

Section A
Project Introduction



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A PROJECT INTRODUCTION

A.1 INTRODUCTION

Coal Valley Resources Inc. (CVRI) owns and operates the Coal Valley Mine (CVM) which is located approximately 100 km south of Edson in the Coal Branch area of Alberta (Figure A.1-1). This area has an extensive coal mining history dating back to the early 20th century when coal extraction was carried out using underground mining methods. Modern surface mining was introduced into the Coal Branch Area during the 1960's.

The CVM has been in operation since 1978 employing both truck/shovel and dragline mining methods. The mine has established a reputation as a dependable supplier of high quality thermal coal for overseas and domestic markets. Depleting coal reserves within the existing CVM permit area require further mine development to allow CVRI to maintain its workforce and to continue to supply thermal coal to its customers. At current forecasted rates of coal production, CVRI will be required to enter new permit areas by mid-2014 as coal reserves in the existing permit area will be depleted.

CVRI is proposing to continue operations of the CVM by developing coal resources in the Robb Trend Area (Figure A.1-2). The Robb Trend Project (Project) is not a new mining development but is rather an extension to the existing mining and coal processing activities at the CVM. The existing infrastructure and resources currently in place for the operation of the CVM will be extended to the Project. The considerable operations and reclamation expertise of CVRI from the existing mining areas will be important to the success of the Project.

The Project is adjacent to existing mining operations and was initially disclosed to the public in 2006. CVRI's reserve estimate for the Project area indicates that it would release approximately 177.5 million tonnes of coal for processing yielding approximately 88.75 million clean metric tonnes (CMT) available for sale. This additional tonnage would provide CVRI with the necessary resources to operate at projected rates of production until 2038.

A.2 PROJECT PROPONENT

Headquartered in Edmonton, Alberta, CVRI is owned by Sherritt International Corporation (Sherritt). Sherritt's common shares trade on the Toronto Stock Exchange under the symbol "S". Sherritt is the largest thermal coal producer in Canada. Sherritt is also a world leader in the production of nickel and cobalt from lateritic ore, with operations in Cuba, Canada and a significant project under development in Madagascar. Sherritt also produces oil and gas from assets in Cuba, Spain and Pakistan, and is the largest independent power producer in Cuba.

CVRI is the owner of the CVM, Gregg River Mine, Obed Mountain Mine and Coleman properties, all located in Alberta. The Project represents a long term resource development within the Coal Branch area of foothills of west central Alberta. The CVM operation was the first exporter of thermal coal within the area and has the capacity to produce more than 4 million tonnes of sub-bituminous thermal coal annually.

Over its 35-year history in Alberta, CVRI has established a track record of success in managing safe, efficient and environmentally responsible mining operations. The CVM has been recognized locally, provincially, and nationally for its safety and environmental achievements.

Throughout this history of mine operations CVRI has also become a well respected supplier to international markets. The Coal Valley brand is known throughout the world as a consistent and stable producer of coal with favorable quality characteristics. The high heat value, high volatile content and low sulphur values are attractive features for most coal users. Main markets are at numerous facilities in Korea and Japan.

Over the 35 years of operation, CVRI, through its operations at the CVM, has achieved many outstanding results which will assist in the development of the Project including:

- an expert understanding of how to mine the coal seams in this area;
- excellent environmental controls and procedures that have evolved over time;
- establishment of a stable, dependable, and skilled workforce;
- an excellent union management relationship;
- a favorable safety record and culture;
- becoming part of the local economy and landscape;
- site specific reclamation techniques that have evolved according to site specific circumstances;
- achievement of reclamation success evidenced by successful certification of reclaimed areas;
- industry leading practices in developing end pit lakes;
- demonstration of reforestation success over the long term;
- demonstration of long term water management results; and
- the ability to bring years of experience to continued mining.

A.3 PROJECT NEED AND ALTERNATIVES

A.3.1 PROJECT NEED

CVRI has been mining coal at the CVM since 1978. Currently nearly 500 employees work at CVM, and to date it has supplied 60 million tonnes of coal to the global market place. This has had a significant long term positive effect on the local and provincial economy.

CVRI is committed to the continued development of coal reserves, particularly those in close proximity to existing mining operations. In 2005 CVRI expanded its Coal Valley Mine Coal Processing Plant (Plant) to nearly 4 million tonnes per year, doubling thermal coal production capacity at the mine.

At current forecasted rates of coal production, the CVM will need to enter new permit areas by 2014 in order to continue to utilize its newly refurbished Plant, and existing workforce to serve customers into the future.

Over the years, the focus of CVRI's operations at the CVM has shifted to supplying coal to customers in the Pacific Rim. Continued coal supply provided by the new mining areas will be shipped via rail to coal terminals on the coast of British Columbia, to be loaded on ships bound for Pacific Rim locations. CVRI expects export coal markets to remain relatively strong into the future. Volatile natural gas pricing in North America, the use of thermal coal in metallurgical markets, strong Chinese domestic requirements and increased demand in other north Asian countries contribute to strong coal sales.

The Project will create economic benefits for a significant portion of the local and regional population. CVRI strives to achieve economic development, employment, environmental responsibility and community benefits for the region.

Development of the Project will provide the following benefits:

- continued receipt of revenue in the form of production royalties, license fees and taxes by municipal, provincial and federal governments;
- continued use of goods and services provided by local, regional and provincial contractors and retailers;
- opportunities for Alberta and Canadian engineering firms, contractors, manufacturers and suppliers to compete in the supply of goods and services; and
- employment which includes skilled, well paid, full time positions.

A.3.2 PROJECT ALTERNATIVES

A.3.2.1 Development of Alternate Coal Reserves

A range of development alternative assessments were carried out for the Project. Initially, CVRI considered development of the various coal reserves in the region including those not currently held by CVRI.

Some of the evaluation factors that were considered in assessing the Project development alternatives include:

- coal leases – held by CVRI or not;
- geological understanding of the coal reserves and quality;
- engineering and mining factors - technical feasibility, pit design, operating reliability, safety, operating and capital costs and abandonment and decommissioning;
- haul distances – distance from the current Plant site;
- biophysical factors/environment - fisheries, vegetation, timber, wildlife, soils, air quality, noise, groundwater, surface water and hydrological; and
- social factors including regulatory processes, land and resource uses, recreational uses, historical values, traditional land use values, public response and safety, and economic considerations.

The evaluation of the different factors considered for the project alternatives are provided in [Table A.3-1](#).

Table A.3-1 Summary of Evaluation of Project Alternatives							
Coal Lease Areas	CVRI Coal Leases	Geological Understanding	Mining Factors	Safety	Haul Distances	Environment	Social Factors
Project	3	2	3	3	3	3	3
Oppelt	3	2	2	3	2	2	3
McLeod East	3	1	2	3	2	2	3
Pits 31 W and 32	3	2	2	3	3	3	3
Manalta McLeod River	1	1	1	3	1	2	2

1. Fair 2. Good 3. Best **Bold - CVRI's Choice**

Of the options considered, the Project area was deemed the most suitable for development at this time.

A.3.2.2 Other Development Alternatives Considered

In addition to considering alternate coal leases for development, CVRI also considered underground mining as opposed to surface mining and relocation/construction of a new plant as opposed to continuing to use the existing Plant. Some of the evaluation factors that were considered in assessing these alternatives include:

- Surface mining – all existing staff at the CVM are trained in surface mining techniques. All equipment is related to surface mining. The mine operates safely and efficiently as a surface mine. The CVM has operated over two years without a lost time accident. CVRI has determined that continuing to use surface mining techniques is the best option at this time.
- Underground mining – CVRI had previously tested underground mining at the existing mine in the early 1980's. While it was technically feasible, there were concerns with the geotechnical stability of the geological formations and the safety of the employees. The production rates were also of concern. CVRI decided to abandon the underground mining and focused on surface mining. CVRI, as a result of this previous testing, the continuity between the existing CVM geology and the Project geology, the lack of trained and available underground mining personnel and equipment, and the continuation of production rate concerns, does not consider underground mining a viable alternative in the Coal Valley region.
- Construct new plant – the construction of a new coal processing plant would require a significant capital investment projected to be greater than \$300 million. The development of the Project as proposed would require no additional capital investment in coal processing facilities.

- Utilize existing Plant - the recent updates to the Plant make it attractive to continue utilizing the existing Plant. The capital costs to continue using the Plant would be negligible. All infrastructure is in place to wash the coal, dry, store and load it on trains. There are nearby areas to store the Plant rejects and coal tailings materials. CVRI has determined that using the existing Plant is the best option at this time.

The primary factors of importance in determining the economic feasibility and mineability of a reserve are proximity to infrastructure, zoning (land use and regulatory), size, quality and geological setting of the reserve. To be economically feasible, the development of a thermal coal mine requires an adequate and a skilled workforce located close to infrastructure that will provide it with the required support facilities. Because the bulk of the thermal coal is exported, proximity to rail lines to transport the coal to ports on the west coast is essential.

A.3.3.3 Access Corridor Options Considered

The development of the Project requires construction of new access corridors in order to transport coal from the Project area to the existing Plant. CVRI identified and evaluated six different access corridor options. These options were evaluated based on:

- proximity to potential air and noise emission receptors;
- water management requirements;
- environmental sensitivities;
- coal haul characteristics including length of haul, slope grade, and
- overall construction cost.

The access corridor options were internally evaluated on the above criteria and externally evaluated during the consultative process including the open houses conducted during the application development. The Project application presents the three access corridor options that are a balance of economic, environment and social factors.

Information regarding the evaluation of the access corridor options is provided in [Section C.2.1](#).

A.4 APPLICATION FOR APPROVAL

This application for the Project provides the government regulators with the necessary information to decide whether or not the Project ensures the orderly, efficient and economic development of Alberta's coal resources in the public interest. The application is focussed on these criteria and provides the conceptual Project level information necessary to support a positive decision.

This application has been prepared by CVRI and is submitted to the Energy Resources Conservation Board (ERCB) in pursuit of a Mine Permit pursuant to the *Coal Conservation Act*.

As the proposed Project is also a mandatory activity with regard to the *Environmental Protection and Enhancement Act*, CVRI has also completed a detailed Environmental Impact Assessment (EIA) document that is meant to satisfy the environmental assessment process required by the ERCB and Alberta Environment and Water (AEW).

The Project will also require the future issuance of authorization(s) pursuant to Federal legislation and regulations. Therefore, this application is also meant to address the environmental assessment process of the Canadian Environmental Assessment Agency (CEA Agency).

The purpose of the environmental assessment process is to support the goals of environmental protection and sustainable development, to integrate environmental protection and economic decisions at the earliest stages of planning an activity, to predict the environmental, social, economic and cultural consequences of a proposed activity and to assess plans to mitigate any adverse impacts resulting from the proposed activity, and to provide for the involvement of the public, proponents, the government and government agencies in the review of proposed activities.

The detailed EIA report, to assess the environmental and socio-economic effects of the Project, has been prepared in accordance with the requirements of the *Environmental Protection and Enhancement Act*, the *Coal Conservation Act* and the *Canadian Environmental Assessment Act*.

CVRI had previously requested and received final terms of reference for the environmental assessment report and anticipates that this application fully satisfies those terms of reference.

CVRI also submits this application to address the broad requirements of the applicable legislation by providing sufficient information for the reviewers to determine, at a project scale, whether or not the Project should be permitted and proceed to the more detailed level of licensing.

CVRI intends to proceed with the preparation and submission of the detailed information required for the various operating approvals once this Project level review is underway.

A.4.1 APPLICANT INFORMATION

The name and address of the applicant for the Project is:

Coal Valley Resources Inc.
Coal Valley Mine
Bag Service 5000
Edson, Alberta T7E 1W1

Correspondence concerning this application should be directed to the above address to the attention of:

Name: Les LaFleur, Project Manager
Phone: (780) 865-8607
Fax: (780) 865-8630
E-Mail: llafleur@coalvalley.ca

A.4.2 EXISTING APPROVALS

Development at the CVM began in 1977 and since then has received a number of regulatory approvals for its continuing operations. Some of the existing approvals held by CVRI for the CVM are listed in [Table A.4-1](#). Copies of these approvals are provided in [Appendix 6](#).

Table A.4-1 CVM Existing Operating Approvals			
Approval Number	Description	Issued Date	Expiry Date
EPEA			
00011066-02-00	Renewal	Nov. 10, 2010	Nov. 9, 2020
00011066-02-01	Amendment	Nov. 10, 2010	Nov. 9, 2020
00011066-02-02	Addition of Pits 152 & 162	Nov. 10, 2010	Nov. 9, 2020
Water Act			
00215635-00-00	Pit 28 Drainage Works	Jun. 1, 2005	Dec. 11, 2013
00215635-00-01	Pit 28 Drainage Works	Oct 20, 2008	Dec. 11, 2013
00222448-00-00	Divert water from Coal Creek	May 25, 2006	May 24, 2016
00222449-00-00	Divert groundwater from 16-23	May 25, 2006	May 24, 2016
00247827-00-00	Mercoal West	Feb. 12, 2010	Feb. 11, 2020
00247827-00-01	Mercoal West	Mar. 24, 2010	Feb. 11, 2020
00285848-00-00	Yellowhead Tower	Oct. 13, 2011	Nov. 9, 2020
Coal Conservation Act			
C2005-6	Mine Permit	May 18, 2005	None
C2005-6C	Permit Amendment	Feb. 8, 2010	None
C2005-6D	Permit Amendment	Dec. 6, 2010	None
C2005-6E	Addition of Yellowhead Tower Haulroad	Nov. 10, 2011	None

A.4.3 REQUEST FOR APPROVAL

The regulatory approval process for coal projects is a staged process.

In this first stage of the process, CVRI is applying to the ERCB for a mine permit area and, as required, submitting an EIA to AEW. Therefore, this application for a mine permit, including the EIA report, presents conceptual details regarding how the Project will be developed, operated and reclaimed. As there is a requirement under the *Canadian Environmental Assessment Act* for an assessment of the environmental effects of the Project, a coordinated report including those requirements has been prepared and submitted for review at the same time.

In the second stage of the process for approvals for the Project, CVRI will submit an application to the ERCB for licences to develop various pits and dumps and an application to AEW for approval to develop, operate and reclaim the proposed Project. These applications are generally

limited to 5 – 10 year operational areas and specify the proposed operation to a greater detail. It is at this stage where CVRI will provide specific details on how the Project will be developed, operated and reclaimed.

In the third stage of the process for approvals for the Project, CVRI will prepare and submit the necessary applications to obtain the specific surface access dispositions and agreements required to support the Project. These authorizations for projects on Public Lands, currently administered through Alberta Sustainable Resources Development (SRD), will be the final approvals needed for access to the Project.

A.4.3.1 Energy Resources Conservation Board

In accordance with Section 10 of the *Coal Conservation Act*, CVRI is requesting approval to amend the existing mine permit C2005-6. Lands required for the Project mine permit boundary are listed in [Table A.4-2](#) and shown on [Figure A.1-2](#).

TWP-RGE	Sec	LSD/QTR	TWP-RGE	Sec	LSD/QTR
46-18-W5M	22	LSD 7, 8, 11, 13, 14; NE	48-20-W5M	21	LSD 12, 13
	27	LSD 10, 15; SE; SW; NW		22	LSD 9, 14, 15, 16
	28	LSD 1, 8, 14; NE		23	LSD 9, 10, 15; SE; SW; NW
	32	LSD 8, 14; NE		24	LSD 2, 12; SW
	33	LSD 9, 10, 15; NW; SW; SE		26	LSD 2, 12; SW
	34	LSD 4		27	All
47-18-W5M	3	LSD 4, 5	28	LSD 4, 5, 8; NE; NW	
	4	LSD 10; NW; SW; SE	29	LSD 6, 11, 14; NE; SE	
	5	LSD 1, 7, 8, 11, 13, 14; NE	31	LSD 16	
	7	LSD 1, 7, 8, 11, 13, 14; NE	32	All	
	8	LSD 1, 2, 7, 10, 15; SW; NW	33	All	
	18	LSD 1, 2, 7, 10; SW; NW	34	LSD 2, 7, 11, 12, 13; SW	
	19	LSD 4	49-20-W5M	4	LSD 2, 3, 4
47-19-W5M	13	LSD 1, 7, 8, 11, 13, 14; NE		5	LSD 12; SE; SW
	23	LSD 1, 7, 8, 11, 13, 14; NE		6	LSD 5, 6; NE, NW, SE
	24	LSD 11, 12, 13; SE; SW		7	LSD 3, 4
	26	LSD 1, 2, 7; SW; NW	49-21-W5M	1	LSD 11, 13, 14; NE
	27	LSD 1, 7, 8, 11, 13, 14; NE		3	LSD 5, 12, 13

¹ Areas are based on Alberta township maps and not from a surveyed boundary.

Table A.4-2 Project - Proposed Mine Permit Area ¹						
TWP-RGE	Sec	LSD/QTR		TWP-RGE	Sec	LSD/QTR
	32	LSD 16			4	LSD 2, 3, 6, 7, 8, 11, 14; NE
	33	LSD 6; SE; NE; NW			8	LSD 16
	34	SE; SW; NW			9	LSD 3, 5, 6, 11, 12, 13; SE
	35	LSD 4		49-21-W5M	11	LSD 1, 7, 8; NE
	3	LSD 4			12	LSD 10; SE; SW; NW
	4	LSD 11, 12, 13; SE; SW			14	LSD 1, 2
	5	LSD 6; SE; NE; NW			15	LSD 5, 6; NW
48-19-W5M	6	SW; NE; NW			16	LSD 4, 5, 14; NE
	7	All			17	LSD 1, 7, 8; NE
	8	LSD 1, 2, 7, 11, 12; SW			19	LSD 15, 16
	18	LSD 1, 2, 12; SW			20	LSD 11, 13, 14; SE; NE
	1	LSD 1, 8, 9, 16			21	LSD 9, 10, 15; SE; SW; NW
	8	LSD 10, 15			22	LSD 3, 4, 5
	12	NE; SE			28	LSD 3, 4, 5
	13	LSD 3, 5, 6; NE; NW; SE			29	LSD 9, 10; SE; SW; NW
48-20-W5M	14	LSD 9, 15, 16			30	LSD 3, 5, 6; SE; NE; NW
	17	LSD 2, 7, 12; SW			31	SE; SW
	18	NE			32	LSD 4
	19	LSD 3, 6, 9, 10; SE		49-22-W5M	25	LSD 9, 16
	20	LSD 4, 5, 6, 7, 8, 11, 12, 14; NE			36	LSD 1

A.4.3.2 Alberta Environment

Pursuant to the Alberta *Environmental Protection and Enhancement Act*, the development of the Project is a Mandatory Activity and as such an Environmental Impact Assessment has been prepared in accordance with the Final Terms of Reference (ToR) issued by AEW. A concordance table of the requirements listed in the ToR and where they have been addressed in this document is included in ([Appendix 1](#)).

A.4.3.3 Environment Canada

Throughout the development life of the Project, a number of physical activities will be necessary that may require approvals in accordance with federal legislation such as the *Fisheries Act* and *Navigable Waters Protection Act*.

CVRI undertook early consultation with the CEA Agency to determine the scope and management of Project approvals which will be sought from the federal regulators. CVRI

received confirmation from the Department of Fisheries and Oceans on April 15, 2010 that as federal approval(s) would be required, based on the preliminary information submitted, CVRI should proceed with the preparation of the required environmental assessment. This application addresses those requirements and is submitted with the intent of beginning the regulatory review under the various federal processes. CVRI has also included the recommended Comprehensive Study Checklist for the Project ([Appendix 2](#)).

CVRI's intent is to provide sufficient information to the CEA Agency to evaluate the potential environmental effects of the Project, in order to enable the federal regulators to identify the approvals that may be required and to allow for a decision that those authorizations can proceed. Detailed applications for authorizations required under federal legislation will be made as they are required throughout the life of the Project.

A.4.3.4 Additional Approvals Required

CVRI intends to file separate applications for those parts of the Project that are legislated under various other statutes. Application and approval requirements applicable to the Project that are intended to be submitted under separate cover are:

- development, operation and approval requirements pursuant to the *Environmental Protection and Enhancement Act*;
- development, operation and approval requirements pursuant to the *Water Act*;
- mine licence requirements pursuant to the *Coal Conservation Act*;
- surface rights requirements pursuant to the *Public Lands Act*;
- site surface disturbance clearance pursuant to the *Historical Resources Act*;
- development permits pursuant to the *Municipal Government Act*;
- electrical power interconnections issued pursuant to the *Electrical Utilities Act*;
- removal of potential navigable waters pursuant to the *Navigable Waters Protection Act*;
and
- construction of works that may alter or disrupt fisheries habitat pursuant to the *Federal Fisheries Act*.

A.4.4 APPLICATION GUIDE AND DESCRIPTION

This application to the ERCB and AEW has been integrated in accordance with ERCB and AEW guidelines to facilitate an efficient review by both the regulatory review agencies and the public. The Project application consists of the following components:

- [Section A – Project Introduction](#)
- [Section B – Geology and Geotechnical](#)
- [Section C – Project Description](#)
- [Section D – EIA Methodology](#)
- [Section E – Environmental Assessment Summary](#)
- [Section F – Reclamation Plan](#)
- [Section G – Public Engagement](#)

- [Appendix 1 – Terms of Reference Concordance Table](#)
- [Appendix 2 – Comprehensive Study Checklist](#)
- [Appendix 3 – Project Team](#)
- [Appendix 4 – Glossary and Acronyms](#)
- [Appendix 5 – References](#)
- [Appendix 6 – Existing Approvals](#)
- [Appendix 7 – Public Engagement](#)
- [Appendix 8 – End Pit Lake Report](#)
- [Appendix 9 – Geological and Geotechnical Compilation Report](#)
- [Appendix 10 – Robb Trend Conceptual Mining Summary](#)
- [Consultant Report #1 – Air Quality \(CR# 1\)](#)
- [Consultant Report #2 – Aquatics \(CR# 2\)](#)
- [Consultant Report #3 – Groundwater \(CR# 3\)](#)
- [Consultant Report #4 – Historical Resources \(CR# 4\)](#)
- [Consultant Report #5 – Human Health \(CR# 5\)](#)
- [Consultant Report #6 – Hydrology \(CR# 6\)](#)
- [Consultant Report #7 – Mammalian Carnivores \(CR# 7\)](#)
- [Consultant Report #8 – Noise \(CR# 8\)](#)
- [Consultant Report #9 – Socio-economic \(CR# 9\)](#)
- [Consultant Report #10 – Soils \(CR# 10\)](#)
- [Consultant Report #11 – Surface Water Quality \(CR# 11\)](#)
- [Consultant Report #12 – Traditional Ecological Knowledge and Land Use \(CR# 12\)](#)
- [Consultant Report #13 – Vegetation, Wetlands and Biodiversity \(CR# 13\)](#)
- [Consultant Report #14 – Wildlife \(CR# 14\)](#)

A.5 REGIONAL AND LOCAL SETTING

Regionally, CVRI's existing CVM and the proposed Project are located within the Rocky Mountain Foothills physiographic region in west-central Alberta (Pettapiece, 1986). The existing minesite is approximately 100 km south-west of Edson, Alberta in an area where several mines (surface and underground) were operated earlier in the 1900s. Many of these smaller mines have been re-mined in the current CVM operations to increase overall coal recovery.

Human occupation in proximity to the CVM includes the communities of Robb and Mercoal ([Figure A.1-1](#)). Mercoal is a seasonal community that has approximately 25 residences. The community of Robb, primarily consisting of approximately 190 full and seasonal residents, is in the midst of the CVM and Project and is located along Highway 47.

The Project is located in an area that is favourably zoned for mining. The *Coal Development Policy* for Alberta, which was adopted in 1976, with the purpose of guiding the exploration and development of coal resources throughout the province, indicates that exploration and development of coal deposits are permitted under strict control to ensure environmental

community of Robb, primarily consisting of approximately 190 full and seasonal residents, is in the midst of the CVM and Project and is located along Highway 47.

The Project is located in an area that is favourably zoned for mining. The *Coal Development Policy* for Alberta, which was adopted in 1976, with the purpose of guiding the exploration and development of coal resources throughout the province, indicates that exploration and development of coal deposits are permitted under strict control to ensure environmental protection and satisfactory reclamation of any disturbed land. The Coal Branch Sub-Regional Integrated Resource Plan (1990), which presents the Government of Alberta's resource management policy for public lands within this region of the Eastern Slopes, designates this area as the Robb Highlands Regional Management Area (RMA). The management intent for this RMA is to provide for a range of multiple use activities, while recognizing the area's resource values.

The Project extends nearly 50 km from the Pembina River, past the community of Robb and incorporates leases on the northwest side of Highway 47. The western portion of the Project (Robb West) is drained by the Embarras River and its tributaries. The Erith River and its tributaries run through the middle portion of the proposed mining area (Robb Centre and Robb Main). The south-eastern tip of the Project area (Robb East) drains directly to the Pembina River system.

The land is forested, forming part of the West Fraser Mills Ltd. Forest Management Area (FMA). CVRI has a well-established relationship with West Fraser and will work with them to ensure the orderly development of these areas. Petroleum related activities are scattered throughout the area including gas pipelines and numerous wells. Steep ridges and broad valleys dominate the terrain features in the area (Figure A.5-1). Public access throughout much of the Project area is limited both by the nature of the terrain and the existing land use dispositions in this area, although there is some local snowmobile and quad use in close proximity to the community of Robb. Hunting is active throughout the proposed Project area.

The key parameters for the Project are presented in Table A.5-1.

Parameter	Project Area
Land Zoning	Coal mining permitted Wildlife Zones Present
Nearest Community	Robb
Terrain	Steep ridges, valleys and wetland areas Erith River, Halpenny and Bacon Creeks
Project Permit Area	Approximately 10,113.6 ha Approximately 50 km in length
Estimated Reserves	Approximately 177.8 raw million tonnes Multiple coal seams Steeplly dipping monocline

Table A.5-1 Key Project Parameters	
Parameter	Project Area
Mining Method	Open pit - dragline & backhoe/truck Average 10 km coal haul

A.6 DEVELOPMENT PLAN

It is anticipated that the Project will be developed in a number of stages using both dragline and truck/shovel mining methods. The life of mine development plan is included as [Figure A.6-1](#). Mining will begin in Robb Centre and Robb Main then progress to other portions of the mine. Subsequent regulatory applications will be submitted as required throughout the life of the Project. The development schedules for the Project area is shown in [Table A.6-1](#). Additional details of the proposed mine development and scheduling are provided in [Section C.3](#).

Table A.6-1 Conceptual Development Schedule																								
	2012				2013				2014				2015				2016				2017 - 2038			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Regulatory Review Phase																								
EIA and Mine Permit Application	█				█																			
Mine Licence and EPEA Amendments		█				█				█				█										
Federal Approvals & Authorizations	█				█				█				█											
Surface Dispositions and Agreements									█				█											
Pre-Production Phase																								
Halpenny Corridor Construction									█															
Erith Corridor Construction									█															
Bryan Corridor Construction																					2026			
Robb Centre Preparation													█											
Robb Main Preparation													█											
Production Phase																								
Robb West																					2027 to 2038			
Robb Main													█				█							
Robb Centre													█				█							
Robb East																					2021 to 2038			

A.7 SUMMARY OF PUBLIC ENGAGEMENT

A.7.1 NEED FOR PUBLIC INVOLVEMENT

During its over 35 years of operation at the CVM, CVRI has successfully developed and implemented a consultation plan with stakeholders to ensure wide spread awareness of mine activities and provide a forum for discussing concerns and issues. CVRI anticipates the continuation of their public engagement program, including:

- engaging in ongoing, open and co-operative dialogue with anyone with a sincere interest in the Project;
- considering concerns in the development and design stages of the Project;
- meeting with public participants who reside, use or have a specific interest in the Project area and/or adjacent locale. For those groups having interests, which are provincial in scope, efforts will be made to seek representatives from local chapters residing within the Coal Valley area. Where local representation is not available, CVRI will make participation as convenient as possible through regular correspondence and/or by arranging to meet with interested groups; and
- allowing opportunities for the local community and key stakeholders to assist in decision making for the Project, such as opportunities to view, question and understand CVRI plans and operating practices. Local community and key stakeholder input and review will be one of the criteria used in choosing the preferred development options; and
- providing ongoing public consultation for the life of the Project.

A.7.2 OBJECTIVES AND SCOPE

CVRI has established the following objectives to guide the public engagement program for the proposed Project:

- establish a program within the overall application, work scheduling and budget;
- identify key community and interest groups and people and encourage their participation;
- provide adequate information for people to learn about the Project and weigh the advantages and disadvantages of its development;
- obtain information from the public to assist in Project decision making;
- identify and understand the concerns and issues of stakeholders; and
- enhance public understanding of the Project and foster support through a credible and consistent involvement process.

A broad range of community, stakeholder and public interests have been identified, including (but not limited to and in no particular order):

- First Nations and Métis communities and organizations declared to have a traditional land use (TLU) interest in the area;
- residents and organizations in the Robb, Mercoal and Edson communities;
- local business and other resource holders;

- environment and health interests;
- municipal governments;
- provincial government;
- federal government;
- people with an interest in the area - historical patterns of use;
- recreation users;
- identified industry operators in the region; and
- CVRI employees.

The public engagement program methods included distribution of Project information to area residents, interested groups and individuals, in addition to the CVM employees. The Project was discussed with stakeholders through direct contact, three newsletters and two open houses. A description of the public engagement methods is provided in [Section G](#) and [Appendix 7](#).

A.7.3 RESULTS

From the various consultation methods, a list of comments and concerns regarding the Project was compiled. Complete results of the public consultation program can be found in [Appendix 7](#). The main areas of concern identified to date include:

- mine planning (sequencing and anticipated timing) and proximity to Robb (need for a buffer);
- air quality (dust) and nuisance factors (noise and blasting vibrations, impact on views);
- trapping resources;
- groundwater and surface water quality and quantity;
- land reclamation and end land use;
- recreational access and use;
- aboriginal consultation;
- public information, awareness and engagement;
- underground coal fires;
- economic and social impacts;
- wildlife and fisheries; and
- historic resources.

A.7.4 CONTINUING CONSULTATION

A broad range of interests were identified during the preparation of this application. Should the Project be approved, CVRI intends to continue the communities' engagement in decisions that affect them. CVRI's goal is to carry forward the following public involvement principles as part of mine development operations:

- decisions which may affect the public will be clearly identified and explained;
- public participants will be provided with opportunities to view, learn, question and understand CVRI's operating practices;

- access will be provided to Project representatives to provide information and discuss issues, needs and concerns;
- a variety of mechanisms for involvement are possible and CVRI will endeavour to adopt those that are receptive to the community of interest, and/or most effective and appropriate to the needs or issues at hand. There will be an ongoing relationship with government representatives who regulate, review and approve plans or issue permits or licences;
- meaningful public involvement opportunities will be provided that are advertised, documented, and linked to the Project decision making processes; and
- Project and application time requirements will be adhered to, to the extent possible.

Where appropriate, CVRI staff will also endeavour to serve as a participant or advisor in regional public land and resource planning. For example, over the operating life of the CVM, CVRI has used a wide range of opportunities to maintain a forum for exchange of information and ideas with stakeholders and the general public. Specific opportunities for public input include:

- CVRI's annual participation in the Edson & District Chamber of Commerce Trade Fair; and
- CVRI's status as an active member on West Fraser Mills Ltd. Forest Resources Advisory Group.

Personal contact is encouraged and made with numerous stakeholder groups to discuss specific mine related activities such as off-permit exploration activities and reclamation/lake access considerations.

A.8 ENVIRONMENTAL INFORMATION SUMMARY

The Project EIA and Cumulative Effects Assessment (CEA) have been prepared to comply with all applicable provincial and federal legislation. The EIA methodology and approach was selected to satisfy both federal and provincial requirements within the spirit of the Canada - Alberta Agreement on Environmental Assessment Cooperation.

This application was initiated with the objective of providing a comprehensive and integrated technical and environmental document that would facilitate an expeditious review and regulatory process. This section of the application provides a summary of more detailed information that is contained in [Section E](#) and in the consultant reports ([CR #1 to 14](#)). To assist in the review of this application, a common numbering scheme exists for each discipline between the sections of the report (*e.g.*, Air Quality is discussed in [Sections A.8.1, E.1, and CR #1](#); Fisheries is discussed in [Sections A.8.2, E.2 and CR #2](#)).

Valued Environmental Components (VECs)

The rigorous review of the Project identified a number of environmental aspects that were specific to the proposed development. A list of Valued Environmental Components (VECs) was developed for each of the various disciplines investigated being those environmental aspects associated with the proposed Project, which have been identified as a concern by CVRI, the public, government and professional community. VECs consider both biological (*i.e.*,

ecosystem) and socio-economic attributes because of the broad-based definition of environmental effect.

The EIA and CEA were focused on the effects that the Project would have on the identified VECs, in combination with other activities in the region, over the projected life of the Project. Application of the selected methodology provided the scope for the EIA and CEA.

VECs were assessed using three scenarios:

- baseline case –which includes existing environmental conditions and existing projects or “approved” activities;
- application case – starts with the baseline case and adds only the Project; and
- planned (CEA) case – which includes past studies, existing and anticipated future environmental conditions, existing projects or activities, plus other “planned” projects or activities.

VECs have been identified within each of the following disciplines:

- air quality;
- fisheries resource;
- groundwater;
- historical resources;
- human health;
- hydrology;
- mammalian carnivores;
- noise;
- socio-economic;
- soil and terrain;
- surface water quality;
- traditional land use;
- vegetation, wetlands and rare plants;
- wildlife (ungulates, small mammals, avifauna, amphibians);
- greenhouse gas and climate change; and
- land and resource use.

Study Areas

The proposed Project permit area is approximately 10,113 ha in size. Within this permit area, the “footprint” of the Project is approximately 5,728 ha. The Local and Regional Study Areas (LSA and RSA) varied in geographic extent according to the needs of the different disciplines. The CEA for this Project considered all the existing, approved and reasonably foreseeable projects. The study area boundaries and projects considered in the CEA are discussed further in [Section D](#) (EIA Methodology).

Based on the input received during CVRI's public engagement program, advice from regulatory agencies and the professionals working on the Project, CVRI is confident that the approach used for the EIA and CEA for the Project is comprehensive and accurately reflects the effects of the Project.

A summary of the EIA is provided in this section. The full EIA information is provided in [Section E](#) and the Consultant's Reports which are listed in each sub-section below.

A.8.1 AIR QUALITY

The potential effects of the Project on air quality are discussed in [Section E.1](#) and Consultants Report #1 (CR #1).

The RSA encompasses all Project emission sources and additional regional emission sources within 5 km of the Project sources. Due to the large distances between the different mining areas considered in this assessment (in particular, Robb West and Robb East) a LSA was not defined.

A number of potential VECs were identified during the issue scoping process as they relate to potential human or ecosystem health effects. The air quality VECs include:

- sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), particulate matter (PM_{2.5}; PM₁₀; TSP), volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), ozone (O₃), and metal concentrations;
- particulate and nitrogen deposition; and
- GHG Emissions.

Modelling was done using the CALMET/CALPUFF model, and was conducted according to AEW (2009). Predictions were made for the maximum point of impingement (MPOI) determined using a grid of receptors as well as at 18 specific receptors. These predictions were compared to the *Alberta Ambient Air Quality Objectives* (AAAQO), Alberta Ambient Air Quality Guideline (AAAQG, for hourly PM_{2.5} only), and the Canada Wide Standards (CWS) for regulated compounds.

The Project will result in atmospheric emissions from fossil fuel combustion sources, fugitive emissions from mine equipment, Plant, soil handling, coal movement and wheel entrainment. Two different Project Cases were identified to assess the impact of the Project on the community of Robb. Project Case 1 includes mining in Robb West, Robb East and emissions from the Plant. Project Case 2 includes mining in Robb Main and emissions from the Plant.

For SO₂ the change in the RSA maximum point of impingement (MPOI) values between the Baseline and Application cases was negligible to small. Modeling predicted a slight increase or no change in the ground-level SO₂ concentrations at special receptor locations. No exceedances of the AAAQO were predicted for any of the averaging periods, for any modelling case.

Using the Ozone Limiting Method (OLM) the model resulted in no predicted exceedances of the AAAQOs of NO₂ for any of the assessment scenarios at any averaging period. NO₂ ground-level concentrations were also predicted by the Total Conversion Method. All predictions with the OLM are well below AAAQOs.

For CO no exceedances of the AAAQO's were predicted for any of the averaging periods for any modelling case.

For PM_{2.5} (particulate matter less than 2.5 microns) ground level concentration for each of the assessment scenarios was determined. To account for the mitigating influences of forested vegetation, the predictions were reduced by 75%, less than the minimum recommended reduction. The hourly air quality guideline and the daily air quality objective were not exceeded for any of the assessment scenarios.

For PM₁₀ (particulate matter less than 10 microns) ground-level concentration for each of the assessment scenarios was determined. As with PM_{2.5}, to account for the mitigating influences of forested vegetation, the predictions were reduced by 75%, less than the minimum recommended reduction. The predicted PM₁₀ concentrations are compared to the 2nd highest daily air quality objective for British Columbia as no AAAQO exists for this compound. When the mitigated approach is considered, the B.C. Air Quality Objective is not exceeded for any of the assessment scenarios.

Ground-level total suspended particulate matter (TSP) for each of the assessment scenarios was determined. As with PM_{2.5} and PM₁₀, it is expected that the surrounding vegetation will reduce the predicted ground-level concentrations of TSP by 75%. With mitigation, there were no exceedances of the annual TSP objective at the RSA MPOI, near Robb area or at any special receptors. In general, the greatest effects of TSP deposition are found near all unpaved road sources. Maximum TSP deposition for both the Baseline and Application cases occurs along the Robb Road. These maximum predictions are much less than the Alberta dustfall guidelines, which are meant to address the nuisance effects of dust particles larger than TSP.

The Project generates trace chemical compounds from fuel combustion at the Plant and fuel combustion for vehicles and mine equipment. No exceedances of AAAQOs were predicted for any COPC and, in most cases, the concentrations at the RSA MPOIs are many orders of magnitude below the AAAQOs.

Surface O₃ can be formed through photochemical production from emissions of anthropogenic NO_x, anthropogenic VOCs, and biogenic VOC compounds. When the Project proceeds, it is accompanied by the cessation of activity in Yellowhead and Mercoal Mines, and in this sense the Project results in a relocation of current mining activity rather than wholly new incremental O₃ precursor emissions. Therefore, the CMAQ model approach indicated a negligible change in regional O₃ concentrations with the addition of the Project.

Deposition of nitrogen can lead to eutrophication in water bodies or changes in growth rates of terrestrial vegetation, and its calculation includes both wet (removal in precipitation) and dry (direct contact with surface features) processes. The regional maximum predicted nitrogen deposition was 4.8 kg/ha/yr for Baseline and 5.7 kg/ha/yr Application and Planned Development cases.

Sources of metals include tail pipe emissions from diesel combustion, combustion of coal in the dryer and fugitive emissions from re-suspension of road dust and material handling in pit operations. No exceedances of AAAQOs are predicted for chromium, lead, manganese and

nickel in any assessment case or at any location. The hourly objective for arsenic was exceeded at the RSA MPOI and at one of the special receptors (the former cabin at Coalspur) in the Baseline case. This exceedance was eliminated in the Application case due to the cessation of Baseline mining activities and the transition to a Tier 4 haul fleet.

Operation of diesel powered mine and haul fleets may result in odorous emissions. In order to assess potential odour impacts, the predicted maximum air concentrations for compounds are compared with established odour thresholds. The mean odour threshold was met or exceeded by the 3-minute prediction for nitrogen dioxide only. Exceedance of the average odour threshold was predicted to occur infrequently (0.01% of the time) at the RSA MPOI, which is located on the Project mine permit boundary just south of the soil hauling area.

The PDC includes all sources in the Application case and any foreseen new developments. As no planned projects have been identified in the RSA, the PDC is identical to the Application Case. As a result an assessment of cumulative effects was not conducted.

In order to reduce potential impacts of the Project on air quality CVRI will:

- systematically apply water to haul roads to minimize dust;
- retain snow cover on roads unless the cover would compromise the safety of vehicle operations;
- utilize gravel or crushed rock on the haul roads as it produces less dust than clay and sandy surfaces;
- apply water during soil handling activities conducted in the summer, where accessible;
- maintain the active surface of haul roads to reduce effective silt content on the running surface;
- reclaim mined areas as soon as possible after mining is completed; and
- retain trees and bushes between mine areas and the community of Robb.

In order to track the effectiveness of the mitigation measures CVRI will:

- conduct monitoring as required in the EPEA approval;
- establish a continuous ambient air quality monitoring station in or near the community of Robb three years before opening Robb Main and continue until mining operations at Robb East are completed, include monitoring of 10-m wind speed and wind gust, 10-m wind direction, temperature, PM_{2.5} and TSP; and
- conduct passive sampling at the community of Robb for NO₂.

A.8.2 FISHERIES

The potential effects of the Project on the fisheries resource are discussed in [Section E.2](#) and Consultants Report #2 ([CR #2](#)).

The aquatics LSA was selected based on the Project area boundaries, drainage basin characteristics, and encompassed the spatial area where Project-specific effects associated with mining activities may occur. This included the Embarras River watershed, including the Erith

River and several watercourses in the Erith sub-basin, as well as one tributary to the Pembina River. The RSA encompassed the LSA and the following:

- the Embarras River from its confluence with Jackson Creek downstream to its confluence with the McLeod River;
- the Erith River basin excluding tributaries in the lower part of the basin;
- Lund Creek from the headwaters to the confluence with the Embarras River;
- Lendrum Creek from the headwaters to the confluence with the Embarras River; and
- the Pembina River from its confluence with the unnamed tributary (PET1) that drains the southeast end of the Project mine permit area to approximately 10 km downstream.

Outside the RSA, aquatic habitat conditions and aquatic resources are expected to be the same, with or without the Project.

During baseline field investigations fish presence was confirmed in 53 of the 84 sites sampled in 42 waterbodies in and adjacent to the Project. Fifteen different fish species were captured and identified. Rainbow trout were the most common and widespread species within the LSA and RSA and were found in 38 of the 42 waterbodies sampled. Bull trout, burbot, lake chub, longnose sucker, and spoonhead sculpin were encountered much less frequently than rainbow trout but were still found at a number of different locations. Other species, including arctic grayling, brook stickleback, brook trout, longnose dace, mountain whitefish, northern pike, pearl dace, trout-perch, and white sucker were uncommon and were only found in one or two waterbodies.

None of the species captured are listed under the federal *Species at Risk Act* (2003).

Provincially, there is one species listed as *At Risk* (rainbow trout), one species listed as *May be at Risk* (Spoonhead Sculpin), two species that are listed as *Sensitive* (artic grayling, bull trout), one species listed as *Undetermined* (pearl dace), one species listed as *Exotic/Alien* (brook trout), and the remaining species are listed as *Secure*.

Baseline benthic invertebrate surveys were conducted on nine watercourses within the Project. Ephemeroptera, Plecoptera and Trichoptera taxa dominated the benthic invertebrate communities at nearly all lotic (flowing) sample sites. Chironomidae and Coleoptera were the only other two groups that commonly made up more than five percent of the remaining taxa.

The VECs selected for assessment include: arctic grayling; bull trout; rainbow trout (Athabasca); and benthic invertebrates.

The issues identified as possibly affecting fish habitat potential, the abundance, health and survival of fish populations (in general) and the abundance, health and survival of VECs within the RSA and LSA were principally related to:

- potential changes to physical habitat components;
- potential changes to water quality (sediment and other chemical contaminants);
- potential changes to flow regime; and
- potential changes to the fisheries resource access.

Project components that have potential to result in direct impacts to fish habitat are related to watercourse crossings, water diversions, development of mine pits, reclamation of end pit lakes, and other activities. Permanent alteration to aquatic habitat as a result of the Project is expected to be limited to those watercourses that will be directly impacted by temporary and permanent diversions. CVRI is committed to satisfying the federal government No Net Loss (NNL) principle in terms of maintaining productive fish habitat and will develop a NNL habitat compensation plan in consultation with the Department of Fisheries and Oceans Canada (DFO) to address potential habitat disturbance, alteration, or destruction resulting from the Project.

Sediment and certain chemical contaminants that may have chronic or lethal effects on aquatic biota have the potential to enter the aquatic ecosystem during mining operations. The effects of Project activities on surface water quality were assessed ([Section A.8.11](#)) and determined that impacts were primarily related to construction activities, the use of nitrogen-based explosives, impoundments operation, and end-pit lake water quality. Well established mitigation measures will be implemented to reduce potential sediment effects to a minimum and potential effects of construction activities on surface water quality are expected to be insignificant. Proven mitigation strategies will be employed to reduce the effect of using nitrogen-based explosives such that water quality is not expected to be significantly affected, therefore potential impacts to fish populations as a result of nitrogen introductions are not expected. A water quality model was used to predict surface water quality downstream of impoundments. Results showed that the effect of impoundment operation on surface water quality is likely to be insignificant and as such effects of impoundment discharge on fish populations in the LSA are expected to be insignificant. Water quality within the proposed end-pit lakes is expected to be similar to existing lakes and will likely be suitable for aquatic life ([Section A.8.11](#)). Effects on fish populations in the LSA due to end-pit lake water quality are expected to be insignificant.

Impacts to fish populations as a result of flow changes is expected to be minimal ([Section A.8.6](#)) since low flows will be maintained (or slightly increased) and peak flows will be moderated. The impacts to fish populations as a result of the pit filling is expected to be minimal since it is assumed that lake filling will be gradual in order to maintain downstream flows and instream flow guidelines (AENV 2011) will be adhered to. Potential changes in peak flows are not expected to significantly affect downstream channel size but a long-term gradual channel entrenching, with less meandering and steeper channel slope may occur which could result in changes to habitat composition over time.

The proposed Project will result in a temporary reduction in access to many of the waterbodies on, or adjacent to, the Project mine permit boundary. The utilization of aquatic resources is highly regulated, such that allowable harvests, if any, are related to an available surplus and not the accessibility of the resource.

The principal potential impact to benthic invertebrate populations is related to changes in water quality, including sediment loads, in streams within and adjacent to the Project and in end-pit lakes. Given that potential effects of the Project on benthic invertebrates can be fully mitigated, the Project is not expected to have a negative effect on this VEC and the potential impact of the Project on benthic invertebrates is considered insignificant.

Given that potential effects of the Project on rainbow trout, bull trout, and arctic grayling can be fully mitigated, the Project is not expected to have a negative effect on these VEC species.

Cumulative effects on fisheries VECs associated with direct habitat loss alteration, changes in water quality, and changes in flows are not expected with mitigation measures implemented.

In order to reduce potential impacts of the Project on aquatic resources CVRI will:

- implement a surface water management plan throughout the life of the Project;
- implement an emergency response plan which includes methods for spill containment in streams and site clean-up;
- design and construct defined watercourse crossings to meet the regulatory requirements for approval under the provincial *Water Act* and federal *Fisheries Act*;
- consider sensitive periods during construction planning by either planning construction to avoid these periods or implementation of site specific mitigation (*i.e.*, redd surveys, fish salvage, sediment monitoring);
- isolate the instream work site if flowing water is present at time of construction;
- complete fish rescue and release from isolated areas where required;
- implement sediment and erosion controls prior to work and maintenance during the work phase until the site has been stabilized;
- implement measures to minimize introduction of deleterious substances during construction including cleaning, servicing, and fuelling of equipment well away from water bodies;
- revegetate disturbed areas around crossing sites;
- reclaim streambed and stream banks to similar pre-disturbance conditions;
- maintain downstream flows;
- use appropriate sizing of diversion channels and/or pump;
- armour and/or line channels or use of flumes where appropriate;
- place and stockpile excavated materials in a location that is well away from the channel route;
- divert flow gradually into constructed channels to minimize potential erosion and mobilization of sediment;
- construct open channel diversions that allow for the movements of fish;
- develop and implement a stream flow management plan for each diversion to ensure that instream flows;
- identify habitat compensation measures and implement at specific sites as needed, in consultation with DFO, Alberta Sustainable Resource Development (ASRD), and stakeholders, in order to ensure NNL of habitat productivity; and
- restrict public access on haul roads or other access routes unless permitted by CVRI.

In order to monitor the effectiveness of the mitigation measures CVRI will:

- monitor flows and total suspended solids (TSS) at all settling ponds;

- conduct regular inspections of all drainage works;
- expand the existing CVRI aquatics monitoring program to include additional benthic macroinvertebrate sample sites;
- implement a water quality monitoring program for the life of the Project designed to meet the requirements of the Project approval;
- conduct long term monitoring of flow in each main creek to document critical low flow conditions during pit filling periods and to define the need for any bypass pumping to maintain in-stream flows;
- monitor components of the compensation plan, (*i.e.*, fish habitat enhancement structures) post-construction to assess the effectiveness of the compensation and to identify modifications that will be made (if necessary);
- evaluate end pit lakes to assess fish use, biological productivity, water quality, and other physical properties (*i.e.*, thermal regime);
- implement TSS/turbidity monitoring during instream work if deemed necessary due to site conditions or timing of works; and
- monitor downstream flows to ensure instream flow needs are met.

A.8.3 GROUNDWATER

The potential effects of the Project on the groundwater resource are discussed in [Section E.3](#) and Consultants Report #3 ([CR #3](#)).

Previous environmental assessments have demonstrated that hydrogeological impacts of mining in this area will not extend beyond the boundary of the mine permit. Therefore, the LSA is the proposed mine permit boundary and there is no differentiation between the LSA and RSA for the purposes of the hydrogeological assessment.

VECs were selected to assess the significance of potential impacts to groundwater within the LSA and RSA. The VECs selected for assessment include groundwater quantity and quality and how they relate to the water wells in the community of Robb.

Mining operations have occurred at the CVM since 1978. Previous to the CVM, there had been surface and underground coal mining in the area from the early 1900's to 1950's. Information regarding the characteristics of groundwater in the area has been available since 1975. The methodology for the evaluation of potential environmental impacts from the Project was to analyze the existing data base from the area, collect selected core hydrogeological information (water levels, hydraulic conductivities and water chemistry) from the proposed mine area, and synthesize all of this into an appropriate assessment. This type of assessment has the advantages of building on existing information and is therefore a reliable predictor of events.

The workings of two underground mines are present in the vicinity of Robb; the Lakeside Mine and the Bryan Mine. These mines worked the Val d'Or seam and it is presumed that they are now flooded with water.

When mine pits are adjacent to water courses there will be a tendency for dewatering of the adjacent pit to draw water that would, for a portion of the year, have entered that water body.

This will be relatively more important in times of low flow such as fall and winter than at times when there is abundant precipitation to generate surface runoff. The operating procedure for pit dewatering is to return the water to the local drainage course. This will have the net effect of an insignificant change in the volume of flow in the water course.

CVRI has monitored the drawdown of groundwater levels in response to the approach and operation of a mining operation. Results of analysing the information showed that impact of pit dewatering is not widespread (50-200 m from the pit) and groundwater levels return to normal in less than one year; therefore, impact is insignificant.

The general practice at the CVM is to discharge groundwater entering the Project mine areas to nearby surface water courses after being treated in settling ponds. It has been shown that the quality of groundwater in the two proposed mining areas are similar to groundwater chemistry in present and past mining areas in Coal Valley and of acceptable quality for discharge to surface water bodies. There will be an insignificant impact on surface water quality caused by the discharge of groundwater from the pits.

There are two issues with respect to how changes in groundwater chemistry may affect the quality of groundwater in the vicinity of the Project pits. These issues can be summarized as 1) changes resulting from the removal and placement of mine spoil, and 2) changes due to spills and leaks. Toe springs are a characteristic of spoil dumps that are external to the mine pit. Water chemistry of four springs at the toes of major mine spoil dumps in the CVM have been monitored since 2000. All parameters fall within acceptable ranges observed elsewhere in the area. The monitoring of toe springs at CVM has demonstrated that there are no significant impacts from spoil on water chemistry. Hydrocarbon fuels will be present in the Project mobile equipment, vehicles and in bulk storage. There is a potential for spills or leaks of these hydrocarbons. Spills from equipment and vehicles will be the result of accidents. In this situation, there will be rapid response and clean up. The probability that such an event could cause an impact on groundwater quality is remote. The impact is therefore insignificant.

The community of Robb relies on water wells to supply individual homes. Unacceptable drawdown of water levels in water wells in Robb is likely to occur when mining operations are active in the areas of the Lakeside and Bryan Mines. This impact will be highest for shallow wells located close to these mines and much less for wells which are deeper and/or located farther away from the underground mines. In all cases, deepening of existing wells represents a viable mitigation. A plan of action should subsequently be developed in consultation with the community that should include to mitigate impacts and include:

- deepening or replacement of wells that are judged to be at high risk,
- monitoring of observation wells to provide notice of diminishing water supply, and
- procedures to provide an emergency water supply should residents experience an interruption of their water supply.

As mining progresses beyond Robb the water diversion in the Lakeside and Bryan Mine's will cease and the groundwater levels will begin to rise beneath the community of Robb. With this rise in water levels the potential for impact will decline; particularly as many of the wells in

Robb will have been previously deepened. There will be no significant impact in the residual or cumulative sense.

In order to reduce potential impacts of the Project on groundwater CVRI will:

- inventory wells in the community of Robb and work with the community to develop an action plan in case an unacceptable drawdown of water levels occurs; and
- continue with implementation of the existing spill response plan.

In order to monitor the effectiveness of the mitigation measures CVRI will:

- monitor shallow groundwater conditions as required in the EPEA approval;
- monitor water chemistry in selected springs on an on-going basis;
- monitor water levels and water chemistry in selected monitoring wells on an ongoing basis;
- establish observation wells into the Mynheer and Wee seams beneath Robb; and
- select existing observation wells established for the Project for on-going monitoring.

A.8.4 HISTORICAL RESOURCES

The potential effects of the Project on historical resources are discussed in [Section E.4](#) and Consultants Report #4 ([CR #4](#)).

In the Province of Alberta, historical resources are defined and regulated under the Alberta *Historical Resources Act*. Historical resources include historic, archaeological, and palaeontological resources. The Project is located in close proximity to Historic Coal Branch towns that results in elevated potential for the presence of historic period sites.

The LSA utilized for the historical resource impact assessment (HRIA) is defined as the mine permit area and the RSA is an area within 10 km of the LSA.

The assessment of sites was accomplished through surface survey and subsurface prospecting of high potential zones and ground-truthing of other areas. The field program involved completion of 1838 shovel tests. This is in addition to the 272 shovel tests previously undertaken prior to coal exploration activities and 505 shovel tests completed in support of other developments and shovel tests completed in support of the Denison mine project.

The HRIA program recorded 67 precontact and historic sites associated with the Project area. Sixty of these are within the proposed Project mine permit area and 36 are found within the Project footprint. There were no palaeontological remains identified in the development zones and there were not any significant bedrock exposures identified.

Archaeological sites located within the Project footprint will be disturbed. CVRI will work with Alberta Culture and Community Services (ACCS) to determine the mitigation strategy for each site and disturbance will not occur until clearance is issued by ACCS under the *Historical Resources Act*. Of the 36 sites found within the Project footprint 27 of these sites are considered to be of low historical potential. That is, the artifact density, diversity, and distributions at those

sites indicate that excavation or other forms of recording is unlikely to contribute any meaningful understanding of the past. Five are precontact sites and four are historic period sites that have the potential to contribute to the knowledge of the area. It has been recommended that CVRI undertake additional mitigation at these nine sites prior to development.

Within the RSA, a total of 504 archaeological sites have been recorded which includes those recorded for the Project. Of these 406 are precontact sites, 84 are historic period sites, 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. 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 changes to the proposed mine permit area or Project footprint subsequent to the HRIA program, several small areas have not had an HRIA completed. Some of these areas have low to moderate potential and no further work is required, other portions have higher potential and additional work will be undertaken as required by ACCS prior to development in these areas.

In order to reduce potential impacts of the Project on historical resources CVRI will:

- obtain clearance from ACCS, as required, prior to development; and
- undertake mitigation measures as recommended and agreed upon with ACCS.

If a historical resource is encountered during mining that has not been identified under an HRIA CVRI will stop work in the area until ACCS has been notified and the appropriate mitigation measures put in place.

A.8.5 HUMAN HEALTH

The potential effects of Project on human health are discussed in [Section E.5](#) and Consultants Report #5 ([CR #5](#)).

The Human Health Risk Assessment (HHRA) describes the nature and significance of potential short-term (acute) and long-term (chronic) health risks to people associated with exposure to the Chemicals of Potential Concern (COPCs) emitted or released from the proposed Project. The HHRA examines potential health risks attributable to the Project in combination with existing developments.

The HHRA focused on the potential health risks associated with chemical concentrations in the LSA and RSA which are consistent with the air quality study areas ([Section A.8.1](#)).

The COPCs for the Project were identified through the development of a comprehensive inventory of chemicals emitted from the Project and to which people might be exposed. The COPCs used in the assessment, in general, include:

- criteria air contaminants (CACs);
- metals;
- polycyclic aromatic carbons (PAHs);
- petroleum hydrocarbon (PHC) fractions; and
- volatile organic compounds (VOCs).

Based on predicted Project air emissions, local residents and persons spending any time near the Project site or in local communities could be exposed through inhalation of COPCs to the atmosphere from the Project.

The following exposure pathways were included in the HHRA:

- inhalation of air;
- inhalation of dust;
- ingestion of soil (inadvertent);
- ingestion of water;
- ingestion of local above-ground plants (including fruit and vegetables);
- ingestion of local below-ground plants (root vegetables);
- ingestion of local traditional plants (Labrador tea and cattail);
- ingestion of local fish;
- ingestion of local wild game (moose, snowshoe hare and ruffed grouse);
- ingestion of water while swimming;
- dermal contact with water; and
- dermal contact with soil.

The key findings of the HHRA are as follows:

- Acute Inhalation Assessment - The potential short-term health risks associated with the Project and other emission sources were evaluated through the comparison of predicted air concentrations for various averaging periods (10-minute, 1-hour, 8-hour or 24-hour) against health-based exposure limits. Overall, there were minimal changes between the Baseline and Application Cases, indicating that the Project emissions are not anticipated to have an impact on human health in the area.
- Chronic Inhalation Assessment - Predicted risks associated with continuous, long-term inhalation of the COPCs were evaluated through the comparison of predicted annual average air concentrations with health-based exposure limits. No exceedances of health-based exposure limits were predicted in the chronic inhalation assessment. All incremental lifetime cancer risks were predicted to be less than 1.0 in 100,000, indicating that the cancer risks associated with the Project are essentially negligible.
- Chronic Multiple Pathway Assessment - The potential long-term health risks associated with exposure to the COPCs via multiple pathways of exposure were evaluated for permanent and seasonal residents in the area. In most instances, potential risks were determined to be negligible. All incremental lifetime cancer risks associated with

exposure via multiple pathways of exposure were predicted to be less than 1.0 in 100,000, suggesting that the cancer risks associated with the Project are negligible.

As there are no planned developments that have been publicly disclosed for the area apart from the Project in the RSA cumulative effects were not assessed in the HHRA.

Monitoring and mitigation has been a part of CVRI operations at the CVM and will be continued as part of this Project. Mitigation programs for key disciplines are provided within the individual consultant reports as appropriate and are summarized as follows:

- air monitoring ([Section A.8.1](#));
- groundwater monitoring ([Section A.8.3](#)); and
- surface water monitoring ([Section A.8.11](#)).

A.8.6 HYDROLOGY

The potential effects of the Project on surface hydrology are discussed in [Section E.6](#) and Consultants Report #6 ([CR# 6](#)).

The surface hydrology assessment presents proposed water management plans and addresses the potential impact of the Project on the quantity of surface water flow and stream behaviour during high, average and low flow conditions, and sediment concentrations in local and regional streams.

The Project area is located almost entirely within the McLeod River watershed with the southern extent of the Project extending into a tributary of the Pembina River. The RSA primarily focuses on the McLeod River basin upstream of its confluence with the Embarras River and includes the Pembina River basin at the confluence with this unnamed tributary. The locally affected watersheds within the LSA of the proposed Project are as follows:

- the Erith River basin and its main tributaries Bacon, Halpenny, Lendrum and Lund creeks;
- the Bryan, Hay and an unnamed creek which join the Embarras River near Robb; and
- the unnamed creek basin draining north into the Pembina River.

For the hydrology assessment the VECs selected include water availability (*i.e.*, flow) and water quality. Elements of the Project that could have an effect on runoff and sediment include cleared land; waste rock piles; haul roads; mine pits and dewatering; water impoundments during and after mining; water diversions (during mining and restoration); and water withdrawals. Various water management and sediment control measures will be implemented for the Project during operations, reclamation, and closure in order to mitigate potential impacts to flow and water quality.

The net impacts of various activities in a basin are highly temporal and site-specific. They depend on the number, size, and location of activity within the watershed. The combined existing CVM and proposed Project mine disturbance areas average 16.5% in the main watersheds. The greatest percentage disturbance in any single basin is in the smaller Hay Creek

watershed at 48.6%. The long-term residual effect of surface water flow by watershed was assessed and found to be insignificant with the implementation of appropriate mitigation measures.

CVRI's historical records show that total suspended sediment (TSS) levels from mine operations are highly variable and within the range of those measured on the regional watersheds. Runoff from Project operations can be controlled by routing to settling ponds before being released to external watersheds. Precipitation in excess of the design storm event, or unusual short-term sediment generation events, may occur. Design of controlled outflows for this type of event will provide an effective level of sediment control. The Project is expected to have an insignificant effect on sediment loads compared to natural conditions.

Other activities in the local watersheds that could have a cumulative effect on stream flows and sediment concentrations in the receiving streams are timber harvesting operations, road and rail areas, petroleum and natural gas activities, the Robb area community, and recreational uses. In the larger McLeod and Embarras basins, the effects of the Project and other activities on river flows diminish to near negligible. With sediment and control measures implemented and maintained at the mines, roads, pipelines and other projects in the basins, the cumulative effects on sediment loading will be insignificant compared to natural variations.

In order to reduce potential impacts of the Project on surface hydrology CVRI will:

- plan and layout facilities to minimize drainage diversions and runoff interception (*e.g.*, locate roads along drainage divides and maintain natural vegetated buffers between active mine areas and undisturbed streams);
- direct runoff from active mining areas, spoil piles and roads to settling ponds or retention and clean-out areas for sediment settling treatment;
- design settling ponds according to the latest sizing methodology (1:10 year storm event and safely convey up to the 1:100 year flood event);
- divert runoff from natural undisturbed area around mine activities;
- divert natural streams around or through active mine areas in a controlled manner to maintain flows at all times by:
 - providing gradual flow diversions with initial flushing/cleaning operations where water flows through new ditches or pits;
 - providing armouring and/or lining of ditches or using culverts or flumes where appropriate to control erosion and limit seepage losses;
 - collecting clean water in in-pit sumps to isolate and keep clear of mine operations;
 - using temporary pumps to direct water around pits where short term bypasses (usually less than 1 year) are required;
 - directing all dirty water to settling facilities and then to the receiving stream once regulatory guidelines have been met; and
 - sizing diversion capacities according to the design life of the diversion, seasonal flows, potential flooding, and fish use and passage.

- design and construct watercourse crossings to meet the regulatory requirements for approval under the provincial *Water Act* and the federal *Fisheries Act* and *Navigable Waters Protection Act*;
- size watercourse and diversions on fish bearing streams to permit fish passage in accordance with standard guidelines (Alberta Transportation 2001);
- install haul road berms to contain road runoff and direct it to designated runoff control works;
- establish minimum vegetated buffer setbacks of at least 10 m from streams and 30 m from major streams, where possible, to minimize the risk of sediment laden runoff entering the streams;
- incorporate flow and erosion control measures, such as ditch check structures, natural depressions or low areas to create cleanouts (for runoff and sediment retention);
- allow depressions or cleanouts to de-water by a combination of evaporation and exfiltration, wherever possible;
- filter sediments by seepage through natural buffers and constructed materials and possibly through local wetland areas where possible; and
- train personnel to minimize disturbances and use and maintain drainage and sediment controls.

In order to monitor the effectiveness of the mitigation measures CVRI will:

- continue monitoring programs already in place at the existing CVM mine (*i.e.*, flow and TSS at settling ponds, regular inspections of all drainage works, and upstream and downstream water quality sampling);
- document the effect of mine operations on long term flow regimes in order to document critical low flow conditions during pit filling periods and define the need for any bypass pumping to maintain in-stream flows;
- establish flow monitoring stations 2-3 years in advance of commencement of Project operations in each watershed;
- conduct periodic runoff and drainage control monitoring (adjust the capacity of or relocate sump systems and drainage works as mining proceeds);
- conduct ongoing monitoring, operations, and maintenance as outlined in the water management plan with periodic reviews and adjustments; and
- monitor adjacent undisturbed areas to ensure surface runoff does not occur from disturbed areas.

A.8.7 MAMMALIAN CARNIVORES

The potential effects of the Project on mammalian carnivores are discussed in [Section E.7](#) and Consultants Report #7 ([CR #7](#)).

Eighteen species of mammalian carnivore are known to be present or are assumed to exist in the RSA. All were initially considered to be candidates as VECs. Seven of the 18 species are listed as Species of Concern by provincial or federal governments. Listed species include grizzly bear, bobcat, lynx, fisher, long-tailed weasel, wolverine and badger. Five mammalian carnivores

species were selected as VECs for the assessment of Project and cumulative impacts on mammalian carnivores; grizzly bear, marten, fisher, lynx and wolf.

Three nested study areas were used to assess Project-specific and cumulative impacts on mammalian carnivore VECs. These included:

- Disturbance Footprint Area (DFA) which is the area within the Mine Permit directly affected by Project development including mines, haul roads, rock dumps, soil piles and ponds;
- LSA which is the mine permit area and transportation corridor boundaries; and
- RSA which is the same as cumulative effects assessment (CEA) study area; based on sub-watersheds/Bear Management Units.

The RSA occurs in a transition between the Foothills (84.8%) and Rocky Mountain (15.2%) Natural Regions. Bear Management Units (BMUs) are comprised of various combinations of Natural Regions/Subregions, Ecodistricts and broad vegetation cover. There are ten BMUs found within the RSA. The Project LSA encompasses a total of 100.9 km² which accounts for 2.8% of the RSA. The LSA occurs entirely within the Upper Foothills Natural Subregion of the Foothills Natural Region. The 10 most abundant land cover classes within the Project LSA occupy 83.2% of the LSA and include:

- Dense Canopy Mature Conifer Forest 12.3%
- Moderate Canopy Mature Conifer Forest 10.4%
- Moderate Canopy Young Deciduous Forest 10.0%
- Moderate Canopy Mature Mixedwood Forest 9.9%
- Open Canopy Regeneration - Herbaceous 9.3%
- Moderate Canopy Young Mixedwood Forest 8.6%
- Dense Canopy Mature Mixedwood Forest 7.7%
- Moderate Canopy Old Growth Deciduous Forest 5.4%
- Open Canopy Regeneration - Shrubby 5.1%
- Moderate Canopy Young Conifer Forest 4.6%

The assessment addressed five potential effects on wildlife habitat and populations including:

- increased mortality;
- habitat alteration;
- sensory disturbance and effective habitat loss;
- barriers to movement and
- habitat fragmentation.

Project effects were assessed for each VEC and type of effect. Project-specific effects were considered to be those that will occur during the life of the Project. Project effects are considered at T10 (baseline + 10 years = maximum disturbance); T25 (baseline + 25 years = intermediate time frame); and T50 (baseline + 50 years = after mine closure).

Increased Mortality

- The development of the Project is unlikely to cause a material increase in direct marten mortality.
- The primary sources of potential direct mortality of fisher from the proposed Project include increased trapping success due to improved access and motor vehicle collisions. With development of the Project trapping access will not increase materially and low vehicle speeds will be maintained.
- The main potential causes of lynx mortality arising from the Project are vehicle collisions from coal haul and fur harvest. Overall, it is predicted that development of the Project is unlikely to cause an increase in direct lynx mortality.
- Project-specific mortality of wolves is predicted to be minimal because; hunting and the carrying of firearms is not permitted on the mine permit areas; and, vehicle traffic speeds on the mine and haul roads are limited to less than 70 kph.
- Direct human-caused mortality, primarily licensed hunting and illegal and self-defence kills, is the factor most responsible for grizzly bear population declines in Alberta and elsewhere in North America. Direct mortality of grizzly bears from the proposed Project is unlikely. Neither legal hunting nor firearms will be allowed within the Project mine permit area. There are no records of grizzly bear deaths (radio-collared or otherwise) on mine lands in the last 40+ years of active mining in the Coal Branch (Symbaluk 2008).

Habitat Alteration

- Marten typically prefer mature and old growth conifer dominated forest for both breeding and foraging. There is predicted to be an increases in suitable marten habitat at 50 years after mining is a result of increasing amounts of late seral closed coniferous and mixedwood forest resulting from natural succession
- High and very high suitability fisher habitat in the RSA was considered to be comprised of old growth deciduous, mixedwood and conifer habitats with dense, moderate and open canopies. With reclamation of the Project and natural succession of existing habitats the amount of high/very high suitability fisher habitat at 50 years post construction is estimated to be 5.5% higher than if mining had not occurred.
- Very high suitability habitat for lynx in the RSA includes closed regenerating forest, dense mature conifer forest, and moderately closed conifer forest. Habitats with high suitability for lynx include open regenerating forest, dense and moderately close mixedwood forest, open coniferous forests and treed wetlands. Significant increases in the supply of high/very high suitability lynx habitat are projected to occur at T25 (13%) and T50 (379%).
- Wolves prefer resting in open natural habitats with an open forest crown (allows light to enter) but with enough cover for protection from wind. It is unknown to what extent this level of habitat alteration will affect wolf populations in the region surrounding the Project. Wolves are currently common in the CVM area in spite of 30 years of mining.
- Mining and reclamation at the CVM has resulted in removal of tree canopies, leading to increases in availability of high energy herbaceous plant material (clover, thistles, legumes) and an increase in ungulates (elk, deer) responding to increased forage and edge habitat. There is strong evidence to suggest that ungulates and plants used for

reclamation are sought and used extensively by grizzly bears occurring in the vicinity of the CVM area.

Sensory Disturbances

- Based on past studies it was concluded that marten will possibly avoid some high quality habitat during blasting and coal hauling during active mining, but this will be a short to medium-term effect with limited demographic consequences.
- Potential sources of sensory disturbance on fisher from the Project are construction, blasting, and hauling of coal to the Plant. These activities have greatest potential to impact fisher in the vicinity of maternal den sites during April to June. Sensory disturbance impacts should be minor in a regional context because relatively little high and very high suitability fisher habitat occurs in the LSA and associated sub-watersheds.
- Lynx are generally tolerant of human presence and activity. Lynx will likely temporarily avoid areas within the mine permit adjacent to active mining (blasting and active hauling). This effect will be short-term and will not likely persist beyond the actual period of the effect (*i.e.*, active mining).
- Wolves are not particularly prone to sensory disturbance as evidenced by their regular use of active roads and logging/mining areas.
- Grizzly bears will likely be displaced from portions of the Project mine footprint and permit area during the active mining period. Displacement will result from construction noise and blasting. At some point shortly after reclamation grizzly bears will be attracted to the herbaceous forage and ungulates on the Project mine footprint.

Barriers to Movement

- Marten movements will be limited on the Project mine site until regenerating forest cover re-establishes, likely sometime between 15 and 30 years post-reclamation. Retention of residual tree islands or riparian buffers at narrow portions of the Project will enhance marten movement in the interim.
- Similar to marten, fisher movements will be limited on and across the Project until regenerating forest cover re-establishes.
- Lynx are effective dispersers and their movement does not appear to be significantly affected by roads, trails, seismic lines, large rivers or lakes. Lynx movements will be limited on the mine site until medium to tall shrub or forest cover re-establishes, likely sometime between 10 and 25 years post-construction. Retention of residual tree islands or riparian buffers at narrow portions of the mine will enhance lynx movement.
- Grey wolves are wide ranging animals that in general are able to disperse across fragmented landscapes to occupy or reoccupy habitat. Movement obstruction associated with the Project is not a substantive issue affecting wolves in the local or regional area.
- The mined lands will not act as a serious barrier to grizzly bears, with the possible exception of during active blasting and hauling.

Habitat Fragmentation

- Marten are adapted to and can tolerate a degree of habitat fragmentation within their home range. The predicted amount of incremental regenerating forest leaves each of the

affected BMUs at or slightly below thresholds for habitat fragmentation conducive to marten residence (*i.e.*, from 20% to 50%).

- Preferred and avoided habitat patches are situated within a matrix of low to moderate quality habitat which are used by fisher for movement and foraging but of themselves could not likely sustain fisher populations over the long-term. Movements across the Project will be obstructed for the first 10 to 15 years. The demographic consequences of movement obstruction is unknown but should not be significant based on the fishers adaptation to fire impacts.
- Increased edge and proportion of landscape in early seral condition can result in increased coyote abundance in the boreal forest (Murray and Boutin 1991). Coyotes have the potential to affect lynx directly through interference (*i.e.*, aggression or killing) and through exploitation of shared resources (*i.e.*, eating hares).
- Movements of wolves are not expected to be affected seriously by proposed mining.

In order to reduce potential impacts of the Project on mammalian carnivores CVRI will:

- Incorporate select native trees and shrubs such as alder and willow into re-vegetation activities;
- maximize downed woody debris (stumps) through direct placement of top-soil and associated slash and stumps;
- maintain and connect to core areas as many residual forest patches as possible;
- maintain a 30 m buffer zone of undisturbed natural habitat along well developed riparian corridors, where available;
- plant coniferous trees at higher stem densities (>180 stems per acre);
- continue to maintain hunting and firearm restrictions on the reclaimed mine including after mining has ceased and until hiding cover on the mines is equivalent to that of natural closed forest cover types.; and
- maintain haul truck and regular vehicle speeds of <70 kph.

In order to monitor the effectiveness of mitigation measures CVRI will:

- monitor the effectiveness of measures designed to increase understory cover (downed woody debris, shrubs, tree density) on reclaimed mine lands for marten, fisher and lynx;
- monitor response of marten, fisher lynx to existing and planned mine land reclamation using winter tracking techniques;
- determine if habitats required for fisher maternal denning occur on or immediately adjacent to the Project and assess their levels of use by fisher;
- monitor the effectiveness of establishing and maintaining hiding cover for grizzly bears near Project edges and adjacent to main roads;
- measure and monitor human use levels of linear features during summer, winter and fall (hunting) seasons. Assign this as a primary task of the ‘bear warden’ position. Use this data to design road closure plans;
- monitor the effectiveness of voluntary and enforced road closures including gating;

- monitor and study specific use of the existing CVM and proposed Project by grizzly bears. Investigate the extent to which existing mines in the region serve as attractive forage sources for grizzlies, and study implications for subregional mortality. Consider non-intrusive methods including DNA hair snagging; and
- continue long-term, multi-species winter monitoring of mammals (carnivores and prey) to regional habitat fragmentation using the tracking data conducted in 2007, 2009 and 2011 as a starting point.

A.8.8 NOISE

The potential effects of noise levels at nearby receptors are discussed in [Section E.8](#) and Consultants Report #8 ([CR #8](#)).

The purpose of the assessment was to generate a computer noise model of the Project under Application Case conditions and compare the resultant sound levels to the Alberta Energy Resources Conservation Board (ERCB) permissible sound level guidelines (Directive 038 on Noise Control, 2007).

Residential receptors in the area include two trappers cabins (located approximately 8.3 km southeast of the Plant and approximately 8 km northwest of Robb), and the community of Robb. All other trappers' cabins, campsites, etc. are more than 1.5 km beyond the proposed Project mine permit boundary and have not been included in the study. This meets with the requirements of ERCB Directive 038.

ERCB Directive 038 on Noise Control (D38) sets the permissible sound level (PSL) at the receiver location based on population density and relative distances to heavily traveled roads and rails. In most instances, there is a basic sound level (BSL) of 40 broadband A-weighted (dBA). The population density for Robb requires that the Robb receptors have a BSL of 43 dBA. In addition, many receptors are within 500 m of the rail line which is heavily traveled during the night-time. For these receptors, the BSL increases to 48 dBA. In all cases, the BSL forms the PSL for the night-time while the day-time PSL is 10 dBA higher. D38 specifies that new facilities must meet a PSL-Night of 40 dBA at 1,500 m from the facility fence-line. The PSLs at a distance of 1,500 m are a $L_{eq}Night$ of 40 dBA and a $L_{eq}Day$ of 50 dBA.

Project operations occur during daytime and nighttime. The equipment and processes occur in different areas at different times throughout the life of the Project. To determine the effect of the Project on the surrounding noise climate, the following three scenarios were modeled to cover the mining activity in different locations:

- Scenario 1 which represents the highest possible noise levels within the community of Robb while the Project is operating at its closest distance to the northwest.
- Scenario 2 which represents the highest possible noise levels within the community of Robb while the Project is operating at its closest distance to the southeast; and
- Scenario 3 which represents the highest possible noise levels at a distance of 1,500 m from the mine permit boundary for mining activity because the two mining operations will be directly adjacent to each other.

For Scenarios 1, 2, and 3 the modeled night-time and day-time noise levels are under the PSLs at all residential and theoretical 1,500 m receptor locations. In addition to the dBA sound levels, modeling results at the residential and theoretical 1,500 m receptor locations indicated C-weighted (dBC) sound levels will be less than 20 decibels (dB) above the dBA sound levels at most locations. For the locations with dBC-dBA sound levels greater than 20 dB, there are no residents nearby. For the Robb residential locations with dBC-dBA sound levels greater than 20 dB, the modeled noise levels are very low (below 25 dBA) and will likely be in-audible. For the 1,500 m theoretical receptors with dBC-dBA sound levels greater than 20 dB, there are no residents nearby. The noise generated is generally not tonal in nature and is more broadband at the low frequencies. As a result, the possibility of a low frequency noise complaint is low.

There are no other industrial noise sources within the study area and current CVM mining activities are a great enough distance from Robb that that noise levels were not measurable. Therefore, no cumulative effects modeling scenarios have been generated.

In order to reduce potential impacts of the Project due to noise CVRI will:

- conduct blasting on weekday afternoons;
- implement the utilization of smaller more localized blasts in order to reduce the amount of explosive used;
- maintain equipment is good working condition; and
- address noise concerns as they are raised by the community of Robb and implement additional mitigation measures as required.

In order to assess the effectiveness of mitigation measures CVRI will:

- conduct noise and vibration monitoring once mining begins to come close to Robb.

A.8.9 SOCIO-ECONOMIC

The potential effects of the Project on socio-economic conditions are discussed in [Section E.9](#) and Consultants Report #9 ([CR #9](#)).

For the purpose of the socio-economic analysis, the RSA includes Yellowhead County and the hamlets within its boundaries (including the community of Robb), the Town of Edson; and the Town of Hinton. The LSA is defined as the Project mine permit area and the community of Robb.

The Project is not a new enterprise but an undertaking that will allow the continuation of an existing venture. Employment is expected to remain roughly constant to current levels, therefore, population and social conditions in the local or regional area are expected to stay fairly static.

The Project will ensure the continuation of the following economic impacts:

- the provision of employing 490 RSA residents in well-paying jobs;

- spending an additional \$85 million over a six-year period in site preparation and support infrastructure;
- annual mine operations spending amounts to \$226 million, of which \$54 million is spent in the RSA, primarily in the form of direct wages and salaries;
- the generation of \$230 million to provincial GDP and \$109 million in provincial household income every year;
- the generation of approximately \$2.8 million annually in royalties to the Province of Alberta and municipal tax payments of \$500,000; and
- the support of local RSA events and initiatives through community investment funding, donating about \$250,000 annually.

The Project maintains the current operations, and represents virtually no effects to the current state of the RSA. Local Project effects include effects of operation on local residents, users of affected lands, and local roadways.

The Project will result in active mining in closer proximity to the community of Robb than is the case with existing operations. The Project will not result in the displacement of any residences. Normal effects from operations, such as dust, noise and vibrations, are expected to be experienced more acutely by residents during these years.

The Project is expected to have a short term negative effect on property values during the period when active mining takes place in proximity to the community of Robb. Property prices are not expected to be affected before and after the period of mining near Robb.

Over the Project timeline, relocation of an approximate 6 km section of the Robb Road and a number of other smaller resource roads will be closed and rerouted due to mining activity. CVRI will continue discussions with other industry users and Yellowhead County officials to determine viable options for minimizing inconveniences and ensuring continued safety for those using the local transportation network.

In order to ensure the local economy and people benefit from the Project, CVRI will continue existing employment and contracting practices. CVRI will continue with the following:

- ongoing inter-industry cooperation with forestry and energy companies building on current working relationships;
- designing the mine plan to avoid active mining on both sides of Robb concurrently and minimizing the duration of development nearest the community;
- continuing the use of dust reduction strategies, such as watering of haul roads;
- using of noise reduction strategies such as lowered night-time activity, use of alternates to equipment horns and alarms;
- continue present monitoring of blasting vibration and noise levels in Robb. Monitoring will also include dust and groundwater supply and quality;
- consideration of inherent advantages of vendors located in or near operating areas when contracting for goods and services;
- continued participation in community involvement initiatives.

A.8.10 SOILS

The potential effects of the Project on soil and terrain resources are discussed in [Section E.10](#) and Consultants Report #10 ([CR #10](#)).

The RSA used for the soil assessment corresponds with the proposed mine permit boundary and the LSA corresponds to the Project footprint.

Soils were investigated at 1350 inspection points within the RSA. An additional 328 soil inspections are located in close proximity to the RSA. A baseline of available soil resources to a depth of 1 m of the surface was prepared using soil landscape mapping combined with laboratory analysis of samples collected from 59 soil profiles to characterize soil suitability for re-vegetation.

The VEC's were identified as a result of the soil and terrain inventory and input from the public; from governments; and from other Project team members. VECs related to soil resources include:

- the soil resource (including topsoil) and the natural diversity of the soil landscapes;
- land capability for preferred land uses plus future productivity; and
- soil and surficial geologic materials have normal concentrations of trace elements.

The soil resource can be lost or degraded in several ways: disturbance of natural soil profile and landscape; burial of soil; mixing of soil; erosion; loss of diversity; and loss of land capability.

The structure of minesoil landscapes will be designed to be similar to pre-mine soil landscapes by having wet and dry soils, soils with concave and convex surfaces, grassland soils, and forest soils. The minesoil landscapes will also be designed to be compatible with the biophysical reclamation units within the mine area. The initial minesoil profiles, with grassland soil characteristics, may continue as grassland soils or will develop into forest soils or wetland soils depending on site location and re-vegetation treatments. The impacts on soil resources due to disturbance will be insignificant after mitigation

Areas where the soils are too wet or the slopes are too steep to allow salvage of surface soil will not have soils salvaged. This lost volume of soil will be mitigated by salvaging to greater than minimum depths in places where soil quality is suitable. The net adverse effect on volume or quality of soil stockpiled for reclamation is expected to be insignificant.

Soils will be salvaged in a one lift operation which results in mixing of soil horizons. Soils from different soil landscapes are subject to mixing in the stockpile and further mixing occurs during placement. The result is a blended surface soil material which is placed as coversoil on levelled (or shaped) spoil. The forest soils typical of the mine disturbance area do not exhibit a strong decrease in quality with depth. Salvaging some or most of the B horizon with the duff and Ae/Bm horizon will have a neutral or positive effect on soil quality. Prescribed salvage depths will avoid soil layers that are detrimental to surface soil quality. Impacts due to mixing of the soil are insignificant.

Erosion of placed coversoil material can occur until the soil surface is stabilized with vegetation cover. With the use of appropriate and available technology there is low risk for accelerated erosion of coversoil. The net loss of soil resources through erosion is insignificant.

The planned reclamation approach will provide for considerable landscape and ecological diversity. Shaping the minescape to have several surface forms and building different minesoil profiles in appropriate landscape positions will provide diversity at the landscape level. The reclamation plan is intended to provide for ecological diversity; the post reclamation landscape will not have large homogeneous areas. Inclusion of lowlands for development into wetlands and water bodies in the post-mining landscape will increase landscape diversity.

Land use capability of a surface mine area is lost during active mining. Minesoil landscapes (surface form) and minesoil profile (soil layer thickness) are developed immediately. Early pioneering attributes can be developed over 1 to 3 years (grass cover, tree seedlings) and early succession attributes take 5 to 20 years or longer to develop (nutrient cycling, native plant invasion, wildlife hiding cover, forest stands). The environmental effect of achieving equivalent capability is local and of short to extended duration. Ecological processes will reverse the effects with time.

In order to reduce potential impacts of the Project on soil resources CVRI will:

- plan to minimize overall disturbance;
- utilize direct placement of surface soil whenever practical;
- salvage suitable coversoil where possible;
- salvage to greater than minimum depths in places where soil quality is suitable;
- plan to provide rough surfaces with topographical diversity in order to provide ecological diversity and minimize large homogeneous areas;
- design post-mine landscapes, minesoils and vegetation with consideration of end land use goals;
- take steps to reduce erosion such as building terraced, rolling, ridged, and hummocky surface forms (reducing overland flow rates and distance) to reduce erosion potential;
- implement sampling of surface spoil prior to coversoil placement to identify potential sodic spoil;
- not use sodic overburden associated with the Mynheer coal seam within 1 m of the surface prior to replacement of salvaged soil;
- create of a variety of landscapes and soil types;
- leave a rough but loose soil surface to reduce erosion potential to a low risk level;
- leave soil surfaces with variable soil thickness, where possible, to provide diversity at the profile level; and
- implement further erosion control measures once coversoil has been replaced.

In order to assess the effectiveness of mitigation measures CVRI will:

- implement sampling of areas recontoured with overburden salvaged from areas over the Mynheer coal seam to determine presence of sodic spoil material; and

- monitor reclaimed areas for erosion.

A.8.11 SURFACE WATER QUALITY

The potential effects of the Project on surface water quality are discussed in [Section E.11](#) and Consultants Report #11 ([CR #11](#)).

The LSA for the Project is defined by the small drainages that begin within or run through the Project permit boundary including:

- Bryan Creek, an unnamed creek draining into the Embarras River near Robb, Hay Creek, Mitchell Creek, Bacon Creek, Lendrum Creek, and an unnamed creek draining into the Pembina River at the time this assessment was prepared were not downstream of existing mines; and
- Jackson Creek, Erith River, Halpenny Creek, Lund Creek, and Lendrum Creek are downstream of existing mines.

The RSA for the Project is defined by the LSA plus the following watercourses:

- Embarras River from its confluence with Jackson Creek downstream to its confluence with the Erith River;
- Erith River from its confluence with Lund Creek to its confluence with the Embarras River; and
- Pembina River beginning at its confluence with the unnamed creek draining into the Pembina River at the southeastern end of the Project permit boundary to approximately 10 km downstream.

Surface water quality is the VEC considered in this assessment. Surface water quality issues considered in the assessment were obtained from results of the public consultation program, information obtained from the Traditional Environmental Knowledge (TEK) and Traditional Land Use (TLU) study, scope of previous assessments at CVM, and a review of the Project mine plans. Issues considered include:

- soil erosion, sediments entering streams via surface runoff, increased sedimentation of surface waters;
- leaching of nitrates into surface waters;
- discharges of water from impoundments to natural watercourses; and
- effects on end-pit lakes on surface water quality.

During the construction phase of the Project activities such as tree clearing; constructing access roads, diversions, and settling ponds; area disturbances for waste and soil piles; clearing and site disturbance; and constructing drainage controls, cleanouts/retention areas have the potential to impact water quality. With implementation of the mitigation measures, potential impacts of the construction phases are predicted to be insignificant in the LSA and therefore are assessed as insignificant in the RSA. The Planned Development Case for both the LSA and RSA are assessed as insignificant as well.

Explosives containing ammonium nitrate will be used during the mine operations to break up the overburden material. The residual effects (after mitigation) of the Project on surface water quality due to increases in nitrogen caused by the use of explosives containing ammonium nitrate are assessed as insignificant in the LSA and therefore are assessed as insignificant in the RSA. The Planned Development Case for both the LSA and RSA are assessed as insignificant as well.

Water collection and impoundment structures will be used to attenuate the impacts of the mining activities on the local watercourses, including increased sediment loads and deposition of those sediments. The water from these impoundments will be released into local streams which will eventually enter the Embarras and Pembina Rivers and smaller tributaries. There will be changes in surface water quality with the Project; however, there are expected to be relatively few instances of detectable increases in the concentration of water quality variables as a result of impoundment discharges and even fewer instances detectable increases in concentration coupled with concentrations being above surface water quality guidelines. Effects of the Project on surface water quality, after mitigation, for operation of impoundments are insignificant in the LSA and RSA. The Planned Development Case for both the LSA and RSA are assessed as insignificant as well.

Twelve end-pit lakes/ponds will be constructed as part of the reclamation landscape for the Project. The effects of these end-pit lakes on the surface water quality have been assessed. The following conclusions may be made regarding the results of the impact analysis of water quality in end-pit lakes:

- all of the end-pit lakes proposed for the Project will likely have groundwater as their major source of water;
- some of the end-pit lakes will be meromictic, others will be holomictic, and others will likely exhibit partial mixes;
- the specific turnover pattern of any particular end-pit lake cannot be predicted, although the likelihood that an end-pit lake will be holomictic will be greater with similar salinity of (any) surface and groundwater inflows and shallower end-pit lake depth;
- the concentration of a number of water quality variables, such as nutrients and major ions, are predicted to be higher in the end-pit lakes than in natural lakes, but these higher concentrations are not at levels that would affect the ecological viability of the end-pit lakes;
- there are predicted to be relatively few instances of measured water quality metals exceeding provincial or federal water quality guidelines in the end pit lakes; and
- patterns of dissolved oxygen concentration with depth and changes in these patterns are predicted to be the major water quality variable influencing amount of suitable aquatic habitat available for aquatic life in the end-pit lakes proposed for the Project.

Effects of the Project on surface water quality in the end-pit lakes (after mitigation) as a result of their design, construction, and management are assessed as insignificant.

In order to reduce potential impacts of the Project on water quality CVRI will:

- plan to divert of clean water around areas to be disturbed;

- minimize the time interval between clearing/grubbing and subsequent earthworks, particularly at or in the vicinity of watercourses or in areas susceptible to erosion;
- install surface runoff collection and treatment systems to control groundwater seepage from road cuts and surface runoff from disturbed areas. Surface runoff will be directed to settling impoundments for removal of settleable solids;
- utilize slope grading and stabilization techniques to control erosion include: ditching above the cutslope to channel surface runoff away from the cutslope, leaving buffer (vegetation) strips between the construction site and a watercourse, placing large rock rip rap to stabilize slopes;
- utilize temporary measures to control erosion before a vegetation cover is re-established, including: diversion ditches, drainage control, check dams, sediment ponds, sumps and mulches;
- plan to undertake progressive reclamation to reduce the amount of disturbed area at any given time;
- whenever possible, carry out construction activities in close proximity to watercourses during periods of relatively low surface runoff and maintain a 30 m buffer (vegetation) strip between construction sites and watercourses except at stream crossings and diversions;
- design and construct all stream crossings will be done in compliance with the Alberta *Code of Practice for Watercourse Crossings* and associated guidelines;
- where necessary, utilize interim erosion/sediment control measures until long-term protection can be effectively implemented;
- the use of explosives with less slurry to reduce the amount of nitrogen compounds released;
- minimize water contact with explosives by undertaking water control activities (dewatering of pit areas, use of diversion ditches and interceptor ditches) to ensure the driest conditions possible for mining and blasting operations; and
- direct mine-affected water to settling impoundments for treatment prior to discharge of surface waters and discharge from impoundments in accordance with conditions in the EPEA approval.

In order to monitor the effectiveness of mitigation measures CVRI will:

- monitor impoundments as required in the EPEA approval; and
- monitor surface water quality in natural watercourses, both upstream and downstream of Project activities as required in the EPEA approval.

A.8.12 TRADITIONAL ECOLOGICAL KNOWLEDGE AND LAND USE

The potential effects of the Project on traditional ecological knowledge and land use are discussed in [Section E.12](#) and Consultants Report #12 ([CR #12](#)).

Consultation and traditional ecological knowledge and traditional land use studies for the Project are conducted in accordance with the *Government of Alberta's First Nations Consultation Guidelines on Land Management and Resource Development*. The Project's consultation

program also incorporated directives from the Canadian Environmental Assessment Agency (CEAA) or other Federal government agencies on Aboriginal consultation when and where required.

As part of CVRI's ongoing consultation program Aboriginal community representatives have been kept up-to-date on mine development activities and toured current mine operations and of potential extension areas. Aboriginal communities involved in CVRI's consultation process include Alexis First Nation, Jim O'Chiese and the Foothills Ojibway Society, and the Nakcowinewak Nation of Canada. The Paul First Nation, Sunchild First Nation, O'Chiese First Nations, Mountain Cree (Smallboy) Camp, Aseniwuche Winewak Nation, and the Métis Nation of Alberta have more recently been involved with consultation activities with CVRI.

Consultation with each group is tailored to the needs of the group depending on development of their own consultation and traditional use programs and level of interest in the area. Communications involve mailouts, meetings, tours, and traditional field studies.

Aseniwuche Winewak Nation has indicated no concern with the proposed Project. Traditional Use Studies for the Project have been completed for the Alexis First Nation, Mountain Cree Camp, Nakcowinewak Nation, O'Chiese First Nation, and Sunchild First Nation. The Foothills Ojibway Society and Paul First Nation are in the process of completing field studies for Project. All groups that have undertaken field studies, with the exception of the Mountain Cree Camp, have done so exclusively using their own traditional use programs or external consultants. They will communicate or share the sensitive data as they feel appropriate with CVRI, SREM Aboriginal Affairs Branch (SAAB), or ACCS. Discussions regarding First Nations concerns with the development and possible mitigation strategies are on-going, and will be finalized on a group-by-group basis after the Project application submission date.

The Aboriginal groups have inspected the Project area and provided CVRI a list of 84 plant and fungi species or classes they use for a variety of medicinal or mundane purposes. As a generic statement, all Aboriginal groups consulted are concerned that CVRI take steps to ensure that native plant species are included in reclamation plans rather than solely agronomic species as have been often utilized in the past.

During discussions, open houses, and fieldwork with Aboriginal groups several items of concern have been raised about the proposed Project and developments. Other stakeholders and the general public had expressed some of the same general concerns. The following summarizes concerns raised:

- water quality;
- moose licks/salt licks/springs;
- displacement of wildlife;
- bears;
- health of wild game;
- avoidance of important locales;
- impact to medicinal and food plants;
- future extension;

- exporting coal/transporting coal;
- clear-cutting and noise pollution reclamation;
- employment opportunities;
- contracting opportunities; and
- agreements.

In order to reduce potential impacts of the Project on Traditional Land Use CVRI will:

- continue consultations with the Aboriginal groups as information is brought forward regarding specific impacts to traditional use areas;
- continue to update SREM Aboriginal Affairs Branch (SAAB) on the progress of consultation with potentially affected Aboriginal groups;
- continue negotiations with Aboriginal groups, on a case by case basis, the avoidance of ceremonial areas, specific plant species, graves, and other areas; and
- undertake further discussions with Aboriginal groups on specific impacts and mitigation measures following the submission of final reports on traditional use studies.

CVRI will undertake the following monitoring measures:

- complete longer-term monitoring on the impact to medicinal and other plants and for general environmental monitoring as per agreements entered into with a number of groups; and
- continue to consult with the Aboriginal communities regarding future development plans.

A.8.13 VEGETATION, WETLANDS AND RARE PLANTS

The potential effects of the Project on vegetation, wetlands and rare plants are discussed in [Section E.13](#) and Consultants Report #13 ([CR #13](#)).

The LSA used for the vegetation and wetlands assessment encompasses the proposed Project mine permit boundary and the RSA extends from Hinton in the northwest past Edson to near Sang Lake in the northeast, down almost to the Blackstone Lookout in the southwest, to near Medicine Lake in the southeast.

The assessment of Project effects on vegetation and wetland resources was based on eight VECs.

- terrestrial vegetation;
- forest resources;
- wetlands;
- old growth forests;
- non-native and noxious plant species;
- traditionally used vegetation species;
- fragmentation; and
- biodiversity.

The LSA was mapped utilizing the Beckingham et al. (1996) ecological land classification system which incorporates vegetation, soil, site, and productivity information. Wetland sampling, rare plant survey, invasive species survey, and old growth inventory were incorporated into the detailed vegetation. In total, 574 vegetation species were documented during field surveys within the LSA. The Project Footprint is predicted to cover 5,728 ha. This represents the removal of 56.8% of ecosite phases from the LSA. Over time, reclaimed and revegetated sites are expected to resemble pre-disturbance ecosites. The residual Project effect is insignificant following the implementation of mitigation and monitoring measures.

Forty-six vegetation species documented during field surveys in the LSA are on the ACIMS Alberta Rare Plant Tracking and Watch Lists; 20 are vascular plants, 18 are and 7 are lichens. Vascular plants with a provincial ranking of between S1 and S3 and with a global ranking of less than G4 are to be transplanted to a suitable plant community. Transplanting of non-vascular lichen and bryophyte species is not a viable option. Mitigation of these species includes reporting observations of these species to ACIMS for updating of the tracking lists and minimizing disturbance where practical in areas of potentially suitable habitat for rare plants and rare plant communities.

Forested areas (both productive and unproductive) represent 67.3% of the LSA. Productive forested land represents 65.5% of the LSA and non-productive forested land represents 1.8%. Non-forested land occupies the remainder of the LSA (32.7%) and is a combination of anthropogenic features, lakes and rivers, and areas with shrubby or graminoid vegetation. Approximately 1,083,496 m³ or 82.2% of the timber volume from the LSA will be removed as a result of construction of the Project.

The area of wetlands that will be removed from the Project Footprint is 565.2 ha which incorporates 76.9% of the LSA wetlands. Wetlands which are limited in distribution in the LSA that will be removed total 90.3 ha which encompasses 16% of the Project Footprint wetlands or 12.29% of the LSA wetlands. One floating fen unique for the Foothills Natural Sub-regions was identified and will be removed by mining. During construction, peat and topsoil materials from wetlands, will be salvaged and stored for replacement during reclamation. With mitigation the effect of the reduction of peatland area, as a result of the Project is expected to be insignificant over time.

The amount of old growth and ecosite phases with the potential to support old growth forests that are to be removed from the Project Footprint is considerable (6,156.7 ha, or 61% of the LSA). It is anticipated that implementation of mitigation measures will result in the return of old growth forests over time. The Project significance rating is insignificant following the implementation of mitigation and monitoring measures.

Sixteen non-native and invasive vegetation species (including noxious species) were noted in the LSA. Of these, five are regulated noxious species with 29 occurrences and 11 are non-regulated species which are considered agronomic invasive species.

Of the TEK vegetation species documented during field surveys, 8 are used for critical medicinal purposes, 20 are used for food and 60 are used for other uses. TEK vegetation have a very high potential to occur in ecosite phase d1, e2, e3 and i1 and a high potential to occur in c3, e1 and j1

in the Foothills Natural Sub-regions. Fifty-four percent (5,467.0 ha) of areas which support TEK vegetation will be removed from the LSA by the Project Footprint. The distribution of ecosite phases which support TEK vegetation will be accessible in the RSA following removal of ecosite phases by Project developments in the LSA. With the implementation of mitigation measures the Project is expected to have a limited spatial effect, and a moderate temporal effect. The Project significance rating is insignificant, contingent upon following the implementation of mitigation and monitoring measures.

Habitat fragmentation will increase with the addition of the Project in combination with other existing and approved future projects in the RSA. Specifically the number of patches will increase while the mean area of individual patches will decrease. Because most of the RSA is dominated by forest stands slated for timber harvesting, natural succession will progressively increase in areas that are mapped as natural open regenerating at baseline. Overall, the number of patches of natural dense conifer, natural closed regenerating and natural moderate conifer cover classes will increase as previously harvested stands mature. Although the responses of species populations to changes in habitat area and fragmentation are uncertain (and these responses are likely to vary among species), it is expected that the populations of most species will recover to near-baseline levels where reclaimed habitat is structurally and compositionally similar to that existing at baseline.

Only the RSA is assessed for the effect of the Project in combination with other existing and future projects in the region. Therefore only broad cover classes were used for the planned development case. Within the RSA, broad cover classes were used to assess the effect of the Project on biodiversity. Most of the RSA has large tracts of land with forest stands in various stages of maturity following timber harvesting, natural disturbances such as fire and other human directed disturbances. At the landscape level, Shannon diversity index and Shannon's evenness index did not show a net change between baseline and closure. This implies that though area may have been lost from some of the natural cover classes, the overall heterogeneity of the landscape did not change as a result of the Project because other patch types, albeit disturbed types are created on the landscape. Over time, these areas will develop into mature forest stands with high biodiversity potential.

In order to reduce potential impacts of the Project on vegetation and wetlands resources CVRI will:

- implement a re-vegetation program which aims at the establishment of ecosite equivalent to the pre-disturbed landscape;
- implement a re-vegetation program which aims at the re-establishment of ecosites which are regionally limited in distribution;
- design to preserve adjacent habitat by minimizing the area required for construction and operation of the Project;
- seed stockpiled topsoil with suitable species mix to ensure long term stability of the soil piles, which reduces erosion and the potential for weed establishment;
- use coarse woody debris, when available, to amend soils to provide mycorrhizal and microbial inoculum;

- implement the use of tree, shrub, forb and graminoid vegetation species native to ecosites;
- implement the use of tree, shrub, forb and graminoid vegetation species to provide structure to ecosites and to enhance biodiversity;
- design the division of wetlands by roads to reduce the effect of water flow to wetlands outside of the Project;
- implement the use of short-lived agronomics on sites with a higher degree of disturbance, to provide soil stability and prevent soil erosion;
- work with Aboriginal groups to design and implement re-vegetation programs that target and support TEK vegetation;
- for areas with high and very high rare plant potential, will focus on the re-establishment of ecosite capability which includes high and very high rare plant potential;
- transplant rare plants found within the Project Footprint that have a provincial ranking of S1-S3 and global rank of less than G4;
- plan to salvage all merchantable timber; and
- continue the weed control program currently in place at the CVM.

In order to assess the effectiveness of the mitigation measures CVRI will:

- assess the composition, structure, ecological succession and biodiversity targets of reclaimed sites;
- monitor timber harvesting activities;
- monitor revegetation efforts by performing survival, growth and health assessments;
- conduct a rare plant survey on any new development areas not included in this assessment;
- monitor and maintain drainage control structures in relation to wetlands adjacent to the Project;
- monitor re-establishment in reclaimed wetlands;
- conduct regeneration surveys on reclaimed lands and assess whether stocking densities and performance expectations are being met;
- conduct regular site inspections to identify invasive species; and
- complete post reclamation studies, similar to those completed on existing CVM reclaimed sites, to assess reclamation success and allow for adaptive management.

A.8.14 WILDLIFE

The effects of the Project on wildlife, including ungulates, small mammals, avifauna, amphibians, are discussed in [Section E.14](#) and Consultants Report #14 ([CR #14](#)).

The VEC's chosen for assessment of the Project effects include:

- ungulates (elk, moose, and deer);
- small mammals;
- breeding birds and raptors; and

- amphibians.

Forty habitat types were identified for the LSA (Table E.14.2.1, CR #14, and Figure 4.1). Habitats were derived from ecosite phase coverage provided by Millennium EMS Solutions Ltd. (Millennium).

Five habitat types dominated the Project (58%) and they are: Lodgepole Pine / TB (13.7%); Lodgepole Pine-Black Spruce / LT (12.9%); Mixed Wood / TB (11.8%); Coniferous Cutblock (10.7%); and Mixed Wood Cutblock (8.9%).

Coniferous forests represented the majority of habitat types (40.5%) of the Project, while deciduous forests comprised of mixed wood or trembling aspen represented 26.5%. Bogs and fens of various composition covered 7% of the area. Willow Upland (0.9%), Willow-Birch Meadow (1%), Forb Meadows (0.06%) and Herbaceous Grasslands (1%) were present. Mixed Wood and Coniferous Cutblocks represented about 20 % of the Project. Non vegetated areas comprised 3% of the area. Small amounts of cattail marsh and open water were present.

A number of field surveys were undertaken to assist with identifying wildlife resources in the area. These included:

- winter ungulate aerial survey;
- pellet-group counts;
- winter snow-tracking surveys;
- small mammal trapping;
- bat survey;
- bird surveys; and
- amphibian survey.

The composite ungulate aerial survey (2008 air survey) indicated that white-tailed deer were the most abundant ungulate (382) observed, followed by elk (187), moose (145), and mule deer (87) (CR# 14, Table 5.1). Relative abundance in the 2008 air survey as expressed by density (uncorrected for visibility bias) was: white-tailed deer (0.38/km²), elk (0.19/km²), moose (0.15/km²), and mule deer (0.09/km²).

Seven species of small mammals and 330 individuals were caught on the Project in 2004 during 3,816 trap-nights. Capture success was 8.6% and the corrected catch effort was 10.16 animals per 100 trap-nights. The southern red-backed vole was the most abundant (4.19 /100 TN) small mammal captured in the Project. It was most abundant in Black Spruce-Pine / LT habitat. The masked shrew was the second most abundant small mammal in the Project (2.25 /100 TN). It was found in all habitats sampled in the Project with the exception of Shrubby Poor Fen.

Thirteen hours of bat surveys were conducted throughout the Project LSA in late July and early August, 2008, 2009 and 2010. Myotis species were the most common bat in the Project (8.9 passes/hour and 2.8 buzzes per hour). Hoary / Silver-haired bats were reasonably common while the Big Brown Bat was the least common.

The Snowshoe Hare was present throughout the Project LSA and is an animal of the forest preferring the shrubby open areas or the forest edges.

The red squirrel is widespread throughout the Boreal-Cordilleran region (Smith 1993) and is probably the best known tree squirrel in the region. The red squirrel and characteristic middens were observed in many different habitats that throughout the Project LSA.

The LSA occurs within the range of the northern flying squirrel (Smith 1993). This species occurs in coniferous and mixed wood forests and it is likely that the northern flying squirrel occurs throughout the Project LSA.

The Least Chipmunk is widespread in the Foothills Natural Region (Smith 1993) and were recorded in the Project LSA May 11 and 12, 2007 in habitats associated with the forest edge.

The muskrat is a semi-aquatic rodent and is widespread throughout the region including in the CVM and observations have been made on the west end of Lovett Lake and on various other ponds.

The American beaver are found throughout the province wherever there is suitable water (sloughs, rivers, creeks and lakes) and trees within easy access. Active and abandoned beaver dams were present throughout the northern part of the Project. This area of the Project LSA consists of narrow, slow flowing rivers and streams, *i.e.*, Hay Creek, whereas the south end of the Project LSA consists more of fast flowing streams and open fens. Beavers have been recorded on ponds and various water bodies on the CVM.

Porcupines are found throughout the province but never in large numbers. Porcupines were observed on the Lovett Ridge in the CVM West Extension and in the CVM South Block (Bighorn 1999:68).

Bird survey activities in the Project between 2007 and 2010 resulted in the identification of 120 species and 3,982 bird observations. Observations were made during the breeding bird survey (2,347 birds); winter resident survey (445 birds); owl survey (15 birds); and incidentally (1,175 birds). The White-throated Sparrow, Yellow-rumped Warbler, Pine Siskin, Lincoln's Sparrow, and Swainson's Thrush were the most abundant species (>20 pairs per km²) identified during the Project breeding bird surveys. These five species represented 6% of the 83 species and 987 birds or 42% of the individuals identified during these surveys.

Two groups of raptors are present in the Project LSA. The diurnal raptors are represented by true hawks, falcons, eagles and soaring hawks and are active during daylight hours. Nocturnal raptors are represented by owls which are primarily active at night. Ten species of diurnal raptors (Osprey, Bald Eagle, Northern Harrier, Sharp-shinned Hawk, Northern Goshawk, Broad-winged Hawk, Red-tailed Hawk, Rough-legged Hawk, Golden Eagle, and American Kestrel) were recorded during raptor surveys conducted on the Project LSA. Four nocturnal owl species, the Boreal Owl, Northern Saw-whet Owl, Barred Owl, and the Great Gray Owl were identified in the Project LSA during nocturnal owl surveys.

Wood frogs, western toads and boreal chorus from all were present on the Project. They were observed or heard calling from roadside ditches, roadside puddles, beaver ponds, riparian areas, tamarack fens, riparian willow habitat, birch-willow meadows, wet cutlines and marshy habitat.

Industrial impacts on wildlife can be classed as direct or indirect. Direct impacts involve mortality by increased vehicular collisions and mortality by increased legal and illegal hunting through provision of new access. Indirect impacts include disturbance and habitat loss due to construction and operating phases. Indirect impacts can be divided into three categories; habitat change, creation of barriers, and harassment resulting in habitat alienation or death.

With mitigation the overall impact to wildlife resources will be insignificant. This assessment is based on the following vegetation response after reclamation:

- grassland vegetation will take five years to establish after initial disturbance;
- trees are typically planted 2-4 years after the initial seed mix. After 8 years (for pine) or 14 years (for spruce) trees will be 2 m high and begin to provide hiding cover for ungulates, *i.e.*, 10-18 years after initial seeding. It is assumed that shrubs will be established at the same time as trees;
- most areas planted to trees will have crown closure by 25 years after initial seeding, average tree height will be >5 m, understorey vegetation will change to respond to altered light regime and native species adapted to understorey conditions will begin to ingress and dominate;
- wetlands will re-establish; and
- forest stands will begin to resemble ecosites with an understorey of hairy wild rye and labrador tea / feather moss at 50 years. More open areas including less densely planted forests and areas left as meadows will have higher cover and diversity of plant species and native graminoids will increasingly dominate open areas.

A variety of wildlife use on undisturbed and reclaimed habitat associated with coal leases during and after the mining phase has been documented. Wildlife have colonized new habitat created by reclamation of coal mines (MacCallum 2003). Activity associated with mining is predictable and focused. Animals are not subject to random and varied human disturbance within the MSL. These conditions allow animals to colonize the reclaimed landscape. The MSL associated with the CVM has provided a secure environment for wildlife and is instrumental in maintaining regional ungulate populations especially in the Critical Wildlife Habitat associated with the Lovett Ridge. Initial displacement of the existing wildlife community on the Project LSA by active mining will be followed relatively quickly by colonization of wildlife species appropriate to the stage of succession reached by the regenerated plant community. Because the development is relatively narrow and small in area, species representative of the initially undisturbed habitats are expected to continue to be represented in the final landscape. Designing complexity into the landscape (lakes, ponds, wetlands, variety in vegetation communities and topography) will support wildlife diversity.

Given that appropriate habitats are established and movement opportunities are designed into the Project disturbance, wildlife are expected to adjust to the initial displacement and disturbance by colonizing newly available habitat and incorporating it into their daily and seasonal activities.

Species composition on the reclaimed LSA will be similar, but changed, in response to the addition of lakes, ponds and other habitat features into the final landscape. Species composition of the wildlife communities will change over time in response to vegetation development and maturation.

The residual impact ratings assume:

- human recreation and access is managed to provide security for wildlife especially in the vicinity of the Lovett Ridge,
- diverse habitat types are established,
- structural complexity is established in reclaimed forest types,
- deciduous shrubs are incorporated into the reclaimed landscape, and
- industrial development in the region is coordinated and promotes best management practices that ensure long term viable wildlife populations.

In order to reduce potential impacts of the Project on wildlife CVRI will:

- undertake reclamation activities that specifically enhance wildlife use of the reclaimed area. Specifically provide diverse vegetation communities and complex arrangements of vegetation and landscape features;
- maintain as much undisturbed habitat as possible during mining will help to enhance the wildlife diversity of the reclaimed sites;
- avoid disturbing wetland habitats as much as possible particularly during haul road placement;
- where possible vegetation clearing should be planned for outside of the May to July breeding season;
- if raptor nests are found during operations, mitigation measures will be developed to address the specific situation;
- continue with the existing CVM wildlife management;
- remove carrion from haul roads to reduce raptor mortality;
- use of raptor-safe power line configurations for distribution lines to minimize chances of raptor electrocution;
- focus reclamation on establishing ecosystem function and initiating soil microbial activity. Wherever possible, direct haul placement techniques will be used;
- reclamation seed mix will be composed of several species of grasses and several species of legumes to provide foraging diversity for small mammals, ungulates, and selected bird species. Reclamation activities will initially establish a cover vegetation of grasses and legumes to prevent erosion and initiate soil development. Trees and shrubs will additionally be planted at the appropriate time;
- planting of willow, and other deciduous shrubs in selected areas to provide additional hiding cover and browsing opportunities for ungulates;
- plan upland grasslands for south-facing aspects so that winter forage opportunities are created for elk and deer;

- plant a variety of deciduous, mixed wood and coniferous forest types would establish forest complexity for ungulates and other wildlife;
- mimic the natural disturbance regime where possible. This includes designing complexity into the landscape by establishing forests with structural diversity and variety in vegetation communities and topography and reclaiming wetlands to include islands, irregular shoreline features, and a variety of aquatic and upland vegetation will promote nesting by waterfowl;
- identify opportunities to develop a number of ponds with shallow edges (<1 m) and emergent vegetation suitable for amphibian breeding and waterfowl nesting;
- vegetate soil stockpiles and waste areas with a grass/legume-forb mix to maintain wildlife use in the disturbance zone and reduce erosion potential;
- reduce line of site and promote movement of wildlife across reclaimed areas by using variable contouring of dump slopes;
- break continuous pit disturbances at intervals by “land bridges” or by variable slope angles as is currently done on the CVM; and
- establish where possible specialized habitat features such as snags, rock outcrops, cliffs and mineral licks.

In order to assess the effectiveness of the mitigation measures CVRI will:

- human use of reclaimed areas and if determined necessary, develop an access management plan;
- timber removal by the FMA holder so that mining and forest harvesting can be coordinated so they do not result in simultaneous removal of mature tree cover and the creation of overly large open disturbances; and
- the response of ungulates to reclamation of the Project and other CVM projects.

A.8.15 GREENHOUSE GAS AND CLIMATE CHANGE

The effects of the Project on greenhouse gas and climate change are discussed in [Section E.15](#) and Consultants Report #1 ([CR #1](#)).

Project Case 1 as identified in the Air Quality Assessment ([Section A.8.1](#)) was chosen for the calculation of GHGs emissions as mining will be at full production and Robb West operations are nearest to Robb. There are three sources of GHG emissions for Project Case 1:

- fugitive emissions of coal-bed methane;
- combustion of clean coal in the coal dryer; and
- diesel combustion in the mine fleet and haul vehicles.

Greenhouse gas emissions are expressed in carbon dioxide equivalents (CO₂e). The total equivalent CO₂ emissions from Project operations were estimated to be 357 kt/yr. According to Environment Canada (2011b), total national GHG emissions were 690 Mt in 2009 and Alberta’s share was 33.8% or 233 Mt. Therefore, direct GHG emissions from Project operations in 2034 will be approximately 0.15% of 2009 Alberta GHG emissions and 0.05% of national emissions.

CVRI will develop a GHG Management plan that will incorporate a process of continuous improvement throughout the life of the Project and will contain elements that are consistent with the Province of Alberta's GHG emissions reduction plan, *Albertans and Climate Changes; Taking Action, (2002)*.

Climate change may affect construction, operation, decommissioning, and reclamation stages of the Project. The effect of global warming on climate variables in Alberta have been assessed by the Prairie Adaptation Research Collaborative (PARC) using IPCC (IPCC 2001) growth scenarios and various international GCMs (Barrow and Yu, 2005). The climate change assessment for the Project included the following elements:

- determine projections for climate parameters during the Project lifetime;
- identify potential effects of climate change on Project stages; and
- identify implications that climate change may have on the Project.

The existing and projected changes to selected climate parameters are provided for the region near the Project. The selected parameters are average annual temperature (K), annual precipitation (mm), degree days (>5⁰C), and moisture index (an increase indicates additional moisture stress). Predicted changes in the 2050s expressed as a percent change from baseline value to median prediction (2050s) are an increase by 0.8% for mean annual temperature, 7% for annual precipitation, 50% for degree days >5⁰C, and 44% for annual moisture index.

An increase in mean temperature will have no impact on the Plant, as it is designed for operation in a wide range of temperatures. Increased precipitation may reduce fugitive dust from many aspects of operations. At the same time, increases in annual moisture index and degree days likely more than offset the increased precipitation, causing additional drying. Fugitive dust emissions are expected to increase with increased drying. PM_{2.5} emissions, which arise largely from combustion, are not expected to change as much as those of coarser particulate. Climate change may impact reclamation and re-vegetation activities, potentially increasing fugitive dust emissions as evidenced by increases in the annual moisture index and degree days in the 2050s.

Overall, the change in climate will have low to no impact on air quality associated with the Project as potential increases in fugitive dust can be managed through adaptive road watering practices.

A.8.16 LAND AND RESOURCE USE

The potential effects of the Project on local and regional land and resource users are discussed in detail in [Section E.16](#).

The LSA for the Project is the mine permit boundary. Under the Coal Development Policy for Alberta the Project is located within Category 4 which allows for “development permitted under normal approval procedures” subject to proper assurances respecting protection of the environment and reclamation of disturbed lands.

The Project is located in an area that is subject to the Coal Branch Sub-Regional Integrated Resource Plan and lies within the Robb Highlands Resource Management Area. Under the RMA the Project falls within three zones:

- Zone 2 (Critical Wildlife) – To protect specific fish and wildlife populations by protecting aquatic and terrestrial habitat crucial to the maintenance of those populations;
- Zone 5 (Multiple Use) – To provide for the management and development of the full range of available resources, while meeting long-term objectives for watershed management and environmental protection; and
- Zone 8 (Facility) – To recognize existing or approved settlement and commercial development areas.

Under SRD Fish and Wildlife portions of the Project fall within the Wildlife and Watercourse zone.

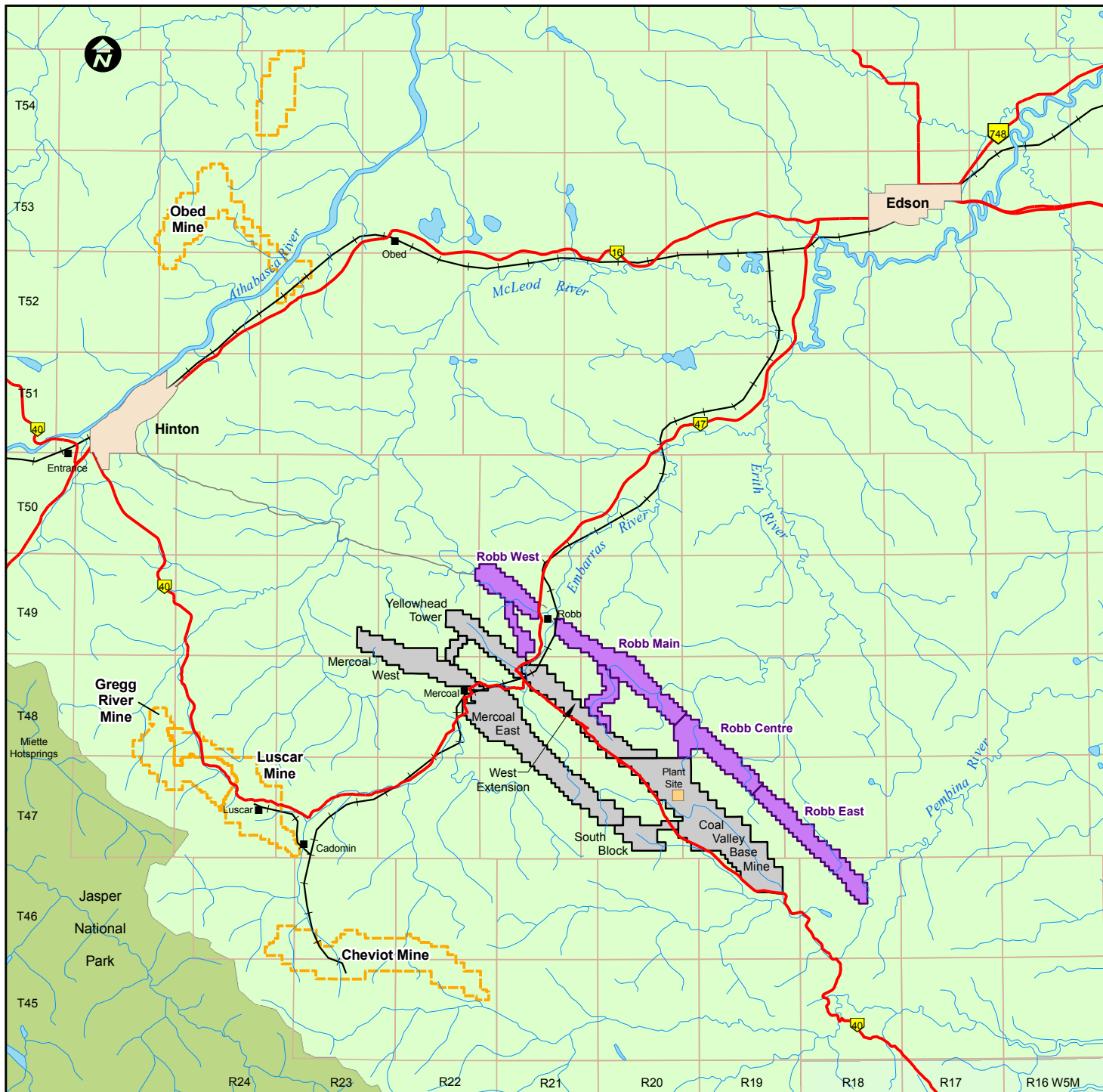
These resource management initiatives were taken into consideration when assessing the potential impacts of the Project on environmental resources.

CRVI has identified other surface and subsurface land and resource users located within the Project mine permit boundary and are listed as follows:

- coal leases
- petroleum and natural gas leases and licences;
- public lands surface dispositions;
- forestry resources;
- utilities;
- aggregate resources;
- infrastructure;
- consultative notations;
- trapping resources; and
- non-industrial land users.

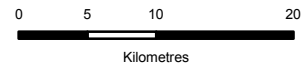
In order to mitigate potential impacts to land and resource users CVRI will:

- continue to communicate with West Fraser and Sundance Forest Industries as to the salvage of merchantable timber;
- discuss with other industrial developers opportunities to maximize resource use and minimize development conflicts;
- continue with CVRI's trapper compensation program; and
- continue with CVRI's public engagement program.



Legend

- Proposed Robb Trend Mine Permit Boundary
- Existing Coal Valley Mine Permit Areas
- Other Mines



PROJECT:

**Coal Valley Mine
Robb Trend Project**

TITLE:

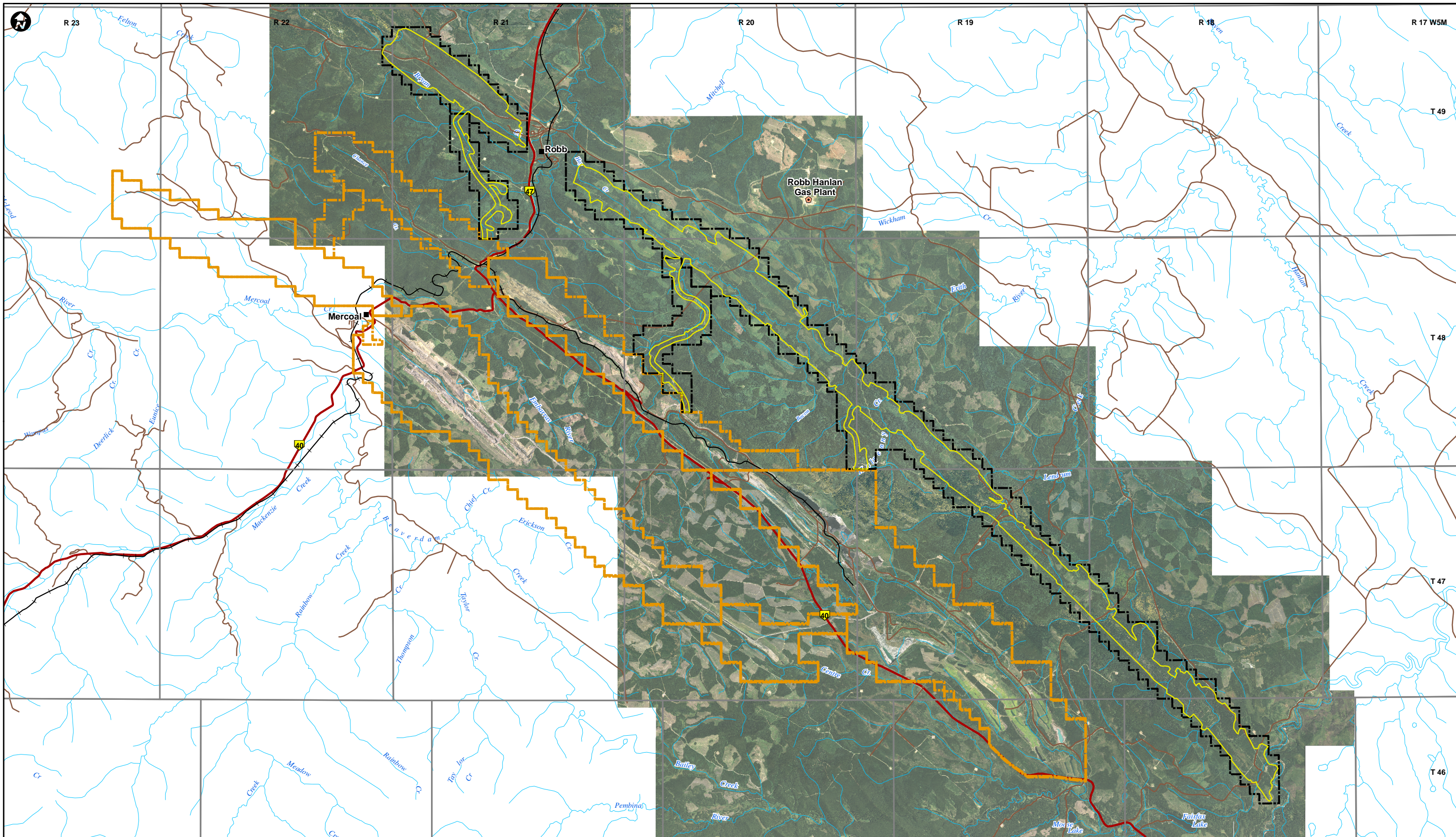
Project Location






DRAWN: PS/JG
 CHECKED: KY
 DATE: Mar 25/12
 PROJECT: 08-041

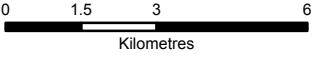
FIGURE:

A.1-1



Legend

-  Proposed Robb Trend Mine Permit Boundary
-  Proposed Footprint
-  Existing Mine Permit Boundary



PROJECT:
**Coal Valley Mine
 Robb Trend Project**

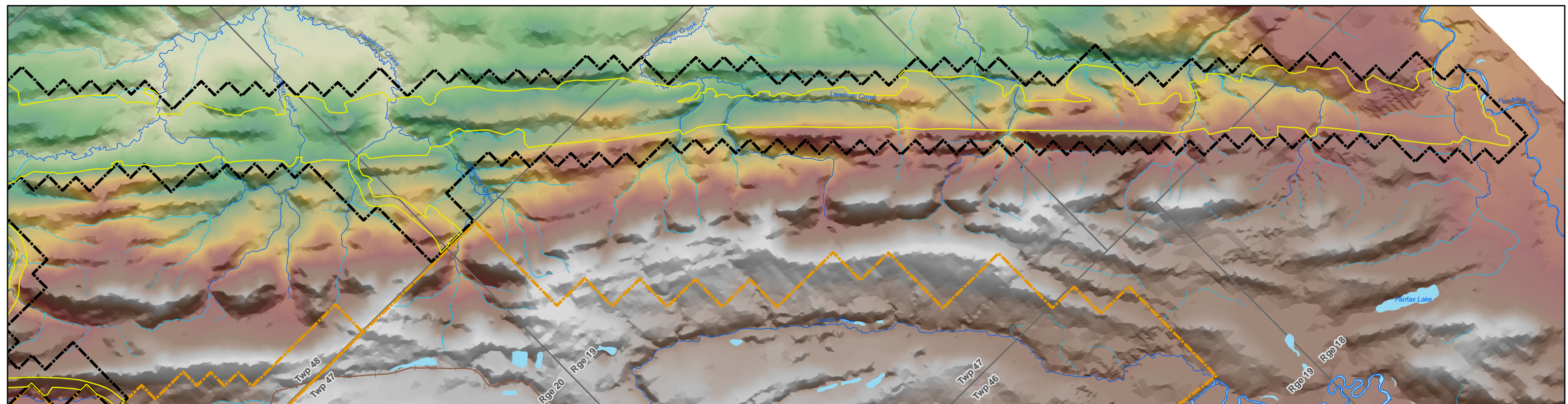
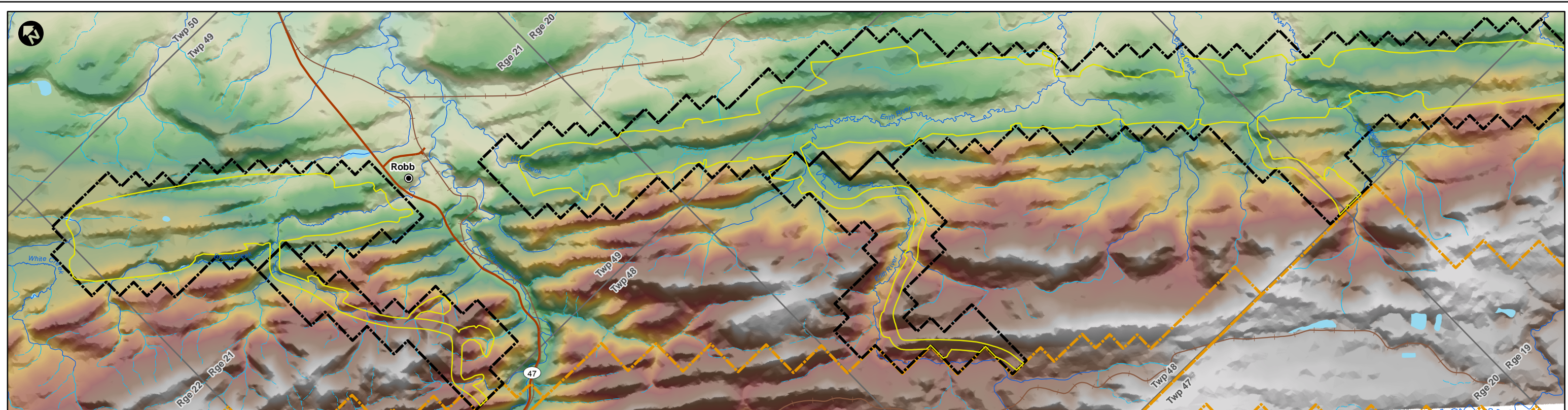
TITLE:
Development Area



DRAWN: PS/JG
 CHECKED: KY
 DATE: Mar 25/12
 PROJECT: 08-041

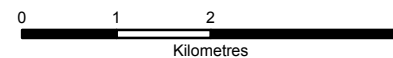
FIGURE:
A.1-2

REF: CVRI 2011, Orthophoto Date, 2010

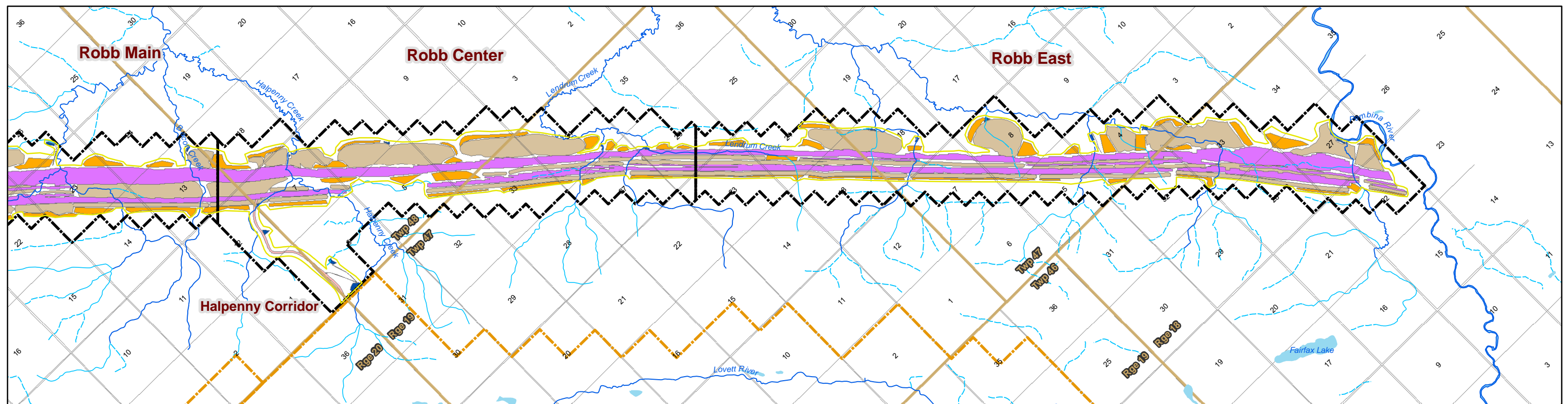
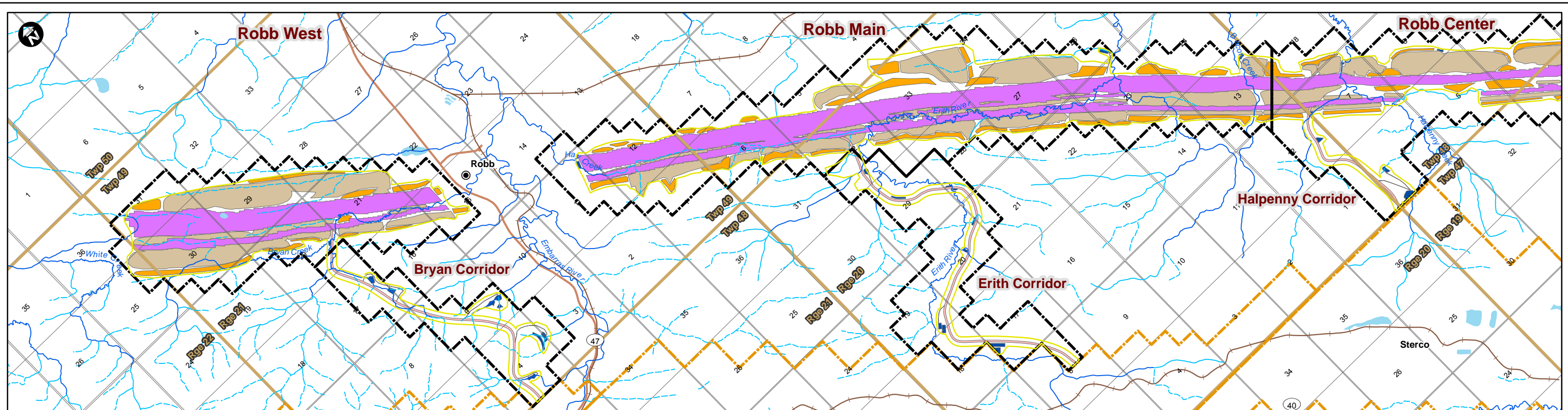


Legend

- Proposed Robb Trend Mine Permit Boundary
- Proposed Footprint
- Existing Mine Permit Boundary
- Paved Road
- Railway
- Permanent Watercourse
- Intermittent Watercourse
- Ephemeral Watercourse
- Waterbody
- Topography (masl)**
- High : 1500
- Low : 1050

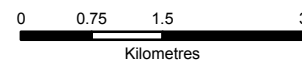


PROJECT: Coal Valley Mine Robb Trend Project		
TITLE: Topography		
DRAWN: SL/JG	FIGURE:	A.5-1
CHECKED: KY	DATE: Mar 29/12	
PROJECT: 08-041		



Legend

- Proposed Robb Trend Mine Permit Boundary
- Proposed Footprint
- Existing Mine Permit Boundary
- Pit
- Overburden Dump
- Soil Pile
- Haul Road
- Pond
- Pond Access
- Permanent Watercourse
- Intermittent Watercourse
- Ephemeral Watercourse
- Waterbody



PROJECT:
**Coal Valley Mine
Robb Trend Project**

TITLE:
Development Plan



DRAWN: PS/JG
CHECKED: KY
DATE: Mar 29/12
PROJECT: 08-041

FIGURE:
A.6-1