PEACE RIVER SITE C HYDRO PROJECT
HERITAGE RESOURCES DATA GAP ANALYSIS

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EXECUTIVE SUMMARY

Introduction

BC Hydro is currently engaged in Stage 2 of a decision-making process for the potential Peace River Site C Hydro Project. Stage 2 includes environmental work to update decades-old studies, and to conduct new studies and technical work. As part of this new environmental work, BC Hydro retained Arcas Consulting Archeologists Ltd (Arcas) to carry out an heritage resources data gap analysis that would update earlier heritage research carried out by Arcas for the Project in 1990-91 (Arcas 1991).

The primary purpose of the heritage resources data gap analysis is to provide background data for BC Hydro’s ongoing planning requirements and environmental work for the Peace River Site C Hydro Project. The specific objectives of the study are to:

- Identify regulatory and other requirements that must be considered for heritage resources in the environmental regulatory phase of the Site C Project;
- Document the current status of heritage information;
- Define potential project effects and issues for heritage resources; and
- Present recommendations for additional work required to meet current regulatory and other requirements for heritage resources.

This study is concerned with all components of Site C construction and operation, and with archaeological, historic, and paleontological heritage resources. Traditional use sites are not considered in this study. Instead, BC Hydro has committed to identifying and studying in partnership with First Nations any traditional social or religious site which does not qualify as a heritage site under the Heritage Conservation Act. Because the specifics of these studies will be developed between the First Nations and BC Hydro, they are excluded here.

This study involved:

- Review of information collected during the 1990-91 data gap analysis by Arcas, including interviews with professional archaeologists involved in previous archaeological studies for Peace Site C;
• Review of published and unpublished reports on past and current heritage studies in the project area;
• Review of site-specific information in the Provincial Heritage Register;
• Interviews with Archaeology Branch personnel;
• Review of heritage topics/issues/concerns identified during BC Hydro’s public consultation program in local communities in 2008;
• Review of documents pertaining to BC Hydro’s Reservoir Archaeology Program; and
• Two workshops in Fort St John with local archaeologists to examine archaeological inventory requirements, fieldwork standards and mapping of archaeological potential.

Potential Project Effects on Heritage Resources

Section 2 of the report addresses potential impacts on heritage resources by the Site C Project. A project effect (impact) may be defined as the net change in the physical condition or integrity of a heritage site with and without the project. A summary table of potential project effects is presented.

Soil disturbance is a primary source of potential adverse effects by the Site C Project on heritage resources. Soil disturbance is associated with a wide variety of pre-construction, construction, and post-construction activities.

The other main source of adverse effect on heritage sites—inundation—impacts sites by rendering the resources essentially inaccessible to future investigation or interpretation. It also subjects the resources to poorly-understood physical and chemical alterations.

Other potential project effects include the loss of fossils through gravel extraction, and impacts associated with land improvements around the reservoir, especially recreation facilities.

Regulatory Requirements

Section 3 of the report reviews regulatory requirements that must be considered for heritage resources in the regulatory phase of the Site C Project.
BC Hydro anticipates that the Project will require certification under the harmonized provincial and federal environmental assessment review process, that is, under the BC *Environmental Assessment Act* and the *Canadian Environmental Assessment Act*. This process has specific requirements regarding the assessment of potential project effects on heritage resources.

Under this process, the provincial Archaeology Branch establishes the regulatory requirements and technical standards for assessments of impacts (project effects) on heritage resources. The Branch’s authority stems from the provincial *Heritage Conservation Act*. Branch requirements for assessing and managing potential project impacts on archaeological and other heritage resources are contained in the *British Columbia Archaeology Impact Assessment Guidelines*, augmented by a number of bulletins, policies, agreements and practices published on the Branch website. These documents provide the procedures and many of the standards required for the Site C heritage assessment.

In order to assess potential impacts on archaeological and historical heritage resources by the Site C Project, the Branch will require an Archaeological Impact Assessment (AIA) to “gain the fullest possible understanding of archaeological resources which would be affected by the project.” The objectives of an AIA are to:

- Identify and evaluate archaeological resources within the project area;
- Identify and assess all impacts on archaeological resources which might result from the project; and
- Recommend viable alternatives for managing unavoidable adverse impacts.

Paleontological resources, especially those from bedrock localities, have not been explicitly protected in the past under British Columbia’s heritage legislation; however, a review of laws in other jurisdictions has been conducted, and steps are being taken to introduce such legislation. In the meantime, the Province has the ability to designate specific fossil sites for protection.

Three different types of provincial heritage permits may be required:

- Heritage Inspection Permit, issued under Section 14 of the *HCA*, which authorizes alterations of heritage sites for site inventory and assessment purposes; this permit will be required for the AIA;
• Heritage Investigation Permit, also issued under Section 14 of the HCA, which authorizes alteration or excavation of heritage sites for impact management purposes; this permit will be required for post-AIA impact management mitigation measures;

• Site Alteration Permit, issued under section 12 of the HCA, which authorizes the development proponent (i.e., BC Hydro) to carry out any activities referred to in section 13 of the HCA; this permit will be required upon completion of impact management mitigation measures.

Archaeology (Pre-Contact Archaeological Resources)

Section 4 of the report addresses pre-Contact archaeological sites in the Project area. Archaeological sites are locations with physical evidence of past human activities for which scientific methods of inquiry (that is, survey, excavation, data analysis) provide the main sources of information.

In British Columbia, archaeological resources include sites and objects of both aboriginal and non-aboriginal origin. Furthermore, archaeological resources are often divided into pre-Contact (prehistoric) or post-Contact (historic) resources, based on the age of the site or object. In the Peace River valley of British Columbia, pre-Contact archaeological sites date to the period before first contact with Europeans in the 1790s and include camps, villages, hunting places, look-outs, trails, stone quarries, burial places, and other sites, all of exclusive aboriginal origin.

Prehistoric archaeological heritage resources received the greatest emphasis in previous heritage studies for the Site C Project. Eleven archaeological surveys spanning 27 years were carried out for the Project as part of preliminary design work prior to the 1981 BC Utilities Commission review of the Project. These Site C surveys located just over 300 pre-Contact archaeological sites of various types within the project area as currently defined. In addition to the shovel testing and artifact collecting that are standard site survey activities, these studies carried out evaluative testing at nine pre-Contact archaeological sites, somewhat more substantial excavations at two pre-Contact sites, and systematic collections of surface artifacts at eight pre-Contact sites.

The study identified the following data gaps for pre-Contact archaeological sites:

• Absence of archaeological field survey to current standards for much of the project area;
• Absence of detailed information to current standards about the nature of many of the heritage sites identified to date; and

• Incomplete assessment of potential site-specific effects by the Site C Project and recommendations for managing potential impacts.

To address these data gaps a number of recommendations were made (Table 5). Section 4 also includes a review of field survey methodological issues, and makes several recommendations regarding approaches to future field surveys.

**Historic Heritage Sites**

Section 5 of the report addresses historic heritage sites in the Project area. Historic sites are heritage resources for which written documentation is available or can reasonably be expected to exist.

The historic period for the project area spans approximately 160 years, beginning in 1793 with the arrival of Alexander MacKenzie, and ending in 1950, the end of the period of early agricultural settlement in the valley as defined by Finlay (1978).

To date, 35 historic heritage resources have been identified as potentially falling within the Site C Project area, including Fur Trade-era trading post/fort sites, trappers’ cabins, grave sites, and early homesteads (Table 4, Figure 6). Some of the historic heritage locations consist of standing historic architectural features, while others consist of buried archaeological remains.

Four forts are the only historic sites identified so far for the Fur Trade/Contact Period (1793-1860). Extensive archaeological work has been done at one of these sites: Rocky Mountain Fort.

The Trapping and Gold Rush period (1860-1910) is represented by a number of historic sites, including Farrell cabin, the Frank Beatton homestead house, and the Moody and Robinson homesteads.

The majority of historic sites in the Peace valley date to the post-1910 agricultural period (1910-1950). They represent aboriginal and Euro-Canadian settlers’ graveyards, cabins, homesteads, trappers’ cabins, sheds, a logging operation, a river ford, a school, and miscellaneous other features (Table 4).
The study identified the following data gaps for historic sites:

- Uncertainty about whether the inventory of recorded historic sites represents the full range of potentially extant sites for the area associated with both First Nations and Euro-Canadian historical use of the valley;
- Incomplete knowledge of the age, origin, context, size, content, and function of each recorded historic site, except for Rocky Mountain Fort;
- Incomplete knowledge and recording of the location of trails, old roads, portages, and river fords;

To address the data gaps listed above, a number of recommendations for future work are made (Table 5)

**Paleontological Resources**

Section 6 of the report addresses paleontological heritage sites in the Project area. Paleontological resources are defined as fossils or other evidence (e.g., trace fossils) of ancient life, which can include plants, invertebrate and vertebrate animals, and single-celled organisms.

Bedrock fossils of interest in the Project area include invertebrates, vertebrates, and plants, as well as microfossils. Marine shales are rich in invertebrates, many of which are important in regional correlation and relative dating of strata. With one exception, vertebrate remains have not been reported as yet from bedrock strata in the project area, but that probably reflects a lack of searching. Non-marine rocks of the Gates and Dunvegan Formations in the Project area have potential for the discovery of dinosaur and other skeletal material as well as footprint trackways. Several important invertebrate and plant fossil sites in the project area have been described in the literature; however, location data are in some cases generalized and there is a clear need for more precise location and documentation.

Preglacial Quaternary fossils from the Project area include a mammoth tusk, bison remains, rodent bones, and rabbit bones. Early postglacial (Late Pleistocene) vertebrate fossils are widespread in the Peace region, dominated by bison but also wapiti and horse.

Key paleontological data gaps for the Project area are:

- Lack of precise information on locations of bedrock invertebrate fossil sites;
- Lack of systematic survey for bedrock vertebrate fossils;
- Lack of systematic survey for Quaternary fossils; and
- Lack of significance evaluation of Quaternary fossils

A number of recommendations are made as to strategies for completing the site inventory to address important data gaps in the known paleontological site record.

**Summary of Gaps and Recommendations**

The report concludes with a summary of data gaps and recommendations in Section 7 (Table 5) and an extensive Bibliography (Section 8).
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1.0 INTRODUCTION

BC Hydro is currently engaged in Stage 2 of a decision-making process for the potential Peace River Site C Hydro Project. Stage 2 includes public consultation and extensive engineering, environmental and technical work to further define the project, to update decades-old studies, and to conduct new studies and technical work. As part of this new environmental work, BC Hydro retained Arcas Consulting Archeologists Ltd (Arcas) to carry out an heritage resources data gap analysis that would update earlier heritage research carried out by Arcas for the Project in 1990-91 (Arcas 1991). This report presents the results of the Stage 2 heritage resources data gap analysis.

1.1 Study Purpose and Objectives

The primary purpose of the heritage resources data gap analysis (the Study) is to provide background data for BC Hydro’s ongoing planning requirements and environmental work for the Peace River Site C Hydro Project (the Project). The specific objectives of the study are to:

- Identify regulatory and other requirements that must be considered for heritage resources in the environmental regulatory phase of the Site C Project;
- Document the current status of heritage information;
- Define potential project effects and issues for heritage resources; and
- Present recommendations for additional work required to meet current regulatory and other requirements for heritage resources.

1.2 Project Description

The Site C Hydro Project involves construction of an earthfill dam on the Peace River just downstream of the Moberly River seven km southwest of Fort St. John (Figure 1). The dam would be approximately 1120 m long at the crest and 60 m high above river level. The project will create a reservoir from behind the dam to the tailrace at Peace Canyon Dam that will be approximately 83 km long and have a surface area of approximately 9,310 ha. The reservoir would be essentially a “run-of-the-river” project, with anticipated reservoir fluctuations of about 0.6 m. Approximately 23 km of Highway 29 will need to be relocated to avoid reservoir flooding, and two new 500 kV transmission lines will need to be installed in the existing 76 km-long 118m-wide transmission corridor that runs from
the Site C area to the Peace Canyon Dam. Further descriptions of the Project can be found in several public documents (e.g., BC Hydro 2007, 2008a) (Photograph 1).

Photograph 1. Upper Peace River Valley Overview (photo: S. Gamble 2007)

1.3 Study Scope

This study is relatively broad in scope. It is concerned with all components of Site C construction and operation, and with the full range of heritage resources (except traditional use) as defined by regulatory agencies.

1.3.1 Project Components

This study includes the lands and activities associated with the following Project components (Figure 1):

- Dam and Construction Facilities – the area around the dam location that includes not only the dam itself, but also the adjacent spillway, a water intake structure, a powerhouse, a switchgear building, a major excavation on the left bank slope above
the dam to stabilize the slope, and a number of borrow pits and spoil areas. In addition, the area includes temporary construction facilities such as cofferdams and diversion tunnels.

- **Access Roads and Bridge** – new road on both banks of the Peace River in the vicinity of the dam along with a new bridge located four km downstream of the dam are included in the study.

- **Reservoir and Safe Zone** —the study includes the entire reservoir as well as the safe zone around the reservoir. The reservoir consists of approximately 5,340 ha of land. The safe zone refers to the area between the edge of the reservoir pool and the safeline, a line (determined in 1978, and currently under reassessment) beyond which the security of residents and buildings can be reasonably assured from landslide activity or beach erosion.

- **Highway Relocation** – the study includes the lands involved in the relocation of sections of Highway 29, including associated facilities (bridges across creeks, culverts, etc.).

- **Transmission Line** – the study includes the existing transmission corridor and any new lands which will be cleared to accommodate the two new transmission lines.

### 1.3.2 Peace River Downstream of Site C

The Peace River downstream of the Site C Dam is not included in this study. According to BC Hydro, the “flow regime downstream of Site C would not be altered appreciably after the initial reservoir infilling period as the operation of Site C would generally be in hydraulic balance (i.e., operated as a run-of-river project)” (BC Hydro 2007:47). As a result, BC Hydro does not expect the project to result in any significant changes to the current effect of the flow regime on heritage sites located along the river downstream of the dam. The effect of the current flow regime on downstream heritage sites was reviewed in an earlier study by Arcas (1991), and is expected to be the subject of a forthcoming long-term (nine year) erosion monitoring study which includes the Peace River between Peace Canyon Dam and the Alberta border under the Peace Water Use Plan (Peace Water Use Plan Committee 2006).

### 1.3.3 Scope of Heritage Resources

BC Hydro anticipates that the Project will require certification under the harmonized provincial and federal environmental assessment review process, that is, under the BC *Environmental Assessment Act (BCEAA)* and the *Canadian Environmental Assessment Act (CEAA)*. This legislation and accompanying guides offer several overlapping definitions of
heritage resources. These are discussed in Section 2 below. To ensure that all possible heritage requirements under the CEAA and BCEA are addressed in this study, the term “heritage resources” in this report includes any structure, site, or thing of archaeological, historical, architectural, or paleontological significance (CEAA 1996:6). Each of these terms is defined in their respective sections below.

1.3.4 **Traditional Use Sites**

Although both the CEAA and BCEAA require that potential project effects on traditional use sites of aboriginal origin be assessed, these sites are not considered in this study. Instead, BC Hydro has committed to identifying and studying in partnership with First Nations any traditional social or religious site which does not qualify as a heritage site under the HCA (BC Hydro 2008b). Because the specifics of these studies will be developed between the First Nations and BC Hydro, they are excluded here. A summary and data gap analysis of existing information on First Nations’ traditional use and ecological knowledge for the Peace River mainstream between Peace Canyon and the B.C./Alberta border for the Peace Water Use Plan can be found in Arcas (2002).

This does not mean, of course, that First Nations will not be involved with sites that do qualify as heritage sites under the HCA. It is understood that prehistoric archaeological sites and historical sites of aboriginal origin are of great interest and importance to First Nations since they document ancestral history and past use and occupancy of the land. Best practices call for collaboration with First Nations in identifying and assessing these sites, and this will undoubtedly be an important feature of any future heritage studies for the Peace Site C Project.

1.4 **Study Team**

The heritage data gap analysis was carried out by a team of archaeological and other consultants under the direction of Dr. Arnoud Stryd of Arcas Consulting Archeologists Ltd (Arcas). The team included Diana Alexander, who, along with Arnoud Stryd, was responsible for the review of pre-Contact archaeological resources; Dr. Catherine Carlson, who was responsible for the review of historic resources; and Dr. Michael Wilson (independent consultant), who was responsible for paleontological resources. Ewan Anderson provided research assistance, whereas Kathryn Taylor and Kendra Gibbons provided GIS and research support.
1.5  Study Approach

In the first phase of this study, information was collected on past and current heritage studies, on the existing heritage inventory, on potential regulatory requirements, and on possible heritage issues. This work involved:

- Review of information collected during the 1990-91 data gap analysis by Arcas, including interviews with professional archaeologists involved in previous archaeological studies for Peace Site C;
- Review of published and unpublished reports on past and current heritage studies in the project area;
- Review of site-specific information in the Provincial Heritage Register;
- Interviews with Archaeology Branch personnel;
- Review of heritage topics/issues/concerns identified during BC Hydro’s public consultation program in local communities in 2008;
- Review of documents pertaining to BC Hydro’s Reservoir Archaeology Program; and
- Two workshops in Fort St John with local archaeologists to examine archaeological inventory requirements, fieldwork standards and mapping archaeological potential.

This information was reviewed and examined for gaps between the current state of Project heritage information, and that required under current regulatory requirements. The data gaps were then assessed to see if any qualified as key gaps that if not addressed could result in a failure to achieve project certification, or cause significant delays in the certification process related to addressing deficiencies.

First Nations were not interviewed during this study at the request of BC Hydro. As envisioned by BC Hydro, First Nations will have opportunities to provide input into the heritage requirements for the Site C Project during their participation on the Technical Advisory Committee for Heritage in the Fall-Winter of 2008, and in subsequent Project consultations with First Nations.
1.6 Report Organization

This report consists of eight sections:

- Section 1 – Introduction
- Section 2 – Potential Project Effects
- Section 3 – Regulatory Requirements
- Section 4 – Pre-contact Archaeological Resources
- Section 5 – Historical Heritage Resources
- Section 6 – Paleontological Resources
- Section 7 – Summary of Data Gaps and Recommendations
- Section 8 – Bibliography
2.0 POTENTIAL PROJECT EFFECTS ON HERITAGE RESOURCES

A project effect (impact) may be defined as the net change in the physical condition or integrity of a heritage site with and without the project (British Columbia Archaeological Impact Assessment Guidelines, 1989: 14). While this change could be beneficial, more commonly the effect is adverse, whether directly or indirectly. Because of their non-renewable nature, physical alterations reduce or remove future opportunities for scientific research, preservation, and public appreciation. In the case of First Nations pre-Contact and historic sites, to remove, reduce or otherwise alter evidence for past land use and occupancy important for the assertion of their aboriginal rights and title, and represents an irreversible loss of heritage value to all concerned.

Potential impacts on heritage resources from the Site C Project have been discussed by Spurling (1980b:53-125) and summarized by the Archaeology Branch (MPSGS 1981:11-16). While most impacts will occur during the construction phase of the Project, adverse impacts also can be anticipated during the pre-construction investigations phase and the later operations and decommissioning phases.

Soil disturbance is a primary source of potential adverse effects by the Site C Project on heritage resources. Soil disturbance results in the moving or removal of archaeological sediments, artifacts, and features such as pits, graves, trails, and culturally modified trees, and in the disturbance or destruction of cabins, drying racks, fences, roads, and other historic structures and features. Even when sediments, features, and artifacts are merely moved, and not completely removed, the changes in integrity of the deposits and the spatial relations between the archaeological materials reduce or eliminate the potential for scientific investigation, preservation, and interpretation.

Soil disturbance is associated with a wide variety of pre-construction, construction and post-construction activities, including pre-construction drilling and moving of materials; construction of access roads and bridges; the relocation of sections of Highway 29; clearing of the reservoir, transmission line right-of-way, and recreation sites; development of borrow pits, spoil areas, and construction facilities; removal and stock piling of top soil from the reservoir; slope failures resulting from water flow, changes in ground water levels, and possibly other sources; blasting and moving dam materials during construction of the dam and adjacent buildings; shoreline stabilization (dyking); and site restoration during construction cleanup and decommissioning.
The adverse effect of inundation on heritage sites is of two kinds: rendering the resources essentially inaccessible to future investigation or interpretation, and subjecting the resources to poorly-understood physical and chemical alterations from water movement, compaction, temperature changes, and biochemical effects.

A potential project effect on paleontological heritage resources comes from gravel extraction, which can expose and potential destroy Quaternary fossils. Furthermore, blasting of bedrock could potentially expose and destroy bedrock fossils.

The table below summarizes potential adverse Project effects on heritage resources by component.

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<th>TABLE 1: POTENTIAL ADVERSE PROJECT EFFECTS ON HERITAGE RESOURCES</th>
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<tr>
<td>Project Component</td>
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| **Dam site**      | • soil disturbance  
                      • bedrock blasting  
                      • gravel quarrying  
                      • bridge and access road construction | • expose, move, and remove archaeological and historic sites  
                                                                 • expose and destroy bedrock and Quaternary fossils |
| **Reservoir**     | • clearing  
                      • topsoil removal/storage  
                      • dyking  
                      • water flow/erosion/groundwater table | • expose, move, and remove archaeological and historic sites  
                                                                 • render archaeological and historic sites inaccessible  
                                                                 • cause uncertain physical and biochemical changes to archaeological and historic sites |
| **Transmission Line** | • clearing  
                       • access roads  
                       • maintenance/danger trees | • expose, move, and remove archaeological and historic sites  
                                                                 (e.g., culturally modified trees) |
| **Highway 29**    | • soil disturbance  
                      • blasting  
                      • gravel quarrying | • expose, move, and remove archaeological and historic sites  
                                                                 • expose and destroy bedrock and Quaternary fossils |

In addition to direct impacts, there potentially could be indirect Project effects associated with land improvements around the reservoir, especially recreation facilities (MPSGS 1981:14).
3.0 REGULATORY REQUIREMENTS

3.1 Federal Regulatory Requirements

BC Hydro anticipates that the Project will require certification under the harmonized provincial and federal environmental assessment review process, that is, under the BC Environmental Assessment Act (BCEAA) and the Canadian Environmental Assessment Act (CEAA). This process has specific requirements regarding the assessment of potential project effects on heritage resources. The CEAA requires every federal environmental assessment to consider potential effects on heritage resources (including any cumulative effects), resulting from a change in the environment caused by that project, including effects “on physical or cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance” (Section 2 (1)).

The Reference Guide on Physical and Cultural Heritage Resources issued by the Canadian Environmental Assessment Agency (1996) to provide guidance to environmental assessments under CEAA defines a cultural heritage resource as “a human work or a place that gives evidence of human activity or has spiritual or cultural meaning, and that has historic value” and notes that this definition “can be applied to a wide range of resources, including cultural landscapes and landscape features, archaeological sites, structures, engineering works, artifacts and associated records.”

The Reference Guide (CEAA 1996:6-10) also provides three key principles in conducting assessments of project effects on heritage resources: 1) “cultural heritage resources should be examined from a broad perspective” and that “any structure, site or thing may be valued for its historical, archaeological, architectural and paleontological significance;” 2) “cultural heritage resources should be ‘assessed in relation to the mandates, objectives and intents of existing legislation and policies on heritage found at various government levels;” and 3) “the concerns of local governments, property owners and others affected by the project should be considered, including concerns of Aboriginal, ethnic or cultural groups whose heritage is involved.”

3.2 Provincial Regulatory Requirements

The BCEAA requires environmental assessments to include the potential project effects on heritage (EOA 2003a:3, 37) and, more specifically, the effects of on-site and off-site facilities and activities for the life cycle of the project on “heritage” (EOA 2003a:10). Furthermore,
proponents must consider heritage and cultural issues raised by First Nations (EAO 2003a: 24-25; 2003c) as well as heritage concerns identified through public consultation (EAO 2003a:24; 2003d:10, 12). “Heritage” is not formally defined in the BCEAA or accompanying guides, but one of the “Questions to Ask” in the Public participation guide (EAO 2003d:12) provides some guidance on the possible scope of this term when it states that assessments of potential effects on heritage resources “could include impacts and opportunities related to local archaeological sites, historic sites, heritage buildings or sites, and landscape features.”

### 3.3 Requirements under the Heritage Conservation Act

Under the harmonized BCEAA/CEAA environmental review process, the provincial Archaeology Branch (Branch) of The Ministry of Tourism, Culture and the Arts establishes the regulatory requirements and technical standards for assessments of impacts (project effects) on heritage resources. The Branch’s authority stems from the provincial Heritage Conservation Act (HCA). The HCA provides for actual or potential protection of many kinds of heritage resources, including archaeological, historical, paleontological and other resources (e.g., plane wrecks). Some kinds of heritage sites receive automatic protection under Section 13 of the HCA, even if not yet identified and recorded (for example, archaeological and heritage sites that pre-date 1846, burial places, aboriginal rock paintings). Other kinds of heritage sites such as paleontological locations and some historic sites are not automatically protected, but can be protected through designation by order in council under Section 13(3) of the HCA, and therefore need to be considered in assessments carried out under the HCA.

Branch requirements for assessing and managing potential project impacts on archaeological and other heritage resources are contained in the British Columbia Archaeology Impact Assessment Guidelines (Guidelines), augmented by a number of bulletins, policies, agreements and practices published on the Branch website. These documents provide the procedures and many of the standards required for the Site C heritage assessment. Similar standards or guidelines do not exist for documenting and assessing impacts on paleontological or built heritage sites.

In order to assess potential impacts on archaeological and historical heritage resources by the Site C Project, the Branch will require an Archaeological Impact Assessment (AIA) to “gain the fullest possible understanding of archaeological resources which would be affected by the project” (Archaeology Branch 1998:10). “The primary objectives of the impact assessment are to:
• Identify and evaluate archaeological resources within the project area;

• Identify and assess all impacts on archaeological resources which might result from the project; and

• Recommend viable alternatives for managing unavoidable adverse impacts…”

(Guidelines, p.10)

The AIA includes an initial archaeological site inventory, that is, an “in-field survey and recording of archaeological resources within a proposed development area” (Guidelines, p.11). While the Branch has final say over the nature and scope of the AIA inventory, the Guidelines note that there “are a number of different methodological approaches to conducting inventory studies” (Guidelines, p.11) and that “the proponent, in collaboration with an archaeological consultant, must develop an inventory plan for review and approval by the Branch prior to implementation” (Guidelines, p.11). Therefore, a major requirement will be the development of a preliminary inventory plan using current technical standards for review by the Branch.

3.4 Management of Paleontological Resources

Paleontological resources, especially those from bedrock localities, have not been explicitly protected in past under British Columbia’s heritage legislation; however, a review of laws in other jurisdictions has been conducted (Fossil Management Review Technical Working Group 2004) and steps are being taken to introduce such legislation. In the meantime, the Province has the ability to designate specific fossil sites for protection. For example, the Wapiti Lake (Fossil Fish Lake) locality in northeastern B.C. consists of a 127.5 ha parcel set aside as Management Class 0 by the British Columbia Ministry of Forests in 1990 and a Land Act Map Reserve was also established by the Ministry of Crown Lands on behalf of the Ministry of Municipal Affairs, Recreation and Culture. Under these provisions all collecting must be undertaken on a permit basis through the B.C. Lands Office (Haggart et al. 1997c:7-8). Paleontological localities have therefore been recorded in some cases as registered heritage sites and are also inventoried as part of Land Resource Management Plans and kept on file at the Geological Survey of Canada, Vancouver Office. Paleontological resources are monitored federally under the aegis of the CEAA, given that they are in turn specified for review in the event of export as potentially significant cultural treasures. These federal acts are particularly relevant where proposed impacts fall under the envelope of other acts pertaining to fisheries and waterways.
3.5 Other Requirements

In addition to requirements under the CEAA, BCEAA and HCA, there may be a number of other heritage requirements under the Local Government Act (given their ability to protect certain kinds of heritage resources) and the Forest and Range Practices Act (for clearing of the reservoir). However, these requirements are consistent with those under the HCA and compliance with HCA requirements will address requirements under these other statutes.

3.6 Heritage Permit Requirements

Three different types of provincial heritage permits may be required under the HCA. These permits define and are a means of enforcing the requirements and technical standards of the Archaeology Branch. The three permits are:

- Heritage Inspection Permit, issued under Section 14 of the HCA, which authorizes alterations of heritage sites for site inventory and assessment purposes; this permit will be required for the AIA;

- Heritage Investigation Permit, also issued under Section 14 of the HCA, which authorizes alteration or excavation of heritage sites for impact management purposes; this permit will be required for post-AIA impact management mitigation measures;

- Site Alteration Permit, issued under section 12 of the HCA, which authorizes the development proponent (i.e., BC Hydro) to carry out any activities referred to in section 13 of the HCA; this permit will be required upon completion of impact management mitigation measures.
4.0 ARCHAEOLOGY (Pre-Contact Archaeological Resources)

4.1 Introduction and Definitions

This section examines pre-Contact archaeological resources as they pertain to the Site C Project. Archaeological sites are locations with “physical evidence of past human activities for which scientific methods of inquiry (that is, survey, excavation, data analysis) provide the main sources of information” (CEAA 1996). Archaeological resources include not only archaeological sites, but also archaeological objects such as artifacts not in a site context.

In British Columbia archaeological resources include sites and objects of both aboriginal and non-aboriginal origin. Furthermore, archaeological resources are often divided into pre-Contact (prehistoric) or post-Contact (historic) resources, based on the age of the site or object. In the Peace River valley of British Columbia pre-Contact archaeological sites date to the period before first contact with European in the 1790s and include camps, villages, hunting places, look-outs, trails, stone quarries, burial places, and other sites, all of exclusive aboriginal origin. Because pre-Contact archaeological sites are of aboriginal origin, they also can be thought of as representing ancient traditional use sites.

Post-contact archaeological sites date from the 1790s and later, and are of both aboriginal and non-aboriginal origin. They are included in the examination of historic heritage resources in Section 5.

4.2 Existing Conditions

4.2.1 Past Site C Archaeological Studies

Prehistoric archaeological heritage resources received the greatest emphasis in previous heritage studies for the Site C Project. Eleven archaeological surveys spanning 27 years were carried out for the Project as part of preliminary design work prior to the 1981 BC Utilities Commission review of the Project (see Alexander 1982; Spurling 1980a: 5.1). The major surveys undertaken during that period include:

- A judgmental survey of the Site C pondage by Fladmark in 1974 (Fladmark 1975b);
- A judgmental survey in 1976 of the Site C pondage focused on the south side of the Peace River (Spurling, Finlay, and Fladmark 1976);
Two seasons of inventory and impact assessment work for the Project in 1977 and 1978 by Spurling using probabilistic sampling (Spurling 1978, 1980a, 1980b);

An inventory and impact assessment in 1977 of the Site C to Peace Canyon transmission line corridor (Fedje 1977);

An intensive inventory and impact assessment of the Site C damsite area by Alexander in 1981 using a mixed probabilistic and judgmental survey approach (Alexander 1982); and

An inventory and impact assessment in 1979 (Wilson 1979) of seven sections of the Peace Canyon to Site C transmission line not surveyed by Fedje in 1977.

These Site C surveys located just over 300 pre-Contact archaeological sites of various types within the project area as currently defined (see Section 4.2.1.1). In addition to the shovel testing and artifact collecting that are standard site survey activities, these studies carried out:

- Evaluative testing at nine pre-Contact archaeological sites (with registration numbers GlRj-1, HaRj-14, HaRj-19, HbRf-62, HbRg-5, HbRh-8, HbRh-33, HbRh-44, HbRh-66);
- Somewhat more substantial excavations at two pre-Contact sites (HaRk-1 and HaRk-14); and
- Systematic collections of surface artifacts at eight pre-Contact sites: HaRk-40, HaRk-41, HaRk-42, HbRh-17, HbRg-15, HbRi-9, HbRi-33, and HbRi-34 (Alexander 1982; Spurling 1980a).

The 1990 heritage resource assessment by Arcas did not involve field work or the collection of new baseline data. Recently, with renewed interest in the possible construction of Peace Site C, Archer CRM Partnership (2008) completed an archaeological overview assessment with ground truthing of known archaeological sites of the dam construction area, including nine impervious material areas and seven slide areas in the vicinity of the damsite.

### 4.2.2 Survey Methods of Past Site C Archaeological Studies

Key to an evaluation of the previous Site C archaeological studies is an understanding of the site survey methods used during the inventory phases of those studies. “Site surveying is the process by which archaeological sites are located and identified on the ground … [and] often involve both surface inspection and subsurface testing” (Archaeology Branch 1998: 11). Critical methodological considerations include: how much of the development area was
included in the survey; if the entire area was not examined, how were the areas that were examined selected; was subsurface testing part of the survey; if so, what was the size, frequency, depth and interval spacing of test pits, and how was test pit placement determined (Archaeology Branch 1998: 11).

4.2.2.1 Judgmental Surveys

In brief, the pioneering Site C surveys by Fladmark and his students used judgmental methods, where the areas chosen for examination are selected based entirely on professional judgment. Only those areas which are thought to have a reasonable chance of containing archaeological sites are surveyed. Information from residents and others can inform the selection process. The judgmental surveys resulted in the identification of many archaeological sites, and provided an outstanding “first look” at the archaeological resources of the project area, identifying approximately 160 sites in what is now the Site C project area. However, because these surveys did not examine areas thought to probably not contain archaeological sites, they did not test pre-existing assumptions about site locations, and resulted in an incomplete picture of the archaeological resources of the project area. Furthermore, as was common at that time, the areas that were examined in the judgmental surveys were not mapped or recorded in any detail (if at all), and shovel testing was sporadic and usually not recorded or mapped. Since systematic site survey is a critical requirement of modern archaeological inventories for impact assessment purposes (Archaeology Branch 1998:12), these initial judgmental surveys, while providing valuable information, cannot fulfill the inventory requirements for a project archaeological impact assessment. This is not surprising, as they were carried out before the archaeological impact assessment and review process was established.

Judgmental methods were used in the inventories for the transmission line corridor by Fedje (1977) and later by Wilson (1979, 1987). Locations to be surface inspected and shovel tested were selected judgmentally.

4.2.2.2 Statistical Quadrat Surveys

Spurling’s 1977-1978 study was an archaeological inventory and impact assessment for the Peace Site C Project. Spurling focused on “obtaining inventory information concerning the location and frequencies of archaeological resources” (Spurling 1980a:2). Spurling applied an innovative, statistically-based, sampling strategy to the site survey, in which a random selection of 74 500 x 500 m quadrats, out of a total of 717 quadrats within the project area, was
surveyed\(^1\) (Figure 2). Each quadrat was divided into one hundred 50 x 50 m units, and a 1 x 1 m test pit was dug in each unit to test for subsurface archaeological deposits. The locations of the test pits within each unit were selected randomly. Test pits were dug to the C soil horizon, fluvial gravels, or until maximum depth possible with shovels was reached. In fallow fields, surface inspection replaced subsurface testing due to difficulties in penetrating the surface.

Surface inspection consisted of two-person crews examining the ground along 50 m wide traverses within each quadrat, resulting in 100% ground inspection at an average crew member spacing of about 17 to 18 m. Forest cover prevented direct observation of the ground in many areas. Steep slopes, planted fields and water courses within quadrats were not examined. Approximately 12% of the project survey area was inspected using this method.

Site definition was “relaxed” in this approach (Spurling 1980a:140). A site was defined as one or more test pits containing archaeological material whose nearest neighbouring tests contained no archaeological material (Spurling 1980a:140). Because of time constraints, no attempt was made to define precise site boundaries or evaluate site content during the survey. As a result, the site counts from this work are somewhat arbitrary. Later, evaluative testing was carried out at eight sites, and a small-scale excavation program took place at one site.

Spurling encountered 112 archaeological sites, bringing the total of sites for the project area at that time to about 310, including 250 in the formal survey area (Spurling 1980a).

### 4.2.2.3 Combined Quadrat and Judgmental Surveys

Alexander’s survey of the damsite area in 1981 used both quadrat sampling and judgmental methods. Twelve quadrats were surveyed (Figure 2) using the same procedure as Spurling, though only about half of the required shovel tests could be dug due to steep terrain, sloughs and river channels. Alexander used judgmental surface inspection and shovel testing for lands with high archaeological potential not covered by the quadrat survey. The judgmental shovel tests measured 30 x 30 cm, with an average depth of 40-45 cm. On the north bank all lands not covered by the quadrats were shovel tested at an interval of about 50 m. In total, 585 shovel tests were dug, and 46.5 km of roads and trails also were examined, without shovel testing (Alexander 1982). Previous surveys in the damsite area had identified five

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\(^1\) Spurling also used 250 x 250 m quadrats on the islands in the Peace River. Quadrats were grouped into seven strata so that all parts of the study area would be included in the survey: north bank floodplain, intermediate terrace complex and valley rim to safeline; south bank floodplain, intermediate terrace complex and valley rim to safeline; and islands. The project area covered about 210 sq km; this area was reduced to 150.75 sq km for survey purposes by deleting rivers, steep valley walls, and recent large-scale landslides (see Spurling 1980a:130-149 for details).
archaeological sites. Alexander discovered six new sites, one by quadrat survey and five by judgmental survey, and re-examined nine previously recorded sites.

Alexander shovel tested 10 of these sites to define site limits, determine if stratification was present, and collect a sample of archaeological materials, providing more thorough site evaluation than is available for most the sites identified by either Fladmark or Spurling. In addition, she carried out evaluative testing at one site (HbRf-62).

4.2.3 Other Relevant Past Heritage Studies

A few archaeological field studies have taken place in and adjacent to the Site C Project area since the conclusion of surveys for the Project in the early 1980s. In 1987 I.R. Wilson Consultants Ltd (Wilson 1987) carried out an inventory and impact assessment of segments of a proposed 138 Kv transmission line corridor between the G.M. Shrum Generating Station at the W.A.C. Bennett Dam and Taylor, in part paralleling the Peace Canyon to Site C transmission line corridor previously surveyed by Fedje in 1977 and Wilson in 1979. One new site was located in the Site C study area.

Other more recent archaeological studies in the Site C area include several assessments for proposed oil and gas developments, for example, Walde (2005) and McKnight (2006), as well as studies by Big Pine Heritage for a BC Hydro transmission line relocation at Cache Creek (Hill 2003; Kinzie 2003; Kinzie and Farvacque 2004). This work has resulted in the discovery of seven previously unidentified archaeological sites.

4.2.4 Archaeological Site Inventory

Based on existing information it is evident that pre-Contact archaeological resources in the project area are both abundant and diverse. Currently there are 115 recorded pre-Contact archaeological sites within the project area as defined by the reservoir pool, construction facilities area around the damsite, transmission line right-of-way (with 50 m buffer), and possible road realignments (with 50 m buffer) (Figures 3, 4 & 5). No exact count is available for archaeological sites within the “safe zone” as safelines have not been established for the south bank nor for parts of the north bank. Using a 1 km buffer around the reservoir pool to define the likely maximum extent of any future safe zone, there are an additional 149 sites, for a total of 264 pre-Contact archaeological sites.
Figure 2. Quadrats surveyed by Spurling (1977, 1978) and Alexander (1981) (1:350,000; Survey Data from Archaeology Branch, Sept. 2008).
Figure 3: Recorded pre-contact archaeological sites in the reservoir (1:350,000; Site data from Archaeology Branch, Sept. 2008).
Figure 4. Recorded pre-contact archaeological sites on the proposed transmission line (1:350,000; Site Data from Archaeology Branch, Sept. 2008).
TABLE 2: NUMBER OF PRE-CONTACT ARCHAEOLOGICAL SITES BY PROJECT COMPONENT^2

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Number of Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir</td>
<td>83</td>
</tr>
<tr>
<td>Construction Facilities Area</td>
<td>10</td>
</tr>
<tr>
<td>Transmission Line Corridor</td>
<td>3</td>
</tr>
<tr>
<td>Road Realignment</td>
<td>31</td>
</tr>
<tr>
<td>1 km Reservoir Buffer</td>
<td>149</td>
</tr>
</tbody>
</table>

The vast majority (>95%) of pre-Contact archaeological sites in the project area are lithic sites. These include lithic scatters (sites with two or more stone artifacts on the ground surface and/or beneath the surface) and isolated lithic sites (single stone artifacts found on or beneath the ground surface). For many of the sites where artifacts were identified only on the ground surface, additional unidentified artifacts may be located beneath the surface.

Less common site types include cultural depression sites comprised of one or more human-made pits that may have functioned as food storage pits (cache pits), cooking features (roasting pits) or habitation features (house pits). In most cases these functions were unknown at the time the sites were recorded. Other types of sites in the project area include trails, mounds of unknown function, burial places, and places with only butchered animal bones. A rock shelter with evidence for past occupation also has been recorded.

Three major time periods are represented in the project area: the Palaeo-Indian Period (9-8,000 to 5,000 years ago), the Archaic Period (5,000 to 1700 years ago), and the Late Period (1700 to 300 years ago) (MPSGS 1981:4). This preliminary chronology is based on collected artifacts types and radiocarbon dates from HaRk-1 and HbRh-8 (Photographs 2 & 3). Pre-Contact archaeological sites in the project area represent excellent opportunities for studying the human history of the region, including regional chronology, adaptations to changing environmental conditions, settlement and subsistence patterns, regional trade, and ancient environments (MPSGS 1981:4-8).

^2 The total is less than the sum of each project area because 11 sites are counted twice in the breakdown since they are located in two project components (e.g., reservoir and road realignment).
4.2.5 Significance of Pre-Contact Resources

Spurling (1980a) provided a preliminary assessment of the significance of each recorded pre-Contact archaeological site in the project area. Each site is assigned a high, moderate or low rating based on its potential for scientific research and public interpretation. Other types of significance were not considered. Just over 200 archaeological sites (both pre-Contact and historic) were considered to have moderate or high scientific research potential, and 54 archaeological sites were judged to have moderate or high interpretive potential.

In 1981, the Archaeology Branch considered Spurling’s preliminary site evaluations as “appropriate for first-order selection” for management purposes, that is, sites with low scientific potential were exempt from management action, and sites with high scientific potential (as well as a sample of sites with moderate potential) required detailed evaluation. It is not clear if this is still the position of the Archaeology Branch, as current requirements for establishing site significance are based on a level of in-field assessment (shovel testing, surface collecting, mapping) not available for many of these sites.
4.3 Assessing Data Gaps

4.3.1 Heritage Conservation Branch “Blue Paper”

At the 1981-82 BC Utilities Commission hearings on Peace Site C, the Archaeology Branch (then the Heritage Conservation Branch) presented what was the first gap analysis of the archaeological work by Spurling and others for the Site C Project (MPSGS 1981). The Blue Paper concluded, after a detailed analysis of the work, that “Site-C heritage impact assessment studies to date are not sufficiently complete or comprehensive for rational impact management decision-making….An acceptable level of understanding can be obtained only through further impact assessment studies” (MPSGS 1981:17). For the pre-Contact archaeological sites they called for additional inventory survey using both systematic and judgmental methods, for site evaluation by evaluative testing, for impact mitigation primarily in the form of systematic data recovery (excavation), and for follow-up surveillance, monitoring, and emergency impact management (MPSGS 1981:17-23).
4.3.2 Arcas 1990 Heritage Assessment

In 1990 Arcas carried out a heritage resources assessment for the Site C Project. The purpose of that assessment was to define changes which had occurred in the heritage baseline information since BC Hydro’s 1980 Energy Project Certificate application for the project, and to collect the data needed to meet or exceed regulatory requirements. The assessment was put on indefinite hold in early 1991. A status report was issued, which provided a heritage data gap analysis, along with recommendations for addressing those data gaps in the eventuality that BC Hydro wanted to resurrect the Project.

The 1990 study included a literature review, interviews with archaeologists and historians familiar with the project area, interviews with regulatory agency personnel, and discussions with local groups interested in the archaeology and history of the area. Robin Ridington of the study team made initial contact with some local First Nations to solicit their views on heritage matters as they pertained to the project, but this effort had only just started when the study was put on hold.

The study report identified a number of data gaps and made a number of recommendations for addressing those gaps (Arcas 1991:16-18). For archaeological resources, these included:

- Lack of evaluative data for most recorded sites; recommended that all recorded pre-Contact archaeological sites be evaluated;
- Lack of survey coverage along the edge of the plateau at the top of the valley wall, the deep alluvial fans at the backs of many of the intermediate terraces, selected non-hummocky areas back from the fronts of the intermediate terraces, old stream channels and other kinds of erosional gulleys on the backs of the intermediate terraces, and selected areas of the floodplain; recommended that these areas be examined, with deep testing with a backhoe in “quite a few cases.”
- Lack of survey coverage on the south bank of the valley; recommended a program of site survey for this side of the river; and
- Lack of information about the geomorphologic history of the valley, a source of information “critical to the proper assessment, prediction and understanding of the distribution of prehistoric archaeological sites; recommended “at least a preliminary study of the geomorphic history of the valley in this area.”
4.3.3 Current Gap Analysis

The objectives and methods of the current gap study were presented in section 1 of this report. A key component of this study was consultation with Archaeology Branch personnel; another was a workshop held in Fort St John with a small group of archaeologists active today in the Peace Valley around Fort St John.

4.3.3.4 Archaeology Branch Input

Telephone discussions were held on different dates in July, August, and September of 2008 with Ray Kenny, Al Mackie, and Jim Pike of the Archaeology Branch. They reported that the Branch does not have at this time a formal position on archaeological requirements for Site C. They did note that they no longer necessarily adhere to the position expressed by the Branch in the 1981 “Blue Paper” (MPSGS 1981). They did indicate, however, that the impact assessments carried out for Site C in the 1970s are not adequate by today’s standards, and that a significant amount of impact assessment work still needs to be done. They noted that data gaps need to be identified, and that a plan needs to be put in place in the context of 2008, not 1981.

They noted that the shovel testing interval used in the 1970s is not adequate by today’s standards. They suggested that it might be possible to examine all land within the project area (except for steep slopes and destroyed locations) with “tight” survey coverage, similar to that being used currently in other large-scale impact assessment inventories in British Columbia, since the project area, while large, was not unreasonably large. They noted that shovel test intervals of 10 m or less are not uncommon in some of these larger studies, especially in areas with high site densities or site potential. In areas of good surface exposure, such as recently ploughed fields, less intensive testing would be required. In the alternative, they noted that a sophisticated and detailed archaeological potential model, possibly using LiDAR base mapping, would have to be developed for the project area as a means of assessing and mapping archaeological potential, which in turn could be linked to different survey methods and levels of shovel testing intensity.

Branch personnel also commented on the lack of deep testing for buried archaeological sites in past studies, and suggested that deep testing be included in any future inventory. They also suggested that areas on the high banks that could slump into the reservoir be included in future inventory work.
Lastly, it was pointed out that if the Project proceeds, BC Hydro will require upon completion of the archaeological impact assessment and mitigation work, a heritage Site Alteration Permit under section 12 of the *HCA*, and that the Branch is unlikely to issue such a permit on “unexamined” land. That means that thorough inventory work will be required, and that all major sites will have to be identified.

### 4.3.3.5 *Fort St John Workshops*

A workshop in Fort St John in July of 2008 vigorously debated the best approaches to an archaeological inventory of the project area. The workshop was attended by Diana Alexander, Matt Begg, and Arnoud Stryd of Arcas, and a number of locally-based archaeologists, all respected experts in the archaeology of the region. BC Hydro staff provided background information and answered technical questions. Diana provided an overview of previous studies undertaken, including work by Fladmark, Spurling, Alexander, Fedje, Wilson, Farvacque and Finlay. There was a diversity of opinion on many of the topics, but a number of conclusions appeared to have the support of many (but not necessarily all) of the archaeologists in the room:

- With the exception of steep slopes, wetlands, and destroyed locations, all areas within the Project area have archaeological potential;
- All areas with archaeological potential need to be examined in the field; finer discriminations in archaeological potential can be made in the field by experienced observers;
- Computer modeling of archaeological potential is not effective for the project area;
- Inventory standards for the Site C work should be the same as those applied to archaeological impact assessments for oil and gas developments and other kinds of developments in northeast BC;
- A shovel testing interval of no more than 10 m should be used in areas of archaeological potential, with smaller intervals on small landforms with very high archaeological potential;
- Testing intervals can be larger in areas with good surface exposure, such as freshly ploughed fields, but some form of systematic subsurface testing is nevertheless required for such areas; and
- Deep testing with a backhoe or tractor-mounted auger is necessary on terraces, alluvial fans and other locations to search for deeply buried archaeological sites.
A second workshop was held in Fort St John in November of 2008 to discuss possible methodologies for assessing and mapping archaeological potential in the project area. Most of the archaeologists who attended the first workshop participated. As a basis for discussion, Diana Alexander presented preliminary potential mapping in the form of overlays on orthophotos and LiDAR imagery for a selected number of map sheets based on ideas discussed in the first workshop. The wide ranging discussion explored several topics including:

- First Nations involvement;
- The need for pre-job heritage awareness training for contractors;
- Potential value of information from private artifact collections;
- Potential use of winter testing of wetland areas during the inventory;
- Lands that would have no potential, e.g. Attachie slide;
- Lands that have been fully assessed previously, e.g. Blocks 121 and 117;
- Methodological issues, e.g. appropriate shovel testing intervals and landform mapping;
- Work planning approaches, including survey intensity;
- Field methodology for transmission line;
- Opportunities for local museum collections and displays;
- Field assistant training needs; and
- Potential for culturally modified trees and fishing weirs in project area.

4.4 Current Data Gaps

The archaeological surveys by Spurling, Fladmark, Alexander and others in the 1970s and early 1980s represent a successful beginning in compiling baseline heritage information for the Site C Project. Their pioneering research has shown this body of information to be massive. At the conclusion of these studies it as recognized that there were gaps in the existing archaeological information and that additional survey and impact mitigation studies would be required (MPSGS 1981; Spurling 1980b).

Furthermore, more than 25 years have passed since the last of these studies. Standards and expectations have changed, and it is not surprising that some aspects of the work conducted in the 1970s and 1980s do not meet the standards of the early 2000s.
Based on consultation with academic and consulting archaeologists, Archaeology Branch personnel, and our review in both this gap analysis as well as our 1990 heritage gap assessment (Arcas 1991), it is our opinion that there are two major data gaps in regulatory requirements for archaeological heritage for the Site C Project. Both are concerned with the state of the resource inventory for the project area:

a) Absence of archaeological field survey to current standards for much of the project area; and
b) Absence of detailed information to current standards about the nature of many of the heritage sites identified to date.

Given the existence of data gaps in the archaeological resource inventory, it follows that both the assessment of potential project impacts on archaeological resources, and the proposed program for managing those impacts, will be incomplete. Therefore, a third data gap is:

c) Incomplete assessment of potential site-specific effects by the Site C Project and recommendations for managing potential impacts.

4.4.1 Resource Inventory Gaps

There is general agreement among the individuals consulted not only in this study, but also in the 1990 gap analysis (Arcas 1991:17), that the archaeological site surveys conducted to date for the Site C Project are insufficient for assessing potential project effects, especially by current standards and expectations. The 1981 Archaeology Branch “Blue Paper” (MPSGS 1981), and the earlier Arcas assessment (1991), reached the same conclusion, and Spurling himself concluded that “continued survey is warranted” (1980b:20).

Although Alexander (1982:29) recommended no further survey for the damsite area, her survey has many of the same shortcomings (by today’s standards) as those associated with Spurling’s survey, as her approach in part used the same quadrat methodology as Spurling. However, her site documentation is closer to modern standards than for sites identified by Fladmark or Spurling because of her use of shovel testing.

The access roads and downstream bridge were not included in the original impact assessment, and will need to be assessed to current standards.

There also may be data gaps for the transmission line right-of-way. Parts of the right-of-way have been surveyed, some more than once (Fedje 1977; Wilson 1979, Wilson 1987), and it is clear that additional survey was required after the initial 1977 survey (Fedje 1977). Seven locations on the right-of-way identified by Fedje (1977) as requiring further survey were
examined in 1979 by Wilson. In 1987, Wilson examined several locations in a 15 m widening of the existing right-of-way. Without a detailed assessment of archaeological potential along the right-of-way it is not clear if all areas requiring field survey by current standards were included in these earlier surveys.

Furthermore, it is not clear if the locations in the transmission line corridor that were surveyed previously were shovel tested at an interval that meets current standards, as no information is available in the reports. A review of field notes may clarify this matter but it is suspected that additional shovel testing will be required.

Based on the above, there are a number of specific gaps in the existing archaeological resource inventory for the Project that should be addressed in further studies:

a) Not enough of the land within the project area has been surveyed, especially land with high archaeological potential;

b) Much of the land that was surveyed was examined in a judgmental rather than statistical manner, leading to non-representative results (Alexander 1982);

c) Lands that were systematically surveyed were subsurface tested using a large (approximately 50 m) testing interval, which could easily miss smaller buried archaeological sites, especially when test pits had to be skipped due to steep slope, sloughs, fallow fields, etc. (in the damsite survey, for example, almost 50% of the test pits could not be dug);

d) The use of a relatively large subsurface testing interval resulted in poorly defined site boundaries, arbitrary definition of sites, and therefore arbitrary site counts and distributional information;

e) Because of the relatively small number of quadrats surveyed and shovel tests dug given the size of the area, it is not possible to make precise predictions about the total number of archaeological sites and their distribution in the project area; and

f) There has been no systematic deep testing with a backhoe or auger in spite of the potential for deeply buried archaeological deposits on the terraces and fans along the rivers of the project area.

In addition to gaps in survey coverage and methodology, there also are significant gaps in the information available for many of the archaeological sites that were identified in those studies. The Guidelines (Archaeology Branch 1998: 12) call for “the complete documentation of each identified site” and, for impact assessment and management purposes, identified
archaeological sites must be documented in sufficient detail to allow for an evaluation of significance. However, of the approximately 260 sites currently recorded in the project area, we estimate that less than 10% can be considered to be adequately documented by current standards. Spurling himself noted that some sites “were inadequately reported” and needed resurvey (1980b:173) and that others needed testing (1980b:172). Furthermore, because of time constraints, Spurling intentionally did not establish site dimensions (1980b:140-3), which is a basic requirement of current archaeological inventories for impact assessment purposes.

Like most sites recorded 20 to 30 years ago, archaeological site inventory forms for the Site C studies are remarkably sketchy by today’s standards. For example, to-scale site maps are not available for most sites. This lack of information is not surprising, given the focus of these studies on large-area site identification. Only eight pre-Contact archaeological sites were evaluative tested during these studies, a method commonly used today for assessing sites with subsurface archaeological deposits. As a result, many of the recorded sites are known only from one or two shovel tests with archaeological material, or from limited surface observations and collections.

4.4.2 Impact Assessment and Impact Management Gaps

The Guidelines (p.10, emphasis added) state that one of the objectives of an archaeological impact assessment is to “identify and assess all impacts on archaeological resources within the project area.” While no one expects that all archaeological sites in an area the size of the Site C project area will be identified (nor could this be demonstrated even if this was the goal) it is obvious that the existing assessment of potential project impacts on archaeological resources (Spurling 1980b) falls short of Guidelines requirements. This is because of data gaps in the existing resource inventory, both in terms of survey coverage and site documentation. Until these gaps are addressed it will not be possible to assess the potential impact of the Project on archaeological resources as a whole. An understanding of potential project impacts as a whole is the key to development of an appropriate impact management program. The absence of a complete assessment of potential project impacts is, of course, a major data gap that needs to be addressed.

In the absence of a complete impact assessment it is, of course, not possible to develop a complete program of impact management for the Site C Project. Like the inventory and impact assessment, the impact management program will in all likelihood have significant time and cost requirements, and will need to be based on complete and up to date information that meets current regulatory standards. It should be noted that existing impact management
programs recommended by Spurling (1980b) and by the Archaeology Branch (MPSGS 1981) for the project as a whole, and by Alexander (1982) for the damsite area, were based on an understanding of project effects as well as regional research and resource management priorities/needs (Archaeology Branch 1998:16) at that time, and may not reflect current understandings, priorities and needs.

No attempt is made in this study to review potential project impacts on archaeological sites based on current project plans, or to identify current research and resource management priorities and needs that might be applicable should further heritage studies be initiated. That work will be an integral part of any future impact assessment and impact management studies.

4.5 Recommendations for Further Studies

To address the data gaps in the existing Site C archaeological resources inventory and impact assessment we recommend that:

The existing inventory and impact assessment be updated and completed to current standards and regulatory requirements as defined in the BC Archaeological Impact Assessment Guidelines; in Archeology Branch policies, bulletins and guidelines; in current best practices as found in Heritage Inspection Permits for impact assessments in northeastern British Columbia; and in BC Hydro’s Reservoir Archaeology General and Technical Standards.

It is recommended that all components of the Site C Project as defined above be included in the updated inventory and impact assessment, that is, the dam and construction facilities area, all access roads and the downstream bridge, the entire reservoir (but not the Safe Zone — see below), all proposed or selected highway relocation alignments, and the transmission line corridor. However, the level of effort does not necessarily need to be the same in all locations.

More specifically, we recommend that additional inventory and impact assessment include:

a) Relocating, evaluating, and documenting to current standards all existing archaeological sites in the Project inventory (the amount of time required per site will vary considerably depending on the accuracy and completeness of information already recorded);
b) Field inventory (survey) of areas with archaeological potential using current surface inspection, subsurface testing, site evaluation and site documentation procedures and standards;

c) Testing of ploughed fields and other areas with good surface exposure, though at an interval greater than that used in undisturbed areas of archaeological potential;

d) Deep testing of a sample of areas with potential for deeply buried archaeological remains;

e) Recording all newly identified archaeological sites to current standards;

f) Reassessing the significance and impact status of all previously identified archaeological sites, and assessing the significance and impact status of all newly identified sites, based on the latest information on project design and potential effects on the environment; and

g) Preparing revised recommendations for managing potential project impacts on archaeological sites, based on current regional research and resource management priorities and needs.

4.5.1 Methodological Approach

Regarding the best methodological approach to completing the inventory and impact assessment, the Guidelines (Archaeology Branch 1998.11) state that “the proponent, in collaboration with an archaeological consultant, must develop an inventory plan for review and approval by the Branch prior to implementation.” Normally this inventory plan takes the form of an application for a Heritage Inspection Permit. One of the first tasks of the consultant(s) selected by BC Hydro to carry out the inventory and impact assessment will be to develop such an inventory plan.

While it is beyond the scope of this study to develop the inventory plan that will be required, the participants in the Fort St John workshop made several recommendations regarding field inventory methods based on their considerable experience with archaeological inventories and impact assessments in the general area. These were summarized in section 4.3.3.5 above, and it is recommended that they be given careful consideration during development of the inventory plan.

Furthermore, it is recommended that careful consideration also be given to the survey approach developed by BC Hydro for archaeological field inventories for the Reservoir Archaeology Program and accepted by the Archaeology Branch (Memorandum of Under-
standing between Archaeology Branch of the Ministry of Tourism, Sport and the Arts and BC Hydro Generation [2008] [“MOU”]). This Program defines, among other things, a process for conducting archaeological inventories and impact assessments in existing reservoirs during periods of drawdown plus critical eroding lands above high pool. In this Program “inventory surveys will take a landscape approach and will typically use a stratified sampling methodology” (MOU, Appendix B). Ideally, all estimates and characterizations are to be accurate to within plus or minus 10%, 18 out of 20 times (MOU, Appendix B). The objectives of this approach for the field inventory are to obtain reliable estimates of the total number of sites with the survey area, obtain reliable estimates of the relative abundance of each type of site within the survey area, accurately characterize the distribution of site types by landform/terrain type within the survey area, and accurately characterize each identified site in terms of horizontal extent (size), depth and artifact density (MOU, Appendix B). The Program makes no recommendations for shovel test size or frequencies.

The Reservoir Archaeology Program field inventory approach is, of course, inconsistent with a requirement for 100% survey coverage of lands with archaeological potential, an approach recommended by others. A possible solution may be a phased approach, in which the results of an initial survey using a stratified sampling methodology can be supplemented by additional statistical surveys if a larger sample is agreed upon, or by judgmental surveys if critical areas (as identified by BC Hydro, First Nations, or the Archaeology Branch) are not included in the initial survey.

4.5.2 Archaeological Potential Modeling

To help guide the development of the inventory plan we recommend that an archaeological potential map be produced for the project area based on a landscape approach. This map would provide a preliminary scoping of survey coverage and intensity, which could be refined as needed, and also would help with inventory budgeting, scheduling, staffing, etc. A landscape approach is consistent with methods currently in use in northeastern British Columbia for modeling archaeological potential.

The idea of computer modeling of archaeological potential was not well received at the Fort St John workshop, and we proposed instead an approach using orthophotos, bare-earth LiDAR imagery, surficial geological mapping, local expertise based on years of experience, and, possibly, one or more field visits. This potential map could be as coarse-grained or fine-grained as the researchers think the data allows, and would be a dynamic “work in progress” document undergoing ongoing review and revision during the field survey.
4.5.3 Study Area Boundaries

Development of the inventory plan will have to consider what boundary to use around the reservoir for inventory purposes. Spurling (1980a) used the safeline – a line beyond which the security of residents and buildings can be reasonably assured from landslide activity or beach erosion – to demarcate the area to be inventoried. In the 1990 gap analysis the Archaeology Branch agreed with the suggestion that the inventory be limited to the area defined by the breakline instead of the safeline, the breakline being a conservatively located line which marks the predicted extent of shoreline retreat (mainly slides in this case). The proposed redefinition was based on the belief that safelines are more of a planning and legal tool than an indicator of potential Project-related impacts, and that probably impacts are better marked by the breaklines. Furthermore, BC Hydro is not planning to establish a safeline for the south bank of the Peace River since there is no residential activity on that side of the river.

However, if the inventory is going to be restricted to the area defined by the breaklines, the Archaeology Branch may want some form of overview study of the area past the breakline. At the time of the 1990 gap assessment it was the position of the Archaeology Branch that an overview study should be conducted for the area between the breakline and takeline (the line used to designate land which is to be purchased or restricted in future use as a direct result of the creation of the reservoir) “for the management of impacts beyond this line [breakline]” (Arcas 1991:11). The overview would assess and map archaeological site potential between these two lines. Further dialogue with the Branch will be necessary to determine if this remains a requirement for the Project.

The inventory plan should also define the study area for the transmission line for the Project. It is recommended that the study area include the existing 118 m-wide right-of-way, and the 11 m-wide danger tree zone adjacent to both sides of the right-of-way where trees may require clearing to safeguard the new transmission lines.
5.0 HISTORIC HERITAGE SITES

5.1 Introduction and Definitions

This section of the report presents a data gap analysis of historic heritage sites in the Site C Project area. It builds on earlier data gap analyses of the Site C Project (Arcas 1991; MPSGS 1981) by examining previous studies of local historic resources within the context of current standards for heritage resource impact assessment. Previous recommendations for historic heritage resource evaluation and mitigation in the upper Peace valley, and assessments of the significance of historic resources to the professional and public communities are also reviewed (MPSGS 1981; Spurling 1980b).

To date, 35 historic heritage sites have been identified as potentially falling within the Site C Project area, including Fur Trade-era trading post/fort sites, trappers’ cabins, grave sites, and early homesteads (Figure 6). Some of the historic heritage locations consist of standing historic architectural features, while others consist of buried archaeological remains.

Historic sites are heritage sites for which written documentation is available or can reasonably be expected to exist. Examples include aboriginal camps and villages, fur trade forts, trappers’ cabins, mining structures, trails, culturally modified trees, cemeteries, and homesteads. Historic sites also include heritage buildings and heritage landscapes.

Many historic heritage sites contain materials or remains that can be investigated by archaeological methods of inquiry, and are commonly referred to as historic archaeological sites. Where these sites are of aboriginal origin, and only oral information is available, these sites are often thought of as traditional use sites in addition to being historic sites.

Unlike pre-Contact archaeological resources (sites), knowledge about historic archaeological sites is potentially enhanced from written accounts. In general, written history corresponds to the period of European colonization because aboriginal peoples in British Columbia lacked writing (their record of history is based on oral history). However, the historic period may include written documents and physical remains of both aboriginal and non-aboriginal heritage sites.
Figure 6. Recorded historic archaeological sites within the project (1:360,000; Site Data from Archaeology Branch, Sept. 2008).
The historic period for the Peace River Valley began in 1793 when Alexander Mackenzie traveled through the area, writing an account of his journey. For the purposes of this study, the historic period ends in 1950—the end of the period of early agricultural settlement in the valley as defined by Finlay (1978) (see section 5.2.2.5 below).

Archaeological sites are places on the landscape where remnants of a past culture survive in a physical context that allows for the interpretation of these remains. The archaeological significance of historic resources is based on the presence of physical evidence, usually in the form of artifacts (e.g., fragments of tools and vessels), features (e.g., remnants of walls, cooking hearths, trash or middens), and ecological evidence (e.g., pollen representing plants that were in the area when the activities occurred, or remains of butchered animal bones). Linear features or sites (e.g., roads, railroads, canals, ditches, tree blazes along an historic road) may also be considered historic archaeological resources.

Historic sites may have a non-archaeological component to them consisting of property types, such as buildings, above-ground objects, and districts that, in some instances, may still be used or maintained. In most cases, such linear features as roads, railroads, ditches and canals will be recorded as historic non-archaeological resources and not as historic archaeological sites. However, abandoned linear features that have a high potential of adding to the knowledge of past land-use practices may be recorded as historic archaeological sites and be assigned Borden site designation numbers.

5.2 Existing Conditions

This section summarizes the current state of knowledge pertaining to historic heritage studies in the upper Peace River valley. This review provides context for identifying the data gaps in knowledge of historic heritage resources for the project area, and for making recommendations for future work. Heritage research consists of archival studies of historical documents, ethnographic research on First Nations culture and land use, records of standing historic structures, and archaeological studies.

5.2.1 History of Historic Archaeological Investigations

The history of archaeological investigations pertaining to historic heritage resources in the upper Peace River Valley is summarized in Table 3. A more detailed description of the various projects follows.
TABLE 3: SUMMARY OF PEACE REGION HISTORIC ARCHAEOLOGICAL STUDIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1962-1964</td>
<td>First surveys of Portage Mountain Dam reservoir (Borden 1962; McGee 1963; Mitchell 1964a, 1964b)</td>
</tr>
<tr>
<td>1972</td>
<td>Recording of two historic burial grounds near Hudson Hope (Murton 1973)</td>
</tr>
<tr>
<td>1974</td>
<td>Rocky Mountain Portage House (HaR1-4) and St. John/Fort d’Epinette (HaCc-22) located (Fladmark 1975)</td>
</tr>
<tr>
<td>1975</td>
<td>Rocky Mountain Fort (HbRf-31) located, and St. John/Fort d’Epinette excavated (Fladmark et al. 1977; Fladmark 1985)</td>
</tr>
<tr>
<td>1975</td>
<td>Exploratory testing of Rocky Mountain Fort, and continued excavation of St. John/Fort d’Epinette (Fladmark 1975; Fladmark et al. 1977; Spurling et al. 1976; Fladmark 1985)</td>
</tr>
<tr>
<td>1984-1987</td>
<td>Excavation and mapping at Rocky Mountain Fort, Yale’s Post, McIntosh’s Post, Rocky Mountain Portage House, and St. John/Fort d’Epinette (Fladmark 1985; Burley et al. 1996)</td>
</tr>
</tbody>
</table>

5.2.1.1 First Surveys: 1962-1964

Charles E. Borden from the University of British Columbia conducted in 1962 the first archaeological reconnaissance of the upper Peace River basin proposed to be flooded by the creation of a Peace Dam (Borden 1962), then called the Portage Mountain Dam (now the W.A.C. Bennett Dam), built upstream from the Site C Project in 1967. The survey area extended from the Peace Canyon west to the confluence of the Finlay and Parsnip Rivers. The three-week terrain reconnaissance was recommended by the Archaeological Sites Advisory Board (ASAB) to facilitate future planning in this archaeologically unknown region. In his report, Borden makes reference to the standing buildings at Fort Grahame, the first fur trade post on the Finlay River, and also notes that “in addition to the historical significance of the region, even a cursory examination showed that its archaeological resources were also considerable” (1962:2). He also suggested that trails should be identified and surveyed for archaeological sites and “Indian camps” (Borden 1962:4).

Following Borden’s fieldwork, a survey the next year by Robert McGhee recorded 17 sites, one of which was an historic cabin (HeSc-2); there were also several historic native campsites observed (McGhee 1963). Don Mitchell returned in 1964 to survey the reservoir
area of the Portage Mountain Dam from the Peace Canyon west to the confluence of the Finlay and Parsnip Rivers (1964a, 1964b). Six sites were recorded in the 17-day survey, including an early 19th-century Indian encampment at Gold Bar, and a grave site. Mitchell categorizes the human occupation of the area as “sparse and recent…as no sites appear to have any great time depth, all remains can probably be attributed to recent Indian population” (1964b:10). He also makes reference to the Rocky Mountain Portage Trail. While this survey is outside the present Site C Project area, its findings of recent historic sites in the Peace River valley allude to the historical use of the valley in general, particularly by First Nations’ peoples (Photograph 4). This research focused on the question of when the Sekani and Beaver peoples became established in the regions of the Peace (Mitchell 1964b:2).

Photograph 4 Beaver First Nations People at Camp Near Fort St. John in 1914 (photo: F. Swannell, BC Archives no. I-33180)
5.2.1.2 Other Surveys: 1970s

In 1973, Phil Murton identified two historic grave sites (HaRl-1, HaRl-2) on a terrace near the town of Hudson’s Hope. The first site has a number of graves marked by grave houses, and the second site, called the “Old Settlers Graveyard,” contains Indian graves (Murton 1973). These sites are outside the Project impact zone.

5.2.1.3 Simon Fraser University Inventories of Site C and E Pondages: 1974-1979

Spurling (1980a) and Fladmark (1985) described the archaeological fieldwork of the 1970s on the fur trade posts, noting that all three locations (representing five different posts) were found through archaeological survey and testing. Fort St. John (HaRe-27) was excavated by two Simon Fraser University field schools in 1975 and 1976 (reported in Fladmark 1975a, 1975b, 1976, 1985; Williams 1978). At Rocky Mountain Fort (HbRf-31), a 16-meter trench and chimney were excavated, and a magnetometer and metal detector survey was done by Finlay (1976; Fladmark 1985) (Photograph 5). Finlay identified three areas corresponding to the three known posts (Rocky Mountain Fort, Yale, and McIntosh), and recognized that the site area is substantially disturbed by river erosion. Work at McIntosh’s post included the preparation of a site map and excavation of 35 square meters of the site (Finlay 1976). Rocky Mountain Portage House (HaRl-4) was mapped by Spurling (1978), who noted that the site is partially disturbed by construction of the ferry landing and road.

A limited survey of post-fur trade era historical sites undertaken in 1977-1978 by Finlay (1978) and Spurling (1980a, 1980b, 1980c) was concerned largely with identifying heritage resources with standing log architecture (Photograph 6). They identified 35 post-fur trade era sites within the Site C Project area (Table 4). None of the post fur trade era sites have been recorded or examined in detail.

5.2.1.4 Simon Fraser University Peace River Land-Based Fur Trade Project 1984-1987

Subsequent to the archaeological fieldwork of the 1970s, Simon Fraser University, under the direction of Professor Knut Fladmark in 1984-1985, and David Burley in 1986-1987, undertook a major study of the Peace River fur trade that incorporated historic, ethno-historic, and archaeological studies (Fladmark 1985). A number of unpublished reports were produced (Burley 1988; Burley and Bedard 1988; Burley and Howe 1988; Carlson 1988; Hamilton 1987; Hamilton et al. 1988; Handly et al. 1988; Ray 1989; and Ray et al. 1986), along with several scholarly articles (Burley and Hamilton 1991; Fladmark 1985) and a


The archaeological research of the 1980s focused exclusively on fur trade sites. Research at Rocky Mountain Fort (HbRf-31) involved preparation of a detailed contour map, a proton magnetometer survey, intensive excavations of approximately 22 percent of the site, and collection of over 23,000 artifacts (Burley 1990; Burley et al. 1996). Continuing on the exploratory excavation of Finlay (1976), Yale’s House (on the former site of Rocky Mountain Fort), Fladmark conducted a proton magnetometer survey (MacMillan 1986; Burley 1990; Burley et al. 1996), and a systematic probe coring inside the stockade and east palisade was carried out (Handley et al. 1988; Burley 1990; Burley et al. 1996). Research at McIntosh’s post included further excavations and removal of the single intact fireplace to the North Peace Historical Society for reconstruction in a museum exhibit (Burley 1988, 1990; Burley et al. 1996). At Rocky Mountain Portage House, a small number of shovel tests were excavated in 1987 that provided minimal results (Burley and Howe 1988; Burley 1990).
5.2.2 Known Historic Archaeological Sites and Chronology

On the basis of archaeological inventory work to date (as described above), there are 35 known archaeological sites that are historic in age or contain historic components that are potentially located within the Site C project area. These sites are distributed widely across the valley between the Moberly River and Hudson’s Hope (Figure 1). A chronological age of the sites is determined on the basis of three periods defined by Finlay (1978). A summary of the known sites and a brief description of each are provided in Table 4. The sites consist of archaeological and/or standing architectural features related to trading posts, trappers’ cabins, homesteads, and miscellaneous other historic activities.

In addition to the recorded sites, a number of old trails, roads, and portages are known to exist that may be considered heritage resources. These include trails that were built from Fort St. John to the Klondike by the Northwest Mounted Police in 1897, and the construction of a wagon road that was attempted and abandoned from 1905-1907 after 600 kilometers had been built. Remnants of the road are visible (Spurling 1980c:86). Also recorded is a ford site across the Peace River (HbRh-35). Finlay (1978) notes that there are remnants of the old Hudson’s Hope Road along the north side of the valley.
5.2.2.5 **Chronological framework (1793 – 1950)**

The historic resources of the study area span an approximate 157-year period of time beginning in 1793 with the arrival to the Peace River valley of the first European (Alexander MacKenzie), to the early Agricultural Settlement period that is given an arbitrary end in 1950 (Finlay 1978). The historic era, dating from 1793 to 1950, is divided by Finlay (1978) into three chronological periods:

- **Period I — Fur Trade/Contact Period (1793-1860)**
  - Four fort sites (Rocky Mountain Fort/Yale’s Post/McIntosh Post, and Rocky Mountain Portage House), and a lithic/metal surface find (HbRg 22) are the only sites identified for Period I. The four sites (Rocky Mountain Fort, Yale’s Post, McIntosh’s Post, and Rocky Mountain Portage House) belong to the Fur Trade period. Three posts were in the same location near the confluence of the Moberly and Peace rivers, and have a single Borden number (HbRf-31) (Photograph 5); and Rocky Mountain Portage House (HaRl-4) is in a separate location near Hudson’s Hope. These sites lack standing structures and are entirely archaeological in nature.

- **Period II — Trapping and Gold Rush (1860-1910)**
  - With the influx of white trappers, many First Nations people in the valley died of introduced diseases, and the establishment of the reserve system meant that the Peace Valley became used almost exclusively by white settlers. The Frank Beatton homestead house, the oldest known existing structure in the Fort St. John area, was built between 1895 and 1900 (MacIntyre and Kindrat 1985). At least two other sites —HaRk-9 (recorded as a log cabin and possible corral), and HaRl-22 (a pre-1900 archaeological site with historic artifacts) —probably date to the second period according to Finlay (1978). In addition, the Moody homestead (HaRj-23), an unnamed site with a trapper cabin (HaRk-30), the Robinson homestead (HaRk-33), and the Farrell cabin (HaRk-34) may date as early as Period II (Table 4). Another trading post was set up in the 1860s at the location of Rocky Mountain Portage House, and relocated to the present site of Hudson’s Hope in 1899. Descriptions of the post can be found in various local historical accounts, but it has not been located or tested archaeologically.

- **Period III — Agricultural Settlement (1910-1950)**
  - The majority of historic sites in the Peace valley date to the post-1910 agricultural period. They represent aboriginal and Euro-Canadian settlers’ graveyards, cabins, homesteads, trappers’ cabins, sheds, a logging operation, a river ford, a school, and
miscellaneous other features (Table 4). These sites are generally settlements and homesteads that were connected by the Old Hudson’s Hope road that led from Charlie Lake to Wilder Creek, Bear Flats, Halfway River, Farrell Creek, and Hudson’s Hope (Finlay 1978). On the south side of the Peace River is an undated log cabin and barn on the Moberly River Flat (HbRf-37). In addition, Finlay (1978) notes that several Period III sites are homesteads that lack buildings, for which only one is recorded (HaRk-16). A logging operation site (HbRj-10), a Peace River ford site (HbRf-35), and rock cairns above the mouth of Tea Creek (HbRf-8) are also recorded (Finlay 1978). No period III historic resources have been archaeologically examined.

<table>
<thead>
<tr>
<th>TABLE 4: RECORDED HISTORIC HERITAGE RESOURCES IN THE SITE C PROJECT AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. HaRj-23 Moody Homestead ca. 1920 standing log structure, archaeological remains (Period II)</td>
</tr>
<tr>
<td>2. HaRk-9 unnamed pre-1930 standing log cabin, depressions, possible corral, refuse (Period II)</td>
</tr>
<tr>
<td>3. HaRk-10 Rutledge Cabin undated, three standing log buildings</td>
</tr>
<tr>
<td>4. HaRk-13 Log cabin, one of oldest still standing; west side Farrell Creek bridge</td>
</tr>
<tr>
<td>5. HaRk-16 Darling Cabin undated, archaeological site of historic cabin that is no longer standing</td>
</tr>
<tr>
<td>7. HaRk-30 unnamed, undated, two standing log buildings, trapper cabin (Period II possibility)</td>
</tr>
<tr>
<td>8. HaRk-31 Zalinka Homestead ca. 1945, two-storey log house, two log barns (Period III)</td>
</tr>
<tr>
<td>9. HaRk-32 Forsythe Cabin undated, standing log cabin</td>
</tr>
<tr>
<td>10. HaRk-33 Robinson Homestead ca. 1920, standing log cabin and log shed (Period II)</td>
</tr>
<tr>
<td>11. HaRk-34 Henry Farrell Cabin, 1900-1915, standing log cabin, reputation of being oldest in the area (Period II)</td>
</tr>
<tr>
<td>12. HaRk-41 surface stone artifacts and one piece of iron</td>
</tr>
<tr>
<td>13. HaRl-1 Burial ground with Aboriginal grave houses above Hudson Hope</td>
</tr>
<tr>
<td>14. HaRl-2 Old Settlers’ and Aboriginal graveyard and campsite on terrace above Hudson Hope; flakes.</td>
</tr>
<tr>
<td>15. HaRl-4 Rocky Mountain Portage House (Period I); lithic scatter</td>
</tr>
<tr>
<td>16. HaRl-5 Maurice Creek historic Aboriginal camp, trail, ceremonial rock</td>
</tr>
</tbody>
</table>
TABLE 4: RECORDED HISTORIC HERITAGE RESOURCES IN THE SITE C PROJECT AREA

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. HaRf-22</td>
<td>unnamed pre-1900 archeological site with historic artifacts (Period II)</td>
</tr>
<tr>
<td>18. HbRf-8</td>
<td>Circular stone alignment (petroform), mouth of Tea Creek (pre-Contact on site form, historic according to Finlay [1978])</td>
</tr>
<tr>
<td>19. HbRf-23</td>
<td>Beatton Homestead, two structures, built 1895 and 1936 (Periods II-III)</td>
</tr>
<tr>
<td>20. HbRf-29</td>
<td>unnamed depressions, possible historic site</td>
</tr>
<tr>
<td>21. HbRf-31</td>
<td>Rocky Mountain Fort/Yale’s House/McIntosh House (Period I)</td>
</tr>
<tr>
<td>22. HbRf-37</td>
<td>unnamed undated standing log cabin, archeological remains, cellar depressions</td>
</tr>
<tr>
<td>23. HbRg-22</td>
<td>Stone artifacts and metal surface find; large site; historic (possibly Period I, Finlay 1978).</td>
</tr>
<tr>
<td>24. HbRg-27</td>
<td>LeFeuve Site 1920s, standing log structure, outbuildings, corral (Period III)</td>
</tr>
<tr>
<td>25. HbRg-28</td>
<td>Flatt/Freer Homestead 1920s, two log structures and barn (Period III)</td>
</tr>
<tr>
<td>26. HbRh-15</td>
<td>Several log buildings; several stone artifacts</td>
</tr>
<tr>
<td>27. HbRh-24</td>
<td>Bentley’s cabin, stone artifacts, east of Cache Creek bridge</td>
</tr>
<tr>
<td>28. HbRh-35</td>
<td>unnamed historic occupation site, archaeological; ford of Peace River</td>
</tr>
<tr>
<td>29. HbRh-45</td>
<td>unnamed root cellar and possible cabin feature, archaeological</td>
</tr>
<tr>
<td>30. HbRh-59</td>
<td>Freer/Robinson Homestead 1920s-1940s, log structures (Period III)</td>
</tr>
<tr>
<td>31. HbRh-60</td>
<td>Dopp Homestead 1920s-1930s, Bear Flat School 1921 (relocated), several log structures (Period 3)</td>
</tr>
<tr>
<td>32. HbRh-61</td>
<td>Watson Homestead ca.1944, two standing log cabins (Period III)</td>
</tr>
<tr>
<td>33. HbRi-10</td>
<td>Halfway river confluence; stone artifacts, and possible 20th century component</td>
</tr>
<tr>
<td>34. HbRj-10</td>
<td>unnamed, depressions and historic artifacts on surface, logging site</td>
</tr>
<tr>
<td>35. HbRj-27</td>
<td>Ardill Ranch, 1944 two-storey log house, two barns (Period III)</td>
</tr>
</tbody>
</table>

5.2.3 Significance of Historic Resources in the Upper Peace River Valley

Five general kinds of significance of heritage sites for contemporary society are recognized in previous archaeological studies for the upper Peace River valley, and are considered applicable to current standards: 1) scientific; 2) public; 3) historic; 4) ethnic; and 5) economic (MPSGS 1981; Spurling 1980b; Guidelines 1989). Fur trade forts and early home-
steads are considered of scientific, historic, and public significance, and several historic sites are potentially of ethnic significance to the Athabaskan and Cree communities of the region. Four sites were determined to have definite ethnic significance by Spurling (1980b:131): the mortuary sites of HaRl-1 (burial ground near Hudson’s Hope), HaRl-2 (Old Settlers Graveyard near Hudson’s Hope), and HbRh-2 (Cache Creek), in addition to the site of HaRl-5 (Maurice Creek) which has mythological importance to the First Nations of the Hudson’s Hope area. Public significance pertains to the interpretive, educational, recreational, or aesthetic value of a site, and although a number of historic sites (such as the fur trade forts and early agricultural homesteads) have high potential in this category of significance, none have been developed for public use or visitation as such. The Ministry’s Blue Paper on heritage considerations for the Site C development noted the potential economic significance of the fort sites, but without the presence of public facilities this was not quantified (MPSGS 1981:7).

5.3 Current Data Gaps

The overview of studies to date on historic heritage resources in or near the proposed Peace Site C project area reveals a number of data gaps in the current state of knowledge about these resources. Building on previous heritage overviews with similar goals (Arcas 1991, 1994; Burley 1990; MPSGS 1981), the data gaps are identified here with recommendations for further work needed to address these gaps. As in previous overviews of this nature, it is recognized that where any physical alteration to heritage sites may occur due to Site C development plans, that “effectively forecloses or reduces future opportunities for scientific research, preservation, or public appreciation, the result is an irreversible loss of heritage resource values” (MPSGS 1981:11).

Specifically, the data gaps for historic Peace resources include:

a) Uncertainty about whether the inventory of recorded historic sites represents the full range of potentially extant sites for the area associated with both First Nations and Euro-Canadian historical use of the valley;

b) Incomplete knowledge of the age, origin, context, size, content, and function of each recorded historic site, except for Rocky Mountain Fort; and

c) Incomplete knowledge and recording of the location of trails, old roads, portages, and river fords;
5.4 Recommendations for Further Studies

To address the data gaps listed above, the following recommendations for future work are made:

a) Upgrade existing records for recorded historical sites with detailed site plans, descriptions, and photographs, as needed;

b) Complete field inventory of historic sites for the project area, including the recording of previously unrecorded sites;

c) Complete documentary research, including a review of archival literature, land records, published historical accounts, and other documentary sources;

d) Interview informants who are long-time residents or local heritage experts to document oral history and folklore on standing structures, natural features, and locally important events and individuals;

e) Work with local First Nations to locate and record information about aboriginal historic sites;

f) Provide an architectural description and analysis of built heritage sites where appropriate;

g) Surface collect and/or conduct evaluative testing at the following historic sites:

- Yale’s House (Arcas 1991; Burley 1990),
- Rocky Mountain Portage House and adjacent terraces (Arcas 1991; Burley 1990);
- Bear Flats School (HbRh-60) (Spurling 1977);
- Farrell’s Cabin (HaRk-34) (Spurling 1977);
- Unnamed cabin (HaRk-9) (Spurling 1977);
- Octagonal granary (HbRj-27) (Spurling 1977);
- The “Reid Store” (Spurling 1977); and
- The Beatton homestead (HbRf-23) (MacIntyre and Kindrat 1985; Spurling 1977).

h) Identify and record the location of heritage trails, old roads, portages, and fords through archival, oral history, and field reconnaissance to reconstruct historic transportation routes. Comparable studies include Goodchild (2002) and Morse (1969).
5.5 Summary Remarks

In general, the majority of recorded historic sites in the Site C area have not been adequately assessed, and will require further evaluation to satisfactorily demonstrate local, regional, or provincial heritage significance. A thorough and complete inventory or preliminary evaluation of the historic sites has not been accomplished to date, effectively precluding the development of a comprehensive, site-specific management plan. The methodology used in previous studies to inventory the recorded historic sites is unknown, and therefore uncertainty exists as to whether or not current knowledge reflects the range and number of historic sites potentially present in the study area. It is recognized that the historic era sites (both aboriginal and Euro-Canadian) have considerable scientific, historical, ethnic, and public value, but there is insufficient information to properly evaluate the significance of the known historic sites, or to know whether or not the inventory is complete.

In addition, all substantive archeological investigations that have been completed for historic sites pertain only to fur trade-era forts, and no sites dating to the later historic periods have been investigated. This has created a gap in knowledge of the later historic periods, including both aboriginal and non-aboriginal sites. Furthermore, the research on the forts has focused on the Euro-Canadian aspects of the sites, and the aboriginal occupations surrounding the forts (known to have existed from archival documents) has not been studied, thus creating a significant gap in knowledge of the historic aboriginal occupation of the region. Of the fort sites that have been examined within the Site C project area, only one – Rocky Mountain Fort – has received substantial investigation, but this did not include the aboriginal occupation areas of the site (Burley 1990).

Examples of research themes that the fur trade era (1793-1860) historic sites may potentially address include information on land-use and subsistence patterns of fur traders; the economic and cultural impact of the fur trade and its closure on the First Nations populations; changes in regional population movements; and effects of the fur trade on the environment of the upper Peace valley (MPSGS 1981:9-10; Quackenbush 1986, 1988, 1989; Spurling 1980c). Fladmark noted over 30 years ago that, “The early fur-trade history of the Peace River is of considerable interest to the post-contact period of British Columbia as a whole, since it was along this natural communication corridor that many of the original European explorers and fur-traders entered the inter-montane area of the province. At least six forts are known to have existed in the British Columbia portion of the Peace District between 1798 and 1890, and others may exist which have yet to be relocated. All the located
sites are relatively large with complex structural features and deserve a high salvage priority if any reservoirs are eventually constructed in the area” (1975c:18).

Post-fur trade-era (1860-1950) research themes may include determining: (a) if any sites are unique or outstanding to the region, such as in quality of construction or building technique, or the oldest of its kind; (b) association with locally historic figures or events; (c) if it is related to an important historic theme or landmark; (d) has objects or features of archaeological interest for determining lifeways and landuse of early trappers and homesteaders; (e) has made a contribution to the historical development of the local community or region; or (f) is associated with a community activity or event. In general, historic heritage resources hold a range of different values to local communities (see MacIntyre and Kindrat 1985; Russell 1983; United Native Nations 1981), and because they are frequently associated with a people’s sense of place, community and roots, they have the potential to become controversial if not afforded adequate consideration in development plans.
6.0 PALEONTOLOGICAL RESOURCES

6.1 Introduction

This section of the report presents a data gap analysis of paleontological heritage resources in the Site C Project area. Preparation of this section included a survey of the literature of paleontological and geological reports, the Geological Survey of Canada and University of British Columbia libraries, and online sources. Source materials consulted included monographs, explorers’ journals, map-area and technical reports, radiocarbon date lists, annotated maps, and unpublished files. This section is based on information in a detailed technical report prepared by Michael Wilson (2009).

6.1.1 Definition

Paleontological resources are defined in Land and Resource Management Plan reports (e.g., Haggart et al. 1997a, b) and BC government documents (Fossil Management Review Technical Working Group 2004), and must be distinguished from archaeological resources despite some overlap. Paleontological resources are defined as fossils or other evidence (e.g., trace fossils) of ancient life, which can include plants, invertebrate and vertebrate animals, and single-celled organisms (Photographs 7 and 8). Overlap with archaeological resources can occur at sites, for example, where ancient people killed extinct bison or mammoths. Such a site is both archaeological (recording human activity) and paleontological (documenting ancient animal life).

Paleontological remains may be both widespread and abundant, especially in the case of marine invertebrates or terrestrial plant fossils. Vertebrate fossils are typically rare in comparison with invertebrates, so virtually all vertebrate discoveries are taken to be of considerable importance. Detailed studies of the evolutionary trajectories of species increasingly require large samples to document variation at each time level.

6.1.2 Type Sites

Although paleontological resources are seldom site-specific, certain localities often do prove to be unusually rich in comparison with others in the same formations. A specific and important application of the “site” concept in paleontology is that of the type site, the site from which the original, defining specimen or specimens (the holotype and additional referred paratypes) of a given genus or and/or species have been collected. The type site in paleontology is therefore the only site from which the named organism
Photograph 7. Fossil ammonites from Kinuseo Creek, South of project area (photo: J. Ruskin 2008)

has certainly been documented; all other occurrences are referred to that genus or species on the basis of comparisons that may or may not be correct. Thus the type site remains forever of key importance as a locality from which additional material (topotypes) can be collected, an important consideration if the type material should become damaged or lost. Given geographic variability in organisms, no other locality can fully replace the type locality, just as no other specimen can seamlessly replace the type specimen(s). Paleontological type sites should therefore be conserved or, if this cannot be done, they should be intensively sampled for topotype material before impacts (Photograph 9).

Paleontological type sites have their counterparts in terms of named geological units (groups, formations, and members). Specific exposures are designated as type or reference sections for these named units in the expectation that they will remain available for comparison with other referred sections. As such, they take on a degree of heritage status.
for geological studies and in the event of their destruction new reference sections must be located and designated to serve in their stead.

6.2  Review of Paleontological Studies

6.2.1  Bedrock Paleontology

Fossils of interest in the Project area include invertebrates, vertebrates, and plants, as well as microfossils. Marine shales are rich in invertebrates, especially ammonites and bivalves, many of which are important in regional correlation and relative dating of strata. Four distinct fossil zones or faunas are present in the Gates and Shaftesbury Formations in the project area, each with its own suite of invertebrate species. Invertebrate fossils from the immediate project area have been used to define some of these zones, making these fossil assemblages of special significance for further documentation and sampling.

With one exception, vertebrate remains have not been reported as yet from bedrock strata in the project area but that probably reflects a lack of searching. The exception is a prominent layer of fish scales, the “Fish-Scale Marker,” that is widespread in Cretaceous strata. Non-marine rocks of the Gates and Dunvegan Formations in the Project area have potential for the discovery of dinosaur and other skeletal material as well as footprint trackways. Significant trackways have already been found in slightly older formations to the west in the Peace River Canyon, as well as in Gates Formation strata to the southeast in Alberta. Marine shales have potential for the discovery of fish and marine reptile fossils, as have been found elsewhere in the region. The Gates and Dunvegan Formations are documented to have plant fossils in or close to the project area, reflecting forests dominated by conifers and ferns. Several important invertebrate and plant fossil sites in the project area have been described in the literature; however, location data are in some cases generalized and there is a clear need for more precise location and documentation.

6.2.2  Quaternary Paleontology

Terrace deposits along the Peace River are of early postglacial age but older Quarternary deposits are occasionally exposed in excavations in upland settings or where the modern valley cuts across filled preglacial valley trends. Preglacial fossils can occur both in the original deposits and reworked into postglacial gravel fills (Hills and Wilson 2005). Mapping of preglacial valleys in northeastern British Columbia confirms that the ancestral Peace River did not follow the modern course and that such intersections are likely (Hickin et al. 2008).
Preglacial Quaternary fossils from the Project area include a mammoth tusk found in 1966 during construction of the W.A.C. Bennett dam (Mathews 1980:19; Woolf 1993), and bison remains (*B. bison occidentalis?*) recovered from gravels beneath till at the Ostero Gravel Pit near Taylor (Mathews 1978:17; 1980: 19). Rodent and rabbit bones were recovered from a mudflow deposit at Bear Flat (Jull and Geertsema 2006; Hebda et al. 2008).

Early postglacial (Late Pleistocene) vertebrate fossils are widespread in the Peace region. The fauna from these deposits is dominated by bison (*Bison antiquus*) but also includes wapiti and horse (Burns 1986; Churcher and Wilson 1979; Shapiro et al. 2004; Wilson 1996). Numerous finds of fossil bison bones have been made at the Clayhurst Gravel Pit, just east of the Project area approximately 5 km west of the BC-Alberta border (Apland and Harington 1994). This location was registered as a heritage site in the Provincial Heritage Registry as HaRa-15.

Bison remains also have been found just south of the Project area, at the East Pine Gravel Pit, 37.5 km east of Chetwynd (Irvine 1982). Another bison skeleton was recovered from heritage site HaRo-1 on Williston Reservoir on the north shore of Peace River Reach, northwest of Hudson Hope (G. Keddie, n.d.). Bison remains of late Pleistocene age were recovered from the Charlie Lake Cave site, northwest of Fort St. John (Driver 1988; Shapiro et al. 2004; Vallières 2004), and a bison cranium was recovered from a gravel pit overlooking the Site C area (Apland and Harington 1994). Also, a bison cranium was found “near Fort St. John” at the “Chilly Pit” and donated to Simon Fraser University Archaeology (Wilson 1996:102).

No formal assessment of the significance of the paleontological specimens found to date and the sites where they have been found has been made.

6.3 **Current Data Gaps**

On the basis of the foregoing summary of known resources, it is clear that the Peace Site C Project area has potential for the continued recovery of important paleontological material and for the discovery of new localities (sites). This potential extends to both bedrock (Cretaceous) and surficial (Quaternary) strata, and is based upon a documented history of discoveries.
6.3.1 Bedrock (Cretaceous) Paleontology Data Gaps

The project area has been studied in moderate detail as far as bedrock paleontological resources are concerned. Studies were made largely for the purpose of determining the ages of enclosing rock strata through the definition of faunal chronozones. The project area has taken on added significance as the type area for certain of these zones, in addition to containing the type section of one formation and of the Fort St. John Group as a whole. As such, the area is a definitional baseline for studies elsewhere and the loss of paleontological resources, or of access to paleontological resources, cannot be minimized. The locations of sites yielding invertebrate fossils have been provided in many of the references consulted. However, these locations have not been stated with enough precision for GIS work; nor can the sites be relocated readily without considerable effort in field survey. No dedicated search has been made for vertebrate fossils in the bedrock strata within the project area. Dinosaur footprint tracks have been found in the Gates Formation of the general area, but there have no surveys for such tracks in exposures of this formation in the Site C area.

6.3.2 Quaternary (Surficial) Paleontology Data Gaps

Unlike the bedrock fossils in the project area, Quaternary fossils have mostly been discovered by accident in the course of excavations for gravel pits or other landscape modifications. The lack of any systematic survey for Quaternary fossils in the project area is a serious deficiency, particularly given the evident richness of vertebrate fossils such as extinct bison, mammoths, and horses in some of the region’s gravel pits.

Evaluation of Quaternary paleontological resources will depend not only on a larger inventory of fossils, but also the dating and identification of the fossils. The lack of radiocarbon dated fossils, and the lack of fossil identification is a significant paleontological data gap, especially in light of the fact that the project area lies in a region where both northern and southern bison have been documented and distinguished on the basis of recovered mitochondrial DNA (Shapiro et al. 2004). Such information is key to the understanding of the evolutionary and dispersal history of these fossil vertebrates. Thus the general region containing Site C is of key importance (and may hold the key) in terms of the identification and relationships of the two groups, and all bison specimens from gravels in the project area should be carefully recovered and properly conserved for DNA analysis.
6.4 **Recommendations for Further Studies**

A number of recommendations are made as to strategies for completing the site inventory to address important data gaps in the known paleontological site record.

6.4.1 **Bedrock (Cretaceous) Fossil Recommendations**

To address the Cretaceous-age bedrock fossils data gaps above, these steps are recommended:

a) Relocate, as precisely as possible, the seven bedrock paleontological sites for which verbal locations have been given. Relocation of these sites would entail field survey and the collection of enough fossil specimens that the characteristics of these sites can be confirmed;

b) Survey for vertebrate fossils in strata exposed along the Peace River and main tributaries. The search would involve examination of talus at the foot of the usually steep exposures, and follow-up searching in the event of a discovery; and

c) Examine the type section of the Gates Formation and surrounding outcrop areas in the Site C area for dinosaur footprint tracks or trackways.

Some recommendations for possible mitigation are:

a) Sample strata for representative samples of macrofossils;

b) Recover from threatened sites evenly spaced vertical sequences of rock samples for microfossil recovery;

c) Collect any previously located large specimens that require specialized collection techniques; and

d) Collect detailed lithological description of type sections and type localities as contextual information relative to the fossils.

6.4.2 **Quaternary (Surficial) Fossil Recommendations**

To address the Quaternary-age fossils data gaps above, these steps are recommended:

a) Prepare an inventory of gravel exposures, including gravel pits:

b) Examine gravel exposures within project area for vertebrate fossils;
c) Establish the ages of a sample of at least 20 Quaternary fossils from the project area by radiocarbon dating as part of the significance evaluation of paleontological resources; and

d) Characterize all fossil bison specimens from gravels in the project area by DNA analysis as part of the significance evaluation of paleontological resources.
7.0 SUMMARY OF DATA GAPS AND RECOMMENDATIONS

The table below summarizes the data gaps listed in section 4 through 6 of this study, along with the recommendations in sections 4 through 6 for further work to address those gaps.

<p>| TABLE 5: PEACE SITE C HYDRO PROJECT HERITAGE RESOURCES DATA GAPS AND RECOMMENDATIONS (2008) |
|-----------------------------------------------|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th><strong>Data Gap</strong></th>
<th><strong>Recommendation</strong></th>
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<tbody>
<tr>
<td><strong>Pre-Contact Archaeological Resources</strong></td>
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</table>
| 1. Absence of archaeological field survey to current standards for much of the Project area | • Field inventory (survey) areas with archaeological potential using current surface inspection, subsurface testing, site evaluation and site documentation procedures and standards  
• Test ploughed fields and other areas with good surface exposure, though at a interval greater than that used in undisturbed areas of archaeological potential,  
• Deep test sample of areas with potential for deeply buried archaeological remains,  
• Record all newly identified archaeological sites to current standards  
• Develop archaeological potential map to guide survey scope |
| 2. Absence of detailed information to current standards about the nature of many of the heritage sites identified to date | • Relocate, evaluate and document to current standards all existing archaeological sites in the Project inventory (the level of effort required will vary from site to site) |
| 3. Incomplete assessment of potential Project effects on archaeological resources and recommendations for managing potential impacts | • Reassess the significance and impact status of all previously identified archaeological sites, and assess the significance and impact status of all newly identified sites, taking into account the latest information on project design and potential effects on the environment  
• Prepare revised recommendations for managing potential project impacts on archaeological sites, based on current regional research and resource management priorities and needs |
<table>
<thead>
<tr>
<th>Historic Resources</th>
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</thead>
<tbody>
<tr>
<td>1. Uncertainty about whether the inventory of historic sites represents the complete range and number of potentially extant historic sites for the project area (sites that represent both First Nation and Euro-Canadian historical use of the valley)</td>
</tr>
<tr>
<td>• Complete field inventory of historic sites in project area, including recording of previously unrecorded sites</td>
</tr>
<tr>
<td>• Work with local First Nations to locate and record aboriginal historic sites</td>
</tr>
<tr>
<td>• Carry out additional documentary research, including review of archival literature, land records, published historical accounts, and other documentary sources, to help identify locations of as yet unrecorded historic sites</td>
</tr>
<tr>
<td>• Interview informants who are long-time residents or local heritage experts to document oral history and folklore on standing historic structures in project area</td>
</tr>
<tr>
<td>2. Incomplete knowledge of the age, origin, context, size, content, and function at recorded historic sites in project area, except for Rocky Mountain Fort (the amount of work required will vary from site to site)</td>
</tr>
<tr>
<td>• Upgrade existing site inventory for project area with detailed site plans, description and photographs, as required</td>
</tr>
<tr>
<td>• Provide an architectural analysis of heritage sites in project area where appropriate</td>
</tr>
<tr>
<td>• Surface collect and conduct evaluative testing at selected historic sites in project area (see text)</td>
</tr>
<tr>
<td>• Complete documentary research (as above)</td>
</tr>
<tr>
<td>• Interview informants who are long-time residents or local heritage experts (as above)</td>
</tr>
<tr>
<td>3. Incomplete knowledge and recording of the location of trails, old roads, portages, and river fords in project area</td>
</tr>
<tr>
<td>• Complete documentary research (as above)</td>
</tr>
<tr>
<td>• Interview informants who are long-time residents or local heritage experts (as above)</td>
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<tr>
<td>• Identify and record heritage trails, old roads, portages, and fords through archival, oral history, and field reconnaissance to reconstruct historic transportation routes</td>
</tr>
<tr>
<td>• Work with local First Nations to locate and record information about aboriginal historic sites (as above)</td>
</tr>
<tr>
<td>TABLE 5: PEACE SITE C HYDRO PROJECT HERITAGE RESOURCES DATA GAPS AND RECOMMENDATIONS (2008)</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
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<tr>
<td><strong>Paleontological Resources</strong></td>
</tr>
<tr>
<td>1. Lack of precise information on locations of bedrock invertebrate fossil sites</td>
</tr>
<tr>
<td>2. Lack of systematic survey for bedrock vertebrate fossils</td>
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<tr>
<td></td>
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<tr>
<td>3. Lack of systematic survey for Quaternary fossils</td>
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<tr>
<td>4. Lack of significance evaluation of Quaternary fossils</td>
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