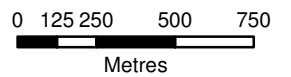


Legend

- Proposed Footprint
- Robb Trend Permit Boundary
- Robb Townsite Boundary
- Highway
- Powerline
- Railway



REF: Date of Orthophoto: 2010

<p>PROJECT:</p> <p>Coal Valley Mine Robb Trend Project</p>							
<p>TITLE:</p> <p>Distance of Mining (Disturbance) to the Hamlet of Robb</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">DRAWN: PS</td> <td style="width: 50%;">FIGURE:</td> </tr> <tr> <td>CHECKED: KY</td> <td rowspan="3" style="text-align: center; vertical-align: middle;">221-1</td> </tr> <tr> <td>DATE: Nov 26/12</td> </tr> <tr> <td>PROJECT: 08-041</td> </tr> </table>	DRAWN: PS	FIGURE:	CHECKED: KY	221-1	DATE: Nov 26/12	PROJECT: 08-041
DRAWN: PS	FIGURE:						
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DATE: Nov 26/12							
PROJECT: 08-041							



Appendix 1

CVM Reclamation Certificates

C-74



ENVIRONMENT
Finance, Administration and
Land Reclamation Services
Land Conservation and
Reclamation Council

3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6212 Fax 403/422-8233

August 23, 1989

Luscar Sterco (1977) Ltd.
P.O. Box 5000
EDSON, Alberta
T0E 0P0

ATTENTION: C. Brinker

Dear Sir:

RE: Coal Valley Mine
Portions of NE1/4 Sec. 17 NW1/4 Sec. 16 Tp. 47
Rge. 19 W. 5th Mer.
Development and Reclamation Approval No. C-4-76

With reference to your letter of October 20, 1988, I enclose a copy of Reclamation Certificate No. C-74 which has been issued in connection with the above coal development program.

As required under Section 54 subsection (2) of the Land Surface Conservation and Reclamation Act, a copy of the certificate will be forwarded to the occupant.

Yours very truly,

S. Slipec
Secretary

/hb

cc: L.K. Brocke
R. Patterson - ERCB
S. Guenette - Forestry, Lands and Wildlife

bc Blatimer
H Ratti
B Watts
E Blum/D Grant
K Crane



ENVIRONMENT
FORESTRY,
LANDS AND WILDLIFE
Land Conservation and
Reclamation Council

3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6212 Telex 037-2006 TWX 610-831-2636

Reclamation Certificate No. C-74

Pursuant to Section 54 subsection (1) of the Land Surface Conservation and Reclamation Act this is to certify that the surface of the land held by Luscar Sterco (1977) Ltd.

within portions of NE $\frac{1}{4}$ Sec. 17, NW $\frac{1}{4}$ Sec. 16 Tp. 47
Rge. 19 W. 5th Mer.

in connection with or incidental to a surface coal mine, held under Development and Reclamation Approval No. C-4-76, as shown outlined in yellow on the plan attached hereto, was found to be in a satisfactory condition.


Dated at *Coal Valley*, Alberta
this *14th* day of *August*, 19*89*



Member-Environment

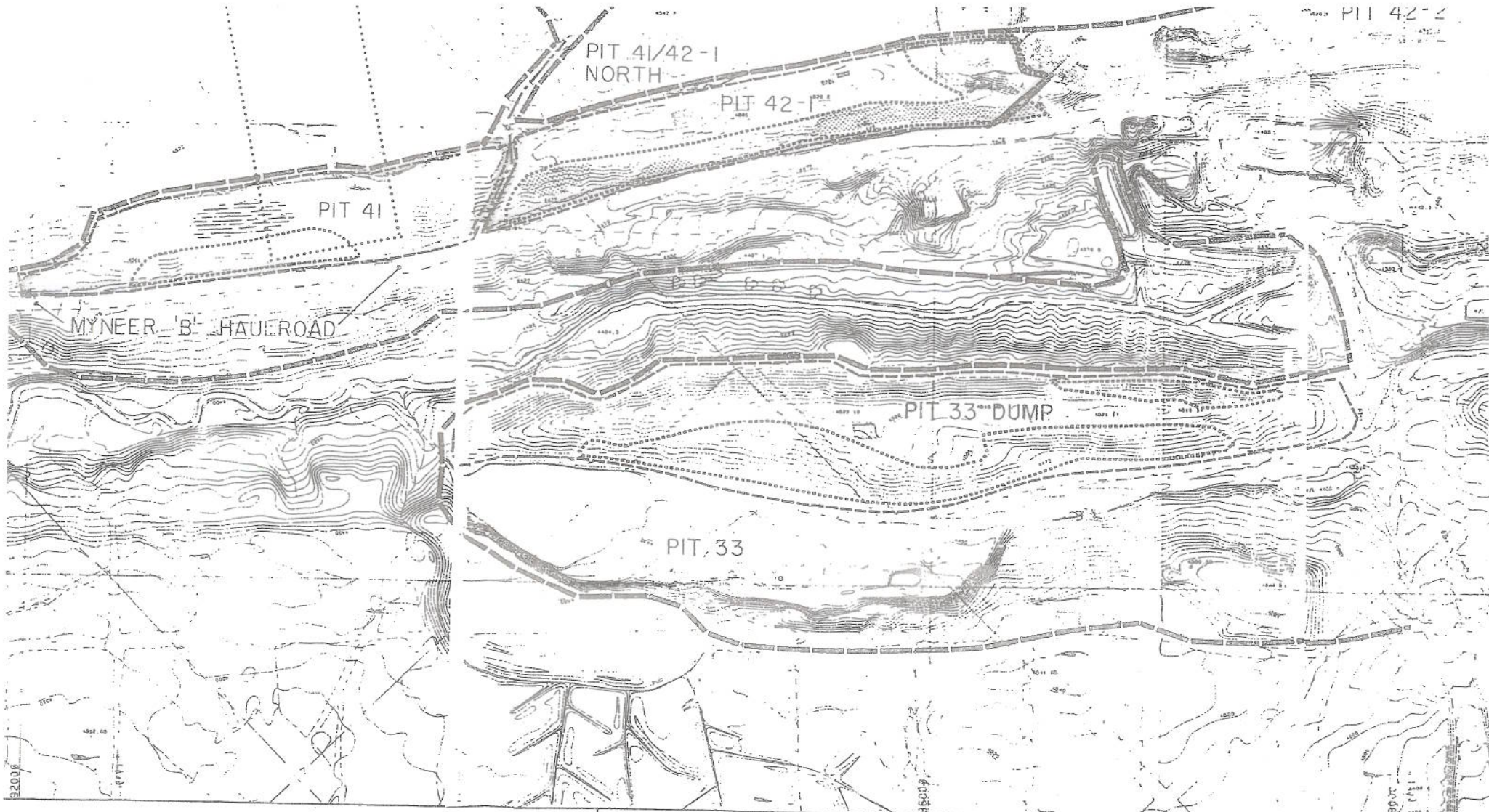


Member-Forestry,
Lands and Wildlife

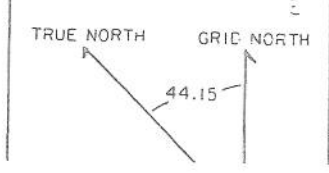


Member-Improvement
District No. 14

Luscar Sterco (1977) Ltd.
P.O. Box 5000
EDSON, Alberta



BAR STERCO 1977 LTD.
 COAL VALLEY



TITLE

APPLICATION FOR CERTIFICATION
 ON PIT 41 42-1 NORTH.

DRAWN	R. 93
CHECKED	
SCALE	

C-83



ENVIRONMENT
Finance, Administration and
Land Reclamation Services
Land Conservation and
Reclamation Council

3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6212 Fax 403/422-8233

October 23, 1990

Luscar Sterco (1977) Ltd.
P.O. Box 5000
EDSON, Alberta
T0E 0P0

ATTENTION: Curtis Brinker

Dear Sir:

RE: Coal Valley Mine
Development and Reclamation Approval No. C-4-76

With reference to your letter dated October 4, 1988, I enclose a copy of Reclamation Certificate No. C-83 which has been issued in connection with the above coal development program.

Yours very truly

for M. D'Hara
S. Tracy
Manager

/na

Enclosure

cc: J. Bondy
S. Guenette
L. Brocke

*copies to Blaine
H. Ratti
D Grant / E Blum
R Stord / D Daniels
C Ferrier*



ENVIRONMENT
FORESTRY,
LANDS AND WILDLIFE
Land Conservation and
Reclamation Council

3rd Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6212 Telex 037-2006 TWX 610-831-2636

Reclamation Certificate No. C-83

Pursuant to Section 54 subsection (1) of the Land Surface Conservation and Reclamation Act this is to certify that the surface of the land held by Luscar Sterco (1977) Ltd.

within portions of NE $\frac{1}{4}$ Sec. 17, SE $\frac{1}{4}$ Sec. 17, SW $\frac{1}{4}$ Sec. 16
Tp. 47 Rge. 19 W. 5th Mer.

in connection with or incidental to a surface coal mine, held under Development and Reclamation Approval No. C-4-76, as shown outlined in yellow on the plan attached hereto, was found to be in a satisfactory condition.

Dated at *Coal Valley*, Alberta
this *15th* day of *October*, 19*90*


Member-Environment


Member-Forestry,
Lands and Wildlife


Member-Improvement
District No. 14

Luscar Sterco (1977) Ltd.
P.O. Box 5000
EDSON, Alberta



ENVIRONMENTAL PROTECTION

Land Reclamation Division

3rd Floor, Oxbridge Place
9820 - 106 Street
Edmonton, Alberta
Canada T5K 2J6

Telephone (403)427-6212
Fax (403)422-0080

C-96

July 22, 1996

Mr. Dane McCoy
Luscar Sterco (1977) Ltd.
BAG 5000
EDSON AB T7E 1W1

Dear Mr. McCoy:

RE: Development and Reclamation Approval No. C-4-76
Lsd 8-11, 14-16 Sec. 9 Tp. 47 Rge. 19 W5M
Lsd 2-3 Sec. 16 Tp. 47 Rge. 19 W5M

I enclose a copy of Reclamation Certificate No. C-96 for your records.

Yours truly,

M. O'Hara

M. O'Hara
Operations Administrative Assistant

/na

Enclosure

cc: M. White

*Ken White
Signature
1/2/96*



Reclamation Certificate No. C-96

This reclamation certificate is issued pursuant to section 123 of the Environmental Protection and Enhancement Act, following an inquiry on June 26, 1996.

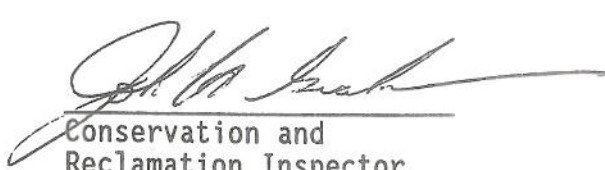
This certifies that the surface of the land held by Luscar Sterco (1977) Ltd.

within Lsd 8, 9, 10, 11, 14, 15, 16 of Sec. 9 Tp. 47 Rge. 19 W5M
Lsd 2, 3 of Sec. 16 Tp. 47 Rge. 19 W5M

in connection with or incidental to a surface coal mine, held under Development and Reclamation Approval No. C-4-76 as shown outlined in yellow on the plan attached, complies with the conservation and reclamation requirements of Part 5 of the Act.

Dated at Redd, Alberta

this 15th day of July, 19 96


Conservation and
Reclamation Inspector
John H. Graham

Company/Agent:

Luscar Sterco (1977) Ltd.
BAG 5000
EDSON AB T7E 1W1

Owners/Occupants:

OPERATOR LIABILITY AFTER RECLAMATION CERTIFICATE

Section 15 subsection (1)(a) and (b), and subsection (2) of the Environmental Protection and Enhancement Act, "Conservation and Reclamation Regulations", outlines the operator liability after a reclamation certificate is issued as follows:

- (15)(1) Where a reclamation certificate is issued under the Act to an operator in respect of any activity referred to in section 1(w)(i) to (vi) or (viii) (SEE NOTE 1 BELOW), no environmental protection order regarding conservation and reclamation may be issued under section 127(2) of the Act
- (a) more than 5 years after the date of the reclamation certificate, in a case where no approval was required in respect of the activity, or
 - (b) after the date of the reclamation certificate, in a case where an approval was required in respect of the activity.
- (2) Where a reclamation certificate is issued under the Act in respect of an activity referred to in section 1(w)(vii) (SEE NOTE 2 BELOW), no environmental protection order regarding conservation and reclamation may be made under section 127(2) of the Act more than 25 years after the date of the reclamation certificate.

NOTE 1: Section (1)(w)(i) to (vi) and (viii) states:

:"specified land" means land that is being or has been used or held for on in connection with

- (i) the construction, operation or reclamation of a well;
- (ii) the construction, operation or reclamation of a pipeline or telecommunications line;
- (iii) the construction, operation or reclamation of a mine, pit or quarry;
- (iv) the construction of public roadways;
- (v) the conduct or reclamation of exploration operations;
- (vi) the construction, operation or reclamation of landfill;
- (viii) the construction, operation or reclamation of a extra-territorial undertaking;

NOTE 2: Section (1)(w) (vii) states:

:"specified land" means land that is being or has been used or held for or in connection with

- (vii) the construction, operation or reclamation of a plant;

Appendix 9

November 18, 2009 Letter from Paul First Nation to
CVRI

PAUL FIRST NATION ADMINISTRATION

PO Box 89 Duffield, Alberta Canada T0E 0N0
Tel : 780.892.2691
Fax : 780.892.3402

www.paulfirstnation.com



Mr. Les LaFleur, P. Eng.
Senior Manager, Technical Services
Mountain Operations
Coal Valley Resources, Inc.
Coal Valley Mine
Bag Service 5000
Edson, AB T7E 1W1

November 18, 2009

RE: Coal Valley Mine Proposed Mercoal West, Yellowhead Tower, and Robb Trend Extensions

Dear Mr. LaFleur,

The Paul First Nation has had the opportunity to assess the impacts of the Mercoal West, Yellowhead Tower, and Robb Trend extensions (see attached map) on our community through open houses, tours for the elders, consultation meetings, and studies of traditional land use. We feel that Coal Valley Resources Inc. has adequately consulted with the Paul First Nation in this regard.

The mine extensions will be developed in our traditional territory. Our Elders and young people urge Coal Valley to ensure that the mine will be developed responsibly, and that the land will be returned to a more natural state for future use by our people and others. Through our discussions with Coal Valley we believe that you will do your best to make this happen, and through ceremony we have asked the Creator for his help as well. We also gratefully accept Coal Valley's contributions to the Paul First Nation educational initiatives, capacity building, and community wellness programs.

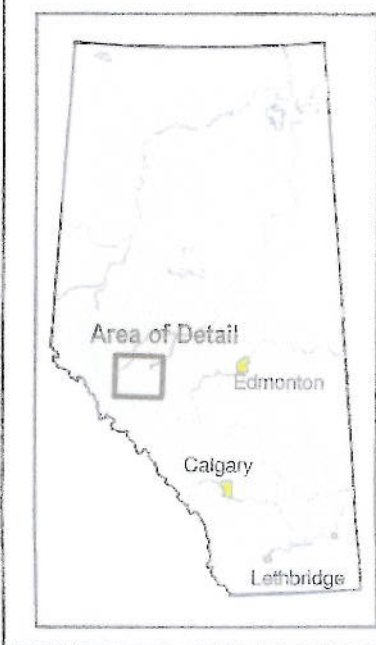
On this basis and on behalf of the Paul First Nation, the First Nations Consultation and Capacity Initiatives Special Advisor, the Council, and I officially endorse the Coal Valley Mine extensions, and indicate that our community has no outstanding concerns regarding

this development. We provide our endorsement for the proposed Coal Valley Mine extensions to proceed.

Sincerely,

A handwritten signature in blue ink, appearing to read "Daniel Paul". The signature is stylized with a long horizontal stroke and a small loop at the end.

Chief Daniel Paul



Legend

- Proposed Mercoal West Development
- Proposed Yellowhead Tower Development
- Existing Coal Valley Mine Areas
- Other Mines
- Highway
- Minor Road
- Railway



<p>PROJECT:</p> <p style="text-align: center;">Mercoal West and Yellowhead Tower Mine Extension Project</p> <p>TITLE:</p> <p style="text-align: center;">Project Location</p>	
<p>DRAWN: PS</p> <p>CHECKED: KV</p> <p>DATE: Feb 11/08</p> <p>PROJECT: 05-171</p>	<p>FIGURE:</p> <p style="font-size: 1.2em;">A.1.0-1</p>

Appendix 15

March 1, 2012 Robb Trend HRIA Summary Report

HISTORICAL RESOURCES

Prepared by:

**Daniel A. Meyer, Ph.D.
Jason Roe, M.A.
and Courtney Lakevold, B.Sc.**

**Lifeways of Canada Limited
105, 809 Manning Road N.E.
Calgary, AB T2E 7M9**

March 1, 2012

EXECUTIVE SUMMARY

Building on the work of previous Historical Resources Impact Assessment (HRIA) projects in the area, the Robb Trend Project (Project) was subjected to HRIA during four separate but related field programs in 2008, 2009, and 2010. The following report presents a summary of the scope and scale of the HRIA program, summary results, and site specific recommendations regarding impact to those sites. Full HRIA reports as required have been submitted to the Historic Resources Management Branch (HRMB) of Alberta Culture and Community Services (ACCS) under Archaeological Survey of Alberta Mitigative Permits 2008-160, 2009-113, 2009-180, and 2010-234. Permit Report 2010-234 is still under review. Due to concerns related to the protection of significant historical resources and under directives issued by ACCS, the following document necessarily withholds certain sensitive site information pertaining to specific site locations in the forms of detailed site descriptions, maps, and tables. This detailed information is contained in the HRIA reports listed above and can be obtained by approved parties from the HRMB and ACCS.

Previous work in the Project area included reconnaissance and testing of large parts of the area in the context of previously proposed mines, forestry cut blocks, pipelines, and coal exploration programs. Including the Project work, these programs resulted in the excavation of at least 3000 shovel tests, 2615 of which were excavated by the authors and crews in the last ten years. In addition to surface reconnaissance of high potential areas, ground-truthing and inspection of others, a total of 2,110 shovel tests were excavated specifically for the Project. These work programs have resulted in the recording of 67 sites in the Project area. These sites range considerably in size, age, and significance.

Two Precontact archaeological sites located in the Project area were previously mitigated. These sites include FgQf-70, mitigated for construction of West Fraser's 3-12-308 Road, and FgQe-66 mitigated in 2009 in advance of coal exploration activities by the Coal Valley Mine (CVM). *Historical Resources Act* clearance has been granted to Coal Valley Resources Inc. (CVRI) or other companies for the disturbance of these sites. We recommend that no further work be required prior to development of the Project.

A total of 42 historical resource sites have been recorded within the proposed mine permit area and/or disturbance footprint during the HRIA programs for the Project or other developments, and on which no further work prior to disturbance is recommended. Again, these sites are typically small, have low artifact density or diversity, and or are heavily disturbed. No further work is recommended on sites FfQd-14 and 15, FgQd-6, FgQe-31, 34, 35, 65, 67, 68, 69, 70, 72, and 73, FgQf-71, 73, 74, 154, 186, 187, 188, and 189, FhQf-18, 19, 21, 26, 37, 39, 105, 112, 113, 114, 115, 116, 117, 118, and 120, FhQg-79, 80, 81, 82, 83, and 87 prior to development of the Project or any other ground disturbing activities. With the exception of those sites recorded under Permit 10-234, these recommendations have been previously made and accepted by ACCS.

A total of 12 significant historical resource sites have been recorded within the proposed mine permit area that also lie within or directly adjacent to the currently proposed

disturbance footprint for the Project. These sites are considered to be of high local, regional, or high regional archaeological significance. We have recommended that additional investigation be required prior to impact of these. These sites are either Precontact or Historic Period in association, and recommended mitigation strategies vary from site to site and include artifact collection, test excavations, excavations programs of varying scales, and archival or informant research. Additional investigation is recommended on sites FgQd-7, FgQe-71, and 75, FhQf-20, 38, 106, 109, 110, 119, and 121, FhQg-84, 85, prior to development of the Project or any other future ground disturbing activities. With the exception of those sites recorded under Permit 10-234, these recommendations have been previously made to ACCS. ACCS agreed with most of those recommendations except for sites FgQe-75, FhQf-20, and FhQf-109 to which they disagreed, and have required no additional investigation prior to site disturbance.

A total of 11 significant sites have been recorded within the proposed Project mine permit area, but outside of areas currently slated for ground disturbing activities. These sites require either continued avoidance or mitigation should development plans change to include impact. These sites are considered to be of high local, regional, or high regional archaeological significance, and we have recommended that additional investigations be required prior to impact. These sites are either Precontact or Historic Period in association, and recommended mitigation strategies vary from site to site and include artifact collection, test excavations, excavations programs of varying scales, and archival or informant research. Additional investigations are recommended on sites FgQd-8, FgQe-74, FgQf-72, 157, 190, and 191, FhQf-23, 107, 108, and 111, FhQg-86 prior to any future proposed ground disturbing activities associated with the Project or any other proposed development. Should these sites continue to be avoided, no further work would be required. With the exception of those sites recorded under Permit 10-234 these recommendations have been previously made to ACCS. ACCS agreed with most of those recommendations except for sites FgQe-74, FhQf-107, and FhQf-108 to which they disagreed, and have required no additional investigation prior to site disturbance.

Following development of the Project, 75% of the known, significant historical resources in the surrounding region will be extant and available for future study of both Precontact and Historic periods. An unknown but large number of significant sites are assumed to be present in undeveloped portions of the region, likely numbering well into the hundreds. The development of the Project, in combination with existing developments and possible future development, will not have a deleterious cumulative effect on historical resources in the area.

Due to subsequent proposed mine permit area or footprint changes for the Project, several small areas have not been subjected to HRIA work. Should further HRIA work be necessary as a result of the recommendations herein or other permit area/footprint changes, or required by ACCS based upon review of these results, more than sufficient time will be available prior to the commencement of any ground disturbing activities given the time required for Project application review. The recommended staged mitigation programs on those significant sites to be impacted can be readily accomplished

prior to initiation of Project impacts. Outstanding HRIA and mitigation work requirements will have no impact on the currently proposed schedule of Project activities.

CREDITS**Field Studies**

Senior Project Archaeologist:	Daniel A. Meyer, Ph.D.
Project Archaeologist:	Jason Roe, M.A.
Assistant Project Archaeologist:	Kevin Thorson, B.Sc.
Archaeologists:	Amber Allen, B.A. Derrick Foster Courtney Lakevold, B.Sc. Carol Ramsey, B.Sc.

Analysis and Reporting

Report Authors:	Daniel A. Meyer, Ph.D. Jason Roe, M.A. Courtney Lakevold, B.Sc.
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1. INTRODUCTION

Building on the work of previous Historical Resources Impact Assessment (HRIA) projects in the area, the Robb Trend Project (Project) was subjected to HRIA during four separate but related field programs in 2008, 2009, and 2010 (Figures 1-4). The following report presents a summary of the scope and scale of the HRIA program, summary results, and site specific recommendations regarding impact to those sites. Full HRIA reports as required have been submitted to the Historic Resources Management Branch (HRMB) of Alberta Culture and Community Services (ACCS) under Archaeological Survey of Alberta Mitigative Permits 2008-160, 2009-113, 2009-180, and 2010-234. Permit Report 2010-234 is still under review.

1.1 Historical Resources of the Project Area

In the Province of Alberta, historical resources are defined and regulated under the Alberta *Historical Resources Act* (2000; formerly the 1973 Alberta *Heritage Act*). Historical Resources as defined in the Act include historic, archaeological, and palaeontological resources (these latter are of non-human origin). These resources include sites, artifacts, and fossils. In addition, following recent changes, the *Listing of Historic Resources* maintained by the HRMB of ACCS includes certain types of traditional use sites identified by First Nations groups.

The ownership of Historical Resources within the Province of Alberta, whether on Crown or private lands, resides with the Crown. They are administered by ACCS under the Alberta *Historical Resources Act*. The Alberta *Historical Resources Act and Regulations* under it empower the Minister (or his agent, the Assistant Deputy Minister responsible for Historical Resources) to require developers to undertake HRIA of development projects that may impact known or unknown historical resources. If significant historical resources are encountered during HRIA work, ACCS may require that further mitigative archaeological studies be carried out if these resources cannot be avoided by proposed development projects.

Each resource is briefly discussed, along with the potential significance of these resources within the Project area and the relative attention directed towards each by this HRIA. Based on the presence of these sites and local topography, much of the area was deemed to have high, moderate, or low potential for the presence of additional unrecorded archaeological and historic sites. The potential maps produced by the model report guided the HRIA field programs.

1.1.1 Historic Sites

Historic Sites are those sites that post-date the exploration and settlement of an area by peoples primarily of Euro-Canadian descent and “Western European Culture.” They may include sites with standing structures/structural remains such as towns, mining camps, cabins, mines, prospects, graves, trails, roads, and railroads. In addition, Historic Sites can include locales where significant historic events occurred but for which there is no physical evidence. Historic artifacts are those artifacts associated with such sites and are generally of industrial rather than of folk manufacture. Historic Sites, including buildings

and places, are a common historical resource in Alberta. Generally, sites of potential significance predate the Second World War, unless a site is of exceptional architectural or historic value. A site with a standing structure may be classified as both a Historic Period archaeological site, and a Historic Site. The position of the Project area in close proximity to Historic Coal Branch towns results in elevated potential for the presence of Historic Period sites.

1.1.2 Precontact Aboriginal Archaeological Sites

Archaeological sites related to aboriginal peoples who seasonally and occasionally occupied these lands over the past 10,000 years are known and were predicted to exist within the Project area. These sites include surface and buried sites. The potential for the presence and preservation of these two classes of sites varies within the Project area, reflecting geographical conditions. Many areas, particularly along the Erith River, White Creek, and Bryan Creek, have high potential for significant Precontact archaeological sites. In addition to our previous experience and knowledge indicating this, many of the legal subdivisions within the Project lands were listed as Historical Resources Value (HRV) 4 or 5 for archaeological sites. Based on Historical Resources Overviews (HRO) and/or Statements of Justification (SoJ) prepared by Lifeways of Canada and submitted to ACCS for the Project areas, ACCS required Coal Valley Resources Inc. (CVRI) to conduct HRIA work on the Project for archaeological and Historic sites and issued the required permits.

1.1.3 Palaeontological Resources

Palaeontological sites and fossils include both surficial and bedrock deposits and the fossilized remains of both living and extinct species of plants and animals. They range from invertebrate fossils and fossil localities found in rocks of Palaeozoic age in the Rocky Mountains and Inner Foothills, through Mesozoic-aged plant and animal remains, particularly those of large land and marine reptiles, to plants and mammals of the Cenezoic.

Exposed, or potentially exposed, fossiliferous bedrock with potentially significant fossil outcrops occur at limited locales within the Project area. Significant mammalian fossils also occur in glacial outwash and post-glacial deposits, generally in gravels. For example, an isolated broken mammoth tibia was found some years ago at the James River Bridge north of Sundre. It radiocarbon dated to ca. 10,000 radiocarbon years ago and is the first and only find of its kind reported for the region to date. The locations of such isolated finds are extremely difficult to predict.

During the early planning phases of the Project, Sam Wilson of Nautilus Palaeontology submitted a palaeontological HRO to staff of the Royal Tyrrell Museum to determine official palaeontological requirements for the project. The project area as then defined consisted of what is now referred to as the Robb Trend Main – Central - East area, but did not include Robb Trend West and the three proposed road corridors. The Schedule A for the Project issued on August 9, 2009 did not require a palaeontological HRIA, but rather indicated that staff of the Royal Tyrrell Museum would visit the area periodically to inspect bedrock exposures.

1.2 Project Areas and Historical Resources Potential

The majority of the Project area was subjected to HRIA in 2009 (Roe 2010) and 2010 (Meyer, Roe, and Lakevold 2011), with smaller portions inspected during assessments for coal exploration activities in 2008 (Meyer and Roe 2009c) and 2009 (Roe 2009c). This work includes the three potential access corridors running from existing Coal Valley Mine (CVM) lease areas to the Project.

1.2.1 Robb Trend Main – Centre - East

Robb Trend Main – Centre – East was subjected to HRIA work primarily in 2009 (Roe 2010, 2009c), and partially in 2008 (Meyer and Roe 2009c). The area covers approximately 7270 hectares of quite varied terrain (Figures 2-4). It is located at the edge of the more rugged Inner Foothills terrain to the southwest and the gentler, wet terrain of the Edson Lowlands to the northeast. There are a series of large northwest-southeast trending ridges with intervening low, wet terrain. A number of watercourses such as Lendrum Creek, Erith River, Halpenny Creek, Bacon Creek, and Lund Creek flow through the area. Large tracts of the lower terrain throughout the Project are wet muskeg dominated by black spruce and other wetland flora. Moderately higher terrain is generally dominated by either open lodgepole pine or aspen forest. The high ridges that run throughout the Project tend to be more mixed deciduous forests with pine, spruce, and aspen forests, reflecting historic logging in the region.

Several major pipelines run across the Robb Trend Main – Centre – East area, often snaking along the narrow ridgetops. Other significant disturbances include a myriad of oil and gas well pads and access roads, and contemporary logging operations have harvested a significant proportion of the area.

Lifeways' experience in the area has observed that soils are typically very shallow, normally with no more than 30 to 40 cm of Holocene material above the till and other glacial deposits. A review of surficial geology (Bayrock and Reimchen 1980) notes small patches of colluvium nearby (deriving from the ridge to the southwest), but the majority of the area is underlain by ground moraine, with tills likely of late Wisconsin age. Small patches of glacio-lacustrine sediments associated with the Edson Lowlands occur, for example, around the headwaters of Bacon and Halpenny Creeks.

Along the river and creek systems and along the northwestern periphery of the area are well-defined landforms with high potential for archaeological sites. The areas of highest potential for archaeological sites are adjacent to major waterways, although the undulating ridge system through the area has a few known archaeological sites.

This general area has witnessed significant past HRIA work, much of it undertaken by Lifeways of Canada. The Project area is located just to the northeast of the Embarras Plateau (see Meyer and Roe 2010, Meyer and Roe 2007, Meyer et al. 2008), an area known to have high Precontact and Historic site concentrations. The nearby areas off of the Plateau, such as this one, tend to have lower site concentrations, but still exhibit Precontact sites in specific locations, typically along watercourses with well-defined landforms. The presence of the Historic Coal Branch in this region has resulted in

numerous coal mines, logging camps, and cabins. Prior to the initiation of the 2009 field reconnaissance in Robb Trend Main – Centre - East, a site data file and report search were carried out to determine how many archaeological or historic sites had been previously recorded within the area. Eighteen previously recorded sites were identified.

The most significant previous HRIA undertaking in the proposed Robb Trend Main – Centre – East area was the 1981 Lifeways survey at the northwestern end of the Project for the then proposed Dennison-Robb mine (Ronaghan and Reeves 1981) under Permit 81-114. This survey inspected roughly the northwestern third of the Project for historical resources, and resulted in the recording of eight sites lying within or directly adjacent to the Project area (as well as a number of sites outside the currently proposed boundary). Given our knowledge of the area, this portion of the Robb Trend Main – Centre – East represented the area with the highest overall site potential. The HRIAs for two pipeline projects across the central portion of the Project in 1997 (Head 1998, Wondrasek 1998) are responsible for the recording of an additional two sites in the vicinity of Bacon Creek. HRIA work in advance of forestry operations in the area under the direction of Dan Meyer from Lifeways in 2002 and 2006 (Meyer 2003, Meyer et al. 2008) recorded another four sites at the northwest end and revisited several of those recorded in 1981. During recent HRIA work for coal exploration activities in the central and southeastern portions of the Project area, Lifeways recorded an additional five Precontact archaeological sites (Meyer and Roe 2009, Roe 2009). Numerous other projects have recorded sites nearby, most notably a concentration of sites along the Embarras River and a small tributary, many first located under Permit 81-114, and others recorded by the author during work in advance of forestry operations in 2004 (Meyer 2005).

The Robb Trend Main – Centre – East area was subjected to HRIA in 2009 under Permit 2009 - 180 (Roe 2010). Overall, the majority of the area is considered to be of low archaeological potential given its low elevation, undulating terrain, and distance from foci of human occupation such as rivers or streams associated with good raised landforms, or well-defined ridges. However, based on personal experience in the area, the potential model developed for the local forest management agreement (FMA) holder, and the March 2009 Listing of Significant Historical Sites and Areas maintained by ACCS, portions of the Project area were identified as having relatively high potential to contain as yet unrecorded sites. These high potential areas included the Embarras and Erith Rivers, Bacon, Lendrum, Hay, and Halpenny Creeks, as well as a number of unnamed and tributary creeks which had been assigned HRVs of 5. Previous field reconnaissance had confirmed that many of these waterways and some of the adjacent landforms had high archaeological potential. Based on review of aerial photographs, it appeared that many of the smaller drainages were not associated with the type of landform on which we commonly find sites in this region. However, a representative sample of these landforms were selected for ground-truthing or visited while traveling to and from areas with higher potential. These activities were useful because we were able to confirm the lower archaeological potential generally associated with these areas. Figures 2 through 4 indicate which areas were examined and tested during our HRIA. Twenty-four archaeological sites were newly recorded during our field reconnaissance in 2009. In addition, eight of the previously recorded sites were revisited and reassessed.

The results of the 2009 HRIA program in Robb Trend Main - Centre – East have been communicated to the staff of ACCS who have reviewed the HRIA report and accepted it on April 27, 2011. A letter dated March 29, 2011 from David Link, Assistant Deputy Minister, ACCS to Les LaFleur of CVRI outlines ACCS requirements regarding the historical resources within that portion of the Project area.

1.2.2 Robb Trend West

Robb Trend West was subjected to HRIA work in 2010 (Meyer, Roe, and Lakevold 2011). The mine lease area within Robb Trend West consists of approximately 1,378 hectares centered on the Robb Road, running from just northwest of Highway 47 and the Town of Robb up the headwaters area of White Creek (Figure 1). The terrain is similar to Robb Trend Main – Centre – East. Consequently, the southwest edge is marked by steep, narrow ridges with deep, dark stream valleys, with the remainder of the area being a transition to more gently rolling, less well-defined high areas between smaller streams and patches of poorly drained (muskeg) terrain. Much of the terrain consists of low or moderate potential landforms such as side slopes, poorly drained terrain, steep valleys with intermittent watercourses, or level terrain well back from watercourses. The only named drainage within Robb Trend West is Bryan Creek, a relatively small stream with headwaters just to the northwest of the Project area, which runs to the southeast and its confluence with the Embarras River at the Town of Robb. In some cases, well-defined terraces or benches occur along Bryan Creek at elevations ranging from 5 to 50 m above the water.

A review of the surficial geology of the region indicates that the majority of the Project area is underlain by a deeply leached till of Cordilleran provenance, and most of the rest, particularly to the northeast, by a slightly leached till also of Cordilleran origin. The uppermost portions of Bryan Creek are underlain by coarse stream alluvium (non-glacio-lacustrine in origin). Organic deposits (fens etc.) are found at the northwest end of the Project area and in another section in the middle. Isolated fan and apron deposits also occur on the margins of the Project area to the northeast.

Surface disturbance of Robb Trend West is higher than in most parts of this region. The most obvious signs today are the Robb Road, Prest Creek Road, smaller logging roads, and numerous seismic exploration trails and cutlines across the area. Approximately 74 hectares or 6% of the Robb Trend West has been very heavily disturbed by the old Bryan Mine alone, extending northwest from Robb and culminating in the large open pit in the center of Robb West and easily visible from the Robb Road. Much of the area in the direct vicinity of Bryan Creek was terraformed to some extent during that mine's life. Historically, large swaths of the Robb Trend West area were logged for mine props and construction materials at the Bryan and other mines, and for the towns of Bryan and Robb. This is most evident in the aspen/balsam poplar dominant or mixed forests covering much of the area. Finally, additional large areas, particularly at the northwest and southeast ends of the Project area have been logged by contemporary forestry operations.

Only small portions of Robb Trend West had been subjected to HRIA work previously. The very northwest corner of the lease area was inspected under Permit 81-127 (Ronaghan 1982). During this inspection no sites were recorded directly within the current proposed lease area, it showed that the areas along White Creek, the headwaters of which extend into the area, are typically high in potential for Precontact and Historic archaeological sites. Prior to the 2010 HRIA, a total of 1 site was known within the Project lands, and another two sites adjacent to these zones. FhQf-1 and 2 (Permit 76-019; Reeves and McCullough 1976), adjacent to the Project area, have likely been removed by development, but should the landforms have proven to be intact and within the Project area, they were to be revisited and reassessed. Thorough review of the site forms and locations relative to the Project indicate that these two sites are/were located outside of the Project area, east of Hwy 47.

The only other known, yet not previously recorded, site within the Robb Trend West area is part of the Historic Period mine known as the Bryan Mine. Above ground workings and other limited remains associated with the Bryan Mine are found to the west of Hwy 47 and primarily south of the Robb Road. In addition, the Coal Branch in general has high potential for the presence of other types of Historic Period sites including trapping cabins, logging camps, and sawmills.

In terms of unrecorded Precontact archaeological sites and archaeological potential, much of the terrain in Robb Trend West consists of low or moderate potential landforms such as side slopes, poorly drained terrain, steep valleys with intermittent watercourses, or level terrain well back from watercourses. However, many areas, particularly along Bryan Creek, had high potential for significant Precontact archaeological sites.

1.2.3 Bryan Corridor

The Bryan Corridor was subjected to HRIA work in 2010 (Meyer, Roe, and Lakevold 2011). The Bryan Corridor is proposed to accommodate a haul road and utilities between the Robb Trend West and existing development areas in CVM's Yellowhead Tower mine (Figure 1). The mine lease area of the Bryan Corridor covers approximately 576 hectares, of which only a small, centralized area will be developed. The planning for this corridor was revised after HRIA work was undertaken, resulting in an area in Sections 4 and 9-49-21-W5M that was not subjected to HRIA work under this program. Recommendations regarding this unsurveyed area are included in Section 5.1 of this report.

The terrain in the Bryan Corridor is largely of lower historical resources potential than the other areas, consisting of a short section along Bryan Creek in the north. These areas are primarily relatively steep slopes, with areas of small drainages, often deeply incised between the ridges. Given the proximity to the Coal Branch these areas have higher potential for Historic Period materials than for Precontact sites given the types of landforms and potential uses available.

In terms of surficial geology, to the north we find the coarse stream alluvium deposits along Bryan Creek, with other nearby areas underlain by deeply leached Cordilleran till.

In most of the area surface materials are derived from colluvial deposits from the underlying bedrock.

Current surface disturbances in the area are similar to those in Robb Trend West, but overall lower in extent. Several roads and pipelines cross the area, and based on vegetation, much of the area was also harvested historically, again likely for mine props. It is also of note that the landforms in the vicinity of Bryan Creek at the north have witnessed severe erosion, in some cases having almost entirely removed landforms that may have been present for portions of the Holocene.

1.2.4 Erith Corridor

The Erith Corridor was subjected to HRIA work in 2010 (Meyer, Roe, and Lakevold 2011). The Erith Corridor is proposed to accommodate the construction of a haul road and utilities between the Robb Trend Main – Centre - East area and existing development areas within the CVM lease (Figure 2). The lease area of the Erith Corridor covers approximately 873 hectares. Proposed disturbance in the Erith Corridor will again consist primarily of a smaller area centralized in the lease area to accommodate road and utility construction, with the majority of the area to remain unimpacted. As with the Bryan Corridor, the planning for the Erith Corridor was revised after HRIA work was undertaken. However, the large majority of the revised area, and all of the currently proposed limit of disturbance within this area, was included within the current HRIA program. Recommendations regarding any unsurveyed area are included in Section 5.1 of this report.

The Erith Corridor has the highest historical resources potential of the areas subjected to HRIA for the Project. It is roughly centered on the headwaters of the Erith River, just north of where it exits the Embarras Plateau. To the north, a number of low terrace landforms in undulating terrain are present along the river. To the south, the terrain becomes more rugged overall, and in some places relatively high and well-defined ridge lines are present, with small streams in deeply incised valleys between them.

In the north, alluvial fan and apron deposits occur along the Erith River due to its emergence from the more rugged terrain to the south, with even a small section of outwash plain in the very north. Other small areas to the north are underlain by slightly leached till of cordilleran origin, but more commonly bedrock derived colluvium, as are large portions of the southern third of the Erith Corridor. Other areas are underlain by a deeply leached till of cordilleran origin.

Much of this area, particularly to the north, has been harvested and ground-prepped in the last 15 years. Other areas to the south also appear to have been harvested historically. Other notable disturbances in the area include cutlines, and several major graveled logging roads, one of which runs through the central area and was itself subjected to HRIA work prior to construction. To the south well pads, borrow pits, and pipelines are also present.

Prior to the 2010 HRIA field program, nine sites had been recorded in the Erith Corridor. Three of the sites, FhQf-107 to 109, were recorded under the 2009 Robb Trend permit (09-180, Roe 2010) in an area of overlap, and were not specifically revisited. Sites FgQf-73, 74, 148, 149, and 154 were recorded by Lifeways under the direction of Meyer in the last ten years, and were not to be revisited given their recommendations of no further work. FgQf-70, recorded under similar circumstances, was also not to be revisited as after test excavations (01-296, Meyer, Reeves, and Lobb 2002) it was recommended for no additional investigation. Sites FgQf-71, 72, and 157 were to be revisited to confirm site locations and current conditions given previous recommendations for further work. FhQf-20 (originally recorded under Permit 81-114, Ronaghan and Reeves 1981) was revisited under Permit 09-180, and was not to be revisited in 2010. Site FhQf-21, also recorded under Permit 81-114 (Ronaghan and Reeves 1981), was to be revisited and reassessed given the length of time since its initial recording and assessment.

The previous HRIA work demonstrated the overall high site potential along this portion of the Erith River.

1.2.5 Halpenny Corridor

The Halpenny Corridor was subjected to HRIA work in 2010 (Meyer, Roe, and Lakevold 2011) and is captured within the Project permit area. The Halpenny Corridor is proposed to accommodate the construction of a haul road and utilities between the Robb Trend East area and existing development areas within the CVM lease (Figure 3). Proposed disturbance in the Halpenny Corridor will again consist primarily of a small portion in the lease area to accommodate road and utility construction, with the majority remaining unimpacted. As with the other two corridors, planning for the Halpenny Corridor was revised after the HRIA program. However, with the exception of LSDs 2 and 7-12-48-20-W5M, the entire area was captured under this HRIA study or under previous Robb Trend HRIA programs. Recommendations for unsurveyed areas are included in Section 5.1 of this report.

The Halpenny Corridor has the lowest overall historical resources potential of the lands covered under this HRIA. In terms of unrecorded Precontact archaeological sites and archaeological potential, much of the terrain in the Halpenny Corridor consists of low or moderate potential landforms such as side slopes, poorly drained terrain, steep valleys with intermittent watercourses, or level terrain well back from watercourses. With the exception of a small section along a stream tributary to the headwaters of Halpenny Creek, where some decent terrace or bench landforms are observed in isolated locations, most of the area is rolling to rugged foothills terrain with only small intermittent streams and low, wet areas and few well-defined hill or ridge landforms. A small section of the Halpenny Corridor at the north has glacio-lacustrine deposits along sections of Halpenny Creek and tributaries, as this area is at the edge of the Edson Lowlands. To the south, surficial geology records indicate that the large majority of the terrain is covered in a slightly leached till of Cordilleran origin, with the southern end being marked by colluviums derived from bedrock sources.

As with the other portions of the Project area, previous industrial activities have impacted portions of the Halpenny Corridor. One large pipeline right-of-way crosses the area, as does one smaller co-op gas pipeline, and of course numerous seismic trails and several well pads. The current vegetation pattern seen on the ground and in aerial photos is indicative of substantial Historic logging, once again likely to feed mine props and building materials to coal mines along the Lovett Branch of the Coal Branch just to the south.

1.3 Report Contents

Due to concerns related to the protection of significant historical resources and under directives issued by ACCS, the following document necessarily withholds certain sensitive site information pertaining to specific site locations in the forms of detailed site descriptions, maps, and tables. This detailed information is contained in the HRIA reports listed above and can be obtained by approved parties from the HRMB and ACCS.

Following the presentation of the region's culture history, description of field methodology, summary results, and site specific recommendations, the report will summarize the results and recommendations of the combined HRIA programs of CVRI's proposed Project. It should be noted that the Project area has been revised since the completion of this HRIA, which may require an additional HRIA program to complete the work for the entire Project area. Sufficient time exists to complete additional HRIA work prior to disturbance.

2. REGIONAL CULTURE HISTORY (AFTER MEYER AND ROE 2010 AND REEVES AND BOURGES 2002)

The culture history of Aboriginal people, whose traditional lands in part included the Foothills of west-central Alberta, dates to the end of the last Ice Age, more than 10,000 years ago (dates provided in this section and elsewhere are in uncalibrated radiocarbon years before present, for later period these closely match calendar years, but for earliest occupations can be as much as 2,000 years younger than calendar years).

Native culture history, prior to the coming of the Europeans, is generally divided into three periods termed the Early, Middle, and Late Precontact Periods (Figure 5). This subdivision is based on major technological changes in projectile point types that are reflective of major changes in weapon systems used in hunting and warfare (Figure 6). This history derived from many studies in Alberta in the foothills, Rockies, and other areas, particularly that relating to the Early Precontact period, is central to understanding the chronological/cultural significance of the data discussed about the excavated sites, and the following discussion that attempts to put these materials into a regional context.

2.1 Ice Age Human Occupation of the Eastern Slopes

Archaeological evidence from North, Central, and South America clearly indicates that ancestral human populations were present in the Americas prior to the end of the last Ice Age, approximately 12,000 years ago. Early people probably frequented the Eastern Slopes 20,000 or more years ago, before the final advance westward of the Late Glacial Ice (known as the Erratics Train Glaciation) from the Hudson Bay to the foothills of the Rocky Mountains. This ice reached its maximum westward and southward extent about 20,000 years ago, forming an ice barrier along the eastern edge of the Rocky Mountain Foothills south of the Athabasca Valley. Unglaciaded areas of the foothills and front ranges laid to the west. Valley and piedmont glaciers, originating in ice fields along the Continental Divide, occupied the major river valleys along the front at that time.

The only glacier to coalesce with the continental ice was the Athabasca Valley Glacier which flowed eastward from the Rocky Mountains as it was augmented by ice flowing across the Yellowhead Pass from the Cordilleran Ice Cap. It coalesced with the Continental Glacier along the eastern edge of the Foothills in the vicinity and to the south of the Athabasca Valley. A network of southward draining channels and lakes lay to the south between the Front Range and the Continental Glacier. Paleoenvironmental evidence suggests this “Ice Free Corridor” was an extremely cold, biologically unproductive, windswept landscape largely devoid of plants and animals and therefore extremely inhospitable to Native American hunters residing both south and north of the ice.

The Erratic Train Glaciation is named after a line of large glacial erratics deposited along the eastern edge of the Foothills south of the Bow River during this last glaciation. Sometime before the Continental Glacier began wasting back, perhaps 16,000 years ago, a very large rock slide occurred in the Upper Athabasca Valley of today’s Jasper National Park onto the surface of the Athabasca Glacier. The rockfall was rafted on the ice out to

the Hinton-Edson area, and plastered onto the surface of the continental ice flowing southward along the edge. Many erratics calved off the edge as part of icebergs. Some were rafted up onto glacial lake shores, while others fell onto the floors of glacial lakes. Some erratics remained on the ice sheet as it wasted away, and ended up resting on exposed ground surfaces.

Many thousands of years later the Nitsitapii (the Blackfoot speaking Kainaawa, Piikáni, and Siksiká people) recognized that the large rocks they saw along the foothills were the same and all created by a single event. Their story “Napi and the Rolling Rock” (Grinnell 1892) accounts for the origin of these erratics. The town of Okotoks (Blackfoot for Big Rock) takes its name from the largest of these erratics located a few miles west of the town. Pictographs and offering sites are found at a number of erratics south of the Bow Valley. None have as yet been reported for erratics to the north.

Humans were already present in North America south of the Ice Sheet before the Foothills Erratic Train Glaciation. It is unclear whether they inhabited the Eastern Slopes before or after the Continental Glacier advance and formation of the proglacial lakes (lakes typically formed along the margin of a retreating glacier). Controversial evidence of human occupation has been found in river gravels below Glacial Lake Calgary silts in the high bluffs of the Bow River in the City of Calgary. The finds come from specific levels within the preglacial gravels below the lake silts. They consist of simply modified fine-grained quartzite river cobbles and spalls from these cobbles. Some are clearly naturally fractured cobbles while others fall within the range of simple human made stone tools that elsewhere in the Americas both pre- and post-date the last ice age (see Reeves et al. 2001 for a summary).

The Calgary finds, if genuine, could be very old but archaeologists and geologists are divided on this issue. Most archaeologists reject the objects as being artifacts because of their probable age. Some geologists accept a few of the objects as artifacts, but consider the overlying deposits to be reworked glacial lake sediments and therefore much younger than originally thought. Unfortunately, the deposits have not been directly dated as neither bones nor other organic material suitable for radiocarbon dating have been found. Most of the “artifacts” appear to have been redeposited in the gravels and were therefore not recovered where they were made/used and discarded. This further complicates the issue.

A number of areas along the Eastern Slopes lie above the upper limits of Late Glacial mountain valley glaciers and west of the Erratics Train Ice. These areas include Inner and Outer Foothill ridges, high erosional flat topped hills/ridges (such as Obed Mountain bordering the Athabasca and river valleys to the north), many surfaces in the Coal Branch and Mountain Park areas as well as similar landforms north of the Red Deer River along the foothills front. Some potential exists for the discovery of artifacts on surfaces in these areas that could pre-date the last ice age. The forms of these tools would be very simple choppers/scrapers made on quartzite cobbles. Such tools continued to be used during the last 10,000 years. Consequently, unless the artifacts are found in a sealed and dateable

context, they cannot be considered as *prima facie* evidence for much earlier occupation of the region.

2.2 The Early Precontact Period ca. 10,500 – 9,750 years ago

The Early Period is characterized by archaeological phases or complexes containing stone projectile points of triangular, fluted, lanceolate, or stemmed forms presumably used with throwing and stabbing spears. At least five Early Period cultural complexes occur along the Eastern Slopes of the Rocky Mountains: a) Clovis and its derivatives; b) Windust; c) Cascade; d) Cody; and e) Plains-Mountain (Figure 5). These are discussed below.

2.2.1 Clovis Complex ca. 10,500 - 10,000 years ago

The Clovis Complex is the earliest well recognized archaeological complex in North America and the earliest known in the Northern Plains/Rocky Mountains. Clovis sites are rare as a result of their age, poor preservation, the exposure of land surfaces and associated deposits of late glacial age. Clovis points are lanceolate shaped with a flake or “flute” running up both sides of the point from the base towards the tip (Figure 6).

Paleoenvironmental data from the Nordegg area indicate that by 11,000 - 10,000 radiocarbon years ago plants, and therefore, animals had recolonized the valley floors and alpine areas creating a generally hospitable environment for the occupation of the Eastern Valley Slopes by people of the Clovis Complex (Mandryk 1992; Hickman and Schweger 1991; see also Beaudoin et al. 1996). The Late glacial environment would have been cold and dry. In Glacier National Park, Montana the timberline was as much as 500 m lower than it is today (Carrara 1989). Towards the Continental Divide lower valley floors would have been characterized by extensive grasslands with restricted open conifer dominated forests at higher elevations along mountainsides. The alpine, while more extensive than it is at present, was possibly less productive.

Clovis peoples were primarily big game hunters. Clovis points have been found associated with mammoth, horse, bison, and camel kills. No Clovis kills have yet been found in Alberta, although it is likely that such will eventually be found, as most of the lands were productive grasslands steppe at the time. Palaeontological finds in the Peace River region and in Central and Southern Alberta indicate a rich and diversified suite of big game animals was present. Isolated bones of mammoth, horse, camel, and bison found in the gravels of the Bow, North Saskatchewan, and Peace Rivers date to 10,000 + years in age. Bison and bighorn sheep were probably common in the mountains during this time. Lake and river fisheries would have been established. Migratory waterfowl moving along the Rocky Mountain Flyway would have utilized lakes as staging areas.

Clovis points and related technologies (i.e. fluted or basally thinned points) have been found along the Eastern Slope valleys and adjacent foothills of the Northern Rockies in Canada. Clovis related artifacts have been recorded in northeastern British Columbia, north of the Peace River (Pink Mountain), in Peace River Country in the vicinity of the City of Fort St. John (Charlie Lake Cave), at the Smuland Creek site (GdQn-1) and others in the Grande Prairie area (Bereziuk 2001), along the inner foothills of the Smoky River

near Grande Cache, in the James Pass area on the Red Deer River, and along the Bow Valley within Banff National Park (Lake Minnewanka) and Vermillion Lakes (where sheep and bison were hunted). In addition, Clovis sites have been recorded in the alpine area of Banff north of the Bow (Langemann and Perry 2001), at Sibbald Flats in the inner foothills south of the Bow, at Bellevue in the Crowsnest Pass, and in Glacier National Park in Montana (see Beaudoin et al. 1996; Driver 1998; and Reeves 2000 for summary reviews). In the summer of 2005, the authors recovered the base of a Clovis point from FfQh-26 near Cadomin (Meyer 2005d, Meyer et al. 2007), and the mid-section of a Clovis spear point was collected from a small site, FfQd-8, located in the morainal uplands along the Brazeau River to the southeast (Meyer 2005c).

The Eastern Valleys/foothills would have been an ideal seasonal habitat for Clovis Complex peoples. Some of the tools found in the Eastern Slope Clovis Complex sites include specimens made from toolstones that originated in Montana/Wyoming. These discoveries indicate a very early establishment of a north-south pattern of movement and toolstone exchange along the Eastern Slopes that seems to have continued for most of the last 10,000 radiocarbon years.

Clovis and other fluted points have not been found to the west in the Kootenai/Upper Columbia River valleys of the Rocky Mountain Trench. This suggests that there was no seasonal movements/trade/travel over the Continental Divide passes in this region of the Northern Rocky Mountains at this time. Large proglacial lakes still occupied substantial portions of these intermountain valleys limiting valley floor areas available for settlement.

Nine thousand nine hundred radiocarbon years ago the Ice Age abruptly ended. In a matter of four or five years the regional climates of the Northern Hemisphere warmed significantly; a dry-cold climate type was replaced with a dry-warm climate type. Summer insolation increased due to a change in the inclination of the earth's axis resulting in very warm summers in northern latitudes. These abrupt changes had very significant short and long-term impacts on the regional vegetation, the big game, and the seasonally resident "Clovis" related/descendant hunters living along the Eastern Slopes/Northwestern Plains. This event may explain the apparent lack of cultural continuity between the early fluted point hunters and later cultural complexes.

Two projectile points provisionally classified as Goshen-Plainview (c.f. Frison 1996), a Clovis derivative, were recovered by the authors in 2005 at FfQh-26 near Cadomin (Meyer 2005d, Meyer et al 2007). A later, possibly derivative, lanceolate point complex has been identified at Lake Minnewanka that dates to approximately 10,000 years ago (Landals 2001). Isolated points of this later tradition have been found at Upper Kananaskis Lake (Reeves personal observation), in the Bow Valley (Fedje 1989, 1996), in the Kootenai Plains on the North Saskatchewan (Reeves n.d.), in the Athabasca Valley near Jasper (Anderson and Reeves 1975), and at Carson – Pegasus Park in the Swan Hills (Ronaghan and Hanna 1983). Excavations at James Pass recovered similar lanceolate points in buried stratigraphic contexts. Charcoal from these levels was radiocarbon dated

to 9750 ± 80 years. Underlying occupations have dates on bone samples ranging from 9930 ± 80 years to $10,140 \pm 80$ years ago (Ronaghan 1993).

2.2.2 *Windust and Cascade Complexes ca. 10,000 – 9,500 years ago*

The Windust and Cascade phases and Western Stemmed Point Complex of the Western Great Basin and Columbia/Fraser Plateau are the next archaeological complexes that are well represented along the Eastern Slopes. These complexes are characterized by large stemmed and lanceolate, or bipointed, spear points often made of basalt or other coarse-grained toolstones (Figures 5 and 6).

FhQe-18 (The Labour Day Site) to the northeast of Robb yielded a Hell Gap style spear point associated with the Windust Complex (Meyer, Roe, and Dow 2008), as did FgQc-5, Daniela's Site, along Hanlan Creek (Meyer 2006a). Another Hell Gap style point was collected at EIPs-35 along the James River (Somer 2007a). FfQh-26 near Cadomin produced a possible Agate Basin style spear point associated with the Cascade Complex (Meyer 2005d, Meyer et al. 2007). FfQh-27 also produced a possible Agate Basin point base (Kulle and Neal 1998b). FfQd-8, the Brazeau Clovis Site, produced point fragments which may be associated with this complex as well (Meyer 2006a). Artifacts of these complexes have been found in surface and excavated contexts in Waterton-Glacier, in the Crowsnest Pass, and along the Bow Valley where they date to between 10,200 - 9,600 radiocarbon years ago (Reeves 2000). Surface finds occur in the Athabasca Valley in Jasper National Park (Anderson and Reeves 1975, Pickard 1988). Stemmed point bases which may be associated with this complex were found at FjQj-1 on Obed Mountain (Damp and Reeves 1981). West of the mountains, artifacts of this complex have been found in the Rocky Mountain Trench from the South Fork of the Flathead River and Flathead Lake Valley in Montana northward to the Kootenai and Columbia River valleys as far north as Golden (Reeves 2000, W. Choquette personal communication).

These “westside” people were hunters-trappers-gatherers and fishers who probably were better adapted to the warm-dry climate of the immediate post-glacial Rocky Mountains than were the earlier Clovis Complex peoples. By about 9,500 radiocarbon years a pattern of seasonal camping by “westside” related cultures had developed within the Eastern Slope valleys whereby people appear to have been travelling back and forth over the Continental Divide passes. With the final disintegration of the Cordilleran Ice Cap and the draining of large proglacial lakes which occupied the valleys of today's interior British Columbia, these “westside” people, residents of Plateaus and basins south of the Cordilleran Ice, were the first to reoccupy the formerly glaciated/proglacial lake region beginning some 10,000 or more radiocarbon years ago. The dry warm climate and open forests/grasslands of the Early Holocene that characterized the western valleys and mountain slopes facilitated movement of these people not only northwards into the Cordillera but eastward across the Continental Divide passes and onto the Eastern Slopes.

2.2.3 *Cody Complex ca. 9,500 - 8,500 years ago*

The Cody Complex is the first well defined bison hunting culture to appear on the Northern Plains and Eastern Slopes. Cody appears to have developed in the Southern Plains around 9,900 years ago and spread northward during the warm-dry climate that

followed the ice age, reaching the Northern Plains approximately 9,500 years ago. The Cody tool kit and points (known as Alberta, Scottsbluff, and Eden points, see Figure 6) are distinctive and very different from those of earlier hunters whom they appear to have replaced. Cody Complex surface finds are relatively common in comparison to earlier point types from the Northwestern Plains. Complex Cody bison corral/traps and large seasonal campsites have been recorded at a number of locales in the Northwestern Plains. Cody sites are much less common along the Eastern Slopes and in the Rocky Mountains, but an increasing corpus of finds indicates that this may be in part a result of the amount of work conducted.

As it spread northward, Cody appears to have displaced an earlier plains culture known as Agate Basin into the surrounding plains/parklands/forest that in turn displaced the older western culture of the mountains. Tool kits and artifacts left behind by these later lanceolate point users make up the “Plains/Mountain” Complex. Cody occupied the Northern Plains until a severe negative climatic change about 8,500 radiocarbon years ago. This resulted in the displacement of Cody and an occupation, of at least the western and northern perimeters, if not the core, by the Plains/Mountain Complex.

Cody Complex points and sites have been found at a few locales along the Eastern Slopes. Two excavated Cody complex-style points were recovered from buried context at Red Rock Canyon in Waterton-Glacier, where they occurred in association with a Plains/Mountain complex. These were radiocarbon dated to 8,300 years ago (Reeves 2000). These co-occurrences suggest contact between these two distinct, temporally coterminous, and geographically adjacent cultural traditions. Cody Complex points were found in mixed stratigraphic contexts with lanceolate points in three excavated sites in the Crowsnest Pass (Driver 1978). Further north, three Alberta/Scottsbluff points were found in deflated contexts at the Lake Minnewanka site in Banff National Park (Christianson 1971). A possible Cody Complex occupation is present at the Norquay site, an excavated campsite located in the Bow Valley of Banff National Park west of the Banff townsite. An Alberta point that had been reworked as a hafted biface/scrapper was among the tools recovered. The occupation dated to between 9,200 and 9,500 radiocarbon years ago (Fedje 1988). Cody Complex points have also been found at Ya-Ha-Tinda (Elliot 1971).

Cody complex points have also been found in the Athabasca Valley both inside and outside of Jasper National Park (Anderson and Reeves 1975, Ball 1983, Pickard 1988, Francis 1994). At Brule Lake, a large stemmed point recovered from excavated context at FhQl-4 dated to $8,675 \pm 270$ radiocarbon years before present (Ball 1983). A Cody complex point base was recovered from surface contexts at FfQh-26 in Mountain Park (Landals et al. 1995), and an Alberta/Scottsbluff point was recovered from in the same area (Kulle and Neal 1998). Excavations at FfQh-26 yielded several more Scottsbluff and Alberta spear points (Meyer 2005d, Meyer et al. 2007). A Scottsbluff point was also collected from FgQe-3 at the Lovettville Townsite (Reeves 1976, Wilson 1977, Wondrasek 1998), and one was recovered from a Precontact component at the old Yellowhead Mine site near Coalspur (Meyer, Kolomyja, and Roe 2010). Excavations at

FgQf-62 near the Embarras River encountered stone tools that may be diagnostic of a Cody Complex site (Meyer, Reeves, and Lobb 2002).

Based on earlier studies (Meyer et al. 2007), we propose that Cody Complex groups may have entered this portion of the Front Ranges from the southeast along the foothills, perhaps in the spring or early summer, then exited to the north and east along the McLeod, Lovett/Pembina, and partially the Athabasca drainages somewhat later in the season. The Embarras Plateau was clearly utilized by Cody groups while in the region. Presently we know little of Cody Complex food resource use, but the presence of large mammal tooth fragments in relatively deep contexts at FfQh-26 is suggestive. An emphasis on big-game hunting would be consistent with what is known elsewhere about Cody resource use. This region would have undoubtedly also offered much more in the way of plant resources, including easy access to alpine plant communities at certain times of the year.

Around 9,300 radiocarbon years ago the regional climate became even drier resulting in the development and spread of more xerophytic grasslands in the Southern Alberta foothills. Similar changes occurred to the north allowing the Cody Complex peoples to expand their range to the lower valleys and foothills front that they occupied seasonally. A similar expansion of Cody Complex peoples also occurred into the Oil Sands area of the Lower Athabasca at this time (Saxberg and Reeves 2003).

Cody Complex materials, with the exception of an isolated find of an Eden point near Windermere, have not been found in the Rocky Mountain Trench (Columbia, Kootenay and Flathead valleys), suggesting that these peoples did not travel west or interact to any degree with groups who seasonally resided in the western valleys.

2.2.4 Plains/Mountain Complex ca. 9,500 – 7,750 years ago

The Plains/Mountain Complex is characterized by specific styles of lanceolate and stemmed points (Figure 6). This culture is well represented along the Eastern Slopes, as well as in the adjacent foothills parklands, and in what are today's northern boreal forests. The spread of this culture out of its mountain homeland is largely related to climatic changes.

As noted earlier, Cody developed and spread north on the plains and along the Eastern Slopes during the warm dry interval which followed the end of the last glaciation. While this warm dry climate persisted until approximately 5,000 radiocarbon years ago, it was punctuated by a short-term, negative climatic change around 8,500 years ago. At this time the ice cap over Hudson Bay disintegrated, resulting in a massive catastrophic flood. Lake Agassiz and Lake Ojibway broke through this ice barrier sending 100 billion cubic meters of water into the Hudson Bay and the North Atlantic. In a matter of three to twenty years this catastrophic event, combined with a change in the inclination of the earth's axis to that of today's, and possible changes in solar radiation, resulted in an abrupt cold snap and a cooler-wetter climate in more northerly latitudes and along the Eastern Slopes.

This cold snap resulted in a depression of the lower timberline in the Southern Alberta Rockies on the order of 100 m (Reeves and Dormaar 1972) and the expansion of conifer parklands downslope into foothill valleys and upland grasslands. As a result, brunisolic soils formed in some areas that today are valley grasslands. Examples of conifer parkland valleys include Crowsnest Lake in the Crowsnest Pass, the Gap of the Oldman River, the valley of the Bow River at Calgary, as well as the North Saskatchewan and Athabasca River valleys west of the mountain front. This regional climatic episode ended with a return to warm conditions around 8,000 radiocarbon years ago. On the west side, conditions continued to dry out resulting in woodlands giving way to open steppes or a steppe/pine forest mosaic approximately 8,400 radiocarbon years ago.

On Eastern Slope surfaces, lake levels and alluvial fans stabilized and soils developed following the rapid growth of alluvial fans during earlier Holocene times. Many of these surfaces are still present today. As a result we have a better understanding of human occupation at that time than we do for earlier times. In Waterton-Glacier 12 sites dating to this time period have been identified with some associated with lake fishing while others are associated with sheep hunting. Similar subsistence patterns have also been identified in the Crowsnest Pass (Reeves 2000, Driver 1982) where the remains of two butchered bighorn sheep were found and radiocarbon dated at $8,550 \pm 270$ radiocarbon years. Further north lanceolate points of this complex have been found in the Bow Valley (Christianson 1972, Fedje 1988, 1989), at Ya-Ha-Tinda (Elliot 1971), at James Pass (Ronaghan 1993), and along the North Saskatchewan (Reeves n.d.) and Athabasca Rivers (Anderson and Reeves 1975, Pickard 1988). Lanceolate points have also been recovered from FiQk-28 on Jarvis Lake in William Switzer Provincial Park (Head 1989, Light 1989). Recent excavations at a site on the north side of Jasper Lake recovered a basally thinned lanceolate point with associated radiocarbon dates of $8,840 \pm 40$ and $8,410 \pm 80$ years (Hudecek-Cuffe 2000). Lanceolate points have also been recovered from excavation at FfQh-27 on the Cardinal River (Kulle and Neal 1998), and further north, near Grande Cache, lanceolate points of this tradition have been found at Grande Cache Lake and at a site on the Smokey River (Brink and Dawe 1986).

2.3 The Early Middle Precontact Period ca. 7,750 –3,000 years ago

The Middle Period begins approximately 7,750 years ago with the appearance of side and corner notched dart points in the local archaeological sequences (Figure 6). These points were used to tip spears used with a throwing stick or “atlatl.” A number of archaeological complexes and phases are present (Figure 5) including earlier ones such as the Mummy Cave Complex (ca. 7,750 – 4,000 years ago) and a derivative complex known as Oxbow (ca. 5,000 – 4,000 years ago). Also present is the McKean Complex (ca. 4,500/4,000 – 3,000 years ago) whose cultural relationships in the Rocky Mountains are to the Great Basin.

Following the Early Middle complexes, the cultural sequence generally diverges between the Saskatchewan and Athabasca Basins. From the Kootenay Plains south the archaeological sequences show a general continuity with earlier cultures. To the north in the Athabasca Basin new complexes appear that are unrelated to earlier cultures. The new, unrelated complexes most probably represent the appearance of both Salish

speaking peoples from the Upper Thompson River to the west and Athabascan speaking Boreal Forest adapted peoples from the Upper Fraser and Peace River areas to the northwest. These cultural changes correlate with the development of modern Boreal Forest environments. These Boreal forest environments are marked by extensive expanses of wetland and muskeg areas that housed a lower and less diverse wildlife population than those which existed in the previous open parkland communities.

2.3.1 Regional Climate/Environmental Change

Climatically, the Early Middle Period encompasses both the warm, dry Mid-Holocene climatic interval (that ended ca. 5,000 radiocarbon years ago) and the initial return to cool-wet conditions of the Late Holocene that resulted in the expansion and closing of forests, the development of extensive tracts of muskeg on former meadowland, and the lowering of tree lines. This climatic transition, like that which marked the end of the Ice Age 10,000 radiocarbon years ago and the cold-wet period of 8,500 radiocarbon years ago, occurred in a very short period of time. Apparent rapid negative environmental impacts resulted in particularly negative environmental consequences to the Native peoples' subsistence base along the Eastern Slopes and Forested Foothills, particularly north of the North Saskatchewan.

During earlier times the lower and upper tree lines, which dropped during the cool-wet interval 8,500 years ago, were again elevated. Forests became more open and Montane grasslands more expansive. Effective precipitation was probably reduced by more than 40% from today's values. Drying westerlies blew for most of the year resulting in a decrease in cloud cover and elevation in mean annual temperature on the order of 2 degrees Celsius. Seasonal shallow ponds and wetlands dried up and soils developed on their surfaces. Glaciers disappeared in the Canadian Rockies. Stream flows were reduced both yearly and seasonally. Many streams down cut through their earlier alluvial fills. Floods were greatly reduced in size and frequency.

During the Mid-Holocene in Jasper, Montane grasslands expanded and fens and wet meadows dried out at lower elevations (Kearney 1981). More frequent and violent Chinook winds combined with reduced winter snow packs would expand and enhance the fall-spring mountain bison ranges along the Eastern Valley floors. This possibly resulted in larger local herds of mountain bison as both their winter and summer range expanded and open forests facilitated their movements from valley floor to alpine grasslands.

Pollen records from Lake Linnet in the Waterton Valley (Christensen and Hills 1985), Crowsnest Lake (Hills et al 1985), the Bow Valley in Banff (White 1986), and Whirlpool Point on the North Saskatchewan (Hills and Reeves personal communication) as well as the Kootenay River Valley in Kootenay National Park (Hallett and Walker 2000) show a marked increase in charcoal with the onset of Late Holocene conditions about 5,000 years ago. This data combined with the pollen spectra suggest that Native people began to fire the Montane forests/grasslands of the eastern valley floors to keep the forest open and maintain grassland productivity (see also Barrett 1981, 1996; Barrett and Arno 1982). It is not known at this time if this pattern of cultural firing extended northward into the Athabasca.

Climate change also impacted landforms of the Eastern Slopes. Wind erosion increased due to more frequent and higher velocity winds combined with decreased groundcover and overgrazing. Ancient dune systems, formed during late glacial times, reactivated and soils drifted. One to two meter thick caps of windblown sediments formed along river bluffs. Hillside sheet erosion increased and slopes destabilized. Headward ravine erosion and storm runoff also increased and much of the earlier sedimentary fills were removed from many of the ravine and stream systems.

A distinctive band of pinkish coloured volcanic ash is often found in sediments dating to this time. This ash, known as Mazama Ash, is very widespread in the Northern Rockies and Pacific Northwest. It resulted from the explosion of a mountain (known as Mount Mazama; today's Crater Lake) in southwestern Oregon 6,800 years ago. This explosion was 48 times larger than the Mount St. Helen's explosion of the early 1980s. A vast blanket of ash was deposited across the landscape. This ash was nutritionally very beneficial to long-term alpine and valley grassland productivity. This is especially notable when compared to regions which lay south of the volcano's plume, south of the Missouri Basin in the Northwestern Plains/Rocky Mountains. Throughout the northern region of the Northern Plains/Rocky Mountains, bison herds prospered as did Native hunters who depended on them. This contrasts greatly with the Wyoming Basins where desertification occurred and a small game hunting/plant collecting way of life replaced earlier communal bison hunting.

The dry warm climate and erosive events ended approximately 5,000 years ago when the regional climate once again flipped to cool-wet conditions. Since then the regional climate has been characterized by a series of short-term and less intensive warm-dry/cool-wet cycles that culminated in the cold-wet Little Ice Age climatic maximum of 300 years ago (Figure 5).

2.3.2 *The Mummy Cave Complex ca. 7,750-4,000 years ago*

The Mummy Cave Complex of the Northwestern Plains/Rocky Mountains is characterized by specific styles of side notched dart points known as Salmon River and Bitterroot Side Notched points (Figure 6). Late Mummy Cave components in the Eastern Slopes also contain eared points known as Oxbow points. They are characteristic of the contemporaneous Oxbow Phase (ca. 5,000 – 3,000 years ago) found in the Parklands and Plains to the east. McKean points, characteristic of another phase that appeared in the Northern Rocky Mountain region about 4,500 years ago, also sometimes occur in Late Mummy Cave components.

Mummy Cave appears to develop out of the earlier Plains/Mountain Complex. Side notched dart points and spear throwers replaced the earlier lanceolate and stemmed points used with throwing and stabbing spears. This new weapon technology (spear thrower) appears in the Eastern Woodlands and Prairie Edge approximately 1,500 years before it does in the Western Plains and Rocky Mountains. It spread rapidly westward across the plains around 8,000-7,750 years ago, probably because the spear thrower greatly facilitated individual as well as communal big game hunting. Contemporary experiments

indicate that spear throwers increase the distance, velocity, and accuracy with which spears can be thrown, a decided advantage in hunting big game, particularly in open country.

There is more emphasis on the use of local toolstones in Mummy Cave in the Alberta Rockies. Late Mummy Cave sites in contrast tend to have more materials from Montana. This localized toolstone procurement pattern is characteristic of Mummy Cave Complex sites in the Northwestern Plains/Rocky Mountains. This shift reflects a change in north-south trade/exchange for high quality toolstone because of a more localized Native band movement pattern partially because of the expansion of local habitats along the foothills and Eastern Slopes.

Fire-cracked rock appears in Late Mummy Cave sites indicating that stone boiling and hot rock roasting cooking techniques were being employed. These techniques were probably obtained from McKean Phase peoples who brought the technology with them when they moved into the region from the Great Basin to the southwest approximately 4,500 - 4,000 years ago.

Mummy Cave is also well represented elsewhere in the Foothills and Mountains. In Waterton-Glacier there is a major increase in the number of sites during this time period reflecting a change in the intensity of occupancy and resource harvesting patterns (Reeves 2000). In the Alpine, Mummy Cave artifacts are found both as isolates as well as in small surface scatters/camps. This is indicative of more intensive seasonal occupations of this terrain. The return to warmer, drier conditions during Mummy Cave times extended the season in the alpine, reduced snow packs and probably increased favourable forage for grazers. This resulted in not only an increase in travel between the west and east sides of the Rockies, but also in more extensive seasonal resource harvesting and occupancy of the alpine by local East Slope resident groups. Alpine productivity peaked after the Mazama Ash fall and was maintained at high levels until the climate changes of circa 5,000 years ago that saw the southward spread of tundra communities. Valley floor sites were more intensively occupied both in Waterton-Glacier and the Crowsnest Pass (Driver 1976) due to the enhanced and extended ungulate productivity of valley grasslands during Mid-Holocene times. Bison were communally hunted in these southern valleys as well as in the Bow Valley during this time. Fishing also intensified.

2.3.2.1 The Wallace Phase ca. 7,500-6,500 years ago

The earliest Middle Period phase in the Foothills of west-central Alberta is the Wallace Phase perhaps dating to between 7,500 and 6,500 years before present. The Wallace Phase represents the earliest occupation of the area by Mummy Cave Complex groups, and perhaps represents a transition directly from Cody Complex occupations of the area.

During this stretch of time the environment would have likely began to open up to a more grassland setting following the Early Holocene conditions. With the drier and warmer climate and the increased grasslands there would be an infusion of animals more adapted to this type of environment. A projectile point we have associated with the Wallace

Phase was recovered from FkQI-16 to the north of Hinton. It tested positive for Bovine antisera (Meyer and Roe 2006) supporting the idea that bison had been in the area during the time period.

The projectile points associated with the Wallace Phase are large Corner-Removed dart points that are similar in form to the Burmis-Barbed projectile point (Ronaghan 1992), and possibly classic Bitterroot Side-Notched style points. Burmis-Barbed style points have been recovered from a number of sites across southern Alberta, supporting dates in the 7,500 – 7,000 B.P. range (Ronaghan 1992, Vivian 2007, Vivian, Roe, and Blakey 2009, Vivian and Blakey 2009, Doll 1982). FfQh-27 (Kulle and Neal 1998b) near Mountain Park has also produced several of this large, corner-notched variety. Anderson and Reeves (1975) illustrate several large corner to side-notched points from surface collections in Jasper that may also be examples of Burmis-Barbed style points, particularly one from the Bried Collection. Again at FkQI-16, a moderate density lithic workshop, one made from a low-quality chert was found (Meyer and Roe 2006). At FfQh-26 two possible Wallace Phase points (#2727 and 2722) were recovered from the excavations (Meyer et al. 2007). Finally, in excavations at FhQg-10 (Hunt 1981), a site located near the Hamlet of Robb, four possible Wallace Phase points (#819, 852, 955, and 1119) were recovered.

Bitterroot Side-Notched points also appear to be associated with the Wallace Phase, as perhaps are Salmon River Side-Notched varieties. At the James Pass Meadow Complex (Ronaghan 1993, Beaudoin, Wright, and Ronaghan 1996, Royal Alberta Museum 2006) above a layer of Mazama Ash and extending into it were a series of Mummy Cave style points, clearly similar to Embarras Phase materials (see below) that Beaudoin, Wright, and Ronaghan (1996) believe are stylistically similar to styles dating from 6,000-5,300 B.P. Below the Mazama Ash a well-defined occupation layer was encountered with two series of projectile points. Five of the points are classic Bitterroot Side-Notched varieties, but three others are different, exhibiting very broad, rounded side-notches. These points look transitional to us between Burmis-Barbed styles and presumably later Bitterroot Side-Notched. This occupation was radiocarbon dated to $7,665 \pm 150$ B.P. The points with the rounded notches are similar to forms recovered at EgPn-230 in Calgary where they date to 7,030 B.P. (Vivian, Bosch, and Reeves 1998).

Other classic Bitterroot styles are relatively uncommon in the region, but include clear examples from FIQs-30 on Grande Cache Lake (Brink and Dawe 1986) and at least one example from the Bried Collection from Jasper National Park (Anderson and Reeves 1975). At several other sites in the region, styles more similar to Salmon River Side-Notched have been recovered including two from FgQe-14 (Calder and Reeves 1977) on the Embarras Plateau, two from FfQh-26 (Meyer et al. 2007) near Mountain Park, possible examples from FIQs-30 on Grande Cache Lake, ElPt-3 (Corkscrew Gap Campsite) on the Clearwater River (Meyer 2005b), and FgPv-14 on a small drainage north of the Pembina River (Somer 2006a). One point from FgQf-16 on the Embarras Plateau (FgQf-16-1006) also bears a resemblance to these points (Meyer and Roe 2010), and a point from FhQg-77 at Coalspur also produced a point likely related to these varieties (Meyer, Kolomyja, and Roe 2010). The precise relationship of these latter

styles to the Wallace and Embarras Phases will need to be determined, but they may be transitional from the Wallace Phase to the Embarras Phase.

Lifeways' understanding of the Wallace Phase in the Foothills of west-central Alberta is based upon the work that has been done to date and is unfortunately inconclusive. Two of the known excavated sites with Wallace Phase occupations appear to be FfQh-26 and FfQh-27, both once again dominated by workshop activities pointing to the production of large, bifacial tools (see Meyer et al. 2007 for a review). Of further note is that FfQh-26 is strongly associated with Cody Complex occupations, and FfQh-27 provides evidence of Agate Basin and Cody Complex occupations. Combining these coincidences of Cody occupations at sites with Early Middle Period occupations in the region leads us to speculate that the Wallace Phase may be a direct outgrowth of local Cody Complex groups in the region.

2.3.2.2 The Embarras Phase ca. 6,500 – 4,000 years ago

The Embarras Phase is likely one of the most important archaeological cultures represented in the Foothills of west-central Alberta. Based on the Mummy Cave Complex components at FgQf-16 and other sites such as FfQh-24, FfQh-26, FfQh-27, FgQe-16, FhQf-10, FiQk-28, FkQl-77, and FIQh-10 with similar assemblages, we have proposed the Embarras Phase dating roughly from 7,000-4,000 years B.P.

One of the diagnostic artifacts associated with the Embarras Phase is the Embarras Side-Notched point, which bears similarity to styles called Gowen elsewhere. Based on similar styles dated elsewhere, we suggest that Embarras Side-Notched points may date roughly in the range of 6,000-4,500 B.P. Additional examples of Embarras Side-Notched points have been recovered at FcPu-2 on the North Saskatchewan River (Somers 2006b), FkQl-77 on Pinto Creek north of Hinton (Meyer, Roe, and Langer 2009), and FIQh-10 on Willow Creek, also north of Hinton (Meyer, Roe, and Langer 2009). Further work will be required to further define the distribution of this point style, its dating, and its technological relationship to other Mummy Cave style projectile points. A dated occupation that may be related to the Embarras Phase comes from the Mountain Creek Site near Pochontas in Jasper National Park, radiocarbon dated to $6,620 \pm 120$ years (Pickard 1989: 37). Occupations of this age were also identified in excavations at site 243R on the north shore of Jasper Lake (Hudecek-Cuffe 2000). Charcoal from a hearth dated to $4,890 \pm 50$ years. At FfQh-31 two radiocarbon dates of $4,710 \pm 50$ B.P. and $4,690 \pm 50$ B.P. (Kulle and Neal 1998b) are associated with an assemblage which matches a possible Embarras Phase occupation.

The Embarras Phase is also characterized by the suite of large bifacial tools (Roe 2009a). Those most strongly associated with the Embarras Phase are the Embarras Bipoints, but Erith Knives, Lovett Unifaces, and Reverse Unifaces also appear to be common tools associated. Without doubt, based on information from FgQf-16 and other sites in the region including FfQh-26, a clear focus of Embarras Phase technology was the production of large, often ovate, bifacial tools. Almost all of the stone tools were made from high-quality, but locally available lithic materials such as quartzite and Nordegg Member Silicified Siltstone.

Despite the emphasis on larger bifacially produced tools and a general paucity of smaller formal tools such as thumbnail scrapers, some smaller tools are associated with this Phase. Although endscrapers, retouched flakes, spokeshaves, and graters have been recovered, it is difficult to associate a formal style of either of these with the Embarras Phase based on current information. However, one technology producing smaller tools does appear to be associated with the Embarras Phase based on the work at FgQf-16 and FfQh-26, and parallels with FfQh-27. Embarras Phase components have a notable number of smaller bipolar cores or wedges, often made on small quartzite cobbles/pebbles, but also with pebble cherts, siltstones, and other cherts. This technology was also likely used to create tools such as gouges, and likely as a starting point for the manufacture of some types of endscrapers. This bipolar technology represents a separate but associated reduction technology at the sites, clearly not used in the production of bifaces, but used to make smaller tools such as wedges, endscrapers, and perhaps projectile points (Walker 1992).

Based upon the very small amounts of exotic toolstones found associated with Embarras Phase components, even for use in tools such as projectile points, Embarras Phase groups do not appear to have been moving over broad areas. This suggests that the Embarras Phase had a settlement system similar to other Mummy Cave groups in Alberta with a less widely ranging, more regionally focused pattern. Embarras Phase groups were likely very familiar with west-central Alberta, and in particular the Embarras Plateau. The presence of only a single piece of basalt also indicates little if any travel or substantial contact over the mountains.

The use of stone boiling and related technologies are uncommon or outright absent in Embarras Phase occupations as with other Early Middle Period complexes. A limited amount of fire-cracked rock was recovered at FgQf-16, but all of these materials appear to have been associated with later occupations. A very similar pattern was observed at FfQh-26 and FfQh-27, and nowhere in our reconnaissance of the region have we encountered a site we believe to be associated with the Early Middle Period and where we have found significant evidence of fire-cracked rock, which altogether is frankly infrequently encountered in the region. Unfortunately identifiable faunal remains are sparse. However, the results of blood residue analysis provide direction for our understanding of part of the Embarras Phase subsistence base. Bison appears to have formed a substantial part of the subsistence base, leading to the conclusion that one of the characteristics of the Embarras Phase would be the reliance on bison and other large ungulates that would have covered the landscape during this drier and warmer time period. In addition to plentiful plant resources, of which we have little knowledge currently, cervids, possibly sheep, rabbit, and grouse were likely taken. None of these, however, likely matched bison in overall economic importance in the region during the Embarras Phase. As with peoples in similar situations, the movement of bison may have played an important part in the movements of the people, at least at certain times of the year.

One thing that is relatively clear from FgQf-16, FfQh-26, FfQh-27 and the myriad other sites in the region is that the settlement pattern did not involve crossing west into the mountains into the Rocky Mountain trench or adjacent areas. We would expect to see more significant amounts of basalts or even obsidians, and cherts rumoured to be found in Jasper and other mountains areas. It also does not appear that north-south movements were all that substantial either. There are low amounts of Top of the World chert, but no other materials more commonly found to the south such as Montana Cherts or even Banff chert. Should there have been greater movement to the north, we might expect to see more than one flake of Peace River Chert at FgQf-16, or other types of toolstone such as Grizzly Ridge Chert from the Deer Mountain Site Complex on Grizzly Ridge northeast of Swan Hills (Darryl Bereziuk, personal communication). Partially for these reasons, we believe the Embarras Phase settlement pattern may have in fact been centered on places such as the Embarras Plateau, with seasonal rounds bringing groups at times further into the Front Ranges at places like Mountain Park, James Pass, the Shunda Creek Valley, Ram River area, the Kootenai Plains, the Athabasca Valley just inside Jasper, Rock Lake, places in the Willmore Wilderness, the Grande Cache area, and potentially points further northwest. At other times of the year these groups lived further east into areas that are Parkland or Boreal Forest today, but were much more pine parklands or grasslands-like at the time.

2.3.3 *McKean Complex ca. 4,500/4,000 – 3,500 years ago*

The McKean Complex of the Northern Plains/Rocky Mountains is an intrusive cultural complex that originated in the Northeastern Great Basin. McKean components are characterized by McKean Lanceolate, Duncan Stemmed, Hanna Stemmed, and Hanna Corner Notched points (Figure 6).

The McKean Complex represents a population movement northeastward out of the Northeastern Great Basin beginning around 5,000 years ago. The earliest McKean components in the Northern Plains are not associated with the communal hunting and processing of bison. As a result it is suggested that McKean peoples were not communal hunters upon their entry into the southwestern edge of the Northwestern Plains or when they reached southeastern Alberta some 500 years later. McKean bone beds are not found at Head-Smashed-In Buffalo Jump. This interval in time is represented by a layer of sterile sands and soils lying between earlier Mummy Cave and later Pelican Lake bone beds. During the course of the following 1,000 or so years, as is suggested by the earliest Pelican Lake Phase kills in southern Alberta at the Head-Smashed-In Buffalo Jump (ca. 3,000 years ago), McKean people acquired the necessary knowledge and skills to become successful communal bison hunters.

In the Northern Rocky Mountains McKean Complex sites occur in Waterton-Glacier (Reeves 2000), in the Crowsnest Pass (Driver 1976), and in the Bow Valley (Fedje 1988, 1989; Langemann and Perry 2001). In Waterton-Glacier, McKean Complex people communally hunted sheep in the mountains using cairn alignments/fences/nets to intercept the sheep as they moved across the ridges at the mountain front. They also hunted the sheep in the Alpine using systems of cairns and blinds. They did not hunt bison communally, at least as a large scale organized enterprise, in the mountain valleys.

In general, McKean camps in the mountain and foothill valleys of the Eastern Slopes of the Southern Alberta Rockies tend to be small, in different locales, more transient, and less substantial than those of the earlier Mummy Cave Complex or those of the later Pelican Lake phases. These Eastern Slope camps are certainly much less substantial than major McKean summer camps located far out on the Plains along the South Saskatchewan River. Toolstone use in most of the southern foothills/mountain sites focused primarily on local resources with some trade/exchange to central/southern Montana. Characteristic of this phase in this area, lithic toolstones consisted most notably of basalt and obsidian.

2.3.3.1 Lovett Phase ca. 4,500-3,000 years ago

McKean as a cultural complex probably does not extend further north than the North Saskatchewan River along the Eastern Slopes, at least in terms of more intensively utilized, core areas. We have designated the next phase for the region the Lovett Phase, tentatively dating from about 4,500 - 3,000 B.P. It encompasses both Oxbow materials and the local variant of the McKean Complex. It appears to have developed directly from preceding Embarras Phase groups, sharing many of the same traits. The Lovett Phase appears to be transitional between earlier Mummy Cave Complex occupations of the region and Late Middle Period cultures, and may represent a blend of traits as archaeological cultures merged.

Following the Embarras Phase, we believe there may have been a gradual drop in population of the Foothills of west-central Alberta. This is based on the current evidence for the succeeding Lovett Phase and following time periods. The reduction of site density in the Foothills after the Early Middle Period may not relate so much to the closing of the forests at this time per se, but perhaps the relative amelioration of the Plains. There may have been a push factor from the foothills, but likely a draw factor as the prairies, which appear to have suffered quite dry conditions through the mid-Holocene (see review in Reeves 1973) began to increase in attractiveness. During this dynamic period of time there were many technological, environmental, and cultural changes occurring not only along the Eastern Slopes, but in the Boreal forest proper to the north, and the grassland regions to the southeast. We are only beginning to understand the ramifications of these technological, environmental, and cultural changes along the Eastern Slopes. Nevertheless we have been able to make several observations that characterize this period of time.

One example of the transitions that occurred during the Lovett Phase can be observed in the types of projectile points found. In the Lovett Phase component at a number of sites there have been transitional Oxbow forms, 'classic' Oxbow forms, and McKean Complex projectile points found together. A similar pattern has been noted with mixed Oxbow and McKean components elsewhere in Alberta.

A significant environmental change was likely occurring during the Late Middle Period. The drier and warmer period of earlier times was coming to an end and the climate was becoming cooler and wetter. Along with the temperature change there was an overall

change in the environment. The cooler temperatures allowed for the forested areas to reclaim areas that had previously been open grassland or parkland type environments. As the grasslands receded the ungulate populations, such as bison, were replaced with more forest adapted animals such as moose and deer. As the forests began to close, the typically expressed idea has been that the overall human population in the area decreased. Such a pattern may explain the considerably fewer number of sites with Lovett Phase components found in this region.

There are a number of archaeological sites with Lovett Phase components in the region. FgQf-16 has a strong Lovett Phase component based upon the recovery of five Oxbow and McKean Complex style projectile points. At FfQh-24 one of the projectile points found during the excavations has a strong resemblance to McKean Complex projectile points (Meyer et al. 2007). One point recovered from FfQh-27 can be assigned to the Lovett Phase (Kulle and Neal 1998b). At FiQk-28, a site in Switzer Provincial Park north of Hinton, three projectile points have been identified as Oxbow-McKean Complex projectile points (Head 1989, Light 1989). At FhQl-4 on Brule Lake, Ball (1983) recovered a projectile point from Level 26 which bears strong similarities to points FgQf-16-1051 and FgQf-16-1005 which we have interpreted as belonging to Lovett Phase occupations. FIQs-30 on Grande Cache Lake (Brink and Dawe 1983) also produced a point of this variety, as well as three other McKean points. GbPv-2 in Carson-Pegasus Provincial Park produced an Oxbow Point (Ronaghan and Hanna 1982). FhPw-15 on a small tributary north of the Pembina River (Somer 2006a) yielded an Oxbow point, as did FaPu-6 on a headwaters tributary of Prairie Creek north of Swan Lake and Swan Creek (Somer 2007a). The Mountain Creek Site in Jasper National Park produced a McKean point in association with a date of $3,350 \pm 130$ B.P. (Wilson 1987), and the Track Site near Pochontas yielded an occupation with an Oxbow point and a radiocarbon date of $3,450 \pm 400$ B.P. (Pickard 1987: 23, fol. 1989: 37). Test excavations at Devona Cave produced an Oxbow point in an occupation dated to $4,240 \pm 90$ B.P. (Head 1988).

Based upon the work done at FgQf-16, and the reassessment of several other sites such as FhQf-10, we have compiled a suite of characteristics attributable to the Lovett Phase. The most obvious characteristic is the significant decrease in large bifacially produced stone tools. At this point, we argue that Embarras Bipoints, unnamed knives, Lovett Unifaces, and Erith Knives are more directly related to the Embarras Phase, but the manufacture of some similar tools may continue into the Lovett Phase. We believe that Reverse Unifaces in particular continued to be manufactured by Lovett Phase peoples. All of the sites with Reverse Unifaces also have projectile points that are characteristic of this period of time. Ironically, one the strongest lines of evidence demonstrating this relationship comes from a site further to the south. At EgPn-430, a site located along the Paskapoo Slopes of Calgary, a number of Reverse Unifaces were recovered with a number of Jumping Pound Phase (local McKean phase) projectile points (Vivian et al. 2009).

During the shift to the Lovett Phase there appears to be a shift towards other local toolstones such as increased amounts of Nordegg Member Silicified Siltstone and more interestingly other non-local toolstones. Lastly and most importantly, the use of fire-

cracked rock related technologies appears during the Lovett Phase. FhQg-76, a small site excavated along the Embarras River near Coalspur in 2008 provides direct evidence. Excavations unearthed a small fire-cracked rock feature directly associated with a broken but identifiable Oxbow-McKean transition point (Meyer and Roe 2009).

Information pertaining to subsistence base is scanty, with few preserved faunal remains, and only two associated tools testing positive for blood residue. In terms of settlement pattern, we are inclined to believe that Lovett Phase groups may have been more directly associated with seasonal rounds focused on Parklands and Prairie areas to the south and east. Forays into the Foothills of west-central Alberta were likely by smaller parties, perhaps focusing on specific activities such as hunting, toolstone procurement, or gathering specific foothills and mountain plant resources. This in part explains what appears to be a reduction in number and size of sites associated with the Lovett Phase, while those areas to the south and east see relatively high numbers of Oxbow and particularly McKean Phase occupations of sites. Following the Lovett Phase, population in the region appears to continue a gradual decrease, but of course never results in actual abandonment of the region.

2.4 Late Middle Period Complexes ca. 5,000/4,000 – 1,600 years ago

2.4.1 Saskatchewan Drainage

The time period from around 4,000-5,000 years ago appears to mark a major cultural shift in the Eastern Slopes between the lands/valleys of the Saskatchewan drainage to the south and those of the Athabasca drainage to the north. There is cultural continuity from the preceding McKean and Mummy Cave complexes along the southern slopes with the development of new phases known as Pelican Lake (ca.3,000-1,600 years ago) and Besant (ca. 2,000-1,200 years ago).

2.4.1.1 Pelican Lake Phase 3,000 – 1,600 years ago

Pelican Lake, characterized by corner notched dart points (Figure 6), is one of two major Late Middle Period phases found widespread over the Northern Plains and the Northern Rocky Mountains (south of the Athabasca drainage). It is believed that this archaeological complex represents the ancestral archaeological culture to a number of Algonquian speaking tribes (including the Blackfoot-speaking peoples: Siksiká, Kainaawa, Piikáni) of the Northwestern Plains/Rocky Mountains as well as to the K'tunaxa of the Rocky Mountains/Rocky Mountain Trench. Similar shaped dart points to those of the Pelican Lake Phase are also found in the Fraser Plateau, in an archaeological complex known as the Shushwap Horizon that is ancestral to Interior Salish peoples of the Fraser-Thompson drainage.

Pelican Lake is well represented in both wintering and summering sites in the valleys, as well as in the Alpine of the Southern Alberta Rockies (Reeves 2000). Toolstone materials used for points found from Waterton-Glacier north to the North Saskatchewan River include a distinctive chert known as Top of the World (TOW). This chert material comes from a series of quarries in Top of the World Provincial Park, located at the head of the Bull River in the Southeastern British Columbia Rockies. These quarries are the

traditional quarries of the K'tunaxa. It can therefore be suggested that some of the Eastern Slopes Pelican Lake occupations were associated with ancestral K'tunaxa bands who resided seasonally in Eastern Slope valleys. Top of the World Pelican Lake points have been found as far north as the Kootenay Plains in the North Saskatchewan River Valley (Reeves n.d.) indicating that ancestral K'tunaxa seasonal territory extended, as it did 2,000 years later, to the North Saskatchewan. Top of the World Chert was recovered in 2004 from FfQb-4 along the Brazeau River (Meyer 2005c), FfQh-26 near Mountain Park (Meyer et al. 2007), and from FgQf-16 near Robb. However, in at least some of these cases, we believe the use of TOW is associated with Early Middle Period groups instead.

Another distinctive toolstone known as Kootenai Argillite, from a quarry located on the west side of Kootenay Lake, sometimes occurs in sites in the Crowsnest Pass, and Bow and Red Deer valleys. These materials indicate that on occasion K'tunaxa bands or individuals from the Kootenay Lake region accompanied other Kootenay bands on their seasonal journeys to the Eastern Slopes.

Other Pelican Lake occupations in the foothills and front ranges of the Southern Alberta Rockies display a distinctively different toolstone pattern that includes toolstones from quarries in Montana. These sites occur in areas of the ancestral Blackfoot speaking peoples' warm season camps in both valley and alpine locations and in areas of cold season camps in the foothills. Other sites of the same cultural complex on adjacent plains display a seasonal residency pattern associated with wintering along the foothills and in the parklands and summering out on the short grass plains. Communal bison hunting undergoes a major intensification at this time.

Verified Pelican Lake occupations are not known from north of the North Saskatchewan River in the west-central foothills. A number of past studies (c.f. Hunt 1981) have classified some point forms as Pelican Lake, but we believe that many of these are misclassified Wallace Phase point styles associated with the Early Middle Period. Other examples from the north are just as easily classified as Plateau Corner-Notched (see Section 2.4.2.1)

2.4.1.2 The Besant Phase ca. 2,000 – 1,200 years ago

The Besant Phase (ca. 2,000-1,200 years ago) characterized by Besant Side Notched dart points (Figure 6) is the other major archaeological phase present in the Northwestern Plains/Foothills at this time. In contrast to Pelican Lake, Besant sites are found in wintering areas in the foothills and mountain front in the Southern Rockies as well as out on the plains and parklands to the east and north. Summering sites are out on the short grass plains, rarely are Besant sites found up valleys in summering areas or in the Alpine. These and other data (including toolstone use patterns) indicate that these people, who were most probably ancestral to Arapahoe speaking people, had quite a different pattern of life than did the Blackfoot speaking Pelican Lake groups. Besant Phase peoples were also consummate bison hunters. Hunt (1982) reports a Besant point from FhQf-10 in the vicinity of the town of Robb, and a Besant point is reported from FiQk-28 on Jarvis Lake (Head 1989, Light 1989). However, these points also appear to be misclassified. Sheila

Greaves has been researching Besant sites in the Front Ranges, and has apparently identified over 100 sites stretching as far north as the Little Smokey that she believes are Besant. We, however, believe that many of the projectile points that have been identified as such are actually misidentified Early Middle Period Embarras Phase varieties. FaPt-15, located well to the south along Swan Creek west of Caroline, produced a point interpreted as Mummy Cave (Somers 2007a), but which may be one of the few examples of actual Besant style points found in west-central Alberta. Besant points were apparently also recovered from James Pass (Ronaghan 1993, Beaudoin, Wright, and Ronaghan 1996). Once again, it appears as if Besant occupations can be found only south of the North Saskatchewan River in this region.

2.4.1.3 Regional Developments and the Salish Shushwap Horizon

In the Southern Alberta and Montana Rockies, as well as on the adjacent plains, overall population numbers increase and resource harvesting and occupancy intensifies in wintering and summering locales in the valleys and alpine areas. Communal bison hunting becomes more intensive. In addition, fishing using weighted nets also appears at sites on St. Mary's, Waterton, and Crowsnest Lakes. New food cooking technologies involving hot rock pit roasting of both meat and edible roots intensifies. Certain roots such as Blue Camas may have been introduced along with pit roasting and weighted-net fishing by Salish speaking peoples of the Columbia Plateau who, around 3,000 years ago, moved into the Flathead Valley of Western Montana. The latter shared similar corner notched point styles to those found in the Shushwap horizon on the Fraser Plateau and to those of the Pelican Lake Phase of the Northwestern Plains/Rocky Mountains.

Salish speaking Shushwap Horizon related peoples also appear during the Late Middle Period in the Bow and Red Deer River Valleys within today's Banff National Park. Here a number of house and cache pit sites have been recorded (Langemann and Perry 2001). Excavations at some of these sites in the Red Deer River Valley above the mountain front indicate the earliest of these pit sites date from ca. 3,000-1,250 years ago. Associated artifacts and toolstones indicate a close relationship to sites on Shushwap Lake that is known to have been occupied at that time by ancestral Salish speakers. Later sites date as recently as 1,250-250 years ago and they associate with the later Salish Kamloops Phase.

The house and cache pit sites on the Red Deer River and in the Bow River Valley below the Banff townsite do not occur downstream on the Ya-Ha-Tinda or on the Kootenay Plains nor in the Athabasca valley suggesting a seasonally specific pattern of residency of the Eastern Slopes (see Langemann 1998). House pits dating to ca. 3,000-2,000 years ago have also been recorded in the Windermere-Columbia Lakes area of the Rocky Mountain Trench suggesting that ancestral Salish speaking peoples also expanded up river and over from the Shushwap Lakes to occupy what are now K'tunaxa lands at the head of the Columbia River approximately 3,000 years ago.

2.4.2 Athabasca Drainage

While occasional Pelican Lake and Besant points may appear further north at sites in the Athabasca Drainage, it appears that a major shift in overall occupancy and resource harvesting patterns was underway in this area at this time. Precontact Native occupations

dating to this time period seem to be focused on the main stem of the Athabasca, at and inside the mountain front. Peripheral areas to the Athabasca, such as the nearby Inner and Outer Foothills of the Coal Branch, lack much evidence of later Precontact occupation suggesting that they were relatively lightly inhabited by Precontact Native peoples approximately 3,000-2,000 years ago. To date, most of the Late Period occupations here and to the north are of unidentified cultural affiliation.

2.4.2.1 Salish Speakers and the Shushwap Horizon ca. 3000 – 1400? years ago

Corner notched points have been recovered from sites in the Athabasca Valley inside Jasper National Park (Anderson and Reeves 1975, Pickard 1988). While classifiable as Pelican Lake Corner Notched types, they are associated with the occupation of the valley by western and northern peoples, rather than occupation by groups whose cultural affiliations were primarily to the Eastern Slopes Rockies and Rocky Mountain Trench to the south.

Basalt corner notched dart points and other basalt artifacts have been found at sites in Jasper. This suggests that ancestral Salish speaking peoples of the Shushwap Horizon also occasionally visited these eastern slope valleys as early as 2,000-3,000 years ago. They most probably entered the valley via the Upper Thompson-Tete Jaune Cache-Yellowhead Pass.

Excavations at 243R on the north shore of Jasper Lake recovered a corner notched point in association with charcoals dated to $1,753 \pm 125$ years (Hudecek-Cuffe 2000). Charcoal from a hearth at a lower level in this occupation (Component IV) was dated to $3,140 \pm 50$ radiocarbon years.

2.4.2.2 Dene Speakers and the Taltheilei Tradition ca. 3,000 – 1,400 years ago

At the Patricia Lake Site in Jasper National Park particular forms of stemmed and barbed dart points, particular types of toolstone cores (known as microblade cores), and obsidian sourced to Mount Edziza in Northwestern British Columbia have been excavated (Pickard 1986). The site dates to circa 3,400 years ago. These artifacts are typical of artifacts found in the Interior Plateau of British Columbia in sites believed to represent ancestral Athapascan speaking peoples. Obsidian artifacts found in excavations further north, near Grande Cache, have been sourced to Anaheim Lake in the Caribou (Brink and Dawe 1986). Evidence of microblade technology has also been recovered from these sites supporting the presence of peoples whose trade and cultural connections are to the west-northwest. Similar artifact assemblages and toolstone sources appear in the Peace River around 4,000 or so years ago. Collectively they are indicative of a southern-southeastern movement of Athapascan speaking, Western Boreal Forest adapted peoples moving out of their homelands towards the north and the west. This movement is thought to correlate with the initial expansion outwards of the Northwestern Boreal Forests at the end of the Mid-Holocene dry period (Ives 1990). Several sites recorded in recent years in the area (Meyer 2005a) may provide additional evidence of Athapascan related microblade technology, but the evidence is considered inconclusive. Two radiocarbon samples recovered from excavations at FgQf-16 near Robb produced dates

near the end of this sequence, however, none of the associated artifacts were diagnostic of this or the other traditions discussed in this section.

The next archaeological complex recognized in the Athabasca drainage is the Taltheilei Tradition. Taltheilei is considered to represent the ancestral cultures of present day Dene speakers of the Athabasca and Mackenzie basins (Ives 1990). Early and Middle Taltheilei (ca. 3,000-1,400 years ago) are characterized by a variety of lanceolate and stemmed thrusting spear and dart points, and Middle Taltheilei is characterized by the addition of some “waisted” or broad side notched dart points. Late Taltheilei is characterized by arrow points.

Stemmed points of the Taltheilei tradition, as well as certain types of large scraping tools known as chi-thos, have been found in the Athabasca Valley and other locales in Jasper (Anderson and Reeves 1975; Pickard 1988), near Obed Lake (T. Head personal communication 1998), at Grande Cache (Brink and Dawe 1986), at Musreau Lake (Buchner 1978), in the Swan Hills (Ronaghan and Hanna 1982), as well as further north in the Peace and Lesser Slave Lake areas. At FiQk-28 on Jarvis lake, one or two points seemingly related to the Taltheilei tradition have been collected (Head 1989, Light 1989). In the Coal Branch, chi-thos have been collected from FgQe-14 and FhQg-2 (Calder and Reeves 1977, Reeves and McCullough 1976), and basalt artifacts including a possible microblade core have been recovered from FhQg-3 and FgQf-13 (Reeves and McCullough 1976, Ronaghan 1981a). The presence of this complex is consistent with historic documents that record Athabascan speakers (Beaver, Sekani, Tsuu T’ina) present in the Athabasca Drainage at the time of European contact. Their occupancy probably extends back on the order of 2,000-3,000 years.

2.5 Late Precontact Period ca 1,600 – 200 years ago

The Late Precontact period is arguably the most poorly understood period in the Foothills of west-central Alberta. Relatively few diagnostic artifacts have been recovered, and even fewer Late Period components have been excavated in the region. That being said, the earlier distinction between the Athabasca and Saskatchewan drainages appears to apply to the patterns observed.

2.5.1 Saskatchewan Drainage

The Late Period in the Northern Plains/Rocky Mountains is characterized by the appearance of the bow and arrow. This new technology is represented in the archaeological record by small notched arrow points. Pottery also appears in some of the later archaeological complexes of the plains/parkland and forests.

2.5.1.1 Avonlea Phase 1,600 – 1,000 years ago

The first of the Late Period archaeological complexes in the Saskatchewan River Basin is known as the Avonlea Phase. It is found in the plains/foothills and mountains and represents Precontact Blackfoot speaking and K’tunaxa peoples. Avonlea developed out of the preceding Pelican Lake Phase. With the exception of two points from the Athabasca Valley in Jasper, the distinctive side notched and triangular arrow points and lithics (known as Timber Ridge Side Notched and Avonlea Triangular; see Figure 6)

have not been found on the Eastern Slopes north of the North Saskatchewan River, the traditional northern limit of K'tunaxa territory. Avonlea occupations are known from sites to the east around Buck Lake near Drayton Valley (Meyer 2010, Meyer and Roe 2009b). Very few Avonlea points have been found in the Alpine zone.

Ancestral Avonlea Piikáni sites in the valleys of Waterton-Glacier record a major seasonal shift in resource harvesting and occupancy. This shift eventually resulted in a refocusing of summer-fall activities towards the plains where sundances were carried out and where people participated in communal fall bison hunts. In conjunction with this shift towards the plains, there appears to have been an abandonment of the summer-fall pattern of fishing in valley lakes and hunting in the Alpine. Massive communal bison jumps develop during the Avonlea phase along the foothills (see Reeves 2000 for a detail discussion of these patterns).

2.5.1.2 Old Women's and Tobacco Plains Phases 1,000 – 200 years ago

In the Saskatchewan River Basin Avonlea develops into two later phases known as Old Women's (representing the Blackfoot speaking peoples) and Tobacco Plains (representing the K'tunaxa). Old Women's is found not only throughout the Upper Saskatchewan Parklands and Plains but also in the foothills and along the mountain front, at least as far north as the Bow Valley.

Tobacco Plains coincides with the traditional K'tunaxa band territories, extending from Waterton-Glacier on the south to the North Saskatchewan on the north. At the Windy Point site on the North Saskatchewan River a collapsed wooden lodge frame has been radiocarbon dated to circa 1,100 years ago (Reeves n.d.). The Tobacco Plains distinctive side notched arrow heads, almost always made of Top of the World Chert on the eastern slopes, are associated with cool-cold weather occupations along the valley floors. This contrasts to the lack of evidence of summer sites in the Alpine in the last 1,000 years. The archaeological evidence matches the traditional historic K'tunaxa winter hunting pattern. Prior to the introduction of the horse this cycle saw bands who resided west of the mountains in the Kootenai and Columbia Valleys journey over mountain passes on snowshoes to hunt buffalo in the Eastern Slope valleys and foothills. The exception to this rule is the Crowsnest Pass where both cold and warm season camps are found. That area was part of the traditional territory of the "Raven's Nest" K'tunaxa band, that was the only band at contact to both winter and summer on the Eastern Slopes.

Few points potentially associated with these phases have been recovered in west-Central Alberta. EIPs-38 just north of the Raven River west of Sundre (Somer 2007a) yielded a late point style, possible Prairie Side-Notched, possibly associated with the Old Women's Phase.

2.5.1.3 Mortlach Phase 500 – 200 years ago

Another Late Period complex identified in the western foothills is the Mortlach Complex that represents Precontact Assiniboine (Stoney) occupation of these lands. A distinctive pottery vessel of this culture was recovered from excavations in a winter bison processing camp near Cremona and radiocarbon dated to about 500 years ago. Pottery has also been

recovered from several sites on Buck Lake northeast of Rocky Mountain House (Heitzmann 1985; Meyer and Roe 2009, Meyer 2010). Some of this appears to be associated with Avonlea occupations or others to the northeast in Saskatchewan, but some may be of Stoney origin. Similar pottery was found in surface collections from the Genesee area as well in recent (ca. 300-year-old) winter bison processing camps in the Bow Valley at Calgary (Reeves et al. 2001).

These finds are consistent with the oral tradition of the Good Stoney. They claim that they gradually moved westward along the North Saskatchewan River from their homeland in Central Saskatchewan prior to the arrival of the fur trade on the lower Saskatchewan. Radiocarbon dated sites indicate their presence in Central Saskatchewan by about 800 years ago. Additional evidence of their occupation will be found in the forested foothills and ranges of the Upper Saskatchewan and possibly the Athabasca.

In the Red Deer River area, side notched arrow points manufactured of local materials have been found in sites on the Little Red Deer River (Loveseth et al. 1986), at Fallentimber Creek (Head 1988), at Wilson Creek (Head 1980), and at Lower Clearwater (Langemann personal communication August 2001). A few Late Period side notched arrow points have been found at Ya-Ha-Tinda. Test excavations of a bison processing site have yielded a radiocarbon date of circa 800 radiocarbon years (P. Francis personal communication August 2001). The phase affiliation has not yet been determined. These sites suggest that Eastern Slope tributary valleys were occupied in this region during Late Period times (ca. 800 or less years ago) and these could be Mortlach Phase occupations.

2.5.1.4 The Mountain Cree ca. 300 – 200 years ago

The Mountain Cree were present in the Upper Saskatchewan River valley before the arrival of the fur trade. Archaeological evidence of Woodland Cree occupations in Northeastern Alberta and adjacent regions of Saskatchewan has been found which dates to approximately 500 years ago (Meyer and Hamilton 1993). As yet, evidence of an equally early movement of Saskatchewan River Cree groups up river above the forks of the Saskatchewan River (where Cree sites known as the Selkirk Phase dating to ca. 500 years ago have been identified) into the Upper Saskatchewan has yet to be found. However, no systematic research oriented archaeological excavations targeting such issues has been done along the North Saskatchewan River in Alberta.

2.5.2 Athabasca Drainage

The Athabasca Basin, outside of the Athabasca Valley in Jasper National Park, is very much an archaeological blank in Late Period times. This does not mean that there are no Late Period sites, but of those that are known or suspected to be Late Period are typically of unknown cultural affiliation.

2.5.2.1 Salish Speakers and the Kamloops Horizon ca. 1,500 – 200 years ago

In the Athabasca Valley in Jasper National Park small arrow points, known as Plateau Side Notched (some manufactured of basalt), have been found in surface collections (Anderson and Reeves 1975; Pickard 1988). Similar small side-notched points have been recovered from FiQk-28 on Jarvis Lake (Head 1989, Light 1989) and two side-notched

points are reported from FiQe-2 on Fickle Lake (Pollock 1978). Many are typical Salish forms indicating that Salish groups of the Late Period Kamloops Horizon, such as the Shushwap and Thompson, also visited the valley in Late Precontact times as they are known to have done in the 19th century.

Late Period occupations have been excavated and dated in Jasper. At 243R, on the north side of Jasper Lake, radiocarbon dates of 520 ± 90 , 510 ± 145 and 720 ± 120 B.P. were obtained for buried occupations. An arrow point was recovered from the surface of this site. At 235R, located in a sand dune between Talbot and Jasper Lake, a radiocarbon date of 675 ± 70 on antler collagen was obtained. A small side notched arrow point was recovered in association (Pickard 1989:38).

2.5.2.2 Dene Speakers and Late Taltheilei 1,400 – 200 years ago

At Carson-Pegasus Park in the Swan Hills a small side notched arrow point was recovered from test excavations (Ronaghan and Hanna 1982). Late Taltheilei occupations have been excavated near Grouard on the north shore of Lesser Slave Lake (LeBlanc 2004). Dene speakers should be present further south in the Athabasca Drainage at that time.

Many small, scattered sites that have not yielded any time-culturally diagnostic artifacts have been recorded in the forests in and adjacent to the Berland, Wildhay, Athabasca, McLeod, Embarras, Lovett, and Pembina Rivers. The majority of these sites south of the Athabasca are probably of Middle rather than Late Period affiliation as is suggested by excavated sites in the Coal Branch (Calder and Reeves 1978; Hunt 1982), on the McLeod River in the Inner Foothills (Landals et al. 1986; Kulle et al. 1998), near Obed Lake (Head 1998), at Grande Cache (Brink and Dawe 1986), and at Musreau Lake (Buchner 1978) that contained Middle Period artifacts but did not contain any Late Period materials. Two sites in the Robb area, FhQf-13, with a radiocarbon date of 735 ± 170 B.P., and FhQf-10, with a radiocarbon date of 480 ± 145 , may represent Late Precontact Period Dene occupations in the Coal Branch area. These dates are far too recent for the Late Middle Period affiliation suggested by the researchers based on the recovered projectile points, many of which are Early Middle Period forms anyway. At this point, FfQh-35 and similar materials collected at FfQh-26 represent the only excavated Athapascan components in the region (Meyer et al. 2007). The most convincing evidence is the small side-notched point from FfQh-35 which bears a strong resemblance to some known Athapascan materials from British Columbia (Matson and Magne 2007). North of the Athabasca River we believe that a more significant proportion of the sites are Late Period, possibly related to Athapascan speakers. To the east in the Outer Foothills there also appear to be more Late Period sites, but these may be more likely associated with ancestral Assiniboine, Creek, and Blackfoot cultures.

These data suggest that as the forests closed and muskegs/wetlands grew through the Late Holocene, ungulate carrying capacities decreased and solitary forest species, such as moose, replaced deer, elk, and bison. For hunters of the western forests, lands peripheral to major rivers and lakes became increasingly marginal to their preferred traditional hunting/fishing territories elsewhere in the western Boreal Forest, which centered on the

fish lakes. The Foothills of west-central Alberta have few lakes of any meaningful size, not many of which are known as fishing lakes. The high density of sites seen around some nearby lakes, such as Buck Lake may be, in part, because there were so few such important lakes to the west (Meyer and Kolomyja 2010). These lakes were the focus of first Beaver, and later Cree, settlement before and during the fur trade. This pattern persisted until the close of the last century. In the early 1900s the Dominion Government banned beaver hunting because of their near extinction. This forced residents of the forests to change their winter settlement patterns and disperse as families into the forests to trap squirrels and other small fur bearers, a way of life now considered to be traditional.

2.6 The Impacts of the Fur Trade ca. 300 -150 years ago

If one were traveling north along and through the Eastern Slope Valleys of the Rocky Mountains and Foothills three hundred years ago, depending on the place and season, one might have met various Aboriginal groups along well worn foot trails and camping spots. In the south, bands of the Piikáni wintered in the foothills and valley fronts from the headwaters of the Marias north to the Oldman and Bow Rivers. Here they spent their winters hunting bison. Most of the Piikáni summered out on the Plains. To the west of the Piikáni were the K'tunaxa bands. The K'tunaxa resided in the Kootenay and Columbia Valleys to the west and crossed over the passes from Howse Pass on the North Saskatchewan River south to the passes of Waterton-Glacier for their mid-winter (January-March) buffalo hunts. One might also have encountered the Ravens Nest K'tunaxa hunting buffalo east of their traditional homeland in the Crowsnest Pass.

Further north, in the lands of the Red Deer and the North Saskatchewan Rivers the occasional family of Assiniboine and Stoney might have been seen, while further north on the Athabasca one might have encountered a family of Dene speaking peoples (Beaver or Tsuu T'ina). If one turned west following the trails up the Athabasca one might have seen small groups of Shushwap or Thompson Indians hunting in the Montane grasslands of today's Jasper National Park or perhaps a band of "Snaring" or "Snake Indians" said to have once lived in that region (Coues 1897). They were most likely an extended family band of Mountain Dene related to the Sekani who frequented the Rockies of the upper Peace River at the time.

Depending on the season, one might not have encountered anyone along the way, particularly if one ventured into Alpine meadows. In many places one would have found reduced evidence of Native presence relative to the Plains and Parklands. One would have seen an abundance of bighorn sheep, mountain buffalo, deer, and elk that undoubtedly continued to be at least a seasonal draw for native people in the region. Some people might have concluded that the area was virtually untouched primeval wilderness.

The 10,000-year record of Native occupation speaks to the contrary. It points to a long and intimate association with the lands. For the last 5,000 years there is evidence that there was knowledge and consistent application of fire in Montane valleys of the Saskatchewan, Missouri, Kootenay, and Columbia Rivers. These fires were used to

sustain productive habitats for grazers and for human communities who depended upon them. Cultures of the west-central Alberta foothills and their subsequent histories were greatly impacted by environmental changes that occurred at the end of the Mid-Holocene. These climatic changes had a major impact on Native resource harvesting and occupancy. In the Athabasca Drainage the result, as noted earlier, was the marginalization or essential abandonment of many areas that were distant and peripheral to the preferred settlement areas in the main valleys. It is in these main valleys that productive Montane habitats were maintained through cultural firing.

As the smallpox epidemics of the 1730s and 1780s swept through their lands, Native occupancy patterns changed. Parks Canada fire return studies record a progressive southward abandonment of cultural firing in the Canadian Rockies (R. Heitzmann personal communication). In the Athabasca the fire cycle changes from an average of 50-60 years to greater than 90 –150 years in the early 1700s. This coincides to the time the first epidemic struck the mountain peoples. When David Thompson and the other traders arrived in the early 1800s and established posts at Jasper the only resident Natives they encountered were Iroquois freemen. These Iroquois freemen had come west a few years earlier as servants to the North West Company NWC at forts of the Upper North Saskatchewan River. They left the trade after their contracts ended and having no reason to return east established their own independent freeman band. Shushwap and Assiniboine hunting parties also traded at Jasper House.

Similar events happened southward along the Rockies. The “Ravens Nest” band of the K’tunaxa was destroyed in the 1730s epidemic. As a result the Crowsnest Pass was abandoned as a place of settlement and was avoided by other K’tunaxa, as well as by Piikáni bands. In contrast, K’tunaxa bands both north and south of the Crowsnest continued to cross the mountains during the winters well into the mid 1800s in order to hunt. They and the Piikáni continued to fire the Montane until the mid 1800s.

The horse was introduced at approximately the same time as was smallpox. According to Piikáni and K’tunaxa oral tradition they acquired horses from the “Snake” people (probably Crow) who also gave them smallpox. The horse played a major role in increasing mobility and changing seasonal resource harvesting and occupancy patterns. This was the case, not only in the grasslands of the plains and parklands for the Piikáni and other Blackfoot speaking tribes but, also in the mountains. Horses greatly facilitated the Piikáni, Kainaawa, and Siksiká’s (the three Blackfoot speaking tribes) ability to make raids westward through mountain passes on the Salish and K’tunaxa during the summer months. These raids were staged in order to capture horses and slaves. These were either kept by the Blackfoot speakers for their own use or traded to neighbouring tribes. By the late 1700s slaves and horses were traded to white fur traders from Montreal. Many wealthy households in Montreal probably had Indian slaves bought at forts on the Upper Saskatchewan River.

By the late 1700s, K’tunaxa bands also traveled eastward over the mountain passes by horse in late spring and fall to hunt along the Eastern Slopes. As a result they were able to pack back bison lodge covers to their winter villages in the Kootenay Valley. These

plains style tipis replaced their traditional mat lodges. Acquisition of horses by Stoney bands north of the Bow River greatly facilitated their movements along the Eastern Slopes. As a result, during the early 1800s, Stoney bands were able to expand their traditional summer hunting territory northwards to the Athabasca as well as southward to Waterton-Glacier.

Cree groups also moved westward up the Saskatchewan River during or before the turn of the 17th century. Often camping with the Piikáni they ranged southward as far as Waterton-Glacier. The K'tunaxa recalled that they first met the Cree when they came over for their winter buffalo hunt shortly before they acquired the horse. The traditional range of these Mountain Cree was probably similar to that of the Stoney and Assiniboine of the Saskatchewan, centering on the forested foothills and parklands of today's west-central Alberta. Cree and Assiniboine often wintered with the Piikáni and other Blackfoot speakers in the mid to late 1700s.

Horses were not practical for most Dene of the northern forests, as horses required forage. They relied on canoes and foot trails in summer and snowshoes in winter to move throughout their traditional territories. During the late 1700s and 1800s feeding horses through the deep snows and long cold winters of the Little Ice Age was problematic. One Dene group, the Tsuu T'ina (who are closely related to the Beaver, resident of the southern edge of the forests) did take up horses and developed a plains buffalo hunting way of life, becoming closely allied with the Siksiká in the 1700s. The Siksiká's traditional wintering grounds were in the parklands of the Saskatchewan. The Tsuu T'ina transition may have begun earlier during the dog days but it has yet to be documented in the archaeological record. Much earlier, perhaps 1,000-1,500 years ago, earlier groups of Dene speakers left their northern forest homeland to drift south along the Rockies to and then east of Yellowstone Country where they became the Plains Apache this transition has also not yet been documented.

In the early to mid-1700s, at the same time smallpox epidemics swept the country and horses changed the societies, European trade goods began to filter west from the French traders/posts at the Mississippi headwaters and from the southern tributaries of Lake Winnipeg, as well as from the Hudson Bay Company posts on Hudson Bay. These goods, particularly metal knives, arrow and spear points, awls, needles, and scrapers quickly replaced the Native stone and bone tools and their associated technologies. Later, brass and copper trade kettles replaced pottery and skin bags for cooking.

In the late 1700s inland posts were established along the Saskatchewan River by the Hudson Bay Company and the Canadian traders from Montreal (who later amalgamated as the Northwest Company). The flow of trade goods and trade alcohol to Native bands increased at this time and as a consequence change in their cultures was greatly accelerated.

By the turn of the 18th century the competing companies had substantial establishments at today's Edmonton and Rocky Mountain House. These, along with small wintering posts, attracted traders from the resident foothills and mountain bands – Piikáni, Stoney,

Cree, Tsuu T'ina, and Assiniboine, as well as people from the plains and parklands - Siksiká, Kainaawa, Atsina, and Cree.

The K'tunaxa did not come often to trade at Rocky Mountain House. In 1800 David Thompson was sent by the NWC westward up the Saskatchewan River and over Howse Pass to establish posts in K'tunaxa and Salish Territory. For the first decade of the 19th Century the Howse Pass route was used by traders for their penetration into and movement of furs out of the Columbia Valley. This direct trade of goods and firearms to the K'tunaxa and Salish compromised the Piikáni's dominance over trade to western tribes. As a result, in 1810 the Piikáni closed the Howse Pass route to traders.

Another more northerly route to the Columbia Valley was required. In the winter of 1810-11 Thompson travelled overland from Boggy Hall, a small NWC house at the junction of the Brazeau River and the North Saskatchewan River, to the Athabasca. He then ascended the Athabasca, built Henry House near today's town of Jasper, and crossed over to the Columbia via Athabasca Pass to the Big Bend of the Columbia. Thompson established what would become, for the next 50 or so years, the overland route from Fort Edmonton via Fort Assiniboine to and from the Columbia. This provided a route along the Athabasca for NWC and Hudson Bay Company (HBC) fur brigades. After amalgamation of the two companies in 1821, the route continued to grow and prosper. Later an overland trail was established over the Yellowhead Pass. In 1813 Jasper House opened downstream, it closed in the 1870s. The overland route was abandoned in 1855. Although Thompson passed through the portion of the Foothills known as the Coal Branch, his journals make few references to that important region (den Otter 1967).

Some Iroquois and Canadien freemen, as well as former English employees of the HBC who had taken country wives, settled down in the Athabasca/Grande Cache area building cabins in the valley and hunting and trapping through the mountains and forested foothills. These settlements became increasingly isolated after the Athabasca fur trade route was abandoned.

Further changes swept through native societies of the Canadian Rockies as competition increased. Competition grew between native societies and between these and the Iroquois and Canadien mixed blood freeman over the depleting supply of fur bearing animals in the Saskatchewan and Athabasca drainages. Inter and intra tribal strife and warfare grew throughout the 70 short years of the fur trade on the Upper North Saskatchewan. In 1870 Rocky Mountain House, which had a sporadic history of openings and closures, finally closed. By then a substantial local community composed of mixed blood Canadien (Métis), as well as a number of English mixed blood families and mixed blood Indian families, was established at Rocky Mountain House.

Fort Edmonton, which had been the principle inland administrative and provisioning post for the Saskatchewan and Athabasca trade since the 1820s after closure of the overland route, continued to serve until the 1870s as both a trading and provisioning post for the dwindling fur trade in the Upper Saskatchewan and Athabasca Districts. By then mixed

blood populations of the region had grown substantially. The bison were hunted to extinction.

More momentous changes followed the signing of Treaty 6 in 1876 by the Cree and Assiniboine of Central Alberta, and the signing of Treaty 7 in 1877 by Blackfoot-speaking peoples, Stoney, and Tsuu T'ina. Many native peoples were forcibly confined to reserves. There were no more bison. Game populations were depleted through disease and over hunting along the Eastern Slopes. Later removals of lands and reserves and massive depopulation due to diseases, such as tuberculosis and influenza, resulted in the abandonment of the old traditional native patterns of seasonal resource harvesting and occupancy along Alberta's Eastern Slopes. The "fires of spring" were no more. A new, less complex, ecosystem with new dominant grazers (elk) has begun to evolve in areas of the Eastern Slopes, particularly after forced wildfire suppression began in the mid-1900s. This ecosystem has never existed before. Climate change, both natural and human-induced, will surely accelerate these changes in the decades to come.

Beginning in the late 19th and early 20th centuries, many areas of the Foothills began to see considerable settlement and development by those of European descent. In many cases, the early settlements were associated with the extraction of resources, particularly coal. The Foothills of west-central Alberta experienced the same phenomenon, with the construction of the railroad and development of mines through Edson and into Jasper, the development of the Coal Branch between Robb and Mountain Park, and of course the development of the Brazeau Collieries at Nordegg.

3. STUDY METHODOLOGY AND TECHNIQUES

3.1 Background and Site Potential

Previous research has amply demonstrated that overall the Foothills of west-central Alberta have high potential for the presence of significant, recoverable historical resources. Details regarding previous work and the Historical Resources potential of specific areas are outlined in Section 1.1 and Figures 1-4 provide our assessment of high potential areas within the Project area.

3.2 Historical Resources Impact Assessment Studies

The HRIA field studies and subsequent analyses and reporting focused on the Precontact archaeological sites and Historic sites known and predicted to be present in the Project area.

3.2.1 Prefield Studies

Prefield archaeological studies consisted of the preparation of Statements of Justification (SoJ) submitted to ACCS outlining our understanding of known historical resources in the Project area, and presenting maps outlining areas of high potential for unrecorded sites. The SoJs resulted in professional recommendations for the undertaking of HRIA of the Project areas given the presence of known historical resources and the potential to record others.

The SoJ programs resulted in the preparation of maps submitted along with permit applications, indicating those areas of greatest potential in the Project areas. The high potential zones shown in Figures 1 through 4 were defined through a combination of air photo interpretation, consultation of the *Listing of Historic Resources*, and extensive knowledge of the area. These maps and potential zones guided the fieldwork program.

3.2.2 Field Studies

The primary objective of the field studies was to locate and assess archaeological and historical sites threatened by development. Had locations such as substantial bedrock exposure or identifiable palaeontological remains been observed, a qualified palaeontologist would have been engaged. The assessment of sites was accomplished through surface survey and subsurface prospecting of high potential zones and ground-truthing of other areas. The field parties for reconnaissance typically consisted of experienced two-person teams.

The survey was conducted under primarily snow-free conditions. Snowfall did occur partway through one field program, but the crew had previously finalized reconnaissance of those areas in which surface visibility was most critical. Lifeways does not believe that the snow affected site encounter rates. Field reconnaissance focused on systematic traverse and shovel testing of high potential landforms within the high potential zones where appropriate. Detailed inspection of exposed landforms, deflating surfaces, and eroding edges for archaeological, historical, and palaeontological materials was

undertaken. Generally, such disturbed surfaces are limited in extent in Boreal forest areas.

The final development footprint will not disturb the entire mine permit area, but the entire area was subjected to HRIA work or ground-truthing in one form or another. All of the high potential zones were ground-truthed and extensive sub-surface testing and other means of locating historical resources were undertaken where appropriate. Many areas of low or moderate potential were ground-truthed while traveling between high potential zones. A “sample” of other areas was ground-truthed to support the potential ratings as defined in the pre-field studies. If other areas were observed to have elevated potential for historic resources, standard field procedures were followed in their assessment.

Standard field procedures followed for the HRIA field program included surface reconnaissance, inspection of exposures, and shovel prospecting in areas of elevated site potential. There are numerous modern disturbances such as roads, pipelines, coal test lines, and other ground disturbances that provided some surface exposure. These exposures prove especially useful in some areas of lower potential where they can assist in the ground-truthing process. Field assessments, site recording, and reporting activities for sites followed procedures detailed in the other HRIA work done by Lifeways in this area. Site recording and assessment included thorough shovel testing, detailed note-taking, the preparation of detailed sketch maps, visual documentation through site photography, the collection of surface artifacts and those recovered in subsurface tests, and the recording of site location on appropriate maps. In addition, we used hand-held GPS units to record the UTM coordinates of sites and areas shovel tested. Coverage was typically good resulting in accurate UTM determinations. Controlled test excavations were not employed during the course of this HRIA. No deep backhoe prospecting was undertaken, as no deep sediment traps with archaeological potential were encountered.

3.2.3 Shovel Testing Extent

Through the procedures described above, Lifeways successfully undertook the HRIA program of the Project areas. In addition to the surface reconnaissance and ground-truthing, the 2009 field program focused on the Robb Trend Main – Centre – East zone excavated a total of 813 shovel tests for site discovery and assessment purposes. These are in addition to the 158 shovel tests undertaken for certain portions of this area in advance of coal exploration in 2008, and the 114 tests undertaken in advance of coal exploration activities in 2009. The 2010 HRIA program focused on Robb Trend West and the three road corridors excavated 1025 shovel tests in zones of high potential. In total, 2110 shovel tests were excavated in the Project area in the course of HRIA work for proposed CVRI development of the area. In addition to this work, in the last ten years, Lifeways teams have also excavated a total of 505 shovel tests within the confines of the Project area in the course of other HRIA work. Figures 1-4 show the locations and scope of the 2615 shovel tests undertaken by Lifeways in the Project area. Given the other previous HRIA work in the area, most notably the survey in 1981 for the proposed Robb-Dennison mine, it is safe to say that over 3000 shovel tests have been excavated in the Project area in the search for historical resources.

3.2.4 *The Borden Site Designation System*

Archaeological information consists of sites, objects (artifacts, bones, etc) recovered from sites, and records regarding the sites and objects (site data, photographs, diaries, maps, etc.). The data obtained during an archaeological reconnaissance of an area or from excavations at a site, as well as information about the site itself must be organized and curated in a manner that it is conserved and accessible for future reference. Information about sites, because they are part of the public record and regulated under legislation, needs to be organized in a systematic, geographically based, manner.

The site designation system in use today is known as the Borden Uniform Site Designation System and was developed by Dr. Charles Borden of the University of British Columbia in the early 1950's (Borden 1952). It is an alpha-numeric geographical locational system based on the National Topographic Map System of Canada. The Borden System designates sites and allows one to locate a site within non-repeating, Canada wide, 10° x 10° quadrangles of latitude and longitude. For example, FhQI-2 is the designated number of a site found in a unique 10° x 10° unit in the Brule Lake area of the Athabasca Valley.

The Borden system is based on NTS 1:500,000 map sheets for Canada. Each sheet beginning at the east coast is assigned sequential ascending longitudinal and latitudinal upper case alphabetic letters. For example, the upper case letters FQ refers to the NTS 1:500,000 map sheet which includes the Hinton region. The first upper case letter refers to latitudinal position of the map sheet and the second the longitudinal position. Within each 1:500,000 map sheet beginning at the lower right-hand corner, lower case letters are assigned to each 10° of latitude (a - l) and each 10° of longitude (a - x). The result is for each 10° x 10° rectangle (known as a Borden Block) a unique designation exists. For example, FhQI is the Borden Block which covers the Brule Lake area in which FhQI-2 is situated. Sites within each Borden Block are assigned sequential numbers reflecting the order in which they were found and recorded.

3.3 **Assessment of Site Significance**

Precontact and Historic archaeological sites vary widely in size, content, complexity, condition, and age, and therefore in significance. Assignment of site significance is based on an archaeologist's assessment of the potential of a site to enhance the collective understanding of the archaeology or historical resources of a region. The information of interest includes: the cultures that were once present, their occupancy patterns, and resource harvesting patterns. An important part of the assessment of site significance revolves around potential for data collection. A site on which additional investigation is recommended prior to disturbance must have preserved information that is recoverable in an efficient and effective manner that will significantly aid our understanding of the past.

Sites vary greatly in their ability to inform on these subjects. Isolated finds with one or two expediently made, used, and discarded artifacts lying on the surface provide very little information in contrast to an isolated find of a projectile point. A projectile point generally informs us on culture, as point styles change through time and space and can usually be associated with specific archaeological cultures. In addition, a projectile point

may inform us about the kinds of toolstone preferred for point manufacture and on trade patterns when non-local varieties of stones are used. That being said, isolated finds even of projectile points have little *in situ* value. That is, these small sites have only very limited amounts of recoverable information associated with them. They are of local significance. They are the most common kind of site, but unless exposed by disturbances or erosion they are the least likely to be discovered.

Large complex campsites or Historic townsites are at the other end of the spectrum. They contain large numbers of artifacts, features, and patterns of association representing complex activity areas, tasks, and social groups. Often these sites contain more than one vertically separated occupation (termed a stratified site) and represent repeated use of a favoured locale over many generations. These sites contain a great deal of information and are of high regional value. If very rare and an outstanding example of their kind they may be of Provincial significance. The Upper Lovett Campsite (FgQf-16) to the south of the Project area is an example of such a site. Sites of high regional significance are one of the least common kinds of site, but because of their location, size, and contents the most likely to be discovered and impacted by development activities.

A very high correlation also exists in the region between preferred settlement locales and travel/transportation corridors of Precontact groups and Historic 19th – 20th Century Euro-Canadian Culture. As a result, regionally significant sites are most likely to have been destroyed during the development of transportation corridors within/or crossing valleys along the Eastern Slopes.

Lying between the extremes of an isolated find and a campsite of high regional significance are the majority of discoverable archaeological sites. The following describes the categories of site significance utilized to evaluate the Precontact and Historic archaeological sites in this study.

3.3.1 *Sites of Local Significance*

Examples of sites of local significance are isolated finds or small artifact scatters and small camps in disturbed or eroded contexts, including small scatters of Historic materials or isolated features. Most lack cultural or time diagnostic artifacts or dateable organics (charcoal/bone). Generally the toolstone used in artifact manufacture is of local origin. Sites of local significance are recorded and mapped, and artifacts collected. Rarely are they recommended for avoidance or further study by a consulting archaeologist and ACCS rarely requires avoidance or further mitigative studies of sites of local significance.

3.3.2 *Sites of High Local Significance*

Examples of sites of high local significance include small artifact scatters (small camps) with time/cultural diagnostic artifacts, isolated hearth features with datable charcoal/bone, small but high density workshops, or isolated Historic cabins. Non-local toolstone may be present at Precontact sites. These sites generally represent one-time occupations by individual, task, or small family groups at that locale. Mapping and archaeological excavation of these sites/features may recover information which will

assist in understanding the archaeology within that locality and its role in the larger region. Sites of high local significance may be recommended for avoidance or further archaeological study by a consulting archaeologist. ACCS may require further mitigative studies of these sites if they cannot be avoided in a proposed development.

3.3.3 *Sites of Regional Significance*

Sites that fall into this category include moderate to large campsites, workshop/quarries, rock art sites, or larger Historic sites such as large logging camps. In campsites, time/culturally diagnostic artifacts, non-local tool stone, features, and datable charcoal or bone are present. These camps represent repeated occupations of a locale by a group (multiple family). A number of stratified occupations may be present. Mapping and archaeological excavation of regionally significant sites will recover information which not only greatly assists in understanding the archaeology of that locality but also of the region. Test excavations are sometimes required to verify that a site is of regional significance. These sites are almost always recommended for avoidance or further archaeological study by a professional archaeologist and ACCS generally requires further mitigative studies at sites of regional significance if to be disturbed by development.

3.3.4 *Sites of High Regional Significance*

The difference between sites of regional and high regional significance reflects differences in size, complexity, number of occupations, activities, density, and diversity of contents, age, and preservation. For example, a moderately-sized Precontact campsite with two occupations may be of regional significance, whereas a larger campsite with stratified remains of four occupations may be of high regional significance. A logging camp may be of regional significance, but a well-preserved Historic townsite may be of high regional significance.

3.3.5 *Sites of Provincial Significance*

Sites of Provincial significance are sites which, because of their outstanding values (size, complexity, rarity, condition, etc.) in comparison to other sites of the same class in the Province of Alberta, would qualify for designation under the Alberta *Historical Resources Act*. Sites of Provincial significance are the least common, and overall rather rare.

3.4 **Aboriginal Consultation and Traditional Use Studies**

Finally, CVRI and Lifeways have been actively engaged in Aboriginal consultation since 2006 on aspects of the proposed Project. Consulted groups include the Alexis Nakota Sioux First Nation, Aseniwuche Winewak Nation, Foothills Ojibway Society, Métis Nation of Alberta, Mountain Cree Camp (Smallboy), Nakcowinewak Nation of Canada, O'Chiese First Nation, Paul First Nation, and Sunchild First Nation. These consultation activities and associated traditional use studies continue. Throughout the course of those field studies, Lifeways staff have gained additional understanding of the geography and historical resources potential of the Project. Reporting on this process will occur separately under a joint process managed by the SREM Aboriginal Affairs Branch (SAAB), with some details available in Section 5 of this Project application.

3.5 Analyses and Reporting

This report presents the findings of the fieldwork and data analyses, provides site significance assessment, and makes specific recommendations regarding appropriate management or mitigation strategies in the context of the Project. Full HRIA reports on Project activities have been submitted to ACCS and are available from the HRMB.

HRIA summary results are presented in Section 4, as is an assessment of cumulative effects on historical resources. Section 5 presents brief conclusions regarding the data collected, summarizes the overall results of the HRIA including summary recommendations, and summarizes the results of the entire HRIA program associated with the Project to date.

4. HISTORICAL RESOURCES IMPACT ASSESSMENT RESULTS

4.1 Archaeological Sites

The combined HRIA programs in support of CVRI's Project developments successfully recorded numerous known and hitherto unrecorded historical resource sites in the proposed Project area. Surface reconnaissance and shovel testing in the area has recorded 67 Precontact and Historic sites associated with the Project area. Not counting materials recovered from mitigated sites, the HRIA programs recovered almost 300 Precontact artifacts and recorded over 120 Historic features ranging from old cabins, to privy pits, to mining railspurs.

Table 1 presents a listing of the 67 historical resources within the Project mine permit area and/or recorded during the course of HRIA work specifically associated with the Project. Of these sites, 60 are within the currently proposed mine permit area (others are now outside due to changes in this proposed boundary), and of those 36 are found within the currently proposed disturbance footprint.

Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
FfQd-14	2008-180	Precontact	Isolated Fine	local	HRV 0	Inside proposed impact footprint	original recommendation: no further work required
FfQd-15	2008-180	Precontact	Scatter<10	local	HRV 0	Within mine permit area but outside of proposed footprint	original recommendation: no further work required
FgQd-6	2008-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	original recommendation: no further work required
FgQd-7	2009-180	Historic	Historic camp	High local	HRV 4	Inside proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted; ACCS has agreed with this recommendation
FgQd-8	2009-180	Historic	Historic camp	High local/ regional	HRV 4	Outside of mine permit area	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted; ACCS has agreed with this recommendation
FgQe-31	1981-114; 2009-180	Precontact	Campsite	Local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-34	1997-163; 2005-	Precontact	Scatter>10	Local	HRV 0	Inside proposed	no additional investigation; ACCS

Table 1 Archaeological Sites Recorded in the Robb Trend Project Area							
Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
	148; 2009-180					impact footprint	has agreed with this recommendation
FgQe-35	1997-134; 97-163; 2005-148; 2009-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-65	2009-113	Precontact	Scatter<10	Local	HRV 0	Within mine permit area but outside of proposed impact footprint	original recommendation: no further work required
FgQe-66	2009-113; 2009-180	Precontact	Scatter<10	High local	HRV 4	Inside proposed impact footprint	site mitigated under 2009-180; no additional investigation; ACCS has agreed with this recommendation
FgQe-67	2009-180	Precontact	Scatter>10	local	HRV 0	Outside of mine permit area	no additional investigation; ACCS has agreed with this recommendation
FgQe-68	2009-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-69	2009-180	Precontact	Workshop	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-70	2009-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-71	2009-180	Precontact	Campsite	Regional	HRV 4	Inside proposed impact footprint	Stage I mitigation program of 40 square meters; ACCS has agreed with this recommendation
FgQe-72	2009-180	Precontact	Isolated find	Local	HRV 0	Outside of mine permit area	no additional investigation; ACCS has agreed with this recommendation
FgQe-73	2009-180	Precontact	campsite	Local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQe-74	2009-180	Precontact	Workshop	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	recommended Stage I mitigation program of 8 square meters; ACCS has disagreed with this recommendation and indicated no further concerns with this site
FgQe-75	2009-180	Precontact	Campsite	High local	HRV 4	Inside proposed impact	recommended Stage I mitigation program of 6 square meters;

Table 1 Archaeological Sites Recorded in the Robb Trend Project Area							
Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
						footprint	ACCS has disagreed with this recommendation and indicated no further concerns with this site
FgQf-70	2001-296	Precontact	Campsite	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-71	2001-296; 2010-234	Precontact	Scatter<10	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-72	2001-296; 2010-234	Precontact	Campsite	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	Stage I mitigation program of 3 square meters
FgQf-73	2001-296	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-74	2001-296	Precontact	Scatter<10	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-154	2003-117	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-157	2004-213; 2010-234	Precontact	Workshop	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	Stage I mitigation program of 4 square meters
FgQf-186	2009-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FgQf-187	2010-234	Precontact	Scatter>10	local	HRV 0	Outside of mine permit area	no additional investigation
FgQf-188	2010-234	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation

Table 1 Archaeological Sites Recorded in the Robb Trend Project Area							
Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
FgQf-189	2010-235	Precontact	Scatter<10	local	HRV 0	Within mine permit area but outside of proposed impact footprint	no additional investigation
FgQf-190	2010-234	Precontact	Campsite	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	Stage I mitigation program of 10 square meters
FgQf-191	2010-234	Precontact	Campsite	Regional	HRV 4	Within mine permit area but outside of proposed impact footprint	Stage I mitigation program of 25 square meters
FhQf-18	191-114; 2002-132	Precontact	Isolated find	Local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-19	1981-114; 2002-132; 2009-180	Precontact	Scatter <10	Unknown	HRV 0	Within mine permit area but outside of proposed impact footprint	site likely removed in previous development; no additional investigation; ACCS has agreed with this recommendation
FhQf-20	1981-114; 2009-180	Precontact	Campsite	High local	HRV 4	Inside proposed impact footprint	recommended Stage I mitigation program of 4 square meters; ACCS has disagreed with this recommendation and indicated no further concerns with this site
FhQf-21	1981-114; 2010-234	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside of proposed impact footprint	original recommendation: no further work required
FhQf-23	HS74951; HS74952; 2009-180	Historic	Mine	High local	HRV 4	Small portion within mine permit area but outside of proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted; ACCS has agreed with this recommendation
FhQf-26	1981-147	Precontact	Isolated find	unknown	HRV 0	Outside of mine permit area	site likely removed in previous development; ACCS has indicated no further concerns
FhQf-37	2002-132	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	original recommendation: no further work required

Table 1 Archaeological Sites Recorded in the Robb Trend Project Area							
Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
FhQf-38	2002-132	Precontact	campsite	High local	HRV 4	Inside proposed impact footprint	original recommendation: Stage I mitigation program of 5 square meters; ACCS has agreed with this recommendation
FhQf-39	2002-132	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	original recommendation: no further work required
FhQf-105	2006-264	Precontact	Isolated find	local	HRV 0	Outside of mine permit area	original recommendation: no further work required
FhQf-106	2009-108	Precontact	Workshop	Regional	HRV 4	Inside proposed impact footprint	Stage I mitigation program of 30 square meters; ACCS has agreed with this recommendation
FhQf-107	2008-180	Precontact	Workshop	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	recommended Stage I mitigation program of 6 square meters; ACCS has disagreed with this recommendation and indicated no further concerns with this site
FhQf-108	2008-180	Precontact	Scatter<10	High local	HRV 4	Within mine permit area but outside of proposed impact footprint	recommended Stage I mitigation program of 8 square meters; ACCS has disagreed with this recommendation and indicated no further concerns with this site
FhQf-109	2008-180	Precontact	Scatter<10	High local	HRV 4	Inside proposed impact footprint	recommended Stage I mitigation program of 6 square meters; ACCS has disagreed with this recommendation and indicated no further concerns with this site
FhQf-110	2009-180	Precontact	Campsite	High local	HRV 4	Inside proposed impact footprint	Stage I mitigation program of 8 square meters; ACCS has agreed with this recommendation
FhQf-111	2009-180	Historic	Historic settlement	High local	HRV 4	Outside of mine permit area	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted; ACCS has agreed with this recommendation
FhQf-112	2008-180	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation

Table 1 Archaeological Sites Recorded in the Robb Trend Project Area							
Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
FhQf-113	2008-180	Historic	Historic trench	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-114	2008-180	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-115	2009-180	Precontact	Campsite	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-116	2009-180	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-117	2009-180	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation; ACCS has agreed with this recommendation
FhQf-118	2010-234	Precontact	Scatter <10	local	HRV 0	Within mine permit area but outside proposed impact footprint	no additional investigation
FhQf-119	2010-234	Historic	Mine	High local	HRV 4	Inside proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to specific area of impact
FhQf-120	2010-234	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside proposed impact footprint	no additional investigation
FhQg-121	2010-234	Historic	Dwelling	High local	HRV 4	Inside proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted
FhQg-79	2010-234	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation
FhQg-80	2010-234	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation
FhQg-81	2010-234	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation
FhQg-82	2010-234	Precontact	Isolated find	local	HRV 0	Inside proposed impact footprint	no additional investigation

Borden Number	Permit Reports	Site Class	Site Type	Archaeological significance	Recommended Historical Resource Value	Relationship to Proposed Robb Trend Project Footprint	Recommendations
FhQg-83	2010-234	Precontact	Scatter<10	local	HRV 0	Inside proposed impact footprint	no additional investigation
FhQg-84	2010-234	Precontact	Campsite	Regional	HRV 4	Inside proposed impact footprint	Stage I mitigation program of 20 square meters
FhQg-85	2010-234	Historic	Dwelling	High local	HRV 4	Inside proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted
FhQg-86	2010-234	Historic	Dwelling	High local	HRV 4	Within mine permit area but outside proposed impact footprint	historical research and Stage I mitigation program of appropriate scale to proportion of site to be impacted
FhQg-87	2010-234	Precontact	Isolated find	local	HRV 0	Within mine permit area but outside proposed impact footprint	no additional investigation

4.1.1 Precontact Archaeological Sites

Fifty-eight of the sites included in the studies represent Precontact site occupations. Of the 53 Precontact sites are in the mine permit area, 15 are isolated finds, 18 small artifact scatters, 2 larger artifact scatters, 5 sites classified as workshops, and 13 classified as small to moderate-sized campsites. Of the 32 Precontact sites in areas of the currently proposed disturbance footprint, 27 of those sites have been recommended for no additional investigation prior to disturbance, or ACCS has required none previously. Five Precontact sites in the disturbance footprint have been recommended for additional work prior to disturbance. The remaining Precontact sites lie outside of the proposed footprint, but Lifeways has provided recommendations should those sites be threatened by development. Table 1 describes the relationship of each known site to the Project footprint, and provides Lifeways' recommendations and/or requirements previously set by ACCS.

4.1.2 Historic Archaeological Sites

Nine of the sites included in the studies represent Historic period site occupations, including cabins, mines and associated features, logging camps, and townsites. The 7 Historic period sites in the mine permit area consist of 1 cabin, 3 logging camps with multiple cabins, 2 coal mines, and 1 small trench or other disturbance. One cabin, two logging camps, and one mine are found in the Project footprint and have been

recommended for additional investigation prior to disturbance. The historic trench is also within the footprint but has been recommended for no additional work, a recommendation agreed to by ACCS. The remaining Historic period sites lie outside of the proposed footprint, but Lifeways has provided recommendations should those sites be threatened by development. Table 1 describes the relationship of each known site to the Project footprint, and provides Lifeways' recommendations and/or requirements previously set by ACCS.

4.2 Palaeontological Remains

Neither significant bedrock exposures nor palaeontological remains of any type were noted in the development zones during the course of the HRIA programs. Any bedrock outcrops observed in the area tend to be along the major river valleys, outside of zones to be impacted. The vast majority of the area is mantled in pre-Wisconsin or Wisconsin glacial or erosional deposits of varying, and, for the most part, unknown thickness.

4.3 Historic Sites

Several of the sites recorded as Historic period archaeological sites are also classifiable as Historic Sites based on the presence of standing structures or other features. The HRIA reports submitted to ACCS provide this additional documentation on this class of site.

4.4 Cumulative Effects Assessment

Historical resources constitute a non-renewable type of social resource, which once heavily disturbed or completely removed by development are not replaceable (that being said, humans are constantly involved in the process of creating new historical resources). It is not only the artifacts that are of historical resources value, but also the specific contexts in which they are recovered. One must consider also that any historical resources database represents only those sites recognized and defined as such. Therefore factors such as preservation conditions, site loss due to erosion or other natural factors, or simply where archaeologists have looked for sites must be considered in an assessment. In addition, although archaeologists often classify sites as representing particular activities prior to meaningful excavation, it is typically only after excavating and analyzing a representative sample of a site that its inherent interpretive value becomes understood. Certain factors, in this region such as the poor preservation conditions and resulting lack of datable materials, can make it difficult to place interpretations into any appropriate context, further complicating matters. Given these factors, cumulative effects on historical resources can be assessed only in the most general terms.

Cumulative effects on historical resources include those directly related to the Project in relation to those from other past, present, and future development projects in the region which have or may disturb historical resources. The assessment of the cumulative effects on historical resources derives from a comparison of HRIA results in the Local Study Area (LSA) to those in a larger Regional Study Area (RSA). One must consider overall known site loss in relationship to site significance, and the effects of this on the ability of archaeologists to interpret historical resources in the future.

4.4.1 *Local Study Area*

For the purposes of this assessment the LSA is defined as the mine permit area, and the results of the HRIA work in that area are summarized above in Section 4.1. Sixty known sites are located in this area, 36 of which, or 60%, will be disturbed or removed in Project development. Twenty-seven of the sites to be disturbed are considered to be of low historical resources potential. That is, the artifact density, diversity, and distributions at those sites indicates that additional investigation in the form of excavation or other forms of recording is unlikely to contribute in a meaningful manner to our understanding of the past.

Five Precontact sites and four Historic period sites will be removed during development of the LSA that are considered to have elevated potential to contribute to our knowledge of the area's past through additional investigation. All of these sites are considered to be of high local or regional archaeological significance, none of them representing particularly unique sites, or particularly valuable examples of a class of historical resource. If the recommended mitigation measures are implemented, the loss of these sites will be offset by information gain. This information will prove valuable in assessing and interpreting historical resources in the region in the future.

4.4.2 *Regional Study Area*

The general region around the Project area is relatively well-known archaeologically. A culture history for the region can be found in Section 2 of this report, a brief summary of the importance of archaeological resources specific to this region can be found in Meyer and Roe 2007a, and a more comprehensive report based on detailed knowledge from survey and excavation can be found in Meyer and Roe 2010. The RSA for this assessment is presented in Figure 7. Known site locations within that RSA have not been plotted due to ACCS concerns over the disclosure of site locations and its effect on the protection of historical resources, but information related to them is summarized below and in Table 2.

The RSA has been defined as an area within ten kilometers of the LSA. This area was established using the “buffer” feature in ArcGIS 10 based on the shapefiles for the Project mine permit area. One important justification for the ten kilometer zone is based on our understanding of human movement and resource use in the area. Ten kilometers is often seen as a reasonable sphere of movement on a daily basis for human groups occupying and using the region. The RSA incorporates portions of a number of the meaningful drainages in the region, including the Embarras, Lovett, Erith, Pembina, and McLeod Rivers, and several important creeks including Dummy, Bryan, White, Prest, Lendrum, Lund, McNeill, Mercoal, Chief, Beaverdam, Centre, Wickham, and Mitchell, and other drainages known to have historical resources associated with them. It includes meaningful regional geographical and topographic variability including portions of the Embarras Plateau to the southwest, the Edson Lowlands to the northeast, and strong ridge systems in between. In addition, the RSA includes portions of the historic Coal Branch area, the early settlements of which had a strong influence on the types of historic period materials to be found in both the RSA and LSA. Based on our comprehensive knowledge

Table 2 Summary of Archaeological Sites in the Local and Regional Study Areas		
Period	Local Study Areas	Regional Study Area
Precontact Period Sites*	58	406
campsite	13	58
workshop	5	41
quarry	0	5
large artifact scatter(>10)	2	22
small artifact scatter(<10)	18	172
isolated find	15	100
other	0	2
Historic Period Sites*	9	84
settlement	1	7
logging camp or cabin	5	30
mine	2	16
other	1	31
Precontact and Historic Period Sites**	0	14
campsite	-	6
workshop	-	1
small artifact scatter(<10)	-	5
settlement	-	4
cabin	-	3
mine	-	1
other	-	1
Total Recorded Sites	67	504
Percentage of Historic Sites that are Significant	89%	69%
Percentage of Precontact Sites that are Significant	28%	27%
Total Percentage of Significant Sites	36%	35%
Percentage of all Sites Extant***	54%	54%
Percentage of All Sites Removed or Disturbed***	46%	46%
Percentage of All Significant Sites Extant***	50%	75%
Percentage of Significant Sites Removed or Disturbed***	50%	25%

* Site Type is open to interpretation, and sites can and sometimes have been given multiple types. These figures should be taken only as generally representative, particularly for Historic Period sites, where in some cases logging camps or settlements may simply have been classified as "dwelling," making it difficult to categorize the sites from available summary information. There are undoubtedly logging camps in both the cabin and settlement categories, and likely settlements in the mining categories.

** The figures show the types of components reported to be at the mixed component sites, and will not add up to 14.

*** Following Development of the Robb Trend Project

of the region and its known historical resources, this RSA is considered to be a meaningful representation of the sites to be found in the region.

4.4.2.1 RSA Sample Parameters

Within the RSA, a total of 504 archaeological sites have been recorded. This number includes those recorded for the Project. Virtually all of these sites have been recorded in

the context of HRIA work, and demonstrate the overall high amount of past development the area has witnessed. The reader must also bear in mind that although the authors believe the site sample is representative of the types and quantities of sites to be found in the region, it is a sample, derived from HRIA work, but does not represent what one would consider to be a stratified random sample that one might expect from a regional survey for solely research purposes.

Sites recorded exclusively as Historic Sites (i.e. standing structures) have been excluded, as the vast majority of sites classified as such under the *Historical Resources Act* have also been recorded as Historic period archaeological sites. The database excludes two palaeontological sites, and several sites that appear to be exclusively of a traditional use nature. Palaeontology is excluded as there is only a single notation for palaeontology in the RSA on the *Listing of Historic Resources*, for a mammalian fossil site on the existing CVM lease along a railroad cut near Diss. The traditional use sites are excluded from the sample as there have been other traditional use sites recorded in the region that do not appear in the Provincial databases for privacy concerns, thus skewing the representativeness of the sample.

The data represent the RSA database to the best of our current knowledge. There may be some discrepancies considering how long ago many of the sites were first recorded, the uncertainty regarding some old site location information, and the fact that some sites have never been fully reported on in HRIA reports. The database includes information on site significance and whether or not they are extant. Once again, some discrepancies may occur because recommendations regarding significance are old, and in many cases it is unclear if sites are still extant. Some sites have been mitigated and likely removed in development, some sites have been mitigated yet are still extant, and some sites have been partially mitigated and partially removed. HRIA reports and recent satellite imagery has been consulted to help determine if sites are still extant. However, for a completely reliable accounting of this, ground-truthing of the majority of sites would need to happen. In addition, all of those sites that will be removed in development of the Project, or those which the authors believe will be removed in near-future developments in the region including mining and forestry operations, have been accounted for in the following discussions as “removed in development.” Sites whose condition is entirely unknown are also included as “removed in development.”

4.4.2.2 Historical Resources of the RSA

Of the 504 sites in the RSA database, 356 or almost 71% were initially recorded by the authors or revisited by them in the context of HRIA work in the last ten years, indicating our strong familiarity with the historical resources of the region. Four hundred six of the sites are Precontact sites, 84 are Historic period, and 14 are known to have both Precontact and Historic components. Thirty-five percent of the previously recorded sites were or are considered to be worthy of additional investigation for data recovery prior to disturbance. While its approximately 9,947 hectares represents 6.5% of the RSA’s 153,359 hectares, the LSA’s 61 sites represent 12% of the RSA site database. Considering that the entire RSA has not been surveyed for historical resources, this is not surprising.

Two hundred seventy-one of the sites previously recorded in the RSA appear to be extant. Therefore, assuming the Project is developed, 46% of the recorded sites in the RSA will have been removed. If we look at significant sites, i.e. those on which a professional has recommended additional work prior to site removal, 25% of the 179 significant sites will have been removed or disturbed by development following completion of the Project. That will leave 75% of the known sites considered to be of higher value for future study still extant in the RSA. One hundred eighteen of the extant significant sites have Precontact period components, and 69 have Historic period components.

Previous HRIA work programs for the Project, previous CVM extensions, forestry developments, and oil and gas projects have resulted in HRIA work conducted on an estimated 20-25% of the entire land base within the RSA. Bearing in mind that HRIA work necessarily restricts intensive activities to areas considered to have high potential, it is safe to say that minimally 1000 hitherto unrecorded and discoverable archaeological sites are to be found in the remaining 75% of the RSA that has not been subject to HRIA work. Until such work is complete, the precise number of sites and their overall significance is of course unknown, but nonetheless indicates that many significant Precontact and Historic sites are yet to be found in the RSA.

4.4.3 *Cumulative Effects Summary and Conclusion*

Following development of the Project, 75% of the known, significant historical resources in the surrounding region will be extant and available for future study of both Precontact and Historic periods. An unknown but large number of significant sites are assumed to be present in undeveloped portions of the region, likely numbering well into the hundreds. As historical resources are not mobile, the precise impact of future development on these resources can only truly be assessed once those developments are proposed and HRIA work is undertaken. However, given that previous development in the region has affected somewhere between 20-25% of the land base, yet 75% of the significant sites within those areas have been fully or partially preserved. Many of those removed have been appropriately studied and information collected prior to removal, so we can expect that implementation of the *Historical Resources Act* on any future developments will result in an appropriate balance between information loss, information gain from mitigation, and preservation of a large sample of sites for future research.

The development of the Project, in combination with existing developments and possible future development, will not have a deleterious cumulative effect on historical resources in the area. Any losses are typically offset by the data gained during mitigation activities, which are typically our only source of information on the historical resources in the area.

5. SUMMARY AND RECOMMENDATIONS

Previous work in the Project area included reconnaissance and testing of large parts of the area in the context of previously proposed mines, forestry cut blocks, pipelines, and coal exploration programs. Including the Project work, these programs resulted in the excavation of at least 3000 shovel tests, 2615 of which were excavated by the authors and crews in the last ten years. In addition to surface reconnaissance of high potential areas and ground-truthing and inspection of others, a total of 2,110 shovel tests were excavated specifically for the Project. These work programs have resulted in the recording of 67 sites in the Project area. These sites range considerably in size, age, and significance. Table 1 provides information on all recorded historical resources within the Project area, and provides summary recommendations for the sites if they are to be disturbed by the Project or other future development activities.

5.1 Outstanding Issues

Due to subsequent changes to the proposed mine permit area or footprint, several small areas have not been subjected to HRIA work (see Figure 8, Table 3).

Area	LSD	Section	Township	Range	Meridian	Recommendations
Robb Trend Main – Center – East	2,3,4	4	49	20	W5	No HRIA, low or moderate potential
	4	32	48	20	W5	No HRIA, low or moderate potential
	15,16	33	48	20	W5	No HRIA, low or moderate potential
	11,12,13	34	48	20	W5	No HRIA, low or moderate potential
	1	18	48	19	W5	HRIA prior to development if disturbance extends to eastern half
	1,7,11	8	48	19	W5	No HRIA, low or moderate potential
	8	4	48	19	W5	No HRIA, low or moderate potential
	4	3	48	19	W5	No HRIA, low or moderate potential
	15	8	47	18	W5	No HRIA, low or moderate potential
	5	3	47	18	W5	No HRIA, low or moderate potential
	9,15	33	46	18	W5	No HRIA, low or moderate potential
East side river 15	22	46	18	W5	HRIA prior to development impacts if footprint to extend into area	
8,10,15	27	46	18	W5	HRIA prior to development impacts	
Robb Trend West	15,16	19	49	21	W5	No HRIA, low or moderate potential
	11	20	49	21	W5	No HRIA, low or moderate potential
	9,14,15	21	49	21	W5	HRIA prior to development if disturbance footprint extends further in this area, otherwise area of higher potential not to be impacted
	3,5	22	49	21	W5	HRIA prior to development if disturbance footprint extends into these LSDs
	3,4,5	28	49	21	W5	HRIA prior to development if disturbance footprint extends further in this area, otherwise area of higher potential not to be impacted
	8,9,10,14	29	49	21	W5	No HRIA, low or moderate potential
	2,3,5,6,12	30	49	21	W5	HRIA prior to development impacts
	1,5,6,7,8	31	49	21	W5	HRIA prior to development if disturbance footprint extends into these LSD 5; other LSDs no HRIA, low or moderate potential
	4	32	49	21	W5	No HRIA, low or moderate potential
	9,16	25	49	22	W5	HRIA prior to development if disturbance footprint extends into

						these LSD 9; no HRIA in LSD 16, low or moderate potential
	1	36	49	22	W5	No HRIA, low or moderate potential
Bryan Corridor	1,2,3,5,6,11	9	49	21	W5	No HRIA, low or moderate potential
	2,3,6,7,8, 9, 10,11,14,15,16	4	49	21	W5	No HRIA, low or moderate potential
	5, 12, 13	3	49	21	W5	No HRIA, low or moderate potential
Erith Corridor	6,11, west half 14	29	48	21	W5	No HRIA, low or moderate potential
	East half 12	21	48	20	W5	No HRIA, low or moderate potential
	8	20	48	20	W5	No HRIA, low or moderate potential
	7	17	48	20	W5	No HRIA, low or moderate potential
Halpenny Corridor	2,7	12	48	20	W5	HRIA prior to development if disturbance footprint to extend further west into western part of LSD 7

5.1.1 Robb Trend Main – Centre – East

Since the completion of HRIA work in Robb Trend Main – Centre – East, several changes have been made in the mine permit area, in some cases resulting in a reduction from the area subjected to work, and in other cases expanding the area. A total of 22 LSDs or portions thereof were not directly included in the HRIA programs. However, almost all of those fall in areas considered to be of low potential, and we recommend that no HRIA be required in those areas prior to development of any ground disturbing activities associated with the Project.

Some small areas along the Pembina River at the very southeastern end were not subjected to HRIA work. These areas in LSDs 8, 10, and 15-27-46-18-W5M and the east side of the river in 16-22-46-18-W5M are high potential, and should be inspected prior to development. Only the eastern portions of LSD 1-18-48-19-W5M along the margins of a small stream should be subjected to HRIA work if ground disturbing is to extend to this area.

5.1.2 Robb Trend West

Since the completion of HRIA work in Robb Trend West, several LSDs have been added to both the mine permit area and disturbance footprint. However, ground-truthing activities during the course of the HRIA program and during traditional use studies found that most of the additional areas are of low to moderate potential. However, some of the additional LSDs have landforms of elevated potential. In some cases the currently proposed footprint will not impact these areas, but in others it will. Table 3 details those areas on which we recommend that HRIA be required prior to development of any ground disturbing activities associated with the Project.

5.1.3 Bryan Corridor

The southern end of the permit area and footprint associated with the road in the Bryan Corridor was revised and shifted further to the east after completion of the field program. Portions of the revised area were directly inspected under Permit 2008-160 for the

previously assessed Yellowhead Tower Extension. The remainder of the area is rugged, with high ridges separating small, steep, and deep drainages. Lifeways consider this area to have low historical resources potential, and recommend that no HRIA work be required here prior to development of the Project.

5.1.4 *Erith Corridor*

Since the completion of HRIA work in the Erith Corridor, portions of five LSDs have been added to the mine permit area. The entire proposed disturbance footprint was included in the HRIA program. Nonetheless, all of the additional areas are of low potential. We recommend that no HRIA be required in those areas prior to development of any ground disturbing activities associated with the Project.

5.1.5 *Halpenny Corridor*

Since the completion of HRIA work in the Halpenny Corridor, portions of two LSDs have been added to the mine permit area. The entire proposed disturbance footprint was included in the HRIA program. However, should the disturbance footprint be shifted to include portions of the western half of LSD 7-12-48-20-W5M not surveyed previously, we recommend that an HRIA be undertaken in that area.

Thorough HRIA work has been undertaken throughout the rest of the Project area, and we recommend that *Historical Resources Act* clearance be granted for ground disturbing activities throughout the proposed Project mine permit area save for the significant site areas outlined in Sections 5.4.4 and 5.4.5 below and the small areas of high potential not inspected previously (only if to be impacted).

5.2 **Historical Resources in the Project Area That Have Been Previously Mitigated**

Two Precontact archaeological sites located in the Project area were previously mitigated. These sites include FgQf-70, mitigated for construction of West Fraser's 3-12-308 Road, and FgQe-66 mitigated in 2009 in advance of coal exploration activities by the CVM. *Historical Resources Act* clearance has been granted to CVRI or other companies for the disturbance of these sites. We recommend that no further work be required prior to development of the Project.

5.3 **Historical Resources on Which No Further Work is Recommended**

A total of 42 historical resource sites have been recorded within the proposed mine permit area and/or disturbance footprint during the HRIA programs for the Project or other developments, and on which no further work prior to disturbance is recommended. Again, these sites are typically small, have low artifact density or diversity, or are heavily disturbed.

No further work is recommended on sites FfQd-14 and 15, FgQd-6, FgQe-31, 34, 35, 65, 67, 68, 69, 70, 72, and 73, FgQf-71, 73, 74, 154, 186, 187, 188, and 189, FhQf-18, 19, 21, 26, 37, 39, 105, 112, 113, 114, 115, 116, 117, 118, and 120, FhQg-79, 80, 81, 82, 83,

and 87 prior to development of the Project or any other ground disturbing activities. With the exception of those sites recorded under Permit 10-234, these recommendations have been previously made and accepted by ACCS.

5.4 Historical Resources in Disturbance Footprint on Which Mitigation is Recommended Prior to Disturbance

A total of 12 significant historical resource sites have been recorded within the proposed mine permit area that also lie within or directly adjacent to the currently proposed disturbance footprint for the Project. These sites are considered to be of high local, regional, or high regional archaeological significance and Lifeways have recommended that additional investigation be required prior to impact of these. These sites are either Precontact or Historic Period in association, and recommended mitigation strategies vary from site to site and include artifact collection, test excavations, excavations programs of varying scales, and archival or informant research.

Additional investigation is recommended on sites FgQd-7, FgQe-71, and 75, FhQf-20, 38, 106, 109, 110, 119, and 121, FhQg-84, 85, prior to development of the Project or any other future ground disturbing activities. With the exception of those sites recorded under Permit 10-234, these recommendations have been previously made to ACCS.

ACCS agreed with most of those recommendations save for sites FgQe-75, FhQf-20, and FhQf-109 to which they disagreed, and have required no additional investigation prior to site disturbance.

5.5 Historical Resources in Mine Permit Area on Which Mitigation is Recommended If to be Disturbed

A total of 11 significant sites have been recorded within the proposed Project mine permit area, but outside of areas currently slated for ground disturbing activities. These sites require either continued avoidance or mitigation should development plans change to include impact to these. These sites are considered to be of high local, regional, or high regional archaeological significance, and we have recommended that additional investigations be required prior to impact. These sites are either Precontact or Historic Period in association, and recommended mitigation strategies vary from site to site and include artifact collection, test excavations, excavations programs of varying scales, and archival or informant research.

Additional investigations are recommended on sites FgQd-8, FgQe-74, FgQf-72, 157, 190, and 191, FhQf-23, 107, 108, and 111, FhQg-86 prior to any future proposed ground disturbing activities associated with the Project or any other proposed development. Should these sites continue to be avoided, no further work would be required. With the exception of those sites recorded under Permit 10-234 these recommendations have been previously made to ACCS.

ACCS agreed with most of those recommendations save for sites FgQe-74, FhQf-107, and FhQf-108 to which they disagreed, and have required no additional investigation prior to site disturbance.

5.6 Scheduling of Additional HRIA and Mitigation Work

Should further HRIA work be necessary as a result of the recommendations herein or other permit area/footprint changes, or required by ACCS based upon review of these results, more than sufficient time will be available prior to the commencement of any ground disturbing activities given the time required for Project application review.

In addition, the recommended staged mitigation programs on those significant sites to be impacted can also be readily accomplished prior to initiation of Project impacts. During 2012, Stage I mitigation programs on all sites in the current proposed footprint could be completed by early summer, with Stage II programs undertaken in late summer and early fall, and subsequent archival, analysis, and report writing in the following winter months, with presumed *Historical Resources Act* clearances in place by spring, 2013.

Outstanding HRIA and mitigation work requirements will have no impact on the currently proposed schedule of Project activities.

5.7 Conclusions

Building on significant HRIA programs of the past, the 2009 and 2010 HRIA programs for the proposed Project have successfully resulted in the recording of a significant suite of both Precontact and Historic Period historical resources. This HRIA program has contributed to the site database in the region, and added to our understanding of settlement patterns and resource use in the area. Mitigation programs implemented on any sites to be impacted will further enhance our understanding of the Coal Branch area's past in particular and Alberta in general.

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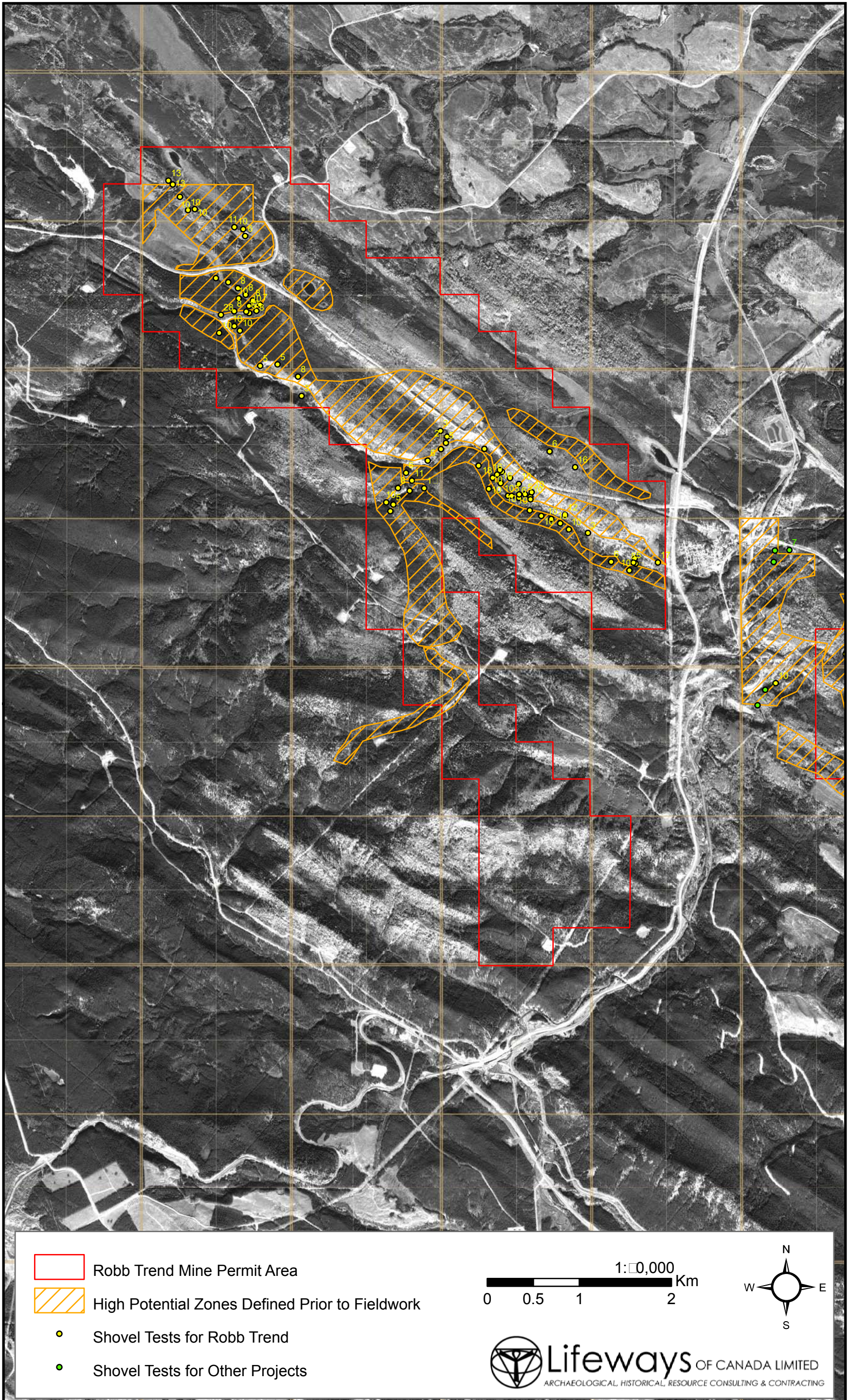


Figure 1: Robb Trend West and Bryan Corridor Permit Boundary, Potential Zones and Shovel Test Locations.