportation	Use of Highway 43, Line Creek Mine Road, Valley Road, and Grave Creek Road by highway transport trucks, light duty vehicles, and crew busses to transport personnel, materials, and consumable items	I
	Explosives Factory	Ammonium nitrate / emulsion storage facilities which have the ability to load explosive agents into delivery trucks	I
		Wash facility to decontaminate the bulk explosive delivery trucks	I
		Storage of explosives (detonators and boosters)	I
	Fuel Storage	Receiving bulk fuel deliveries	I
		On-site storage of fuel	I
		Dispensing fuel	I
		Transferring fuel to on-site delivery trucks	I
	Mine Roads Development	Building roads from material sourced on-site	I
	Mining	Progressive clearing	III
		Removal of unconsolidated material	III
		Loading, hauling, and stockpiling of soil	I
		Drilling and loading of blastholes	II
		Detonating the explosives	II

Project Phase	Project Component	Description of Activities	Physical and Cultural Heritage
		Loading, hauling, and dumping of mine rock	I
		Loading, hauling, and stockpiling of coal	I
	Site Water Requirements	Using contact water as the primary process make-up water from Interim Sediment Pond (Year 1 to 5)	I
		Using contact water as the primary process make-up water from the North Pit (Year 5 to 15)	I
		Backup reservoir in Grave Creek as a secondary source of process make-up water	I
	Coal Processing	Run of mine coal sizing	I
		Washing coal	I
		Mechanical and thermal drying of coal	I
		Coal reject disposal (part of loading, hauling, and dumping of mine rock activities)	II
		Conveying clean coal	I
	Sewage Treatment	Sewage will be treated by a septic system constructed at the plant site which will support the administration, mine dry, and CHPP facilities	I
	Main Sediment Pond	Construction of Main Sediment Pond in Year 4	II
		Management of the Main Sediment Pond discharge	I
	Reclamation	Reclaiming available areas as soon as possible to achieve reclamation objectives	I
Reclamation and Closure	Transportation	Use of Highway 43, Line Creek Mine Road, Valley Road, and Grave Creek Road by highway transport trucks, light duty vehicles, and crew busses to transport personnel, materials, and consumable items	I
	Dismantling Infrastructure and Buildings	Dismantling of the CHPP, maintenance facilities, administration, and other facilities	I
		Dismantling, salvaging, collecting, and transferring materials to a recycling facility or other approved facility	I
	Removal of Linear Infrastructure	Removal of the powerline	I
		Removal of the natural gas line	I
	Reclamation	Reclaiming available areas as soon as possible to achieve reclamation objectives	I
	Monitoring	Reclamation monitoring	I
		Geotechnical monitoring	I
		Aquatic effects monitoring	I
	Water Management	Management of the Main Sediment Pond discharge	I

Project Phase	Project Component	Description of Activities	Physical and Cultural Heritage	
Post-Closure	Water Management	Decommissioning the Main Sediment Pond once water quality objectives have been met	I	
	Road Use	Branch C Road will remain as a permanent access road for future commercial and recreational use	I	
	Rail Line	The rail line will remain as a permanent feature	I	
	Monitoring	Reclamation monitoring		I
		Geotechnical monitoring		I
		Aquatic effects monitoring		I

Notes (after EAO, 2013):

I = No or negligible effect (positive or adverse) is anticipated; not carried forward in the assessment

II = Potential adverse effects requiring additional mitigation or substantive positive effects are expected; carried forward in the assessment

III = Key interaction resulting in potential significant adverse effect or significant concern; carried forward in the assessment

#### 16.4.2.1.1 Discussion of Interactions by Project Phase

##### Construction and Pre-Production

During construction activities, there is the potential for interactions with physical and cultural heritage (particularly known archaeological resources) through the activities identified by a level III in Table 16.4-1. These interactions are expected to take place during ground disturbance activities (e.g., clearing, grubbing, logging, excavation, foundation construction, etc.). Where ground disturbance activities are required, there is potential for a key interaction (level III) resulting in a potential significant adverse effect, which warrants further consideration. Where Construction and Pre-Production components or activities do not include ground disturbance, such as transportation to the site through existing road networks, stockpiling of wastes (in an already disturbed footprint) or collection of waste materials, no interaction was identified and these activities will not be further considered in relation to physical and cultural heritage in this assessment.

As described in Section 16.3.1.2, there are no known palaeontological sites within the Project footprint or Archaeological LSA. Based on the geological formations of the Project footprint, there is potential for palaeontological resources to be present within the Project footprint, and thus the discovery of a palaeontological resource during the Construction and Pre-Production phase (i.e., ground disturbance for excavation, foundation construction, etc.) will be considered within this assessment.

##### Operations

During Operations, there is the potential for interactions with physical and cultural heritage (particularly known archaeological resources) through the activities identified as level III in Table 16.4-1. Similar to the Construction and Pre-Production phase, Operations requires ground disturbance activities (i.e., through mining), and there is the potential for a key interaction (level III) resulting in potential significant adverse effect which warrants further consideration. Furthermore, the construction of the Main Sediment Pond during Operations has the potential to interact with physical and cultural heritage through ground disturbance activities. A level II interaction has been identified for this activity because of the anticipated

disturbed state of the Project footprint from Construction and Pre-Production and Operations activities that will have already taken place at the time of the new Main Sediment Pond construction.

Similar to the Construction and Pre-Production phase, where Operations phase components or activities do not include ground disturbance, such as transportation to the site through existing road networks, stockpiling of wastes (in an already disturbed footprint) or collection of waste materials, there was no interaction identified and these activities will not be further considered in relation to physical and cultural heritage in this assessment.

Based on the geological formations of the Project footprint, there is potential for palaeontological resources to be present within the Project footprint and the discovery of a palaeontological resource during the Operations phase (i.e., mining and coal processing) will be considered within this assessment.

#### Reclamation and Closure, and Post Closure

It is not anticipated that there will be interactions with the activities outlined in the Reclamation and Closure phase, nor the Post-Closure phase, due to the lack of ground-breaking activities outside of areas already disturbed by the Project.

#### 16.4.2.1.2 Identification of Potential Effects on Physical and Cultural Heritage

In general, the Project has the potential to affect physical and cultural heritage through:

- Ground disturbance activities (e.g., clearing, grubbing, logging, excavation, foundation construction);
- Mining activities (e.g., clearing, removal of unconsolidated material, and blasting);
- Coal processing activities; and
- Construction of the Main Sediment Pond.

Potential effects on physical and cultural heritage as a result of the Project that are carried forward in the discussion of potential effects are summarized in Table 16.4-2.

Table 16.4-2: Potential Effects on Physical and Cultural Heritage

Potential Effect	Rationale for Selection of Effect
Change in palaeontological resources due to ground disturbance activities	Based on the geological formations located within the Project footprint, there is potential for ground disturbance activities during site clearing, construction, and mining to result in changes to palaeontological resources in the Project footprint.
Change in archaeological resources due to ground disturbance activities	Based on the results of the archaeological impact assessment conducted within the Project footprint and Archaeological LSA, there is potential for activities during site clearing, construction, and mining involving ground disturbance to result in changes to archaeological resources in the Project footprint and Archaeological LSA.

## 16.4.3 Discussion of Potential Effects

### 16.4.3.1 Change in Palaeontological Resources due to Ground Disturbance Activities

As described in Section 16.3.1.2, there are no known palaeontological sites within the Project footprint or Archaeological LSA. A desktop level Preliminary Fossil Impact Assessment was conducted for the Project footprint (Aeon Paleontological Consultants Ltd., 2021) with the objective to assess the potential for fossils to be present within the Project footprint, and to evaluate the level of risk that Project activities would pose to the fossils. The Fossil Impact Assessment methodology and detailed results are provided in Appendix 16-B.

The coal-bearing Mist Mountain Formation and the Morrissey Formation underlie the proposed mining areas and therefore will be impacted by mining activities. Trackways of vertebrates and other fossils have been encountered in these formations at other coal mining operations in the Elk Valley. The risk to fossils in the mining areas is therefore assessed to be high. Disturbance to the Fernie Group shales, which are present along the access roads, the conveyor route, and in the rail loadout area, would be moderate during construction in those areas. The risk to fossils in the Fernie Group is therefore assessed to be moderate. Disturbance to the older bedrock formations that are present along the Grave Creek Road would be low. Although bedrock could be exposed locally during road widening, it is typically covered by unconsolidated sediments in that area. The risk to fossils in those formations is therefore assessed to be low. Unconsolidated sediments are present along the Grave Creek Road and in the rail loadout area, but no fossils have been reported from unconsolidated sediments in the Fernie–Elk Valley–Crowsnest region. The risk to fossils in the unconsolidated sediments is therefore assessed to be low.

Based on the findings of the Preliminary Fossil Impact Assessment, ground disturbance activities as a result of the Project may affect palaeontological sites in the Project footprint, should they exist. There is a potential for the Project to have a negative effect on palaeontological resources in the Project footprint if palaeontological sites are inadvertently destroyed because they were not readily identifiable during mining activities. However, through the implementation of a Chance Find Protocol (discussed in Section 16.4.4.1) and due to the small area of the Project footprint in relation to the fossil bearing formations (i.e., Mist Mountain Formation), impacts on local palaeontological resources are anticipated to be negligible.

Positive effects on palaeontological resources may also occur as a result of the Project because the identification of palaeontological resources within the Project footprint may allow for scientific research on finds that may otherwise not have been discovered, contributing scientific knowledge of the area.

### 16.4.3.2 Change in Archaeological Resources due to Ground Disturbance Activities

As described in Section 16.3.2.2, there are a number of known archaeological sites within the Project footprint and Archaeological LSA that have the potential to be disturbed as a result of the proposed Project. Table 16.4-3 summarizes both anticipated direct and indirect effects on the known archaeological resources (including presence, number, type, and location) in the Project footprint and Archaeological LSA that have the potential to be impacted by the proposed Project. Direct impacts refer to the direct change, disturbance, or destruction of an archaeological resource as a result of the Project (i.e., the archaeological resource is located within the Project footprint where ground disturbance will take place). An indirect effect to archaeological resources refers to the loss of geographical context related to these resources

that are located in close proximity to, but not directly within, the Project footprint (i.e., will not be directly impacted). Loss of geographical context refers to the loss of surrounding features of the landscape that provide information and insight into the occupational sequence and circumstances of the particular archaeological resource. This information may infer some aspects to the significance of an archaeological site, such as a site that pre-contact peoples may have used routinely, rather than incidentally. Indirect impacts may also include the introduction of elevated environmental risk to the heritage resource (i.e., such as the elevated risk of erosion).

Based on information provided by the Ktunaxa Nation Council (Chapter 23, Section 23.8.3.2.3), Grave Prairie is a landscape containing extremely important Ktunaxa cultural values and is located within the Project footprint. The KNC Lands Advisory Working Group have determined that the area of Grave Prairie has significant cultural significance to Ktunaxa and that any additional infrastructure, including the proposed rail loadout, is not compatible with this cultural landscape. Based on the direction from Ktunaxa Knowledge Holders (as noted in Section 23.8.3.2.3), the area currently known as the “Grave Prairie Cultural Landscape” contains two “zones”; a “Culturally Significant Area” where no new activities or infrastructure will be accepted, and a “Culturally Sensitive Area” which requires rigorous in-depth assessments prior to Ktunaxa contemplating additional development. The impacts to this site of any proposed development cannot be mitigated, and simply avoiding the physical remains of Ktunaxa ancestors is not enough to justify the proposed rail loadout facility as stated by Ktunaxa Nation. Grave Prairie was also identified as a landscape containing extremely important Shuswap Band cultural values (Chapter 24, Section 24.7.3.2.6).

Table 16.4-3: Summary of Potential Project Effects on Archaeological Sites in the Project Footprint and Archaeological LSA

Archaeological Site*	Location/Development Area	AOA Polygon	Impact Direct / Indirect	Type of Impact(s)
Phase I - Railway Siding/Loop and Loadout Facility				
DIPr-8	Loadout Facility & Access Road	C38-20	Direct & Indirect	<p>Partial loss of site (i.e., Polygons F – J) via the removal of top soil and mechanical alteration to the infrastructure components associated with facilitate loadout facility and access road. Site contains suspected burial mounds, but site polygons containing identified mounds are not within the development footprint</p> <p>Potential for indirect impacts to portions of the site (i.e., Polygons A – E) through loss of regional/contextual information</p>
DIPr-80	Railway Siding & Loadout Loop	C38-15	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration to facilitate the rail loadout
DIPr-83	Railway Loadout Facility (Grave Prairie)	C38-15	Direct	Loss of site area via the removal of top soil and mechanical alteration to facilitate the rail loadout

Archaeological Site*	Location/Development Area	AOA Polygon	Impact Direct / Indirect	Type of Impact(s)
DIPr-84	Railway Loadout Facility (Grave Prairie)	C38-15	Direct	Loss of site area via the removal of top soil and mechanical alteration to facilitate the rail loadout
<b>Phase II – Transportation Corridor</b>				
DkPq-19	Transportation Corridor (Grave Creek & Harmer Road)	C38-21	Indirect	Sites are peripheral to (i.e., between) the Project footprint (Grave Creek Road and Harmer Road); potential for indirect impact(s) through loss of regional/contextual information
DkPq-20	Transportation Corridor (Grave Creek & Harmer Road)	C38-21	Indirect	
DIPq-8	Transportation Corridor (Harmer Road)	C38-20	Indirect	Site is peripheral (i.e., upslope) to the development footprint (Harmer Road); potential for indirect impact(s) through loss of regional/contextual information, and increased potential for erosion (e.g., undercutting, slope wash, and slumping)
DIPq-10	Transportation Corridor (Grave Creek Road)	N/A	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPq-11	Transportation Corridor (Grave Creek Road)	CM-13	Indirect	Site is peripheral (i.e., downslope) to the Project footprint (Grave Creek Road and Harmer Road); potential for indirect impact(s) through loss of regional/contextual information
DIPq-12	Transportation Corridor (Harmer Road)	C38-20	Indirect	Sites are peripheral (i.e., upslope) to the footprint of road upgrades (Harmer Road); indirect impact(s) through loss of regional/contextual information, and increased potential for erosion (e.g., undercutting, slope wash, and slumping)
DIPq-13	Transportation Corridor (Harmer Road)	C38-20	Direct	Loss of site area via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPr-42	Transportation Corridor (Harmer Road)	C38-19	Direct	Partial loss of currently defined site areas (i.e., polygons B - E) via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPr-43	Transportation Corridor (Harmer Road)	C38-19	Direct	Partial loss of currently defined site areas (i.e., polygons C & D) via the removal of top soil and mechanical alteration to facilitate road upgrades

Archaeological Site*	Location/Development Area	AOA Polygon	Impact Direct / Indirect	Type of Impact(s)
DIPr-46	Transportation Corridor (Harmer Road)	C38-19	Direct	Partial loss of currently defined site areas (i.e., polygons A - D) via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPr-65 DIPr-66	Transportation Corridor & Loadout (Harmer Road)	C38-44	Indirect	Sites are no longer within the Project footprint; indirect impact(s) through loss of regional/contextual information
DIPr-67	Transportation Corridor (Harmer Road)	C38-12	Indirect	Sites are no longer within the Project footprint; indirect impact(s) through loss of regional/contextual information
DIPr-68	Transportation Corridor (Harmer Road)	C38-44	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPr-69	Transportation Corridor (Harmer Road)	C38-44	Indirect	Site is no longer within the Project footprint; indirect impact(s) through loss of regional/contextual information
DIPr-75	Transportation Corridor (Harmer Road)	C38-44	Direct	Partial loss of site area via the removal of top soil and mechanical alteration to facilitate road upgrades
DIPr-76 DIPr-77	Transportation Corridor & Loadout (Harmer Road)	C38-44	Indirect	Sites are no longer within the Project footprint; indirect impact(s) through loss of regional/contextual information
DIPr-78	Transportation Corridor (Harmer Road)	C38-44	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration to facilitate road upgrades
<b>Phase III – Mine Site</b>				
DkPq-11	N/A	C20-101	Indirect	Sites are peripheral to the footprint of the coal mine and ancillary infrastructure components; loss of contextual information
DkPq-15	N/A	C20-72	Indirect	
DkPq-16	Coal Extraction (East Pit)	n/a	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration of the surrounding landscape
DkPq-17	Processing Facilities/Buildings, Conveyor	C20-99	Direct	Loss of site area (Legacy Status) via the removal of top soil and mechanical alteration of the surrounding landscape
DkPq-18	Spoil Area	C20-97	Direct	Loss of site area (Legacy Status) via top soil removal and burial of surrounding landscape by spoil

Note: the archaeological sites that were not identified as having the potential for direct or indirect impacts (i.e., identified as N/A by the archaeologist) were not included within this summary table. Refer to the Archaeological Impact Assessment reports in Appendix 16-A for further details on archaeological sites that are not expected to be impacted by the Project.

In summary, as evidenced by the data in Table 16.4-3, 15 known pre-contact archaeological sites within the Project footprint cannot be avoided and will be affected by direct disturbance associated with Project activities. None of these 15 archaeological sites are known to contain ancestral or historical burial sites.

#### 16.4.3.3 Transboundary Effects

No transboundary effects on physical and cultural heritage are anticipated because impacts to archaeological and palaeontological resources will be limited to the area of physical disturbance within the Project footprint (direct effects) or in close proximity to the Project footprint (indirect effects due to loss of geographical context). As described in Chapter 1, Section 1.3.3, federal land is not required to facilitate the Project and the Project does not overlap with any federal lands; therefore, no effects to physical and cultural heritage on federal lands are anticipated.

### 16.4.4 Mitigation Measures

The mitigation measures proposed for physical and cultural heritage are based on available best management practices (BMPs), provincial and federal guidance documents, mitigation measures conducted and accepted for similar projects, and professional judgment.

Mitigation measures were identified for each potential effect on physical and cultural heritage. For the purposes of this assessment, mitigation measures are defined to include Project design features, procedures, or practices that will reduce or eliminate Project-related effects to physical and cultural heritage. Potential Project-related changes to physical and cultural heritage will be reduced through design mitigation, regulatory requirements, site reclamation, BMPs, including management plans, monitoring, and adaptive management. Where mitigation measures are considered to be completely effective, potential Project effects on physical and cultural heritage are not identified as residual effects.

#### 16.4.4.1 Mitigation Measures for Change in Palaeontological Resources due to Ground Disturbance Activities

Because the occurrence of palaeontological resources (i.e., fossils) in the Project footprint is unpredictable, a Chance Find Protocol will be implemented for the Project. If fossils are encountered during excavation activities on site, NWP will follow the proposed Chance Find Protocol provided in Appendix A of Appendix 16-B. This protocol establishes procedures to be followed when fossils are encountered so that appropriate recovery or mitigation plans can be developed and implemented, including:

- Diverting work away from the immediate area of a fossil find;
- Reporting the find to the site supervisor and designated palaeontology specialist;
- Photographing the find and recording its location;
- Informing the B.C. Fossil Management Office or designated museum; and
- Developing a recovery or mitigation plan.

No residual effects from ground disturbance activities are predicted on palaeontological resources as a result of the Project through limiting Project activities to the extent of the approved Project footprint and through the implementation of the Chance Find Protocol.

#### 16.4.4.2 Mitigation Measures for Change in Archaeological Resources due to Ground Disturbance Activities

An Archaeology Management Plan (Chapter 33, Section 33.4.1.2) was developed for the Project and describes protocols that will be followed where the Project footprint encroaches upon the recorded boundaries of pre-contact archaeological sites (pre-dating A.D. 1846) that are protected under the Heritage Conservation Act, in addition to best management practices for archaeological potential zones and Chance Finds. Mitigation measures for direct impacts to archaeological resources will include, but not be limited to, the following:

- Avoidance of known archaeological sites will be undertaken wherever possible to preserve pre-contact archaeological resources;
  - The Project footprint has been consciously placed to minimize direct impacts to as many archaeological sites as possible. NWP has conducted initial proactive mitigation through the Project planning phase through the redesign of the rail loadout to avoid impacts to suspected ancestral burials that were identified during the Baseline Archaeological Program. Through consultation with the Project Archaeologist and Ktunaxa Nation Council, an area within continuous, rolling slope situated upslope to the east-southeast of Grave Prairie was identified as a suitable revised location for the rail loadout. Although several relatively small-sized archaeological sites were discovered within the revised location, none of the sites contained evidence of ancestral burials;
- Conduct consultation with appropriate Indigenous groups and develop appropriate mitigation plans (e.g., supplemental shovel testing, evaluative testing, block excavation, sample screening of archaeologically-pertinent sediment that is to remain within a remnant portion of a site, 100% screening of archaeologically-pertinent sediment that is to be exported from the locality of a site, monitoring of mechanical activity) for the anticipated direct impacts to 15 known archaeological sites to be directly impacted by the Project activities (refer to Table 16.4-3);
- Due to the evolution of the mine plan and placement of associated infrastructure components, portions of the Project footprint have not been subjected to an in-field archaeological assessment; therefore, a subsequent archaeological impact assessment, including evaluative investigations, under a Section 12.2 Heritage Inspection Permit will be required to determine if and where archaeological resources are present. Currently, unassessed areas include, but may not be limited to:
  - a. Phase IV (Alexander Creek valley - Secondary Transportation Corridor);
  - b. Utility Corridor (west of Elk River); and
  - c. Phase I and II clearance limits (recently defined);
- Application for a provincial Section 12.4 Alteration Permit, to facilitate the Project where it overlaps with identified pre-contact archaeological sites; this is to be held concurrently with a Section 12.2 Heritage Inspection Permit. Note that the process of developing both lawful and ethical methodologies to facilitate mitigative strategies to develop within pre-contact archaeological sites is dynamic and each site will have to be assessed individually with input and guidance provided by the B.C. Archaeology Branch and applicable Indigenous communities. In general, mitigative strategies could include, but may not be limited to by the time the Project is implemented:
  - At a minimum, monitoring by a qualified archaeologist will be required throughout the duration of mechanical activity during Construction and Pre-Production within and adjacent

- to currently delineated site areas and areas identified within the baseline reporting as containing high archaeological potential;
- Excavation of supplemental shovel tests and evaluative units to contribute to a site's artifact assemblage and obtain an adequate amount of contextual information;
- Salvage inspection (e.g., sample screening) of mechanically-excavated, archaeologically-pertinent sediment extracted from, and potentially immediately adjacent to, delineated archaeological site boundaries. Note that all topsoil/sediment from an archaeological site that potentially contains archaeological artifacts must remain within or immediately adjacent to the defined site boundary;
- Short-term or long-term halt(s) of mechanical activity should significant archaeological resources (artifacts and cultural sites) or palaeontological resources (fossils) be exposed while archaeological monitoring is occurring to conduct systematic data collection if/as needed; and
- Salvage inspection (100% screening) should any archaeologically-pertinent topsoil/sediment that originates from within an archaeological site be required to be removed from the locality of the site area; this is to prevent the export of archaeological artifacts;
- Incident response procedures for Chance Finds and the discovery of human remains will be put in place as per the Section 12.4 Alteration Permit, and will be followed in the event that previously undiscovered artifacts or sites are encountered during Project-related activities.

Strategies proposed to avoid or offset impacts to the Grave Prairie Cultural Landscape are those identified in the Indigenous Impact Management Plan (Chapter 33, Section 33.4.3.4) and those specific measures listed by the Ktunaxa Nation in Chapter 23, including:

- Evaluating all options to reduce impacts of the rail loadout on the Grave Prairie Cultural Landscape as recommended by Ktunaxa Nation including the adequate consideration to avoidance impact through alternative means that may include:
  - Longer truck haul to a less sensitive load out location;
  - The extension of rail to the Alexander Valley section of the facility; and
  - Agreements with existing operators to share already existing rail load out infrastructure, if possible.
- As the Grave Prairie Cultural Landscape includes a "Culturally Sensitive Area" which requires rigorous in-depth assessments prior to contemplating additional development, NWP will continue to work with the identified Indigenous Communities to address related concerns.

Impact management measures are expected to be refined with continued consultation with Ktunaxa Nation and Shuswap Band. Follow-up on Project-related activities that have the potential to impact the Grave Prairie Cultural Landscape will also be undertaken through the Indigenous Impact Management Plan.

Mitigation measures for indirect effects to archaeological resources will include, but not be limited to, the following:

- Limit Project activities during the Construction and Pre-Production, Operations, and Reclamation and Closure phases to the extent of the approved Project footprint; and
- Periodic surveillance of mechanical activity and implemented ground disturbance beyond recorded archaeological sites will be conducted to confirm that any inadvertently exposed and

unidentified archaeological material is handled appropriately and adheres to Best Practices, Chance Find Procedure, and methodology and conditions of heritage permitting.

#### 16.4.4.3 Summary of Mitigation Measures for Physical and Cultural Heritage

The key mitigation measures proposed to mitigate potential effects on physical and cultural heritage are summarized in Table 16.4-4. Anticipated residual effects that will be carried forward in the characterization of residual effects, significance, and likelihood and confidence are outlined in Table 16.4-4.

Mitigation measures proposed to reduce adverse effects to physical and cultural heritage are generally accepted, understood, and proven to effectively reduce adverse effects on physical and cultural heritage. Given that the impacts to archaeological resources cannot be completely avoided, the overall effectiveness of the proposed mitigation to address a change in archaeological resources due to ground disturbance activities are rated as moderate. Where mitigation measures do not or may not mitigate all effects or if there is a low level of confidence in their effectiveness, the effect was carried forward for further analysis of residual effects. Mitigation measures that are expected to completely mitigate potential effects with a high level of confidence based on their proven effectiveness elsewhere were classified as having no expected residual effects. Impact management measures described in this chapter and in the Indigenous Impact Management Plan are expected to be refined through continued consultation with the Ktunaxa Nation and Shuswap Band. Follow-up on Project-related activities that have the potential to impact the Grave Prairie Cultural Landscape will also be undertaken through the Indigenous Impact Management Plan.

If monitoring indicates that the effectiveness of mitigation measures is lower than predicted, further mitigation may be required as per adaptive management strategies outlined in the Archaeology Management Plan (Chapter 33, Section 33.4.1.2).

No other technically and economically feasible mitigation measures were considered for physical and cultural heritage, and NWP is not aware of potential future technology innovations that could help further mitigate effects.

#### 16.4.5 Characterization of Residual Effects, Significance, Likelihood, and Confidence

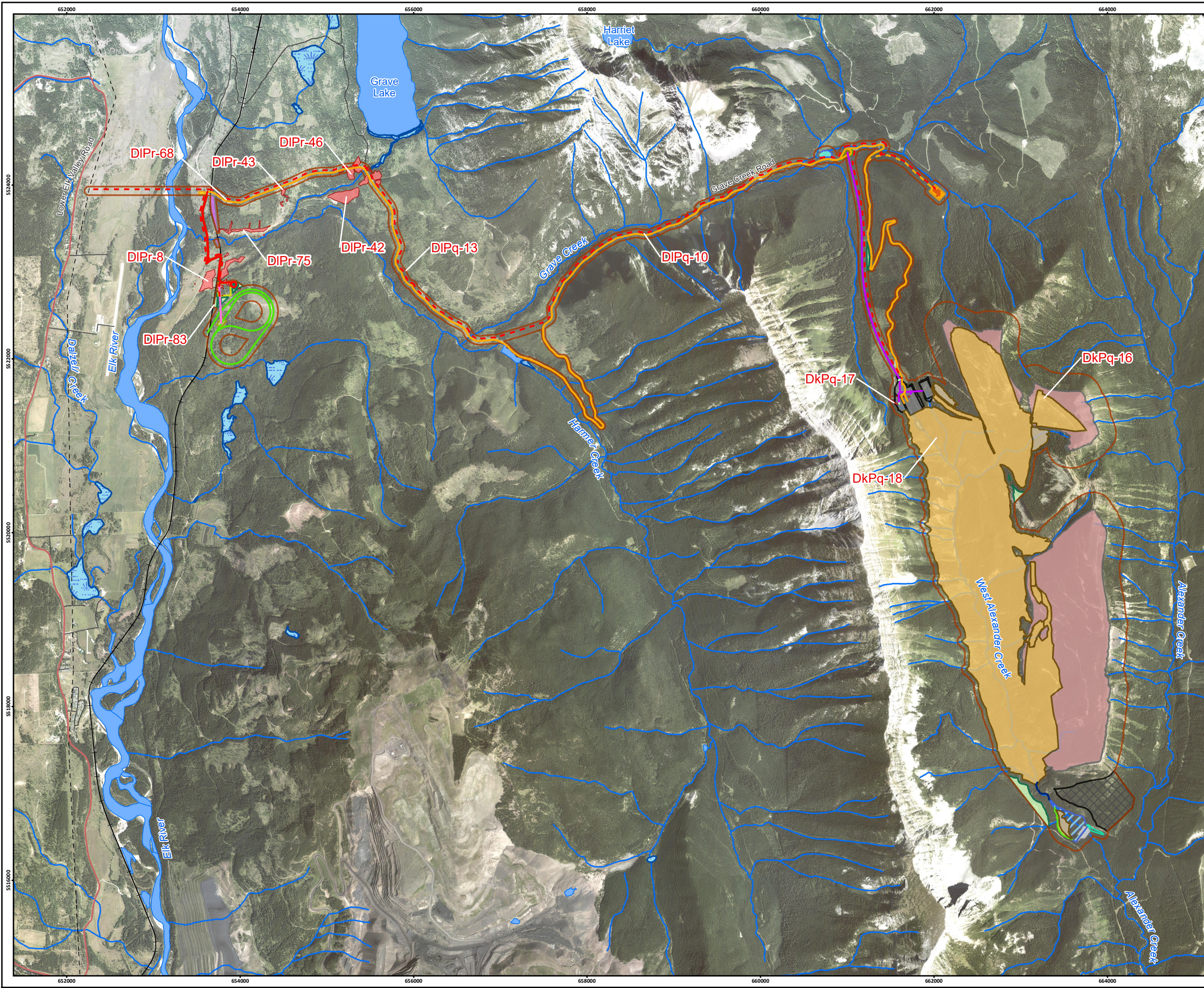
Based on the evaluation of potential Project effects on physical and cultural heritage, the potential residual effect that may remain after implementation of proposed mitigation measures includes a change in archaeological resources due to ground disturbance activities.

There are 15 pre-contact archaeological sites anticipated to be directly impacted by the Project (Table 16.4-3; Figure 16.4-1). These resources are located in areas where adjustments to the Project footprint cannot be made, and therefore additional mitigation in the form of salvaging these resources through a controlled, permitted, professional archaeological excavation will be required. Archaeological monitoring during ground disturbance activities, as needed, will further assist in identifying and preserving previously undiscovered archaeological resources in the event that they are uncovered.

Table 16.4-4: Summary of Proposed Mitigation Measures Related to Physical and Cultural Heritage

Potential Effect	Mitigation Measures	Rationale	Applicable Project Phases	Effectiveness	Residual Effect
Change in Palaeontological Resources due to Ground Disturbance Activities	<ul style="list-style-type: none"> <li>Minimize Project footprint through Project design</li> <li>Limit Project activities to the extent of the approved Project footprint</li> <li>Implement Chance Find Protocol</li> </ul>	<ul style="list-style-type: none"> <li>Minimizing the Project footprint and disturbance area reduce the potential for impacts to palaeontological resources</li> <li>The Chance Find Protocol will promote appropriate recovery or mitigation plans for palaeontological resources, should they be encountered</li> </ul>	<ul style="list-style-type: none"> <li>Construction and Pre-Production</li> <li>Operations</li> </ul>	High	No
Change in Archaeological Resources due to Ground Disturbance Activities	<ul style="list-style-type: none"> <li>The Project footprint has been consciously placed to minimize direct impacts to as many archaeological sites as possible</li> <li>Limit Project activities to the extent of the approved Project footprint</li> <li>Conduct consultation with the B.C. Archaeology Branch and appropriate Indigenous groups and develop a lawful and ethically appropriate mitigation plan that will likely require site-specific methodologies</li> <li>Conduct subsequent archaeological impact assessment and investigations under a Section 12.2 Heritage Inspection Permit on provisionally delineated site areas, areas within the Project footprint that have been identified with high</li> </ul>	<ul style="list-style-type: none"> <li>Consciously placing and minimizing the Project footprint reduces the potential for impacts to both discovered and undiscovered archaeological resources</li> <li>Industry practices as described in the Archaeology Management Plan are proven to be effective in reducing the potential for impacts to archaeological resources and ensuring that appropriate protocols and procedures are followed</li> <li>As the Grave Prairie Cultural Landscape includes a “Culturally Sensitive Area” which requires rigorous in-depth assessments prior to contemplating additional development, NWP will continue to work with the identified Indigenous Communities to address related concerns</li> </ul>	<ul style="list-style-type: none"> <li>Construction and Pre-Production</li> <li>Operations</li> </ul>	Moderate	Yes

Potential Effect	Mitigation Measures	Rationale	Applicable Project Phases	Effectiveness	Residual Effect
	<p>archaeological potential, and previously unassessed areas</p> <ul style="list-style-type: none"> <li>• Application for a provincial Section 12.4 Alteration Permit, to facilitate the Project where it overlaps with identified pre-contact archaeological sites</li> <li>• Implementation of an incident procedure as per the Section 12.4 Alteration Permit</li> <li>• Impact management measures described in the Indigenous Impact Management Plan are expected to be refined through continued consultation with Ktunaxa Nation and Shuswap Band to address the potential effects on the Grave Prairie Cultural Landscape, an important cultural landscape for the identified Indigenous Communities</li> </ul>				

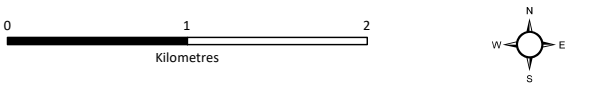


**Crown Mountain Coking Coal Project**

**Figure 16.4-1**  
Archaeological Sites in the Project Footprint

**LEGEND**

New and Revised Archaeological Site Boundary	Plant Site\ROM Stockpile Area
Project Footprint	Powerline-Site Power
Channel to Ultimate Pond	Water Reservoir
Clean Coal Haul Road\Site Access	Main Sediment Pond
Explosive Storage Access\Facility Road	Dam
Rail Loadout Road	Spillway
Rail Loop	Diversion Ditch
Service Corridor	Clearing
Coal Process Plant Conveyor	Additional Area
Coal Process Plant Duct	Contingency Area
Train Loadout Conveyor	Arterial/Collector Road
Waste Dump	Local/Resource Road
Mined Area	Railway
Clean Coal Stockpile and Truck Dump	Transmission Line
Overflow Coal Stockpile	Watercourse
Soil Stockpile Area	Waterbody
Explosive Storage Facility\Pad	Wetland
Loading Bin	British Columbia/Alberta Border



Scale 1:42,000

Map Drawing Information:  
Data Provided By NWP Coal Canada Ltd, Dillon Consulting Limited, Province of British Columbia  
GeoBC Open Data, Government of Alberta Open Data, Natural Resource Canada.  
Imagery Provided By GeoBC OrthoImagery (Aug 2016).

Map Created By: JL  
Map Checked By: HEB  
Map Coordinate System: NAD 1983 UTM Zone 11N



Project: 12-6231  
Status: FINAL  
Date: 2021-10-27

Appropriate incident response procedures are detailed in the Archaeology Management Plan (Chapter 33, Section 33.4.1.2). As such, the discovery of undocumented archaeological site(s) within the Project footprint is not anticipated to result in an adverse residual effect as the site(s) will be mitigated through the professional, permitted excavation and recovery of the artifacts and any other information (e.g., features), in accordance with all applicable laws and regulations and in consultation with the provincial heritage regulator and Indigenous communities, as applicable. No ancestral remains identified during the archaeology baseline program as suspected burial mounds are anticipated to be impacted by the Project through the redesign of the Project footprint. Should a confirmed or suspected burial(s) be identified during the Project and avoidance strategies are not possible, a mitigation plan would be developed for the site(s) in consultation with the appropriate government agency (e.g., Royal Canadian Mounted Police [RCMP], regional Coroner) and Indigenous groups; this may include the respectful assessment of the burial sites, and, if applicable, ceremonial activities led by the appropriate Indigenous groups.

As noted in Section 16.4.3.2, Grave Prairie is a landscape containing extremely important Ktunaxa Nation and Shuswap Band cultural values and is located within the Project footprint. Ktunaxa Nation (as detailed in Chapter 23) has stated that any additional infrastructure, including the proposed rail loadout, is not compatible with this cultural landscape, and Ktunaxa perspective indicates that the impacts to this site from any proposed development cannot be mitigated. As per Ktunaxa Nation perspective, simply avoiding the physical remains of Ktunaxa ancestors is not enough to justify the proposed rail loadout facility. While measures identified in Section 16.4.4.2 and in Chapter 23, Section 23.10.5 are proposed to avoid or offset impacts to the Grave Prairie Cultural Landscape, the Grave Prairie Cultural Landscape includes a “Culturally Sensitive Area” which requires rigorous in-depth assessments prior to contemplating additional development as recommended by Ktunaxa Nation.

The residual effect of a change in archaeological resources due to ground disturbance activities during Construction and Pre-Production and Operations is characterized as follows:

- Duration: Permanent, as loss of an archaeological resource or site during Construction and Pre-Production or Operation is non-renewable and cannot be reversed once it occurs.
- Magnitude: High, the potential for adverse effects to archaeological resources or sites is high due to the amount of potential change relative to baseline conditions (particularly for the 15 known pre-contact archaeological sites within the Project footprint that cannot be avoided and will be affected by Project-related ground disturbance) and the Grave Prairie Cultural Landscape.
- Geographic Extent: Discrete to local, as only archaeological resources within the Project footprint will be directly impacted; however, indirect impacts (i.e., loss of geographical context related to resources that are located in close proximity to, but not directly within the Project footprint) may occur.
- Frequency: Once, the direct loss of archaeological resources within the Project footprint occurs only within the Construction and Pre-Production or Operations phases of the Project.
- Reversibility: Irreversible, archaeological resources that are retrieved from the Project footprint cannot be returned/reburied within the Project footprint in the same geographical context. Change of an archaeological site such as the Grave Prairie Cultural Landscape is irreversible.
- Context: High, archaeological resources are important to Indigenous Peoples (e.g., Grave Prairie Cultural Landscape for Ktunaxa Nation and Shuswap Band) and are an important resource to British Columbia as a whole for the preservation and understanding of the sequence of human occupation and history.

#### 16.4.5.1 Determination of Significance

A significant adverse residual effect on archaeological resources is one that results in a permanent Project-related disturbance to, or destruction of, all or part of an archaeological resource considered to be of major importance due to factors such as rarity, condition, cultural significance (e.g., ancestral burial mound), or opportunities for research, and that cannot be mitigated or compensated. The implementation of mitigation is a key element of this significance criterion. Therefore, in consideration of the above discussion, the significance threshold, the mitigation that has been implemented to date, and the mitigation that will be implemented as the Project moves forward, both under provincial regulation and authorization, including the salvaging of archaeological resources at the 15 known pre-contact archaeological sites in the Project footprint that will be affected by ground disturbance through a controlled, permitted, professional archaeological excavation, the residual effects of the Project on physical and cultural heritage (and specifically archaeological resources) for all phases of the Project are rated not significant.

#### 16.4.5.2 Likelihood and Confidence

Effects that are determined to be not significant do not require a characterization of likelihood.

Confidence considers the reliability of data and analytical methods used in the assessment of effects. The confidence in the characterization of the residual effect to archaeological resources from Project development is considered to be moderate. With the exception of, but potentially not limited to Phase IV (Alexander Creek valley - Secondary Transportation Corridor), the Utility Corridor (west of Elk River), and Phase I and II clearance limits (recently defined), which are identified as requiring subsequent assessment, archaeology baseline conditions within the Project footprint are relatively well established, providing sufficient data to assess the potential for direct impacts to archaeological resources. Mitigation strategies proposed to avoid or offset impacts to archaeological resources are expected to be moderate to high in effectiveness; however, consultation activities with Indigenous groups could result in changes to the confidence of mitigation success and effectiveness. Adaptive management measures will be developed and implemented to address corrective actions, as necessary, based on the results of consultation with the B.C. Archaeology Branch and Indigenous groups, and the development of a lawfully and ethically acceptable mitigation plan.

No residual effects on a change in archaeological resources due to other Project activities are predicted after implementation of the planned mitigations. Monitoring during Construction and Pre-Production and Operations, and adaptive management as necessary will confirm these effects predictions and the effectiveness of mitigation, or provide information to implement adaptive corrective actions and strategies.

#### 16.4.5.3 Summary of Residual Effects Assessment

Residual effects and the selected mitigation measures, characterization criteria, likelihood, significance determination, and confidence are summarized in Table 16.4-5. There are no significant residual effects to physical and cultural heritage anticipated as a result of the Project.

Table 16.4-5: Summary of Residual Effects on Archaeological Resources

Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
Change in Archaeological Resources due to Ground Disturbance Activities	<ul style="list-style-type: none"> <li>Construction and Pre-Production</li> <li>Operations</li> </ul>	<ul style="list-style-type: none"> <li>The Project footprint has been consciously placed to minimize direct impacts to as many archaeological sites as possible</li> <li>Limit Project activities to the extent of the approved Project footprint</li> <li>Conduct consultation with the B.C. Archaeology Branch and appropriate Indigenous groups and develop a lawful and ethically appropriate mitigation plan that will likely require site-specific methodologies</li> <li>Conduct subsequent archaeological impact assessment and investigations under a Section 12.2 Heritage Inspection Permit on provisionally delineated site areas, areas within the Project footprint that have been identified with high archaeological potential, and previously unassessed areas</li> <li>Application for a provincial Section 12.4 Alteration Permit, to facilitate the Project where it overlaps with identified pre-contact archaeological sites</li> <li>Implementation of an incident procedure as per the Section 12.4 Alteration Permit</li> <li>Impact management measures described in the Indigenous Impact</li> </ul>	<p>Duration: Permanent                      Magnitude: High                      Geographic Extent: Discrete to local                      Frequency: Once                      Reversibility: Irreversible                      Context: High</p>	Not Significant	Moderate

Residual Effect	Project Phases	Mitigation Measures	Summary of Residual Effects Characterization	Significance (Significant, Not Significant)	Confidence (High, Moderate, Low)
		<p>Management Plan are expected to be refined through continued consultation with Ktunaxa Nation and Shuswap Band to address the potential effects on the Grave Prairie Cultural Landscape, an important cultural landscape for the identified Indigenous Communities</p>			

## 16.5 Cumulative Effects Assessment

Cumulative environmental effects are the result of Project residual effects interacting with the effects of other past, present, and reasonably foreseeable future projects or activities to produce a combined/overlapping effect. The objective of the cumulative effects assessment is to consider overlapping effects for all residual adverse effects, not only those predicted to be significant (EAO, 2013). The assessment of cumulative effects on the physical and cultural heritage VC requires that:

- The Project results in a residual adverse effect on the physical and cultural heritage VC;
- A residual Project effect interacts cumulatively with effects from other projects or activities (i.e., an effect of the Project overlaps spatially and temporally with those of other projects or activities) that have been or will be carried out;
- The other projects or activities have been or will be carried out and are not hypothetical; and
- The cumulative effect is likely to occur.

Further information regarding the cumulative effects assessment methodology is provided in Chapter 5, Section 5.3.5.

### 16.5.1 Overview of Residual Effects

Based on the characterization of residual effects on physical and cultural heritage presented above, the single residual effect, change in archaeological resources due to ground disturbance activities, that may remain after implementation of proposed mitigation measures was characterized as not significant.

### 16.5.2 Assessment Boundaries

The spatial boundary of the cumulative effects assessment is the Archaeological RSA, which is spatially equivalent to the Archaeological LSA (refer to Figure 16.2-1). Since potential effects on archaeological resources are directly associated with areas of ground disturbance within the Project footprint only, the Archaeological RSA provides a conservative boundary to constrain the areas where archaeological resources may be affected by Project activities. The loss of geographic context associated with the loss of an archaeological site outside the Project footprint may result in an indirect effect on physical and cultural heritage, and this will also be considered in the cumulative effects assessment below.

Temporal, administrative, and technical boundaries for the cumulative effects assessment are equivalent to those used in the characterization of project effects (refer to Section 16.2.3).

### 16.5.3 Identifying Past, Present, and Reasonably Foreseeable Projects and/or Activities

The effects of past and present projects and activities in the Archaeological RSA, including forestry, sediment extraction, previous mineral exploration, and road construction, are generally represented by the existing conditions as documented in Section 16.3.

The Project is nearby to other metallurgical coal mines in the Elk Valley, including Teck's Elkview Operations (8 km southwest) and Line Creek Operations (12 km north); however, these are both located outside of the Archaeological RSA for the Project, as are other reasonably foreseeable future projects

including the Michel Coal Project, Bingay Main Project, and Fording River Extension Project. Forestry and related road development/upgrades, excluding logging that will occur as part of Construction and Pre-Production, is the only reasonably foreseeable future activity predicted to occur in the Archaeological RSA and spatially and temporally overlap with Project effects with a potential for adverse cumulative effects on archaeological resources. Indirect impacts (i.e., loss of geographical context related to resources that are located in close proximity to, but not directly within the Archaeological RSA) may occur as the result of other proposed mine developments. Archaeological baseline information and potential impacts to archaeological resources are not yet publically available for the reasonably foreseeable future projects listed above, so it is not possible to conduct a cumulative effects assessment on indirect impacts to archaeological resources as a result of projects located outside of the Archaeological RSA.

#### 16.5.4 Identification of Cumulative Effects

Based on the results of the land use assessment (Chapter 19), the Project footprint overlaps with Canfor's operating area forest tenure A19040 that covers all Crown land within the Project footprint. In addition, the Project footprint also overlaps with managed forests located on private land. As discussed in Chapter 19, information provided by Canfor indicates that there are plans for future cuts to the northeast and to the southeast of the rail loadout, and to the north of the mine site, although these areas are not yet permitted. Canfor also indicated that they have long-term plans for cuts in the Project footprint and could advance those plans/concentrate future logging activity in this area to reduce the overall area of cut in this tenure. NWP has also been informed that Canfor has an agreement for use of the Grave Creek Road and may be undertaking some road upgrades before 2022.

Potential changes in archaeological resources due to ground disturbance activities for the Project are predicted to occur in the form of both direct impacts (i.e., direct change, disturbance, or destruction) and indirect impacts (i.e., loss of geographical context related to resources that are located in close proximity to, but not directly within the Project footprint). Similar impacts would be expected to occur for reasonably foreseeable future forestry operations to a lesser extent, as ground disturbance activities are anticipated to occur at shallower depths during logging compared with the deeper excavations required for the Project during activities such as foundation preparation and removal of unconsolidated material.

#### 16.5.5 Mitigation for Cumulative Effects

The mitigation strategy developed for Project effects is also applicable to the Project's contribution to cumulative effects on archaeological resources. As described in Section 16.4.4, the mitigation plan involves a combination of Project design features, procedures, and practices aimed at reducing or eliminating Project-related effects to archaeological resources.

Given that commercial forestry operations are generally bound to the same legislative/regulatory frameworks as the Project in terms of archaeological resources, it is reasonable to expect that such activities will be subject to similar or analogous mitigation requirements specific to the respective industry. Reasonably foreseeable future forestry activities that spatially and temporally overlap with the Project are subject to similar states of knowledge regarding the mitigation of effects to archaeological resources. Should the Project spatially and temporally overlap with future forestry operations, ongoing and continued collaboration between project proponents, government, Indigenous groups, and other

stakeholders will be necessary to confirm that appropriate mitigation measures are adopted such that adverse cumulative effects on archaeological resources are minimized to a practical extent.

Assuming that all proponents responsible for future projects and/or activities in the Archaeological RSA follow legislated mitigation requirements and collaborate to confirm that additional appropriate mitigation measures are adopted, if required, no residual cumulative effects are predicted on archaeological resources in the Archaeological RSA. Given that no residual cumulative effects are predicted, further characterization of residual effects and a determination of significance of residual effects is not warranted.

### 16.5.6 Summary of Cumulative Effects Assessment

In consideration of the above, there are no residual cumulative effects of the Project in combination with those of other past, present, and reasonably foreseeable future projects or activities on physical and cultural heritage (and particularly archaeological resources) during all phases of the Project; they are, by default, rated not significant, with a high level of confidence.

## 16.6 Follow-up Strategy

For any residual effects due to the Project assessed, in consideration of applied mitigation measures and best practices to avoid, minimize, or reduce effects, the residual effects of activities associated with the Project, during each of the Project phases, on archaeological resources were rated not significant, with a moderate level of confidence. As described previously in Section 16.5, further cumulative effects assessment for archaeological resources is not warranted. However, the CEA Act, 2012 requires that a follow-up program be conducted when the level of confidence in the Project effects assessment is less than high, either to verify the effects predictions or to verify the effectiveness of mitigation measures.

Effective design and construction, mitigation, adaptive measures, and good housekeeping and management practices, as well as additional archaeological assessments will be required during Construction and Pre-Production and Operations. The implementation of these site-specific mitigation and/or adaptation measures outlined in the Archaeology Management Plan (Chapter 33, Section 33.4.1.2), including appropriate design, monitoring, and response to incidents, can significantly reduce the potential for adverse effects on archaeological resources.

Before the onset of construction activity, the Follow-Up Strategy (i.e., supplemental archaeological assessment[s] on un-assessed terrain with the Project footprint) will be completed. Additionally, supplemental inspection and investigation of all 15 sites, to be conducted under applicable heritage permitting, will be required to confirm that a thorough understanding of the archaeological sites is had and adequate (i.e., representative) artifact assemblages with contextual information have been obtained. The extent of the pre-construction inspection and investigation of the 15 sites within the Project footprint cannot be detailed at this time due to the dynamic state of the mitigative process, based in part on evolving legislation (i.e., the HCA) and Indigenous consultation requirements. Additional surveys and monitoring will be required to further refine the extent of the inspection and investigation for these sites.

The Follow-up Strategy will be refined and supplemented with additional site-specific details prior to commencement of the Construction and Pre-Production phase, as the permitting process progresses.

Throughout each Project phase, monitoring results will be used to assess the effectiveness of mitigation measures to support the evaluation and improvement of mitigation measures, and inform the development of adaptive management measures, should they be required.

## 16.7 Summary and Conclusions

The Crown Mountain Coking Coal Project (the Project) activities and components have the potential to result in adverse effects to physical and cultural heritage in the Project footprint. As a result of the archaeological assessments completed for the Project, 28 archaeological sites were discovered in the Archaeological LSA, and 9 previously recorded archaeological sites were updated. There are currently no known palaeontological sites within the Project footprint, but there is a high potential to encounter fossils in the Mist Mountain and Morrissey Formations underlying the proposed mining areas; the risk to fossils in these areas was therefore assessed to be high. No residual effects from ground disturbance activities are predicted on sites of historical or architectural significance or on palaeontological resources as a result of the Project through limiting Project activities to the extent of the approved Project footprint and through the implementation of the Chance Find Protocol.

Based on the findings of the archaeological assessment, the Project footprint has been re-engineered and consciously placed to minimize direct impacts to as many archaeological sites as possible in the locality of Grave Prairie. However, 15 pre-contact archaeological sites, either in part or in entirety, will be directly impacted through development of the Project. Implementation of the Project's mine plan will therefore require a substantial amount of archaeological investigation, mitigation, excavation, and monitoring under applicable heritage permitting to abide by provincial legislation and meet guidelines put forth by applicable Indigenous communities to address pre-contact artifact concentrations and/or features that have been identified as containing increased significance. Based on the evaluation of potential Project effects on archaeological resources, a change in physical and cultural heritage due to ground disturbance activities during Construction and Pre-Production and Operations may remain as a potential residual effect.

The Grave Prairie Cultural Landscape contains extremely important Ktunaxa Nation and Shuswap Band cultural values and is located within the Project footprint. The area of Grave Prairie has important cultural significance and Ktunaxa Nation has stated that any additional infrastructure, including the proposed rail loadout, is not compatible with this cultural landscape. Ktunaxa perspective indicates that the impacts to this site from any proposed development cannot be mitigated, and according to Ktunaxa Nation, avoiding the physical remains of Ktunaxa ancestors is not enough to justify the proposed rail loadout facility. Continued consultation with Ktunaxa Nation and Shuswap Band to mitigate potential effects of Project-related activities will be undertaken through the Indigenous Impact Management Plan.

A significant adverse residual environmental effect on physical and cultural heritage is one that results in a permanent Project-related disturbance to, or destruction of, all or part of a historical, archaeological, palaeontological, or architectural resource considered to be of major importance due to factors such as rarity, condition, cultural significance (e.g., ancestral burial mound), or opportunities for research, and that cannot be mitigated or compensated. Therefore, in consideration of the above discussion, the significance threshold, the mitigation that has been implemented to date, and the mitigation that will be implemented as the Project moves forward, both under provincial regulation and authorization, the

environmental effects of the Project on physical and cultural heritage (and particularly archaeological resources) for all phases of the Project are rated not significant.

Forestry and related road development/upgrades, excluding logging that will occur as part of Construction and Pre-Production, is the only reasonably foreseeable future activity predicted to occur in the Archaeological RSA that will spatially and temporally overlap with Project effects with a potential for adverse cumulative effects on archaeological resources. Assuming that all proponents responsible for future projects and/or activities in the Archaeological RSA follow legislated mitigation requirements and collaborate to confirm that additional appropriate mitigation measures are adopted, if required, no residual cumulative effects are predicted on physical and cultural heritage (and particularly archaeological resources) in the Archaeological RSA.

Due to the evolution of the mine plan and associated infrastructure, portions of the Project footprint have not been subjected to an in-field archaeological assessment; therefore, a subsequent archaeological impact assessment will be required as part of the physical and cultural heritage follow-up strategy to determine if and where archaeological resources are present.

## 16.8 References

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