Coal Valley Resources Inc. - Coal Valley Mine

Robb Trend Project
Environmental Screening Report
CEAR #61436

Submitted to
Canadian Environmental Assessment Agency

May 2014

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1. INTRODUCTION

Pursuant to the Canadian *Environmental Assessment Act* (the Act), the Department of Fisheries and Oceans Canada (DFO), Natural Resources Canada (NRCan), and Transport Canada (TC) are the Responsible Authorities (RA) for the Coal Valley Resources Inc. (CVRI) Coal Valley Mine (CVM) Robb Trend Project (the Project) as they may issue permits or licences, approvals or take other action to allow the Project to commence. DFO may take action in relation to subsection 35(2) of the *Fisheries Act*; NRCan may take action in relation to paragraph 7(1)(a) of the *Explosives Act*, and TC may take action in relation to Section 5 of the *Navigable Waters Protection Act*. Due to this potential involvement, DFO, NRCan, and TC are required to ensure that an Environmental Assessment (EA) is conducted in compliance with the Act. The Project is subject to a screening-level EA.

This screening report provides a summary based on the "*CVRI CVM Robb Trend Project Environmental Impact Assessment"* (EIA) application. This application is to be considered as part of the information available for review during the screening report assessment. Although this application was submitted to the Alberta Energy Regulator (AER; formerly the Energy Resources Conservation Board [ERCB]) and Alberta Environment and Sustainable Resource Development (ESRD) it is our position that in the spirit of the harmonised review of resource development projects, this information can also be referenced in the screening report.

Key documents for the EA include:

- *Notice of Commencement of an Environmental Assessment; Coal Mine, Embarras, Erith and Pembina Rivers, Robb, AB* (April 18, 2011; updated June 19, 2012) (see the Agency *et al.* 2011);
- *Final Terms of Reference Environmental Impact Assessment Report for Coal Valley Resources Inc. Proposed Robb Trend Project* (ESRD 2011);
- *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (CVRI 2012); and
- Responses to Supplemental Information Requests (SIRs) from ESRD and responsible and federal authorities.
    - SIR #1 submitted December 7, 2012;
    - SIR #2 submitted June 17, 2013; and
    - SIR#3 submitted April 1, 2014.

1.1 Federal EA Contact Information

The Federal Environmental Assessment Coordinator for this Project is the Canadian Environmental Assessment Agency (the Agency). For information related to the EA for this Project please contact:

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2. PROJECT DESCRIPTION

Project Information	
Project Title	Coal Valley Resources Inc. Coal Valley Mine Robb Trend Project
Description of Work/Activity	Open pit coal mine extension
Project Location	Approximately 100km south of Edson in the Coal Branch area of Alberta near the town of Robb.
Proponent and Contact Information	Coal Valley Resources Inc. Les Lafleur Project Manager Coal Valley Mine, Bag Service 5000 Edson, Alberta T7E 1W1 Phone: (780) 865-8607 Fax: (780) 865-8630 E-Mail: llafleur@coalvalley.ca
Provincial Application Date	April 11, 2012
CEAA Registration Date	April 18, 2011
CEAA Triggers	Section 5(1)(d) of the Act as CVRI will require to obtain permits or authorisations from RAs.
Assessment Coordinator	Sean Carriere, Team Lead
CEAA Determination Date	TBD

CVRI is proposing to continue operations of the CVM by developing coal resources in the Robb Trend Area (Figure 2-1). The 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 174 million tonnes of coal for processing yielding approximately 87 million clean metric tonnes (CMT) available for sale. This tonnage would provide CVRI with the necessary resources to operate at projected rates of production until 2038.

2.1 Project 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 mine site 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.

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 to the Pembina River system. Other watercourses that occur within the Project development area include Bryan Creek, Hay Creek, Bacon Creek, Halpenny Creek, Lendrum Creek, and Lund Creek. The specific mine areas (*i.e.*, Robb West) will be developed in stages based on approved mine licences. The mine permit area will not all be disturbed at once but rather over an extended period of time based on approved mine plans.

The Project is located north of the existing mine, oriented parallel to the current operation. Multiple coal seams are present within the Project area. These seams are situated with a north-west and south-east strike direction. The seams dip to the north-east. Terrain is characterised as foothills with high ridges and distinct valleys. Ridges are oriented as the coal seam, running the length of the Project. The coal reserves are within a valley formed by ridges on both sides.

The majority of the Regional Study Area (RSA) is situated within the Upper Foothills Natural Subregion of Alberta, with a small portion occupying the Lower Foothills Natural Subregion. The Upper Foothills (UF) are situated at a higher elevation than the Lower Foothills (LF). Subsequently, the climate of the UF is characterised by a stronger cordilleran influence compared to the more continental climate of the LF (Strong and Leggat 1992; Natural Regions Committee 2006). The climate in the CVM area is classified as Boreal-Cordilleran with long, cold winters and moderately warm summers with an average frost-free period of 73 days. The area falls within Class 5H agroclimatic area (very severe heat limitations), climatic index is positive, and the climatic energy index is less than 900 units (based on growing degree days, 5°C (A.S.A.C., 1987)). As elevation increases from LF to UF, more winter precipitation is received and the length of the growing season becomes shorter. The average annual temperature recorded at Environment Canada's weather station is 2.5°C, while the average annual precipitation is

637.2 mm, with the majority received during July (Natural Regions Committee 2006). Winds originate most frequently from the west to northwest and from the southeast.

Topography in the area ranges from undulating or strongly rolling dissected plateaus to steep slopes. The parent material of the UF is composed of primarily sand and mudstone of Tertiary and Upper Cretaceous origin, the latter of which is associated with coal seams (Natural Regions Committee 2006). Within the LF, siltstone and shale occur as well. Surface materials are predominantly medium textured and somewhat calcareous glacial till deposits that become thin on steep slopes, and may occur in association with exposed bedrock, tertiary gravels and colluviums (Natural Regions Committee 2006). At lower elevations, glaciofluvial sands and glaciolacustrine clays can be found. Upland soils include well to imperfectly drained Orthic Gray Luvisols and Brunisolic Gray Luvisols. Dystic Brunisols are characteristic of sandy areas, while Eutric Brunisols and Regosols are associated with calcareous and recently deposited aeolian and fluvial materials. Lowlands are associated with Terric and Typic Mesisols, and Peaty and Orthic Gleysols.

The area where the Project is situated 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 recognising the area's resource values. 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 recognise existing or approved settlement and commercial development areas.

Mineral exploration, including coal mining, is permitted in all three of the above mentioned zones of the RMA.

The land the Project is located on is forested, forming part of the West Fraser Mills Ltd. (West Fraser) 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 pipelines and numerous wells. Steep ridges and broad valleys dominate the terrain features in the area. 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.

Overall, the Project setting is favourable for open pit coal mining and has a successful history of supporting the coal mining industry in Alberta.

2.2 Project Schedule

The CVM requires access to the resources encompassed within the Project in a timely manner. In order to plan for this, CVM is planning that all required regulatory, municipal and internal Project approvals are received by Q1 of 2015 for start of construction and Q1 of 2016 for start of mining.

Full production is expected to be reached by 2018 with all mine equipment relocated into the Project area. Available coal resources within the existing CVM operations will have reached the end of their economic limits and mining will essentially be completed by this time. Full production is expected to continue until 2034 when annual production rates slowly decline as the remaining reserve area is completed. The life of the CVM, based on the remaining reserves within the Project area and currently licenced mining areas, is 2038, an operating life of 25 years.

3. SUMMARY OF THE ENVIRONMENTAL ASSESSMENT

For the purpose of the federal EA, it was determined to include the following elements and activities:

- the construction of mine related infrastructure such as haul roads, water management systems (ponds, ditches, sumps), access roads, pits and dumps;
- the operation of an open pit coal mine and associated infrastructure (as listed above) under normal operation as well as accidents or malfunctions that might occur during the operation; and
- the reclamation and decommissioning of the coal mine and related infrastructure at the end of the mine life to the extent that is currently known and as approved by the provincial regulatory authority.

The scope of the federal EA is outlined in the *Notice of Commencement of an Environmental Assessment; Coal Mine, Embarras, Erith and Pembina Rivers, Robb AB* (April 18, 2011), and *Final Terms of Reference Environmental Impact Assessment Report for Coal Valley Resources Inc. Proposed Robb Trend Project* (ESRD 2011). The scope of the EA included mandatory factors under Section 16(1)(a) to (e) and 16(2) of the *Act*.

As stated in the *Notice of Commencement of an Environmental Assessment; Coal Mine, Embarras, Erith and Pembina Rivers, Robb AB* (April 18, 2011),

> "The scope of the project includes all physical activities associated with the expansion of the existing mine and coal mining activities including watercourse crossings and realignments, access, storage areas and other undertaking directly associated with the works."

3.1 Environmental Assessment Methods

The EA methods are described in detail in the *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (CVRI 2012).

The EA focused on Valued Environmental Components (VECs) that could potentially be affected by the Project and that were identified through field studies, literature review, past experiences, Project plans or identified by discipline experts involved in the EA.

The following disciplines and related VEC's were considered in the EA:

- Atmospheric Environment:
  - Air quality.
  - Noise.
- Groundwater resources.
- Surface water resources:
  - Surface water quality.

    - hydrology (water management).
- Aquatic environment:
    - fisheries resources.
    - habitat within the aquatic environment.
- Terrestrial environment:
    - Soils and terrain;
    - Vegetation, rare plants and wetlands.
    - Wildlife.
- Archaeological and heritage resources:
    - Historical Resources.
    - Traditional Land Use.
- Conservation of reclamation materials and reclamation of areas disturbed by mining and mining related activities.
- Current land and resource use.
- Public health and safety.
- Socio-Economic.
- Public and First Nations engagement.

Potential cumulative environmental effects that could occur due to other regional projects, accidents, malfunctions and unplanned events (*i.e.*, extreme weather events) were also considered in the EA.

Potential environmental effects were identified in relation to the particular VECs. Significance of the potential environmental effect was listed and mitigation measures that are to be employed were described. With the proper implementation of the mitigation measures, no significant adverse environmental impacts remain throughout the life of the Project.

4. SUMMARY OF ENVIRONMENTAL EFFECTS ASSESSMENT

A complete and detailed description of the environmental effects assessment is available in the *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (CVRI 2012) as well as the supporting three rounds of SIR's submitted December 2012, June 2013, and April 2014. The following sections provide a summary of what is captured in the application and SIR responses.

4.1 Atmospheric Environment

4.1.1 Air Quality

The potential effects of the Project on air quality are discussed below. A detailed summary of the components of the air quality assessment is provided in Appendix 1, Table 1 of this report.

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

- sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter ($PM_{2.5}$; PM_{10}; TSP), volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs), ozone (O_3), and metal concentrations;
- particulate and nitrogen deposition; and
- GHG Emissions.

Modelling was done using the CALMET/CALPUFF model, and was conducted according to ESRD (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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on air quality are discussed in Appendix 2. CVRI is proposing to continue their current program of air quality mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to air quality effects are discussed in Appendix 3.

4.1.2 Noise

A detailed summary of the components of the noise assessment is provided in Appendix 1, Table 2 of this report.

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 AER 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 AER Directive 038.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on noise are discussed in Appendix 2. CVRI is proposing to continue their current program of noise effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to noise effects are discussed in Appendix 3.

4.2 Groundwater Resources

A detailed summary of the components of the hydrogeology (groundwater) assessment is provided in Appendix 1, Table 3.

Previous environmental assessments at the CVM 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.

The community of Robb relies on water wells to supply individual homes. Drawdown of ground water levels in water wells in Robb has the potential to occur when mining operations are active in the areas closest to the town site. This potential impact will be highest for shallow wells, located in and around old underground workings that are close to the active mine areas and much less for wells which are deeper and/or located farther away from the mine development. In all cases, deepening of existing wells represents a viable mitigation. A plan of action will subsequently be developed in consultation with the community that will include mitigation of 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 any potential groundwater affect will cease and there will be no significant impacts in the residual or cumulative sense.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on groundwater are discussed in Appendix 2. CVRI is proposing to continue their current program of groundwater mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to groundwater effects are discussed in Appendix 3.

4.3 Surface Water Resources

4.3.1 Surface Water Quality

A detailed summary of the components of the surface water quality assessment is provided in Appendix 1, Table 4.

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 Embarrass 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 rock 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 not significant in the LSA and therefore are assessed as not significant in the RSA. The Planned Development Case for both the LSA and RSA are assessed as not significant 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 not significant in the LSA and therefore are assessed as not significant in the RSA. The Planned Development Case for both the LSA and RSA are assessed as not significant as well.

Water collection and impoundment structures will be used to decrease the impacts of the mining activities on the local watercourses, including potential sediment loads and deposition of those sediments. The water from these impoundments will be released into local streams which will eventually enter the Embarras or Pembina Rivers. 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 of detectable increases in concentration coupled with concentrations being above surface water quality guidelines. Effects of the Project on surface water quality, after mitigation, are not significant in the LSA and RSA. The Planned Development Case for both the LSA and RSA are assessed as not significant as well.

Eleven end-pit lakes/ponds[1] will be constructed as part of the reclamation landscape for the Project. Six of the lakes will be "flow-through" lakes that are constructed on streams and will have an inlet and an outlet. Five of the lakes will be constructed "off-channel" with no direct channel inlet but will have an outlet to allow overflow to report to adjacent streams. 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 receive groundwater contributions;
- 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;

[1] Revised as per ESRD SIR#2 Appendix 20 of the second round of SIR's and AER SIR#3 Appendix 1of the third round of SIR's. The original application proposed the formation of twelve end pit lakes/ponds.

- 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 – Appendix 2) as a result of their design, construction, and management are assessed as not significant.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on surface water quality are discussed in Appendix 2. CVRI is proposing to continue their current program of surface water quality mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to surface water quality effects are discussed in Appendix 3.

4.3.2 Hydrology (Water Management)

A detailed summary of the components of the surface hydrology assessment is provided in Appendix 1, Table 5.

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 exception of the southern extent of the Project that extends 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 long-term residual effect of surface water flow by watershed was assessed and found to be not significant with the implementation of appropriate mitigation measures.

CVRIs 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 not have a significant 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 not significant compared to natural variations.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on surface hydrology are discussed in Appendix 2. CVRI is proposing to continue their current program of surface hydrology mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to surface hydrology effects are discussed in Appendix 3.

4.4 Aquatic Environment

A detailed summary of the components of the fisheries assessment is provided in Appendix 1, Table 6.

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* (Athabasca 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*.

The VECs selected for assessment include: arctic grayling; bull trout; Athabasca rainbow trout; 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.

Throughout the application process the Project Team has engaged DFO by providing them with a copy of the *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (April 2012) as well as the subsequent SIR responses.

In addition to these documents meetings have been held with DFO to describe the proposed Project and outline implications regarding fish habitat impacts and future *Fisheries Act* approval requirements. An initial meeting was held on March 3, 2013 to discuss the Project and to highlight concerns regarding the magnitude of HADD and a seeming reliance for compensation. In response to this meeting a *Fish Compensation Document* was provided to DFO on August 28, 2013 (See Appendix 4). This document outlined mining options including minor amendments to

satisfy fish habitat compensation concerns as it relates to both disturbance and reclamation. Proposed modifications were made to the mine reclamation plan wherein some of the previously contemplated reclaimed lakes have been substituted by restored stream channels.

On October 7, 2013 another meeting was held with DFO and Project Team representatives to discuss the Project and the Fish Compensation Document as it related to fish and fish habitat. A Project update was provided at this meeting related to the SIR responses and potential mine plan revisions.

On March 13, 2014 the Project Team provided the *Preliminary Fish Compensation Outline Project Update and Revised Discussion Report* based on the August 28, 2013 document (See Appendix 4). The review process including the three rounds of SIRs has resulted in the determination that several minor 'revisions' to the original mine plan concept should be incorporated into the Project plan where a lesser degree of environmental impact or a greater degree of mitigation would result thus reducing potential risk of impact. These minor 'revisions' are captured in the overall mine disturbance and related reclamation plan as they relate to fish habitat, both of which are captured in Appendix 4.

Given that potential effects of the Project on rainbow trout, bull trout, and artic 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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on fisheries are discussed in Appendix 2. CVRI is proposing to continue their current program of fisheries mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to fisheries effects are discussed in Appendix 3.

4.5 Terrestrial Environment

4.5.1 Soils and Terrain

A detailed summary of the components of the soils assessment is provided in Appendix 1, Table 7.

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 characterise 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.

Soils will be salvaged in a one lift operation which results in mixing of soil horizons. Prescribed salvage depths will avoid soil layers that are detrimental to surface soil quality. Impacts due to mixing of the soil are not significant.

Erosion of placed cover soil material can occur until the soil surface is stabilised with vegetation cover. With the use of appropriate and available technology there is low risk for accelerated erosion of cover soil. The net loss of soil resources through erosion is not significant.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on soil resources are discussed in Appendix 2. CVRI is proposing to continue their current program of soils effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to soil resources effects are discussed in Appendix 3.

4.5.2 Vegetation, Rare Plants and Wetlands

A detailed summary of the components of the vegetation assessment is provided in Appendix 1, Table 8.

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 utilising 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 assessment. In total, 574 vegetation species were documented during field surveys within the LSA. The revised Project Footprint is predicted to cover 5,457 ha. This represents the removal of 56.0% of ecosite phases from the LSA. Over time, reclaimed and revegetated sites are expected to resemble pre-disturbance ecosites. The residual Project effect is not significant following the implementation of mitigation and monitoring measures.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on vegetation resources are discussed in Appendix 2. CVRI is proposing to continue their current program of vegetation effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to vegetation resources effects are discussed in Appendix 3.

4.5.3 Mammalian Carnivores

A detailed summary of the components of the mammalian carnivore assessment is provided in Appendix 1, Table 9.

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.

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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on carnivores are discussed in Appendix 2.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to carnivores effects are discussed in Appendix 3.

4.5.4 Wildlife

A detailed summary of the components of the wildlife (ungulates) assessment is provided in Appendix 1, Table 10.

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

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

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.

With mitigation the overall impact to wildlife resources will be not significant. 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, understory vegetation will change to respond to altered light regime and native species adapted to understory conditions will begin to ingress and dominate.
- Wetlands will re-establish.
- Forest stands will begin to resemble ecosites with an understory 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.

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 colonising 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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on ungulates are discussed in Appendix 2. CVRI is proposing to continue their current program of ungulates effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to ungulates effects are discussed in Appendix 3.

4.6 Archaeological and Heritage Resources

4.6.1 Historical Resources

A detailed summary of the components of the archaeological and historical resource assessment is provided in Appendix 1, Table 11.

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 utilised 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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on historical resources are discussed in Appendix 2. CVRI is proposing to continue their current program of historical resources effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to historical resources effects are discussed in Appendix 3.

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.

4.6.2 Traditional Land Use

A detailed summary of the components of the traditional land use assessment is provided in Appendix 1, Table 12.

Consultation and traditional ecological knowledge and traditional land use studies for the Project were 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 extension areas. Aboriginal communities involved in CVRI's consultation process include Samson Cree Nation, Alexis Nakota Sioux Nation, O'Chiese First Nation, Foothills Ojibway First Nation (formerly the Foothills Ojibway Society), Nakcowinewak Nation of Canada, Paul First Nation, Sunchild First Nation, Mountain Cree (Smallboy) Camp, Aseniwuche Winewak Nation, Whitefish First Nation, Ermineskin Cree Tribe, and the Métis Nation of Alberta.

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 summarises 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.

The above listed concerns and how they relate to the various Aboriginal communities has been documented in Appendix 5. Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on traditional resources are discussed in Appendix 2. CVRI is proposing to continue their current program of traditional resources effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to traditional resources effects are discussed in Appendix 3.

4.7 Current Land and Resource Use

A detailed summary of the components of the land and resource use assessment is provided in Appendix 1, Table 13.

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 recognise existing or approved settlement and commercial development areas.

Mineral exploration, including coal mining, is permitted in all three of the above mentioned zones of the RMA.

CVRI 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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on land and resource use are discussed in Appendix 2. CVRI is proposing to continue their current program of land and resources effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to land and resource use effects are discussed in Appendix 3.

4.8 Health and Socio-Economic

4.8.1 Human Health

A detailed summary of the components of the human health assessment is provided in Appendix 1, Table 14.

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.

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 hydrocarbons (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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on human health are discussed in Appendix 2. CVRI is proposing to continue their current program of human health effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to human health effects are discussed in Appendix 3.

4.8.2 Socio-Economic

A detailed summary of the components of the socio-economic assessment is provided in Appendix 1, Table 15.

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.

Mitigation strategies proposed by CVRI in order to reduce potential impacts of the Project on socio-economic are discussed in Appendix 2. CVRI is proposing to continue their current program of socio-economic effects mitigation.

Monitoring is an important component of the effects assessment and supports the continuous improvement of the environmental management program at the CVM. Monitoring specific to socio-economic effects are discussed in Appendix 3.

4.9 Responsible Authorities

Based on the environmental effects assessment (Section 4.1 – 4.8) the following summaries can be made for the three responsible authorities as they relate to the Project.

4.9.1 Department of Fisheries and Oceans Canada (DFO)

As stated in Section 4.4, throughout the application process the Project Team has engaged DFO by providing them with a copy of the *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (April 2012) as well as the subsequent SIR responses.

In addition to these documents meetings have been held with DFO to describe the proposed Project and outline implications regarding fish habitat impacts and future *Fisheries Act* approval requirements. A *Fish Compensation Document* was provided to DFO on August 28, 2013 (See Appendix 4). This document outlined mining options including minor amendments to satisfy fish habitat compensation concerns as it relates to both disturbance and reclamation. The revisions to

the mine reclamation plan included wherein some of the previously contemplated reclaimed lakes have been substituted by restored stream channels.

On March 13, 2014 the Project Team provided the *Preliminary Fish Compensation Outline Project Update and Revised Discussion Report* based on the above mentioned August 28, 2013 document (See Appendix 4). The review process including the three rounds of SIRs has resulted in the determination that several minor 'revisions' to the original mine plan concept should be incorporated into the Project plan where a lesser degree of environmental impact or a greater degree of mitigation would result thus reducing potential risk of impact. These minor 'revisions' are captured in the overall mine disturbance and related reclamation plan as they relate to fish habitat, both of which are captured in Appendix 4.

The *Preliminary Fish Compensation Outline Project Update and Revised Discussion Report* (Appendix 4) provides options and reclamation objectives in line with the "No Net Loss" principle. Crossing designs will adhere to the *Fisheries Act* and Alberta Coad of Practice to ensure fish passage is maintained.

Throughout the life of the Project, CVRI will be applying for various approvals with DFO as the mine progresses. The Project is expected to have insignificant impact to fish populations in the region with the implementation of mitigation measures.

4.9.2 Natural Resources Canada (NRCan)

The Project will include relocation of an existing bulk explosives 'manufacturing plant'. A licence for the facility will be required by the *Explosives Act* (s.7(1)(a). A preliminary site location for the facility has been identified but is subject to further engineering evaluations. CVRI is progressing toward the appropriate applications for this licence. The proper licensing under the *Explosive Act* will be applied for and obtained prior to the relocation of the 'manufacturing plant'. This relocation is not required for the Project until approximately 2018.

4.9.3 Transport Canada (TC)

The prominent streams to be crossed or diverted by mining are listed in Table 4-1 and Table 4-2 along with channel characteristics and expected details of the crossings and diversions. The navigable water characteristics are based upon observations of channel widths and depths conducted at various locations along the streams, as documented in CR#2, Figures 5 to 12, and are at not necessarily at specific crossing or diversion locations. Specific crossing locations may change during detailed planning and design stages, at that time and if CVRI deems it necessary to opt into the *Navigable Protection Act* (NPA) Navigable Water Protection Program, formal applications for approval and detailed plans would then be submitted.

Initial Development

Development in the first five years is expected to involve only one river crossing which could potentially involve TC if CVRI opts into the Navigable WATER Protection Program.

The haulroad connecting the Project to the existing CVM Plant will be constructed within the Erith River corridor. The chosen route will result in a single crossing of the main stem of Erith River. This crossing has been identified within Table 4-1 and Table 4-2.

Full details of the proposed structure, river channel alignment and features related to navigation will be presented in a forthcoming application.

The Project is expected to have insignificant impacts to navigable watercourses in the region with the implementation of mitigation measures.

Table 4-1 Potential Navigable Watercourses Intercepted by the Mine

No.	Watercourse	Active Mine Period by Year	Drainage Area (km^2)	Discharge (m^3/s)			Diversion/ Stream Length Intercepted (m)	Preliminary Navigability Screening	Preliminary Navigability Screening				
				Mean Annual	2 Year Peak	20 Year Peak		Average Channel Width (m)	Average Channel Depth (m)	Channel Slope (%)	Sinuosity Ratio	Frequency of Natural Obstructions	Navigability
1	Erith River	1-13	54.6	0.43	8.1	29.7	5,000	12.5	>0.6	0.7	>1.2	N/A	Yes
2	Erith East Trib (ERT1)	2-13	15.5	0.12	2.3	8.4	700	3-5	0.5	0.7	>1.2	N/A	Yes
4	Halpenny West Trib (HLT1)	8-9	7.1	0.06	1.1	3.9	920	2.7	0.4-0.9	0.8	1.8-2	N/A	Yes
5	Halpenny Creek	3-13	25	0.2	3.7	13.6	270	2.6-6	>0.6	1.5	2	N/A	Yes
8	Lendrum Trib (LET3)	10-13	11.1	0.09	1.6	6	450	3.9	<0.6	1.8	1.3	N/A	No
11	Lund West Trib (LDT1)	12-14	7.6	0.06	1.1	4.1	625	3.2-4.1	<0.6	2.2	1.1	N/A	No
14	Upper Lund Creek	17 and on	8.3	0.07	1.2	4.5	2,200	1.3-6.5	na	2.3	>1.2	N/A	No
15	Pembina Trib (PET1)	17-24	7.9	0.06	1.2	4.3	300	2.9	<0.6	1.0	na	N/A	No
13	Bryan Creek	17-24	18.8-19.6	0.15	2.8	10.2	250	2.1	0.6+	1.6	>1.4	Numerous	No

Table 4-2 Potential Navigable Main Corridor Haulroad Crossings

Watercourse	Active Period of Year	Location	Drainage Area (km^2)	2 Year Peak Flow (m^3/s)	Typical Culvert Diameter	Crossing Type[1]	Channel Width (m)	Channel Depth (m)	Channel Slope (%)	Sinuosity Ratio	Frequency Natural Obstructions	Navigability
Erith Road												
Erith River (ER-6)[2]	1-25	At E6/E7pond	32.6	4.63	3.6	3	11.9	>1.2	1.3	1.4	Woody debris	Yes
Halpenny Road												
HLT1	1-25	Above P7 pond	6.71	1.00	3	2	2.7	0.9	1.8	1.1	Few	Yes
Robb West Road												
Bryan Trib (BRT2A)	14-25	Above W6 pond	6.81	1.01	2	TBD	<3	<0.6	3.5	1.14	N/A	No
Bryan Creek[3]	14-25	Above East 7 pond	7.31	1.08	3	2	2.4	<0.5	2.1	1	N/A	No

[1]Crossing Type 3 = Navigable clear span arch; Type 2 = culvert with fish passage, Navigability to be determined; TBD = to be determined

4.10 Effects of the Environment on the Project

Potential effects of the environment on the Project (throughout all phases including construction, operation, and reclamation) were identified. Climatic factors that could pose a risk to the Project resulting in delays and or modifications include:

- severe weather such as heavy rainfall events, blizzards and thunderstorms;
- flooding; and
- wildfires.

Mitigation measures such as suspension, modification or addition of specific construction activities will allow the Project to safely and successfully continue operations throughout these severe environmental events. Adaptive management, along with prevention, detection and suppression will also make sure that any environmental events will not have a significant influence on overall operations.

5. ACCIDENTS AND MALFUNCTIONS

CVRI will ensure that environmental features and protection measures are taken into consideration during all phases, from planning to reclamation of mine development. Technically proven and economically feasible measures will be taken to protect environmental quality for air, water, vegetation, wildlife and land resources. Risk or probability of an accident or malfunction has been incorporated into the overall assessment and subsequent VEC's tables.

CVRI undertakes as a priority "pollution prevention" in preference to "pollution cleanup".

Pollution prevention measures in place at the CVM include:

- reuse and recycling of products;
- substitution of products purchased with more "environmentally friendly" materials;
- equipment modifications and improved operating efficiencies; and
- conservation of materials and resources.

CVRI is an active participant in many environmental and regulatory initiatives and will continue to be an active member of these programs during the operating life of the Project. West Central Airshed Society (WCAS), West Fraser's Forest Resources Advisory Group (FRAG), Grizzly Bear Recovery Program, Athabasca Trout Recovery Plan and the Upper Athabasca Watershed Council are a few of the environmental initiatives CVRI actively participates in.

CVRI is committed to ensuring that its operations comply with all relevant laws and regulations. This commitment is attained in many ways:

- key CVRI employees be keep informed of relevant laws, regulations and operating guidelines through training programs;
- continual review and updating of emergency preparedness procedures; and

- continual review and updating of operating procedures including responsible handling, use and disposal of products and materials.

Environmental and Occupational Health and Safety Inspectors routinely monitor CVRI's site operations and regulatory compliance. CVRI will continue carrying out its environmental and operating programs in the Project area using an adaptive management approach.

CVRI's Environmental Protection Program at the CVM is to first prevent and second to minimise adverse environmental impacts resulting from mine related operations. The program will be implemented in the Project area through the following on-site mechanisms:

- adaptive management approach to environmental risk assessment;
- Safety, Health and Environment Committee (SHE) comprised of key CVRI employees;
- emergency response and wildfire control and prevention;
- waste management program;
- spill response and clean up procedures;
- operating policy commitments; and
- site reclamation.

CVRI recognises and performs three stages of environmental risk assessment. Throughout these stages of risk assessment, CVRI adapts operating practices to ensure that environmental impacts are eliminated or minimised. Government regulation and public involvement ensure successful implementation of environmental programs.

The first stage of adaptive management is carried out prior to mine development. At this stage, baseline environmental conditions are documented and potential environmental risks and impacts are assessed. Mine plans are developed to ensure that the risks and impacts are prevented or mitigated.

The second stage is carried out during mine operations. The potential risks and impacts that were identified prior to mine development are monitored to ensure that control and mitigation measures are effective or if adaptive measures are required. The purpose of monitoring is to determine if changes in the natural environment (*i.e.*, background conditions) have occurred after mining has commenced.

Potentially adverse environmental effects can be halted or mitigated prior to becoming a concern.

This is achieved by the following methods:

- continually updating relevant environmental baseline information throughout the life of the operation;
- determining whether the impacts and risks identified prior to development were correct, or whether all impacts and risks had been identified; and
- assessing whether existing mine plans and operations can be modified to further reduce environmental risk and impact.

The final stage is carried out following the completion of mine development. A post reclamation assessment is carried out to demonstrate that all environmental encumbrances and liabilities associated with mine development operations have been removed.

Part of CVRI's Environmental Protection Program is the Safety, Health and Environment (S.H.E.) Committee. The purpose of the S.H.E. Committee is to act as a site custodian to ensure that the operation regularly evaluates, and if necessary, mitigates or eliminates adverse impacts on the environment.

The S.H.E. Committee consists of senior personnel from each of the following functional areas: Materials Management, Maintenance, Engineering, Pit Operations, Plant Processing, Safety, and Environment. The S.H.E. Committee has various responsibilities that include:

- initiating and recommending health, safety and environmental improvements to Site Management which mitigate adverse impacts as a result of mining operations or enhance baseline health, safety and environmental conditions; and
- developing materials and programs that communicate to the employees, government and public, CVRI's commitment, efforts and accomplishments in environmental management.

CVRI has an Emergency Response Plan in place for various emergency situations. As part of the Emergency Response Plan an Emergency Response Team (ERT) exists who are trained to assist in:

- fires;
- extrication of trapped persons;
- care of injured persons;
- chemical spills; and
- other emergencies.

Detailed emergency response plans which are specifically designed for various sites at the CVM are present in areas such as the Plant, office complex, maintenance and light duty machine shops, fuelling stations and pit operations are in place. These specific plans rely on personnel training, leadership and communication amongst all involved parties.

CVRI also has a Wildfire Control and Prevention Plan which is updated annually for each wildfire season. This plan includes on-site fire prevention and control equipment, communication procedures as well as off-site communication with the public and firefighting authorities (ESRD) and cooperative efforts in regional fire prevention and control. Fire prevention, detection, reporting, and suppression measures are the basis of this plan. The FireSmart Wildfire Assessment System is also referred to by CVRI when developing new mining areas in further effort to decrease the chance of a wildfire caused by industrial activities.

Materials and products currently used at CVM will also be utilised during development of the Project area. CVRI's team of environmental consultants has evaluated the various products to be used in the Project area and the potential risk of exposure to the general public and biota. Based

on this review, three purchased products (diesel fuel, ammonium nitrate, and flocculants) and two mining by-products (coal dust/PM_{10} and suspended sediment) were identified and have been evaluated for impact assessment. The results of the evaluations concluded that the products used in the mining of the Project area would not impact the general public or biota. Their assessment evaluated current operating practices. Spill conditions were not assessed since the incidence of spills occurring at the CVM is low. A comprehensive spill response program is in place to prevent any adverse effects on the environment.

All employees are accountable for ensuring that a high level of spill prevention is maintained by following good housekeeping and maintenance practices. For example, programs are in place which include product inventory monitoring, inspections of containment and transfer facilities and leak detection monitoring. Records of these practices are also kept. Facilities requiring repair are brought to the attention of the Maintenance Department for follow up action.

In the event of a spill, the effectiveness of response operations are influenced by the time in which the spill is detected, controlled and contained. The initial spill response is designed to address the issues of paramount concern such as safety, environmental and property protection. After a spill is detected, the following actions are taken:

- Ensure that the source(s) of the spill has been shut-off.
- Determine the level of hazard to personnel, property and the environment. If necessary, the Senior Foreman is called for assistance. The Senior Foreman may elect to handle cleanup operations with departmental personnel. If it appears that the spill could result in damage or harm to personnel, the environment or property, CVRI's ERT will be called and respond for cleanup. If additional manpower and spill response expertise is required, it will be obtained through mutual aid support groups, spill cleanup contractors and/or consulting services.
- Start spill containment, recovery and cleanup operations with equipment on hand.
- Initiate spill notification procedures.

Initial cleanup operations focus on containing the spilled product to prevent further contamination. The spill is contained to the smallest manageable area possible, to channel flow to containment areas, and to keep the spill out of water courses.

The immediate area around a product spill will be secured and kept clear of nonessential personnel. Reference will be made to the product Material Safety Data Sheet for proper treatment and cleanup procedures. If practical and feasible, spilled material will be recovered and returned to a storage area for reuse or recycle. Spilled material which cannot be recovered will be picked up and stored for proper disposal. Procedures followed in the onsite disposal or short term storage of contaminated material will comply with regulatory requirements for disposal/storage.

Employees receive instruction through safety, health and environment training programs to ensure they understand spill notification and clean up procedures. In addition, each departmental Senior Foreman and all ERT members receive spill prevention training (supplemented by appropriate training manuals) and "hands on" field training sessions. CVRI has provided on site

Spill Containment and Clean up workshops for all Emergency Response Teams within the organisation.

6. CUMULATIVE ENVIRONMENTAL EFFECTS ASSESSMENT

Cumulative environmental effects are defined as the effects of a project that are likely to result when a residual effect acts in combination with the effects of other projects or activities that have been or will be carried out. The cumulative effects assessment was scoped to focus on the identified VECs and residual environmental effects of the Project when considered in association with environmental issues of regional concern, and the effects of past, present, and future actions or projects that have been or will be carried out in the region.

CVRI assessed the cumulative effects of the Project, in combination with existing facilities and other reasonably foreseeable projects, for each VEC. It was found that in some cases no planned projects were identified in the RSA and as a result no cumulative effects assessment was required. In other instances, no cumulative effects were present as project contribution to effect can be fully mitigated. The detailed information related to the cumulative environmental effects assessment can be found in the *CVRI CVM Robb Trend Project Environmental Impact Assessment* (EIA) application.

With the implementation of mitigation measures, the Project is not expected to result in any significant adverse environmental effects.

7. FUTURE DEVELOPMENT

Once the Project has received EA sign-off from CEAA (DFO, TC and NRCan) and has obtained the necessary approvals including under the *Coal Conservation Act* (CCA) an amendment to the existing mine permit boundary and *EPEA*, CVRI will then apply for additional approvals to allow for the start of mine related operations.

The first stage of scheduled development is planned for the Erith Corridor, connecting the Project with the existing mine area. It should be noted that this scheduled development does not involve any active mining but rather is focused on the haulroad and related laydown areas. No mining activity is planned for this portion of the licensing. The Erith Corridor Project is a haul road development project involving:

- a haulroad (standard size; 30m running width) with multiple fish bearing stream crossings;
- laydown areas along the haulroad;
- facility site (clearing and site preparation);
- additional laydown site adjacent to the facility site (clearing and site preparation);
- future dragline erection site (clearing, site preparation, cement pad);
- upgrading the existing logging road for bus entry;

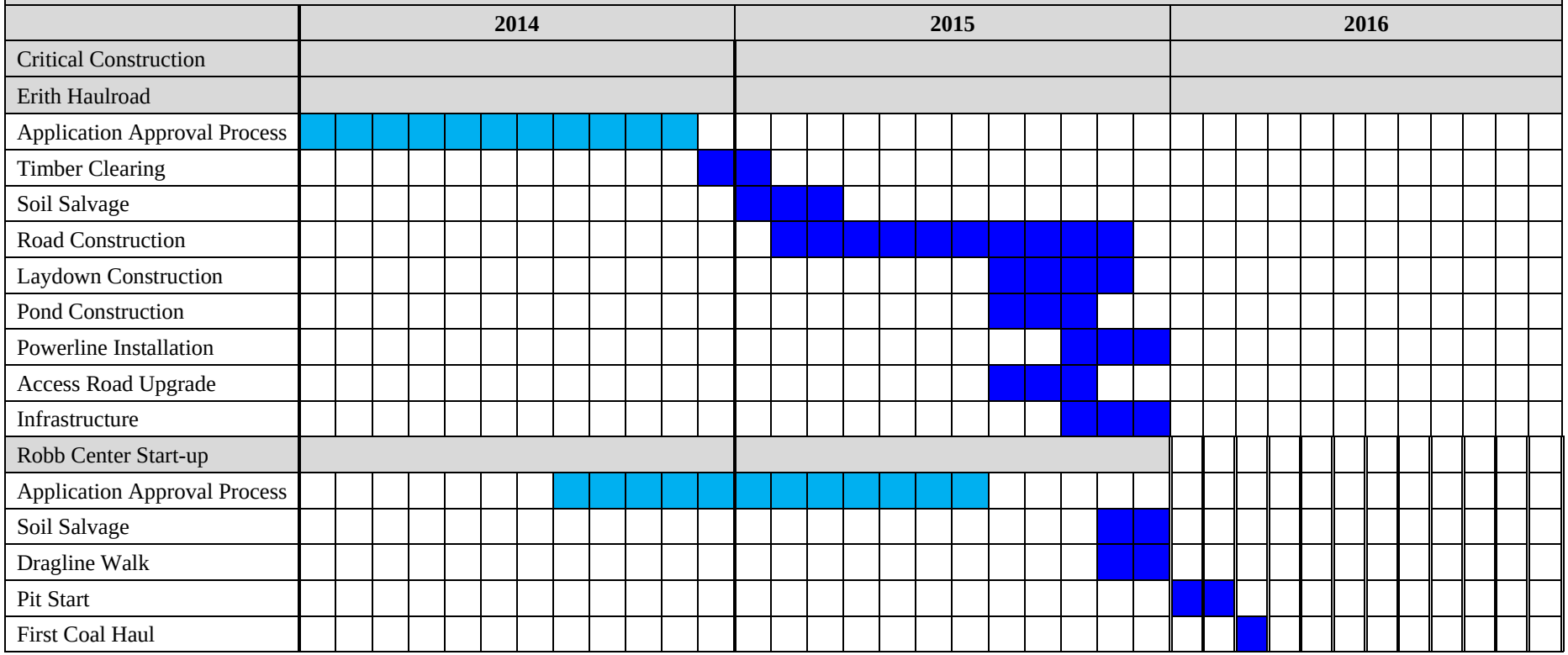
- construct auxiliary roads connecting the laydown areas and to the existing logging road and proposed haulroad;
- powerline corridor (25kV), substation; and
- water management facilities (settling ponds, ditches, diversions).

The Erith Corridor license application will require a number of approvals that will be applied for and include:

- mine license requirements pursuant to the *Coal Conservation Act*;
- approval requirements under the *Water Act*;
- site surface disturbance clearance pursuant to the *Historical Resources Act*;
- surface rights requirements pursuant to the *Public Lands Act;*
- development permits pursuant to the *Municipal Government Act*;
- construction of works that may alter or disrupt fisheries habitat pursuant to the Federal *Fisheries Act*; and
- the impact of potential navigable waters pursuant to the *Navigable Waters Protection Act*.

Once the Erith Corridor application has been submitted the mine license application for the first stage of mining will be in progress for a target submission in late 2014. Table 7-1 displays an estimated schedule for future applications, approvals and mining operations.

Table 7-1 Estimated Schedule for Future Mining Applications, Approvals and Operations



8. PUBLIC ENGAGEMENT

8.1 Need for Public Engagement

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 is committed to 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.
- 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.
- Providing ongoing public consultation for the life of the Project.

8.2 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 organisations declared to have a traditional land use (TLU) interest in the area;
- residents and organisations 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, six newsletters, drop-in sessions (2012-2013) and six open houses. CVRI representatives have drafted and are working on finalising a community agreement with the Robb Hamlet Preservation Association (RHPA) Board as part of the ongoing community engagement for the Project.

8.3 Results of Public Engagement

From the various consultation methods, a list of comments and concerns regarding the Project was compiled. 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.

8.4 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.
- 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.

9. CONCLUSION

CVRI believes that, based on the information presented in the application, along with the implementation of appropriate mitigation measures, the Project will not have a significant effect on the environment.

Appendix 1

Effects Summary Tables

1.0 SUMMARY OF VEC'S

The Robb Trend Mine Extension Project (Project) application constitutes the Environmental Impact Assessment (EIA) for the Project. Environmental baseline reports and impact assessments for each environmental and socio-economic discipline are contained in Consultants Reports (#1 - #14). The EIA report summarises the anticipated environmental impacts of the Project and options for further monitoring and mitigative measures relating to these impacts.

The EIA Report has addressed impact concerns by identifying Valued Environmental Components (VECs). VECs are those environmental attributes associated with the Project, which have been identified to be of concern either by directly-affected stakeholders, government or the professional community. VECs consider both biophysical (*i.e.*, ecosystem) and socio-economic attributes because of the broad-based definition of environmental effect as outlined both in federal and provincial legislation. Greenhouse Gas & Climate Change; and Land & Resource Use have also been included in the VEC review for application purposes.

The development of alternatives, options or variations to the mine plan were completed in response to various questions that were received during SIR#1 and SIR#2. CVRI had responded with discussions including the following:

- *End Pit Lakes*

CVRI indicated that it was likely that mine plan changes over the life of the Project would focus on reduction of end pit lake size and depth through increased backfill.

- *Stream* Diversions

CVRI provided discussion regarding the limiting of stream diversions (number and length of time).

- *Erith River Diversion*

CVRI provided a discussion regarding the option of eliminating the 'Mynheer Pit' through the length of the Erith River. The potential loss of coal resource was identified.

- *Water Management*

CVRI provided discussion around maintaining water quality in regional watercourses and the overall management of mine affected water.

- *Project Revisions*

Ongoing Project review, particularly early planning regarding fish compensation plans with DFO, has focused on reclamation plans including end pit lakes and stream restoration. As 'fish habitat' remains under the jurisdiction of DFO the technical review discussions provided by DFO needs to be reflected within the Project plans.

Since providing responses to SIR#2 additional Project revisions have been established in accommodating DFO concerns regarding maintenance and future restoration of fish habitat. Other revisions have also been introduced reflecting other stakeholder concerns. The resulting Project development plan provides a balanced approach to maximising coal recovery within limits of other elements.

Appendix 6 contains the Project summary document which outlines all of the proposed changes that have been made to the original mine plan. These proposed changes have been made in an effort to decrease the Project footprint and overall environmental impact.

Based on these potential mine plan revisions the VEC's have been reviewed and the following summary explains any changes, if any, as they relate to the revised mine plan considerations.

1.1 AIR QUALITY

Table 1 summarises air quality impact ratings for Project residual effects. Overall, residual air quality impacts relevant to the Project were considered to be insignificant for several reasons. Project contributions to predicted concentrations at the RSA MPOI and at local receptors were typically very small in an absolute sense. The addition of the Project did not result in exceedances of the CWS and AAAQOs or odour thresholds. All Project air quality impacts are reversible and the ambient air quality is expected to revert to its original state after the Project ceases to operate. As predictions in the PDC case were the same as those in the Application case, the ratings and conclusions above are applicable to it as well.

The minor changes to the Project mine plan will not result in any major air quality changes. In fact, with the proposed mine plan revisions air quality will either remain as modelled or improve slightly due to less area being mined and larger vegetated buffers.

Table 1 Summary and Rating of Impacts - Air Quality

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
1. NO_2 Concentration												
	Potential human health effects and odour	Appendix 2	Project Residual and Cumulative	Local	Long	Continuous	Reversible in long term	Moderate. Potential for odour at the Project permit boundary.	Negative	High (NO_X emissions from combustion well understood)	High	Not significant
2. SO_2 Concentration												
	Potential human health and vegetation effects	Appendix 2	Project Residual and Cumulative	Local	Long	Continuous	Reversible in long term	Low for short term; moderate for annual	Negative	High (sulphur content in fuel known)	High	Not significant
3. Particulate Concentration												
	Potential human health effects and visibility impairment	Appendix 2	Project Residual and Cumulative	Local (adjacent to haul roads or active pits)	Medium	Continuous	Reversible in long term	Low for $PM_{2.5}$ and TSP; moderate for PM_{10}	Negative	Moderate (greater uncertainty in fugitive emission factors and secondary PM formation)	High	Not significant
4. CO Concentration												
	Potential human health effects	Appendix 2	Project Residual and Cumulative	Local	Long	Continuous	Reversible in long term	Moderate	Negative	High (CO emissions from combustion well understood)	High	Not significant
5. Particulate Deposition												
	Potential vegetation effects and nuisance	Appendix 2	Project Residual and Cumulative	Local (adjacent to haul roads or active pits)	Medium	Continuous	Reversible in long term	Moderate	Negative	Moderate (more uncertainty in deposition estimates)	High	Not significant

Table 1 Summary and Rating of Impacts - Air Quality

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
6. Ozone Concentration												
	Potential human health effects	Based on management of precursors	Project Residual and Cumulative l	Regional	Long	Continuous	Reversible in long term	Low	Negative	Moderate (based on provincial scale modeling)	High	Not significant
7. VOC and PAH Concentration												
	Potential human health effects and odour	Appendix 2	Project Residual and Cumulative	Local	Long	Continuous	Reversible in long term	Moderate	Positive	Moderate (products of incomplete combustion less certain)	Medium	Not significant
8. Metal Concentrations												
	Potential human and ecological health effects	Appendix 2	Project Residual and Cumulative	Local (adjacent to haul roads)	Long	Continuous	Reversible in long term	Low	Negative/ Positive	Moderate (contribution of crustal sources more variable)	Medium	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.2 NOISE

The noise modeling indicated noise levels below the respective PSLs at all of the residential receptors (trapper's cabins and Robb residents) and at the theoretical 1,500 m receptors (1,500 m from the Project mine permit boundary). The noise modeling indicated that low frequency tonal noise is not anticipated for most of the receptor locations. There were some exceptions; however, the calculated noise levels for those situations were either well more than 5 dBA below the PSLs or in areas where there are no residents nearby. This results in a minimal possibility of any low frequency tonal noise concerns.

The minor changes to the Project mine plan will not result in any major noise changes. In fact, with the proposed mine plan revisions noise levels will either remain as modelled or improve slightly due to less area being mined and larger vegetated buffers.

As the Project progresses towards Robb, CVRI will work with Robb residents in conducting noise and vibration monitoring and will implement further mitigation techniques as appropriate. A summary of the predicted effects on noise VECs is included in Table 2.

Table 2 Summary and Rating of Impacts - Noise

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	The modeled night-time and day-time noise levels are under the PSLs with Project noise combined with the ASL values at all residential and theoretical 1,500 m receptor locations	Not Significant
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	The modeled night-time and day-time noise levels are under the PSLs with Project noise combined with the ASL values at all residential and theoretical 1,500 m receptor locations	Not Significant
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	There are no differences between day-time and night-time operations for this scenario, so the noise levels will be the same day or night. The modeled night-time noise levels are under the PSLs with Project noise combined with the ASL values at all residential and theoretical 1,500 m receptor locations	Not Significant

1.3 HYDROGEOLOGY

The CVM has been operating for over 35 years. During this time numerous assessments have been conducted that can be used to gain an understanding of the impact of mining on groundwater in the area. After 35 years of mining activity in the CVM there have been no significant changes to groundwater chemistry or adverse impacts on groundwater levels.

The fact that no impacts have been documented, combined with the fact that the Project will be in a similar hydrogeological regime is incontrovertible evidence of the anticipation of insignificant impact in the Project area with the notable exception of impact to water wells in the community of Robb in relation to the original mine plan. This potential impact to water wells in the community of Robb is decreased or eliminated due to the potential mine plan revisions as the community would see a larger buffer. This buffer would allow for the old existing underground workings to be left in place. These existing underground workings may be acting as the major source of water for the community.

It has been concluded that the Project will have an insignificant impact on groundwater in the area and with mitigation the community of Robb will have a continued supply of potable water (well or otherwise). A summary of the predicted effects on groundwater VECs is included in Table 3.

Table 3 Summary and Rating of Impacts - Hydrogeology

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
1. Impacts on Water Wells												
	Wells in Robb	Water Well Replacement Policy	Project	Local	Short	None	R-ST	Low	Neutral	High	Moderate	Not significant
			Residual	Local	Short	None	R-ST	Low	Neutral	High	Moderate	Not significant
			Cumulative	Local	Short	None	R-ST	Low	Neutral	High	Moderate	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant- (No Impact, Low Impact, Moderate Impact), Significant (High Impact)

1.4 SURFACE WATER QUALITY

The minor potential revisions to the Project mine plan will not result in any major surface water quality changes. In fact, with the proposed mine plan revisions the overall disturbance area decreases which leads to a smaller area that would require surface water treatment after being affected by mine activity. All other surface water that has been affected by mine activity will be contained and treated with proven management systems.

CVM has been in operation for over 30 years. During this time CVRI has successfully developed and operated surface water management systems. With mitigation, monitoring and adaptive management the Project will have an insignificant impact on watercourses in the LSA and RSA. A summary of the environmental assessment is included in Table 4.

Table 4 Summary and Rating of Impacts - Surface Water Quality

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent1	Duration2	Frequency3	Reversibility4	Magnitude5	Project Contribution (Direction)6	Confidence Rating7	Probability of Occurrence8	Impact Rating9
1. Surface Water Quality												
	Changes in Surface Water Quality from Construction Activities	Appendix 2	Application	Local	Short	Isolated	Reversible, Short-term	Low	Negative	High	High	Not significant
				Regional	Short	Isolated	Reversible, Short-term	Low	Negative	High	High	Not significant
			Planned Development	Local	Short	Isolated	Reversible, Short-term	Low	Negative	High	High	Not significant
				Regional	Short	Isolated	Reversible, Short-term	Low	Negative	High	High	Not significant
	Changes in Surface Water Quality from use of Nitrogen-Based Explosives	Appendix 2	Application	Local	Long	Periodic	Reversible, Long-term	Low	Negative	High	High	Not significant
				Regional	Long	Periodic	Reversible, Long-term	Low	Negative	High	High	Not significant
			Planned Development	Local	Long	Periodic	Reversible, Long-term	Low	Negative	High	High	Not significant
				Regional	Long	Periodic	Reversible, Long-term	Low	Negative	High	High	Not significant
	Changes in Surface Water Quality from Operation of	Appendix 2	Application	Local	Extended	Occasional	Reversible, Long-term	Low	Negative	High	High	Not significant
				Regional	Extended	Occasional	Reversible, Long-term	Low	Negative	High	High	Not significant

Table 4 Summary and Rating of Impacts - Surface Water Quality

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent1	Duration2	Frequency3	Reversibility4	Magnitude5	Project Contribution (Direction)6	Confidence Rating7	Probability of Occurrence8	Impact Rating9
	Project Impoundments		Planned Development	Local	Extended	Occasional	Reversible, Long-term	Low	Negative	High	High	Not significant
				Regional	Extended	Occasional	Reversible, Long-term	Low	Negative	High	High	Not significant
	Water Quality of End-Pit Lakes	Appendix 2	Application	Local	Residual	Continuous	Irreversible	Low	Neutral	High	High	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.5 HYDROLOGY

The area of surface water sources that potentially could be affected by mine activity will decrease. Some watercourses that would have been disturbed based on the original mine plan will now be unaffected. With appropriate mitigation and monitoring there will be an insignificant impact on flow and sedimentation within local and regional watercourses.

Table 5 summarises the overall impacts during the operational and abandonment phases for each VEC. Insignificant in terms of flows is less than a 10% change, comparable to the degree of accuracy of flow measurements or published data for small streams. Controlling sediment levels to less than licensing requirements are considered as insignificant for sediment concentrations. Some effects may be either positive or negative due to some uncertainties reflecting the variable conditions that are possible during high, low and average flow periods. However, the assessments are expected to have a high degree of confidence with respect to the magnitude of significance of the impacts.

Table 5 Summary and Rating of Impacts - Surface Hydrology

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Impact or Effect	Geographical Extent [1]	Duration [2]	Frequency[3]	Reversability[4]	Magnitude [5]	Project Contribution[6]	Confidence Rating[7]	Probability of Occurrence[8]	Significance[9]
1. Change in Runoff Due to Mine Construction and Operation												
Changes in runoff due to haul roads		Appendix 2	Application	Local	Long	Seasonal/ Periodic	Reversible in the long-term	Moderate	Negative	High	High	Not significant
			Cumulative	Local	Long	Seasonal/ Periodic	Reversible in the long-term	Low - Mod	Negative	High	High	Not significant
Changes in runoff due to Clearing and Logging		Appendix 2	Application	Local	Long	Seasonal	Reversible in the long-term	Low – Mod	Negative	High	High	Not significant
			Cumulative	Local	Long	Continuous/ Seasonal	Reversible in the long-term	Low – Mod	Negative	High	High	Not significant
Changes in runoff due to operation of Pits & Pit Dewatering		Appendix 2	Application	Local	Long	Continuous	Reversible in the long-term	Low	Negative	High	High	Not significant
			Cumulative	Local	Long	Continuous	Reversible in the long-term	Low	Negative	High	High	Not significant
Changes in runoff due to Temporary Diversions		Appendix 2	Application	Local	Short	Isolated	Reversible in the short-term	Nil	Neutral	High	High	Not significant
			Cumulative	Local	Short	Isolated	Reversible in the short-term	Nil	Neutral	High	High	Not significant
Changes in runoff due to Spoil Piles		Appendix 2	Application	Local	Long	Seasonal	Reversible in the short-term	Low	Negative & Positive	Moderate	Medium	Not significant

Table 5 Summary and Rating of Impacts - Surface Hydrology

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Impact or Effect	Geographical Extent [1]	Duration [2]	Frequency[3]	Reversability[4]	Magnitude [5]	Project Contribution[6]	Confidence Rating[7]	Probability of Occurrence[8]	Significance[9]
			Cumulative	Local	Long	Seasonal	Reversible in the short-term	Low	Negative & Positive	Moderate	Medium	Not significant
2. Change in Runoff After Reclamation and Closure												
Construction of End Pit Lakes and Restored Channels		Appendix 2	Application	Local	Residual	Continuous	Irreversible	Low-High	Negative & Positive	High	High	Significant
			Cumulative	Local	Residual	Continuous	Irreversible	Low-High	Negative & Positive	High	High	Significant
Changes in runoff due to Reclaimed Spoil Areas		Appendix 2	Application	Local	Residual	Continuous	Reversible in the long-term	Low – Mod	Negative to Positive	Moderate	High	Not significant
			Cumulative	Local	Residual	Continuous	Reversible in the long-term	Low - Mod	Negative to Positive	Moderate	High	Not significant
3. Change in Sediment Concentrations (Water Quality) Due to Mine Construction and Operation												
Impact on sediment concentrations due to Haul Roads		Appendix 2	Application	Local	Long	Periodic	Reversible in the long-term	Low	Negative	High	High	Not significant
			Cumulative	Local	Long	Periodic	Reversible in the long-term	Low	Negative	High	High	Not significant
Impact on sediment concentrations due to Clearing and Logging		Appendix 2	Application	Local	Long	Periodic	Reversible in the long-term	Low	Negative	High	High	Not significant
			Cumulative	Local	Long	Periodic	Reversible in the long-term	Low	Negative	High	High	Not significant
Impact on sediment concentrations due to Pit & Pit Dewatering		Appendix 2	Application	Local	Long	Occasional/ Isolated	Reversible in the short-term	Low	Negative	High	Medium	Not significant
			Cumulative	Local	Long	Occasional/ Isolated	Reversible in the short-term	Low	Negative	High	Medium	Not significant
Impact on sediment concentrations due to Temporary Diversions		Appendix 2	Application	Local	Short	Isolated	Reversible in the short-term	Nil	Neutral	High	High	Not significant
			Cumulative	Local	Short	Isolated	Reversible in the short-term	Nil	Neutral	High	High	Not significant
Impact on sediment concentrations due to Spoil Piles & Rock Drains		Appendix 2	Application	Local	Long	Seasonal/ Periodic	Reversible in the long-term	Low	Negative	Moderate	Medium	Not significant
			Cumulative	Local	Long	Seasonal/ Periodic	Reversible in the long-term	Low	Negative	Moderate	Medium	Not significant
4. Change in Sediment Concentrations (Water Quality) After Reclamation and Closure												
Impact on sediment concentrations due to End Pit Lakes and Restored Channels		Appendix 2	Application	Local	Residual	Periodic	Irreversible	Low-Moderate	Positive/Neutral	High	High	Not significant
			Cumulative	Local	Residual	Periodic	Irreversible	Low-Moderate	Positive /Neutral	High	High	Not significant

Table 5 Summary and Rating of Impacts - Surface Hydrology

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Impact or Effect	Geographical Extent [1]	Duration [2]	Frequency[3]	Reversability[4]	Magnitude [5]	Project Contribution[6]	Confidence Rating[7]	Probability of Occurrence[8]	Significance[9]
Impact on sediment concentrations due to Reclaimed Spoil Areas		Appendix 2	Application	Local	Residual	Periodic	Reversible in the short-term	Low	Neutral	Moderate	Low	Not significant
			Cumulative	Local	Residual	Periodic	Reversible in the short-term	Low	Neutral	Moderate	Low	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.6 AQUATIC RESOURCES

Potential impacts to the selected VECs relate primarily to direct physical habitat alteration/loss, changes in surface water hydrology, and surface water quality issues. The potential mine plan revisions would limit the amount of alteration/loss or changes in surface water hydrology by maintaining watercourses in their current positions and state. Habitat effects primarily impact Rainbow Trout which were most abundant and widespread in the streams directly affected by the proposed diversions. Again, the potential mine plan changes would decrease the amount of habitat being affected by mining activities. Potential adverse effects to other VECs species relate primarily to surface water hydrology and water quality issues which both would see overall decreases in related mining affects.

With mitigation there will be an insignificant impact on the VEC's identified. Table 6 summarises the potential impacts on aquatic resource VEC's.

Table 6 Summary and Rating of Impacts - Aquatic Resources Environmental Components

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
1. Rainbow Trout												
	Habitat alteration, changes in surface hydrology, sedimentation and other changes in water quality	Appendix 2	Project	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Residual	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Cumulative	No cumulative effects as project contribution to effect can be fully mitigated								
2. Bull Trout												
	Habitat alteration, changes in surface hydrology, sedimentation and other changes in water quality	Appendix 2	Project	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Residual	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Cumulative	No cumulative effects as project contribution to effect can be fully mitigated								
3. Arctic Grayling												
	Sedimentation and other changes in water quality habitat alteration,	Appendix 2	Project	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Residual	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant

	changes in surface hydrology		Cumulative	No cumulative effects as project contribution to effect can be fully mitigated								
4. Benthic Invertebrates												
	Habitat alteration, changes in surface hydrology, sedimentation and other changes in water quality	Appendix 2	Project	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Residual	Local	Long	Occasional	Reversible	Low	Negative	High	Low	Not significant
			Cumulative	No cumulative effects as project contribution to effect can be fully mitigated								

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.7 SOILS AND TERRAIN

Surface mining will completely disrupt the natural terrain and natural soil landscapes and will be mitigated by reclamation (Section F of the application). The potential mine plan revisions will decrease the overall disturbance area (footprint) leaving more areas undisturbed by mining activities.

Reclamation is the creation of new terrain (minescapes) and new soil landscapes (minesoil landscapes) followed by re-vegetation. Through the reclamation activities (recontouring, direct placement, subsoil/soil replacement) the Project will have an insignificant effect on soil and terrain. A summary of potential environmental effects, residual effects and significance is presented in Table 7.

Table 7 Summary and Rating of Impacts - Soil & Terrain

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
1. Soils												
Disruption of natural soil landscapes		Appendix 2	Project	Local 5,729 ha	Short	Continuous	Reversible (long term)	High	Negative	High	High	Not significant
			Residual	Local 5,729 ha	Residual	Continuous	Reversible (long term)	Low	Neutral	High	High	Not significant
			Cumulative	Local 5,729 ha	Residual	Continuous	Reversible (long term)	Low	Neutral	High	High	Not significant
Loss of non-salvageable soil		Appendix 2	Project	Local 5,729 ha	Short	Isolated	Irreversible	Low	Negative	High	High	Not significant
			Residual	No residual effects noted								Not significant
			Cumulative	No cumulative effects noted								Not significant
Change in soil quality by mixing during salvage		Appendix 2	Project	Local 5,729 ha	Short	Periodic	Reversible (long term)	Low	Neutral	High	High	Not significant
			Residual	Local 5,729 ha	Residual	Continuous	Reversible (long term)	Low	Neutral	High	High	Not significant
			Cumulative	No cumulative effects noted								Not significant

Table 7 Summary and Rating of Impacts - Soil & Terrain

VEC / Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
Accelerated erosion of minesoils causes loss of soil resource	Appendix 2	Project	Local 5,729 ha	Short	Isolated	Reversible (long term)	Low	Neutral	High	High	Not significant
		Residual	Local 5,729 ha	Residual	Isolated	Reversible (long term)	Low	Neutral	High	High	Not significant
		Cumulative	No cumulative effects noted								Not significant
Loss of soil landscape diversity	Appendix 2	Project	Local 5,729 ha	Extended	Continuous	Reversible (long term)	Low	Neutral	High	High	Not significant
		Residual	No residual effects noted								Not significant
		Cumulative	No cumulative effects noted								Not significant
2. Land Capability											
Loss of land capability and future production	Appendix 2	Project	Local 5,729 ha	Short	Continuous	Reversible	Moderate	Negative	High	High	Not significant
		Residual	Local 5,729 ha	Extended	Continuous	Reversible	Moderate	Neutral	High	High	Not significant
		Cumulative	Local 5,729 ha	Extended	Continuous	Reversible	Moderate	Neutral	High	High	Not significant
Delay in returning capability and diversity	Appendix 2	Project	Local 5,729	Short	Continuous	Reversible	Moderate	Negative	High	High	Not significant
		Residual	Local 5,729 ha	Extended	Isolated	Reversible	Moderate	Neutral	High	High	Not significant
		Cumulative	No cumulative effects noted								Not significant
Climate change causes increased moisture deficits	Appendix 2	Project	No project effects noted								Not significant
3. Overburden Characteristics											
Increased trace element concentrations	Appendix 2	Project	No project effects noted								Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.8 VEGETATION AND WETLANDS

As stated above, surface mining will completely disrupt the natural terrain and natural vegetation but will be mitigated by reclamation (Section F of the application). The potential mine plan changes will decrease the overall disturbance area (footprint) leaving more areas undisturbed by mining activities.

Environmental effects on vegetation and wetland resources were assessed after accounting for relevant mitigation measures. Mitigation and monitoring methods and approaches towards re-establishing pre-development land capability are planned for all stages of the Project to minimise and, where possible, prevent Project effects. These methods will be implemented in conjunction with the Project Reclamation Plan (Section F of the application), and priority effort will be given to the VECs. Through the reclamation activities (recontouring, soil replacement, seeding, planting, fertilising) the Project will have an insignificant effect on vegetation and wetlands. Table 8 summarises the impacts to Vegetation, Wetlands and Rare plants.

Table 8 Summary and Rating of Impacts - Vegetation and Wetlands

VEC	Nature of Potential Effect	Mitigation / Protection Plan	Type of Effect	Geographical Extent of Effect1	Duration of Effect2	Frequency of Effect3	Ability for Recovery from Effect4	Magnitude of Effect5	Project Contribution6	Confidence Rating7	Probability of Effect Occurrence8	Significance9
1. Terrestrial Vegetation/Plant Communities (Ecosite Phases)												
	Reduction in Plant Community Types & Area	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	High	Neutral	Moderate	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	High	Neutral	Moderate	High	Not significant
2. Rare Plants, Rare Plant Communities and Rare Plant Potential												
	Removal of Rare Species, Communities & Potential	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Moderate	Neutral	Low	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Moderate	Neutral	Low	High	Not significant
3. Wetlands												
	Reduction in Types & Area	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	Low	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	Low	High	Not significant

Table 8 Summary and Rating of Impacts - Vegetation and Wetlands

VEC	Nature of Potential Effect	Mitigation / Protection Plan	Type of Effect	Geographical Extent of Effect1	Duration of Effect2	Frequency of Effect3	Ability for Recovery from Effect4	Magnitude of Effect5	Project Contribution6	Confidence Rating7	Probability of Effect Occurrence8	Significance9
4. Old Growth Forests												
	Removal of Old Growth Forests	Appendix 2	Application	Local	Extended	Isolated	Reversible Long Term	Low	Neutral	High	High	Not significant
			Cumulative	Local	Extended	Isolated	Reversible Long Term	Low	Neutral	High	High	Not significant
5. Non-native and invasive species												
	Spread of Invasive & Non-native Species	Appendix 2	Application	Local	Extended	Periodic	Reversible Long Term	Low	Neutral	High	High	Not significant
			Cumulative	Local	Extended	Periodic	Reversible Long Term	Low	Neutral	High	High	Not significant
6. Traditionally Used Plants												
	Removed from Footprint	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Moderate	Neutral	High	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Moderate	Neutral	High	High	Not significant
7. Biodiversity												
	Reduction in Genetic-Species Diversity	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Low	Negative	Moderate	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	Moderate	High	Not significant
	Reduction of Community Diversity	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	High	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	High	High	Not significant
	Reduction of Landscape Diversity	Appendix 2	Application	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	High	High	Not significant
			Cumulative	Local	Extended	Continuous	Reversible Long Term	Low	Neutral	High	High	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.9 MAMMALIAN CARNIVORES

As stated above, surface mining will completely disrupt the natural terrain, natural vegetation and overall wildlife habitat but will be mitigated by reclamation (Section F of the application). The potential mine plan changes will decrease the overall disturbance area (footprint) leaving more areas, wildlife habitat, undisturbed by mining activities.

Ratings were based on predicted post-mitigation (residual) conditions and successful implementation of mitigation. An effect was considered to be significant if it was not reversible over the medium to long-term, was of high magnitude and was likely to result in long-term impacts on regional or sub-regional population sustainability of the VEC. Significant impacts were also considered to influence the VEC in a manner far removed from that predicted on the basis of the natural range of variability.

All of the Project-specific impacts on VECs were predicted to be insignificant with respect to regional or sub-regional populations of the VECs considered. Table 9 summarises ratings for impact types and VECs.

Table 9 Summary and Rating of Impacts - Mammalian Carnivores

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
1. Marten												
	Increased Mortality	Appendix 2	Application	Local	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
	Habitat Alteration		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	High	Negative	High	High	Not significant
	Sensory Disturbance		Application	Regional	Long	Isolated	Reversible-ST	Low	Negative	Moderate	High	Not significant
			Cumulative	Regional	Extended	Periodic	Reversible-ST	Low	Negative	Moderate	High	Not significant
	Habitat Fragmentation		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	High	Negative	High	High	Not significant
	Barriers to Movement		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
2. Fisher												
	Increased Mortality	Appendix 2	Application	Local	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
	Habitat Alteration		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Negative	High	High	Not significant
	Sensory Disturbance		Application	Regional	Long	Isolated	Reversible-ST	Moderate	Negative	Low	High	Not significant
			Cumulative	Regional	Extended	Periodic	Reversible-ST	Low	Negative	Moderate	High	Not significant

Table 9 Summary and Rating of Impacts - Mammalian Carnivores

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
	Habitat Fragmentation		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	Moderate	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Negative	Low	High	Not significant
	Barriers to Movement		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	Moderate	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Negative	Moderate	High	Not significant
3. Lynx												
	Increased Mortality	Appendix 2	Application	Local	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
	Habitat Alteration		Application	Local	Extended	Continuous	Reversible-LT	Low	Positive	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Positive	High	High	Not significant
	Sensory Disturbance		Application	Regional	Long	Isolated	Reversible-ST	Low	Negative	Moderate	High	Not significant
			Cumulative	Regional	Extended	Periodic	Reversible-ST	Low	Negative	Moderate	High	Not significant
	Habitat Fragmentation		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Positive	High	High	Not significant
	Barriers to Movement		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
4. Wolf												
	Increased Mortality	Appendix 2	Application	Local	Extended	Occasional	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Occasional	Reversible-LT	Low	Negative	Moderate	High	Not significant
	Habitat Alteration		Application	Local	Extended	Continuous	Reversible-LT	High	Negative	High	High	Not significant

Table 9 Summary and Rating of Impacts - Mammalian Carnivores

VEC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Type of Effect	Geographic Extent[1]	Duration[2]	Frequency[3]	Reversibility[4]	Magnitude[5]	Project Contribution (Direction)[6]	Confidence Rating[7]	Probability of Occurrence[8]	Impact Rating[9]
			Cumulative	Regional	Extended	Continuous	Reversible-LT	High	Negative	High	High	Not significant
	Sensory Disturbance		Application	Regional	Long	Isolated	Reversible-ST	Low	Negative	Moderate	High	Not significant
			Cumulative	Regional	Extended	Periodic	Reversible-ST	Low	Negative	Moderate	High	Not significant
	Habitat Fragmentation		Application	Local	Extended	Continuous	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Positive	Moderate	Medium	Not significant
	Barriers to Movement		Application	Local	Extended	Continuous	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Negative	High	Medium	Not significant
5. Grizzly Bear												
	Increased Mortality	Appendix 2	Application	Local	Extended	Occasional	Reversible-LT	Low	Negative	High	Low	Not significant
			Cumulative	Regional	Extended	Occasional	Reversible-LT	High	Negative	High	Medium	Significant
	Habitat Alteration		Application	Local	Extended	Continuous	Reversible-LT	Moderate	Positive	High	High	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Moderate	Negative	High	High	Not significant
	Sensory Disturbance		Application	Regional	Long	Isolated	Reversible-ST	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Periodic	Reversible-ST	Low	Negative	High	Medium	Not significant
	Habitat Fragmentation		Application	Local	Extended	Continuous	Reversible-LT	Low	Negative	High	Low	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Negative	High	Low	Not significant
	Barriers to Movement		Application	Local	Long	Isolated	Reversible-LT	Low	Negative	High	Medium	Not significant
			Cumulative	Regional	Extended	Continuous	Reversible-LT	Low	Negative	High	Medium	Not significant

(1) Local, Regional, Provincial, National, Global
(2) Short, Long, Extended, Residual
(3) Continuous, Isolated, Periodic, Occasional (Accidental, Seasonal)
(4) Reversible in short term, Reversible in long term, Irreversible – rare
(5) Nil, Low, Moderate, High
(6) Neutral, Positive, Negative
(7) Low, Moderate, High
(8) Low, Medium, High
(9) Not significant, Significant

1.10 WILDLIFE

As stated above, surface mining will completely disrupt the natural terrain, natural vegetation and overall wildlife habitat but will be mitigated by reclamation (Section F of the application). The potential mine plan changes will decrease the overall disturbance area (footprint) leaving more areas, wildlife habitat, undisturbed by mining activities.

The assessment assumes the following vegetation response after mine disturbance and subsequent 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, understory vegetation will change to respond to altered light regime and native species adapted to understory conditions will begin to ingress and dominate;
- wetlands will re-establish; and
- forest stands will begin to resemble ecosites with an understory 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 colonised new habitat created by reclamation of coal mines. 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 colonise 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 colonisation 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 colonising 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.

Table 10 provides a summary of the net impacts of the Project on wildlife after mitigation measures have been implemented.

Table 10 Summary and Rating of Impacts - Wildlife

VEC	Nature of Potential Impact	Mitigation/ Protection Plan	Type of Effect	Criteria for Determining Significance						Significance	Project Contribution	Confidence Rating
				Extent	Duration	Frequency	Recovery	Magnitude	Probability			
1. Ungulates (Moose, Deer, Elk)												
Elk	Loss of Foraging Habitat	Appendix 2	Project	Local	Grassland Development (Extended)	Continuous	Reversible in Short-Term	Moderate	High	Significant	Positive	High
	Loss of Forest Cover		Residual	Local	Shrub Development (Long) Forest Development (Long)	Continuous	Reversible in Long-Term	Low	High	Not significant	Neutral	High
Moose	Loss of Foraging Habitat	Appendix 2	Project	Local	Shrub Development (Long)	Continuous	Reversible Long-Term	Low	High	Not significant	Neutral	Moderate
	Loss of Forest Cover		Residual	Local	Forest Development (Long)	Continuous	Reversible in Long-Term	Low	High	Not significant	Neutral	High
Deer	Loss of Foraging Habitat	Appendix 2	Project	Local	Grassland Development (Extended)	Continuous	Reversible in Short-Term	Moderate	High	Significant	Positive	High
	Loss of Forest Cover		Residual	Local	Shrub Development (Long) Forest Development (Long)	Continuous	Reversible in Long-Term	Low	High	Not significant	Neutral	High
Elk Moose Deer	Disruption of Movement Patterns	Appendix 2	Project	Local	Short	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
			Project	Local	Short	Continuous	Reversible in Short-Term	Moderate	High	Not significant	Neutral	Moderate
Elk Moose Deer	Displacement	Appendix 2	Project	Regional	Long	Continuous	Reversible in Long-Term	Moderate	Medium	Not significant	Neutral	Moderate

Table 10 Summary and Rating of Impacts - Wildlife

VEC	Nature of Potential Impact	Mitigation/ Protection Plan	Type of Effect	Criteria for Determining Significance						Significance	Project Contribution	Confidence Rating
				Extent	Duration	Frequency	Recovery	Magnitude	Probability			
Elk Moose Deer	Direct Mortality	Appendix 2	Project	Local	Short	Continuous	Irreversible	Low	High	Not significant	Neutral	High
2.	**Small Mammals**											
	Loss of Habitat	Appendix 2	Project	Local	Grassland Development (Extended)	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
					Shrub Development (Long) Forest Development (Long)	Continuous	Reversible in Long-Term	Low	High	Not significant	Neutral	Moderate
3.	**Breeding Birds and Raptors**											
	Loss of Habitat	Appendix 2	Project and Residual	Local	Grassland Development (Extended)	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
			Project	Local	Shrub Development (Long) Forest Development (Long)	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	Moderate
					Short	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
	Direct Mortality	Appendix 2	Project	Local	Short	Continuous	Irreversible	Low	High	Not significant	Neutral	High

Table 10 Summary and Rating of Impacts - Wildlife

VEC	Nature of Potential Impact	Mitigation/ Protection Plan	Type of Effect	Criteria for Determining Significance						Significance	Project Contribution	Confidence Rating
				Extent	Duration	Frequency	Recovery	Magnitude	Probability			
	Displacement		Project and Residual	Local	Grassland Development (Extended)	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
		Appendix 2	Project	Local	Shrub Development (Long) Forest Development (Long)	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	Moderate
					Short	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High
4.	**Amphibians**											
	Loss of Habitat	Appendix 2	Project	Local	Short	Continuous	Reversible in Short-Term	Low	High	Not significant	Neutral	High

1.11 HISTORICAL RESOURCES

The Historical Resource Impact Assessment (HRIA) completed for the Project has resulted in the recording of 67 sites in the Project area. These sites range considerably in size, age, and significance. Nine sites within the Project footprint require further investigation prior to disturbance and eight sites have been identified outside the disturbance footprint that will require further investigation should CVRI include these areas in the disturbance footprint. As well, there are small areas that have not been subjected to an HRIA which are to be completed before disturbance activities can proceed.

All outstanding HRIAs are to be submitted to ACCS. Mitigation measures approved by ACCS will be conducted by CVRI prior to disturbance activities taking place. CVRI is to obtain clearance from ACCS before commencing with developments.

Table 11 provide a summary of the net impacts of the Project on historical resources after mitigation have been implemented.

Table 11 Summary and Rating of Impacts – Historical Resources		
Resources with potential for impact by mining operations.	The assessment of sites was accomplished through surface survey and subsurface prospecting of high potential zones and ground-truthing of other areas. Field reconnaissance focused on systematic traverse and shovel testing of high potential landforms within the high potential zones. 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 Dennison mine project. Over the years approximately 3000 shovel tests have been excavated in the Project area. The HRIA programs recorded 67 precontact and historic sites associated with the Project area. Of the 67 sites, 60 are within the proposed 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.	Not Significant

1.12 TRADITIONAL ECOLOGICAL KNOWLEDGE

CVRI has provided capacity funding and other support to a number of Aboriginal groups that have used the Coal Valley area in the past and present. Capacity funding was used to complete TUS and TEK studies of the proposed Project. TUS results indicate Aboriginals in the area continue to use the region for hunting, collection of medicinal and food plants, camping, and ceremonial pursuits. The potential mine plan changes will decrease the overall disturbance area (footprint) leaving more areas such as wildlife habitat, natural vegetation and natural terrain undisturbed by mining activities. Some Aboriginal groups have indicated that the Project will impact specific areas they use but through appropriate measures the impact to resources and areas important to them can be mitigated or avoided. Some Aboriginal groups have indicated that the Project will impact specific areas they use but through appropriate measures the impact to resources and areas important to them can be mitigated or avoided.

The TUSs undertaken for the Project have collected and safeguarded important cultural information for several Aboriginal groups. These studies not only provide information important to the assessment of environmental impacts but help in the transmission of cultural knowledge from elders to the young people. It also resulted in an important and positive extension of CVRI's relationship with the Aboriginal peoples and their inclusion in the approval process for developments in the region. Field studies for several Aboriginal groups are still awaiting completion and further discussion. Consultations with the Aboriginal groups will be ongoing as information is brought forward regarding specific impacts to traditional use areas.

Table 12 provides a summary of the net impacts of the Project on traditional ecological knowledge after mitigation measures have been implemented.

Table 12 Summary and Rating of Impacts – Traditional Ecological Knowledge and Land Use

Plants and Fungi	A total of 84 species or classes of plant/fungi that are important to Aboriginal groups have been identified in the Project area. 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 utilised in the past.	Not Significant

Table 12 Summary and Rating of Impacts – Traditional Ecological Knowledge and Land Use		
Impact to Medicinal and Food Plants	One of the most common concerns among Aboriginal elders was the impact to medicinal and food plants in the Project area. A number of these plants are "rare" or "rare elsewhere", whereas others are more common. Often these plants cannot be transplanted due to specific conditions required. Transplanting may, in some cases, impact the potency or efficacy of the medicines. CVRI was asked to use traditional knowledge and native plant species in the reclamation process.	Not Significant
Clear-Cutting and Noise Pollution	It was noted that the forested area, wildlife, and medicinal plants would be impacted by the clear-cutting and mining operations in the area. Concern was also expressed over the displacement of animals by noise pollution.	Not Significant
Wildlife	Discussion of concerns regarding animal species tended to occur in generic terms, and were typically about hunting and trapping practices.	Not Significant
Bears	A number of Aboriginal people also mentioned the importance of bears. Although not frequently hunted, bears are powerful and an important animal often viewed as four-legged men.	Not Significant
Health of Wild Game	Aboriginal people have noted that with increased development in the area, particularly from oil and gas, comes an increase in visibly diseased game animals. Sometimes the animals are inedible once killed and skinned as if tainted or poisoned. They attribute poor health of these animals to nearby developments and its effects on the environment.	Not Significant

Table 12 Summary and Rating of Impacts – Traditional Ecological Knowledge and Land Use		
Moose Licks/Salt Licks/Springs	The availability of moose or salt licks was raised as a concern as some of these will be removed during Project development. These are important to the wildlife in the region and location of the lick are important places for hunters to look for game.	Not Significant
Displacement of Wildlife	Many Aboriginal people use or have used this area for hunting, particularly for moose, deer, and elk. Many mentioned that portions of the Project area are great moose habitat and expressed concerns about impact of the Project on game populations (particularly moose). Moose are culturally important as the most preferred game. Furbearers commonly trapped are of general concern although no Aboriginal person cited ownership of a trapline to be affected.	Not Significant
Water Quality	Water Quality is the most commonly raised issue for Aboriginal people. Their concern is how the CVRI will keep the water clean and expressed scepticism that it could be accomplished. Concerns include surface water and groundwater. One issue raised is how groundwater flow will affect others on the margins of the Project area. As water is often seen as one of the four major elements of life, it is critical to the well-being of all animal and plant life in the region.	Not Significant
Avoidance of Important Locales	Aboriginal groups have or will identify to CVRI the locations of known burials, ceremonial sites, and camping locations within the proposed Project areas and region. Discussions are underway on avoidance or mitigation strategies on a case-by-case basis.	Not Significant
Future Extension	One individual expressed concern about the potential extension of the Project to the southeast on the opposite side of the Pembina River. Active traplines are located to the east. One individual expressed concern that the CVM could potentially expand to the Genesee area because of the extent of the coal seams.	Not Significant

Table 12 Summary and Rating of Impacts – Traditional Ecological Knowledge and Land Use		
Exporting Coal/Transporting Coal	Several individuals expressed concern that the coal was being exported to foreign lands. At one Open House, an individual inquired about coal trains and exposure to coal dust along rail lines.	Not Significant
Employment /Contracting Opportunities and Agreements	Many people expressed interest in job opportunities for Aboriginal peoples. Concerns were voiced about past discrimination and the requirement for a high school diploma to obtain employment with some industries. Several elders thought the need for a diploma would encourage youth to finish school but frequently this was viewed as a barrier to older Aboriginal individuals. The need for further training or certificates for certain positions was raised. Desire for the incorporation of Aboriginal youth into positions such as environmental monitors or to assist in reclamation was expressed A number of consulted Aboriginal groups have expressed interest in solidifying their relationship with CVRI through long-term memoranda of understanding or similar written agreements. Several Aboriginal groups enquired about contracting opportunities for Aboriginally-owned companies or affiliated corporations	Not Significant
Reclamation	The use of native species and traditional knowledge during reclamation is important. Questions were raised about the expected length of time required for regrowth of mushrooms, tree fungus, trees, and plants. Questions of what the landscape would look like after reclamation and if prior reclamation studies had been completed were also raised. Several people mentioned that animals are attracted to reclaimed areas and expressed concerns about the effect of this on game populations and hunting rights.	Not Significant

1.13 LAND & RESOURCE USE

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 recognise existing or approved settlement and commercial development areas.

Mineral exploration, including coal mining, is permitted in all three of the above mentioned zones of the RMA.

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

CVRI 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 maximise resource use and minimise development conflicts;
- continue with CVRI's trapper compensation program; and
- continue with CVRI's public engagement program.

Table 13 Summary and Rating of Impacts – Land and Resource Use

Industrial Uses	A majority of the coal leases within the Project area are held by CVRI or held by companies within a royalty arrangement to CVRI. An agreement is currently under negotiation between CVRI and West Fraser to remove lands to be mined as part of the Project from the FMA. Communication with area oil and gas companies continues to discuss the management and access of resources.	Not Significant
Non-Industrial Uses	Public engagement program CVRI has undertaken discussions with many of the non-industrial users that may be impacted by the proposed development. CVRI will continue to work with the public with respect to expressed concerns.	Not Significant

1.14 HUMAN HEALTH

The chemical emissions from the Project are not expected to result in adverse health effects in the region. For most of the Chemicals of Potential Concern (COPCs), the magnitude of the differences in predicted health risks between the Baseline and Application Case is negligible. In recognition of the influence of duration and pathway of exposure, risk estimates were segregated into:

- acute inhalation;
- chronic inhalation; and
- chronic multiple pathways.

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.

Table 14 Summary and Rating of Impacts – Human Health		
Potential human health risks associated with Project emissions or releases were examined using a conventional risk assessment paradigm.	The risk assessment paradigm is consistent with those developed by Alberta Health and Wellness (AHW 2011), Health Canada (2009a), the Canadian Council of Ministers of the Environment (CCME 2006), and the U.S. Environmental Protection Agency (US EPA OSW 2005). This methodology has been endorsed by a number of provincial regulatory authorities in the past, including AEW, Alberta Health and Wellness (AHW) and the Alberta Energy Regulator (AER). The risk assessment paradigm involves four steps: • problem formulation; • exposure assessment; • toxicity assessment; and • risk characterisation.	Not Significant

1.15 SOCIO-ECONOMIC

Approval of 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 represents continued operations of the CVRI CVM, which in its 35 year existence has been an integral part of the RSA. The RSA, and especially the Robb area, has been host to mining for over 100 years.

Whereas the Project ensures the continuation of the CVM until 2038 the absence of the Project will see a reduction of production by 2013 and complete closure soon after. This would mean layoff of the current workforce, except a limited number of positions continuing for additional years of reclamation activity. Over time, the end of operations would result in the loss of 530 direct, permanent and contract jobs. All other effects of the CVM on the region would also cease by 2018. These include the approximately $54 million of annual spending in the RSA; the associated procurement, tax and royalty payments and contribution to GDP to Yellowhead Country, Alberta and elsewhere.

The potential mine plan changes will not change the overall mine schedule drastically seeing a slight decrease of approximately 5 months of production. Table 15 provides a summary of the net impacts of the Project on local socio-economics.

Table 15 Summary and Rating of Impacts – Socio-economic		
A number of measurable parameters are used to assess the effects of the Project on communities in the study area, including: workforce; spending and employment; income; land use effects; population change, and its related effects on service providers and municipal physical infrastructure; and effects specific to local residents.	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.	Not Significant

1.16 GREENHOUSE GAS & CLIMATE CHANGE

Project Case 1 as identified in the Air Quality Assessment (CR#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 CO_2 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.

The potential mine plan changes will not change or will slightly decrease the overall GHG emissions related to the Project. The overall disturbance area (footprint) will decrease thus not requiring as much equipment support which leads to a decrease in the release of emissions. Table 15 provides a summary of the net impacts of the Project on greenhouse gas and climate change.

Table 16 Summary and Rating of Impacts – Greenhouse Gas & Climate Change

Potential greenhouse gas and climate change risks associated with Project emissions or releases were examined using a conventional risk assessment paradigm.	The existing and projected changes to selected climate parameters are provided for the region near the Project. 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 $>5^0$C, and 44% for annual moisture index. 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.	Not Significant

Appendix 2

Mitigation Summary Tables

2.0 MITIGATION METHODS AND OVERVIEW

Mitigation has been a part of CVRI operations at the CVM and will be continued as part of this Project. The long-term residual effects of the various disciplines was assessed and found to be insignificant with the implementation of appropriate mitigation measures. Mitigation strategies are on-going and will adapt, if required, to make sure any Project affects remain insignificant. If alternative mitigation methods are warranted, CVRI will research and develop the necessary methods to successfully proceed in mine development without affecting the environment in a negative way. If possible, the best mitigation method is avoidance; this is not always possible but if the opportunity arises, CVRI will try to limit the overall disturbance and environmental footprint of the Project as a form of mitigation.

2.1 Air Quality

- systematic application of water to haul roads to minimise dust;
- retention of snow cover on roads whenever possible unless the cover would compromise the safety of vehicle operations;
- utilisation of gravel or crushed rock on the haul roads as it produces less dust than clay and sandy surfaces;
- application of water during soil handling activities conducted in the summer, where accessible;
- maintenance of the active surface of haul roads to reduce effective silt content on the running surface;
- reclamation for mined areas as soon as possible after mining is completed; and
- retention of trees and bushes between mine areas and the community of Robb.

2.2 Noise

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

2.3 Groundwater

- 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.

2.4 Surface Water Quality

- plan to divert clean water around areas to be disturbed;
- minimise 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 in an effort 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;
- utilise slope grading and stabilisation techniques to control erosion including: 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 stabilise slopes;
- utilise 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 in compliance with the Alberta Code of Practice for Watercourse Crossings and associated guidelines;
- where necessary, utilise interim erosion/sediment control measures until long-term protection can be effectively implemented;
- implement the use of explosives with less slurry to reduce the amount of nitrogen compounds released;
- minimise water contact with explosives by undertaking water control activities (dewatering of pit areas, use of diversion ditches and interceptor ditches) for drier conditions for mining and blasting operations; and
- design water management to 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.

2.5 Hydrology

• plan and layout facilities in an effort to minimise drainage diversions and runoff;
• 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;
• divert runoff from natural undisturbed area around mine activities;
• divert natural streams around or through active mine areas in a controlled manner to assist in maintaining flows 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 or exceed 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;
• install haul road berms to contain road runoff and direct it to designated runoff control works;
• establish vegetated buffer setbacks of at least 10 m from streams and 30 m from major streams, where possible, to minimise 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 minimise disturbances and use and maintain drainage and sediment controls.

2.6 Aquatic Resources
• implementation of a surface water management plan throughout the life of the Project; • implementation of an emergency response plan specific to the Project that will include methods for spill containment in streams and site clean-up; • design and construction of defined watercourse crossings to meet the regulatory requirements for approval under the provincial *Water Act* and federal *Fisheries Act*; • consideration of sensitive periods during construction planning by either planning construction to avoid these periods or implementation of site specific mitigation ; • isolation of the instream work site if flowing water is present at time of construction; • completion of fish rescue and release from isolated areas where required; • implementation of sediment and erosion controls prior to work and maintenance during the work phase until the site has been stabilised; • implementation of measures to minimise introduction of deleterious substances during construction including cleaning, servicing, and fuelling of equipment well away from water bodies; • revegetation of disturbed areas around crossing sites; • reclamation of streambed and stream banks as appropriate; • maintenance of downstream flows; • use of appropriate sizing of diversion channels and/or pump; • armouring and/or lining channels or use of flumes where appropriate; • placement and stockpiling of excavated materials in a location that is well away from the channel route; • diversion of flow gradually into constructed channels to minimise potential erosion and mobilisation of sediment; • construction of open channel diversions that allow for the movements of fish; • development and implementation of a stream flow management plan for each diversion to maintain instream flows; • identification of habitat compensation measures and implementation at specific sites as needed, in consultation with DFO, Alberta Sustainable Resource Development (ESRD), and stakeholders, in order to address NNL of habitat productivity; and • restriction of public access on haul roads or other access routes.

2.7 Soil & Terrain
• plan to minimise overall disturbance; • utilise 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 promote ecological diversity and minimise 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; • plan to create 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.

2.8 Vegetation and Wetlands
• 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 minimising 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 with the goal of enhancing 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 where possible 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.

2.9 Mammalian Carnivore
• incorporate select native trees and shrubs such as alder and willow into re-vegetation activities; • maximise 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 metre 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 areas of the Project 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.

2.10 Wildlife

- 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 minimise 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;
- plant 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 specialised habitat features such as snags, rock outcrops, cliffs and mineral licks.

2.11 Historical Resources

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

2.12 Traditional Ecological Knowledge and Land Use

- 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, for 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.

2.13 Land and Resource Use

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

2.14 Human Health

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 human health related disciplines are provided within Appendix 2 of this report and include:

- air monitoring;
- groundwater monitoring; and
- surface water monitoring.

2.15 Socio-economic
• 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 minimising 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.

Appendix 3

Monitoring Summary

3.0 MONITORING

Monitoring has been a part of CVRI operations at the CVM and will be continued as part of this Project. In order to assess the effectiveness of mitigation measures, CVRI will set up and employ monitoring programs related to the various disciplines. Ongoing annual monitoring is a key component of the Project in order to confirm the insignificant affect the Project has on the local environment. The data retrieved from the monitoring will allow CVRI to adapt mine operations and or mitigation methods appropriately to ensure regulatory compliance.

3.1 Air Quality

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 NO_2.

3.2 Noise

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

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

3.3 Groundwater

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.

3.4 Surface Water Quality

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.

3.5 Hydrology

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

- continue monitoring programs already in place at the existing CVM (*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 from disturbed areas does not occur.

3.6 Aquatics

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

- monitor flows and TSS at all settling ponds;
- conduct regular inspections of all drainage works;
- expand the existing CVM 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.

3.7 Soil Resources

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.

3.8 Vegetation

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 and allow for adaptive management.

3.9 Carnivores

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.

3.10 Wildlife

CVM will monitor:

- 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.

3.11 Historical Resources

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.

3.12 Traditional Ecological Knowledge and Land Use

CVRI will undertake the following monitoring measures:

- complete longer-term monitoring on the impact to medicinal and other plants and for general environmental monitoring; and
- continue to consult with the Aboriginal communities regarding future development plans.

3.13 Land and Resource Use

CVRI will continue to consult with stakeholders as development of the Project area progresses over the life of the mine area.

3.14 Human Health

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 summarised as follows:

- air monitoring;
- groundwater monitoring; and
- surface water monitoring.

3.15 Socio-economic

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 minimising 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 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; and
- continued participation in community involvement initiatives

Appendix 4

Preliminary Fish Compensation Outline Project Update & Revised Discussion Report

Coal Valley Resources Inc. - Coal Valley Mine

Robb Trend Project

Preliminary Fish Compensation Outline
Project Update & Revised Discussion Report

Submitted to
Department of Fisheries and Oceans Canada,
Alberta Environment and Sustainable Resource Development,
Alberta Energy Regulator, and
Canadian Environmental Assessment Agency

March 13, 2014

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1.0 INTRODUCTION

Coal Valley Resources Inc. (CVRI) submitted a Mine Permit Amendment application (Environmental Impact Assessment – EIA) for the Robb Trend Project (Project) in April, 2012.

Since then the application has been under review by public, stakeholders and government agencies (federal and provincial) including the Alberta Energy Regulator (AER), Alberta Environment and Sustainable Resource Development (ESRD), and the Canadian Environmental Assessment Agency (CEAA) and their various departments. The regulatory review has raised numerous questions, provided commentary on the proposed plans, and requested consideration of various alternatives.

Three Supplemental Information Requests (SIRs) have been made by government agencies with responses filed by CVRI for each round:

a. Response to SIR #1 was submitted December, 2012;
b. Response to SIR #2 was submitted June, 2013; and
c. SIR #3 was received October 24, 2013. A response is in preparation.

This review process has resulted in the determination that several minor 'revisions' to the original mine plan concept should be incorporated into the Project plan where a lesser degree of environmental impact or a greater degree of mitigation would result thus reducing potential risk of impact.

2.0 DFO REVIEW

Throughout the application process the Project Team has engaged DFO by providing them with a copy of the *Coal Valley Mine Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (April 2012) as well as the subsequent SIR responses.

In addition to these documents meetings have been held with DFO to describe the proposed Project and outline implications regarding fish habitat impacts and future *Fisheries Act* approval requirements.

March 3, 2013

An initial meeting was held on March 3, 2013 at DFO Edmonton office to discuss the Project and to highlight concerns and requirements DFO expressed concerns regarding the magnitude of HADD and a seeming reliance of EPL for compensation. DFO requested further information to clarify available options to reduce these levels of risk. DFO further identified a preference to a greater degree stream channel habitat and lower level of lake habitat. In response to this meeting a *Fish Compensation Document* was provided to DFO on August 28, 2013 (See Appendix 1). This document outlined mining options including minor amendments to satisfy fish habitat compensation concerns as it relates to both disturbance and reclamation. Proposed modifications were made to the mine reclamation plan wherein some of the previously contemplated reclaimed lakes have been substituted by restored stream channels.

October 7, 2013

On October 7, 2013 representatives from CVRI, CEAA, Millennium EMS Solutions Ltd. (MEMS), and Pisces Environmental Consulting Services Ltd. (Pisces) met at the DFO Edmonton office to discuss the Project and the *Fish Compensation Document* as it related to fish and fish habitat. A Project update was provided at this meeting related to the SIR responses and potential mine plan revisions.

At the meeting, DFO identified remaining concerns and further clarification of the proposed changes. CVRI concluded the meeting with an offer to provide additional description of the Project revisions with respect to HADD and compensation values attained through reclamation.

3.0 SUPPLEMENTAL QUESTIONS RAISED BY DFO

1. End-pit lake (EPL) size and depth is a major concern. Is it possible to backfill the EPL's to decrease depth comparable to the EPL Development Guidelines?

Response:

Yes, some changes to the EPL can be accommodated to provide designs more comparable to the guidelines.

CVRI has already implemented some changes and is confident that further design refinements will result in EPL designs more closely matching the Alberta End-Pit Lake Guidelines.

CVRI has incorporated a number of revisions to the proposed mine plan in order to provide improvements to the EPL designs forecasted in the reclamation plan. These changes will be described in the forthcoming AER and ESRD SIR #3 documents. Figure 1 illustrates the locations of revisions recently implemented. A summary of the revisions, related to EPL follows:

- Lake 4 has been deleted from the proposed plan and replaced with a reclaimed stream channel.
- Revisions in the mine areas have resulted in Lakes 1, 2, 3, and 12 with decreased size and volume. This decreased volume will also decrease projected fill times.
- CVRI has noted that mine sequence of many large pits can be modified to develop the pits in a staged manner which would result in a greater degree of in pit backfill. This will result in decreased lake volumes, decreased maximum depth and increased littoral area.
- CVRI has modified the approach proposed for connecting streams across reclaimed lakes. Many of the diversions across backfilled 'land bridges' will be retained as stream channels instead of creating flow through EPL's. This change will provide additional stream channel for the original streams and improve conditions for lake outlets.
- Numerous other changes have been identified in order to decrease stream channel habitat losses and provide greater degree of channels as inlets or outlets to future lakes.
- Several of the proposed lakes will be established as 'off-stream' water bodies which will be designed to outlet into channels which flow to streams. This will allow for a greater degree of control on flows and fish passage options.

- Many of the proposed lakes will be scheduled for construction later in the Project life. This allows for a greater degree of monitoring and establishment of current EPL's in the current Mine area. Results of the research and monitoring of these current lakes will assist in future planning.
- The EPL's proposed for the Project will be developed over time, rather than clustered together. This sequence will also permit a greater degree of planning and implementation of design elements over time as EPL technology develops further.
- EPL habitat as compensation for HADD can be sequenced over several years and can be approved in stages as mining advances through the Project area. CVRI will design and construct these EPL's in alignment with Alberta End-Pit Lake Guidelines.

Table 1 is provided to illustrate the lake characteristics for the revised mine plan. Size, depth and volume of lakes will be modified through mine plan changes. Lake designs will be established during the approval process which is expected to be staged throughout the life of the Project.

Table 1 End Pit Lakes – Revised Plans

Lake	Original Plan					Revised
	Surface Area	Maximum Depth	Lake Volume	Littoral Area	Fill Time	Comments
	(Ha)	(m)	(million m^3)	(Ha)	(Years)	
1	63.5	**75**	21.7	**5.0**	**57.1**	Size, depth, volume reduced significantly. Littoral area increased.
2	93.0	**65**	23.3	17.6	**27.7**	Size, depth, volume reduced significantly.
3	60.3	**55**	12.7	**8.3**	**44.1**	Size, depth, volume reduced significantly. Littoral area increased.
4	71.1	**45**	8.1	17.8	2.2	Deleted from plan, replaced by stream channel.
5	131.8	**45**	22.2	33.8	7.8	
6	28.9	**50**	4.4	4.9	**3.4**	
7	16.4	25	1.8	3.7	1.4	
8	20.1	40	2.0	5.9	7.0	
9	21.0	35	2.8	4.1	6.6	
10	5.5	15	0.1	2.3	.06	
11	17.7	35	2.0	4.0	5.8	
12	96.0	55	25.4	9.1	28.6	Size, depth, volume reduced significantly. Littoral area increased.

*Footnote: Red text signifies design elements that were focus of revisions.

It is important to note that the EPL's, as currently proposed, are expected to have a medium to high probability of success based on design factors outlined in the EPL Development Guidelines. Table 2 presents the anticipated 'revised' lake layouts in context with EPL guidelines design features. As shown on Table 2 most of the design parameters that are ranked has highly important (including those parameters that are dependent on lake depth) have a moderate to high probability of success as defined by the EPL Development Guidelines.

Table 2 End Pit Lakes – Guideline Parameters

Lake	Parameter	Probability of Success										
		1	2	3	5	6	7	8	9	10	11	12
	Sustainability (Water Balance)	High	High	High	High	High	High	High	High	High	High	High
	Lake Dynamic/Function	High	High	High	High	High	High	High	High	High	High	High
	Filling Method/Schedule	Low	Low	Low	Medium	High	High	Medium	Medium	High	Medium	Low
	Lake Geometry	Medium	Medium	Medium	Medium	Medium	High	Medium	Medium	High	High	Medium
	Shoreline Stability	High	High	High	High	High	High	High	High	High	High	High
	Stratification/Mixing	Low	Low	Low	Low	Medium	Medium	Medium	Medium	Low	Medium	Low
	Water Quality	High	High	High	High	High	High	High	High	High	High	High
	Potential Toxic Substances	High	High	High	High	High	High	High	High	High	High	High
	Littoral Zone	Low	Medium	Medium	High	Medium	High	High	Medium	Low	High	Low
	Substrate in Littoral Zone	High	High	High	High	High	High	High	High	High	High	High
	Connectivity	Medium	Medium	Medium	Medium	High	Medium	High	High	High	High	Medium
	Riparian	High	High	High	High	High	High	High	High	High	High	High
	Score (1-low,2-med,3-high)	26	29	29	31	33	34	33	32	32	34	28
	Total Available Score	36	36	36	36	36	36	36	36	36	36	36
	Percentage	72%	81%	81%	86%	92%	94%	92%	89%	89%	94%	78%

Other Comments

For Lake 5 can the mean depth be decreased to 15 - this will get rid of the low rating highlighted in red
For Lake 10 if %littoral can be increased from 19.5 to 20 then the ranking can be changed from Medium to High (blue highlight)
For Lake 10 the amount of littoral needs to be reduced so that it is less than 40% and average depth is increased to 4 m. This will get rid of the two low ratings highlighted in yellow

Lakes proposed for the Project have been reduced from 12 to 11. Revisions to date have resulted in improvements to lake designs with regard to EPL Guideline requirements. Additional future revisions can be expected as mine designs are revised over the life of the Project. Comments regarding the lake characteristics itemized in Table 1 include:

- Four of the proposed lakes are predicted to be large and deep. Lakes 1, 2, 3 and 12 will be developed as 'end cuts' in the mine sequenced which result in reduced backfill opportunity. These are the last pits excavated in a series of mine pits. Further refinement of mining sequence in these pits can be expected to further improve backfill.

Focus of fish habitat will be directed to Lakes 6, 7, 8, 9, 10, and 11. These lakes are smaller and shallower. Mean depths are within guidelines. A large portion of littoral zone can be provided. All of these lakes will function as 'flow through' with direct connectivity to streams.

2. Are all of the EPL designed to be fish habitat? How much fish habitat is being considered to be developed?

Response:

All EPL's will be reclaimed for utilization of fish populations. Several lakes will be established as 'flow through' water bodies fully connected with existing rivers and creeks which will provide water inflow. Additional lakes will be established as standing water bodies filled with surface and groundwater inflows but outflowing into adjacent streams. Figure 2 provides an illustration of the conceptual landscape post-reclamation including EPL's and restored channels.

The End-Pit Lake Guidelines suggest that 'flow through' lakes should be considered more favorable for fish utilization due to water circulation. However, any connection of lakes to a nearby channel would be advantageous since the lakes augment and diversify the range of habitat.

The *Fish Compensation Document* indicates that the online flow-through lakes will be designed for self-sustaining fish populations while the other lakes will be determined based on conditions at the time of reclamation (inflow/outflow). Discussions with regulators and factoring in the regional fisheries objectives will also help direct the final reclamation end land uses.

In total, the EPL's as currently designed will provide over 550 ha of fish habitat (Table 3 and 4). While some lakes may require additional modification to facilitate the establishment of fish populations in a reasonable timeframe, there are several lakes that are considered highly likely to successfully support self-sustaining fish populations as currently designed. It is CVRI's opinion that these lakes (Lakes 8, 9, 10, 11) will provide sufficient habitat to adequately compensate/offset for habitat losses and that habitat afforded by the other lakes would not be required to satisfy requirements under the *Fisheries Act*. In specific, there are 4 lakes (Lakes 8, 9, 10, and11) that have very similar characteristics to the EPL system that has already been developed in the upper Embarras River.

While monitoring results for the Embarras Lakes system are preliminary, the initial investigations suggest that the system is supporting Athabasca Rainbow Trout and densities in the Embarras River downstream of the lakes are higher now than when assessed prior to mining.

Recent reports related to monitoring of existing CVM lakes are provided for information (See Appendix 2). These reports include:

- Aquatic Monitoring Program For End Pit Lakes in the Headwaters of the Embarras River, 2011 – 2012, Pisces Environmental Consulting Services Ltd., April, 2013. This report provides early monitoring results in the 'Upper Embarras Lake' EPL system at CVM. The objective of this program is 'to assess the viability of the EPL's' once they were constructed.
- Preliminary Results for Fish Sampling Conducted in the Embarras Lakes System, Pisces Environmental Consulting Services Ltd, February 4, 2014. This report provides a brief update of 2013 fish sampling program conducted within and adjacent to the lake system.
- Recommendations for Channel Enhancement in the Embarras Lakes End Pit Lake System, Pisces Environmental Services Ltd., August 21, 2013. This report summarizes recommendations for channel enhancement of connecting channels in the Embarras Lakes End Pit Lake System. The recommended work would assist in further supporting a self-sustaining native fish population within the lakes. CVM will be implementing an enhancement program as recommended.
- 2012 Post-Construction Monitoring of the Permanent Diversion Channel on Upper Mercoal Creek for the MP2 Development, Pisces Environmental Consulting Services, March 19, 1013. This report provides a summary of Year 3 (Post-Construction) monitoring results for a diversion channel.
- Preliminary Results for Investigations Conducted on Existing End Pit Lakes in the South Block Area of the Coal Valley Mine, Pisces Environmental Services Ltd., February 18, 2014. This report provides a brief update of 2013 preliminary investigation to assess fisheries potential in older, completed EPL's within the south-east portion of the CVM.
- Macrophyte and Bathymetric Surveys in End-Pit Lakes in the Coal Valley Mine Area, Hatfield Consultants, February, 2014. This report summarizes the assessment of bathymetry and macrophyte communities in nine existing EPL's in the CVM area.

Several EPL are proposed for the Project reclamation plan. Table 3 describes the revised lake design elements for each of the proposed lakes. Significant littoral zone area will be accommodated in each lake providing appropriate fish habitat.

Fish habitat will be available as follows:

- Lake surface area will be in excess of 5,000,000 square meters.
  - Approximately 1,100,000 square meters (22%) will be provided in lakes which provide 'flow through' connectivity with established streams.
  - The remaining 3,900,000 square meters will be provided in lakes connected to nearby streams through outlet channels.
- Littoral area of approximately 1,036,000 square meters.
  - Approximately 249,000 square meters will be provided within the lakes having flow through connectivity.
  - The additional 787,000 square meters will be available in the other connected lakes.

Table 3 EPL Fish Habitat Available			
Lake	**Surface Area (Ha)**	**Littoral Zone (m^2)**	**Inflow Conditions**
1	<63.5	+50,000	Connects to Lake 2
2	<93.0	+176,000	Outflow to Bryan Creek
3	<60.3	+83,000	Outflow to Hay Creek
4			Lake deleted, replaced with stream habitat
5	<131.8	+338,000	Outflow to Erith River
6	28.9	49,000	Halpenny Creek flow through
7	16.4	37,000	Lendrum Creek flow through
8	20.1	59,000	Lund Creek flow through
9	21.0	41,000	Lund Creek flow through
10	5.5	23,000	Lund Creek flow through
11	17.7	40,000	Lund Creek flow through
12	<96.0	+91,000	Outlet to Lund Creek
Total		**+1,036,000**	

Table 4 provides a tabulation of the 'stream habitat' which will be returned within the Project area. Accommodations have been made to improve the quantity of 'stream habitat'. In many cases the opportunity will be presented to also 'improve' the habitat quality and diversity over what was originally in place.

Table 4 Stream Channel Habitat Available			
Basin	**Type**	**Area (m^2)**	**Comment**
Bryan Creek	Constructed Channel		Bryan Creek will be diverted and then returned into reclaimed Mynheer Pit
	Constructed Channel		Channel will be built on land bridge between Lake 1 and 2
	Lake Outlet		Outlet of Lake 2 will flow to Bryan Creek
		15,688	
Hay Creek	Lake Outlet		Lake 3 will flow into Hay Creek
		6,363	

Table 4 Stream Channel Habitat Available			
Basin	**Type**	**Area (m^2)**	**Comment**
Erith River	Constructed Channel		Temporary channel provided in reclaimed McPherson pit during Mynheer mining
	Constructed Channel		Final river route through Mynheer Pit in place of Lake 4
	Constructed channel		Channel on land bridge between lakes
	Lake Outlet		Lake outlets build on land bridge
		67,485	
ERT1 ERT2	Constructed Channel		Channel as bypass of Mynheer Pit
		1,406	
Bacon Creek	Constructed Channel		Channel on land bridge over pit width
	Lake Outlet		Lake outlet on land bridge
		2,777	
Halpenny Creek	Constructed Channel		Channel on land bridge over pit width
		4,129	
Lendrum Creek LET1 LET2	Constructed Channel		Channel on land bridge over pit width Downstream
		25,663	
Lund Creek			
		24,851	
Pembina East			Diversion built as channel
		660	
Total		**122, 753**	

3. Has there been any discussion or plans for discussion with ESRD in relation to the Rainbow Trout Recovery Plan?

Response:

Recovery Plan

ESRD is currently proposing a recovery plan for Athabasca Rainbow Trout in anticipation of a possible decision to move the species into a threatened species designation. Status of this decision is unknown.

CVRI has a staff member sitting on the committee which is developing the Athabasca Rainbow Trout Recovery Plan. This member is participating in the discussions and determination of the recovery steps being proposed for the plan. A rough draft of the recovery plan had been circulated in March 2013. No apparent progress has been reported since then.

CVM Participation

CVRI is also currently active in participation with ESRD in EPL development within the current mine area. This active work includes efforts to improve conditions for Athabasca Rainbow Trout in the region. A specific project involving EPL 'Embarrass Lake' (Pit 122) is focused on establishment of a local, self-sustaining population of Athabasca Rainbow within the upper headwaters of Embarrass Lake. A compilation of reclaimed lakes and stream channels has been identified for the project. A downstream 'fish barrier' was constructed to keep species from migrating into the system. ERSD has introduced native Rainbows into the system with early results showing favorable start to the project.

CVRI, ESRD and DFO continue discussions related to EPL reclamation in the area with respect to species introductions and specific habitat and migration alternatives. A co-operative approach favoring ESRD fish management requirements will continue to be followed.

There has been no direct communication between ESRD and CVRI specifically related to the Rainbow Trout Recovery Plan and Robb Trend Project. Within the *Fish Compensation Document* CVRI has identified that the main focus of the fish habitat compensation is the Athabasca Rainbow Trout.

For information, CVRI has provided recent material obtained from the ESRD website which is related to 'species at risk' (see Appendix 3).

4. Table 12 of the Fish Compensation Plan needs to be revised to reflect the revisions.

Response:

CVRI has also provided Table 5, 6, and 7 to illustrate the HADD levels forecast for the Project area with the revisions included.

Table 5 indicates the 'spread' of habitat loss over the life of the Project. Initial mining activity is focused in the Erith River area and then advances to other Project areas. The cumulative total of habitat loss would be 159,819 m^2after incorporating the recent plan revisions.

Table 5 Fish Habitat Impact Over Life of Project

		Old	New	Habitat	HABITAT AREA (M**2)																							
		Case	Case	Potential	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Bryan Creek		14208	14208	High																	-4000	-10000	-208							-14208
		1480	1480	Low																	-1480									-1480
																														0
Hay Creek		2325	6363	Low												-5000	-1363													-6363
																														0
Erith River	Main	67485	67485	High		-3000	-2000	-3000	-30000	-1000	-1000	-8500	-1000			-15000	-1000	-1000	-985											-67485
	ERT1	5834	1000	High										-1000																-1000
	ERT1A	102	0																											0
	ERT2	406	406	Low			-406																							-406
	ERT3	7751	7751	Low				-7751																						-7751
																														0
Bacon Creek		2777	2777	High								-2500	-277																	-2777
																														0
Halpenny Creek	Main	7601	4129	Low								-3500	-500	-129																-4129
	HLT1	2239	0																											0
	HLT2	219	0																											0
																														0
Lendrum Creek	Main	17468	17468	Moderate										-16000	-1468															-17468
	LET1	1923	3282	Moderate										-3282																-3282
	LET3	22161	7959	High										-7959																-7959
																														0
Lund Creek	Main	11026	16033	Moderate																	-7000	-3000	-4000	-2033						-16033
	LDT1	2991	2991	Low												-2000	-500	-491												-2991
	LDT1A	1091	1091	Low												-1091														-1091
	LDT2	209	209	Low														-209												-209
	LDT3	2507	3831	Low																-3500	-331									-3831
	LDT4	542	542	Low																	-542									-542
	LDT5	154	154	Low																	-154									-154
																														0
Pembina East	PET1	5236	660	High																	-100	-560								-660
																														0
Total		177735	159819		0	-3000	-2406	-10751	-30000	-1000	-1000	-14500	-1777	-28370	-1468	-23091	-2863	-1700	-985	-3500	-13607	-13560	-4208	-2033	0	0	0	0	0	-159819
Cumulative					0	-3000	-5406	-16157	-46157	-47157	-48157	-62657	-64434	-92804	-94272	-117363	-120226	-121926	-122911	-126411	-140018	-153578	-157786	-159819	-159819	-159819	-159819	-159819	-159819	

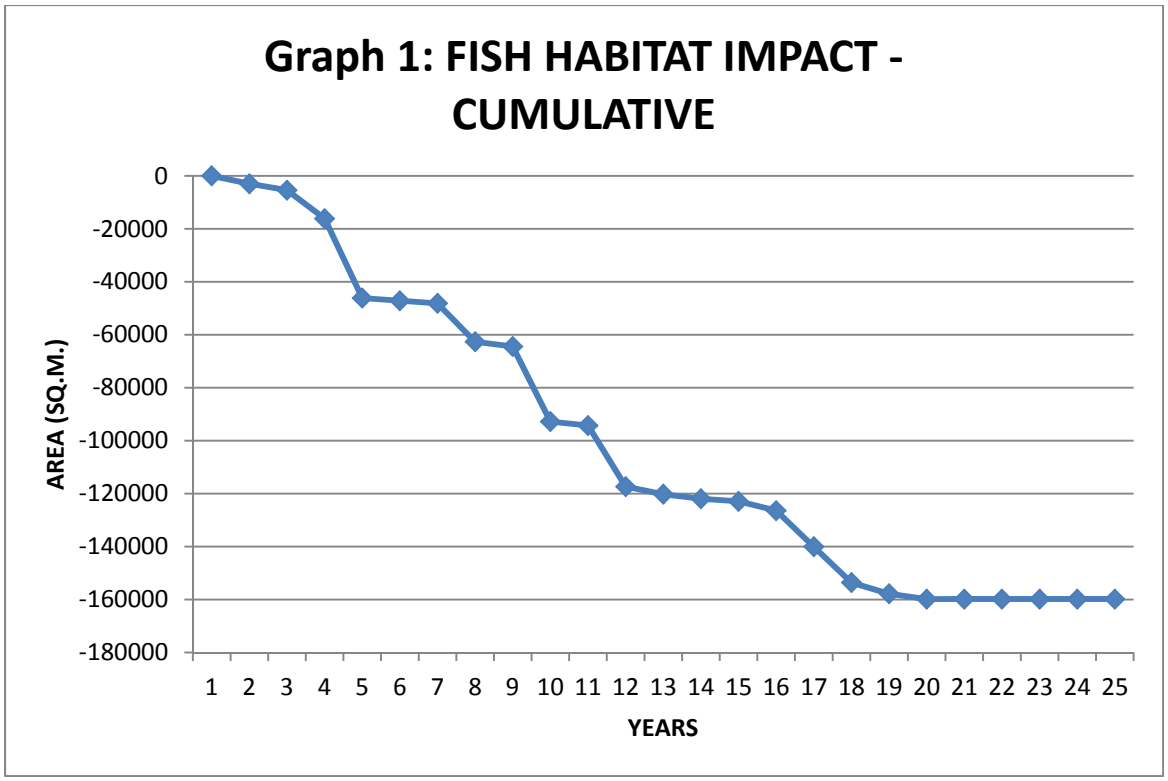


Table 6 includes the 'return' of stream channel habitat as the Project advances through time. (The table does not include any EPL contribution). Much habitat will be restored in earlier years before the loss incurs in other segments of the Project. This tabulation results in a maximum cumulative loss of about 48,000 m^2 reducing to about 38,000 m^2 at the conclusion of the Project. No 'off site' compensation has been incorporated into this schedule although opportunity is available within the surrounding region.

Table 6 Net Fish Habitat Impact Over Life of Project

		Old	New	Habitat	HABITAT AREA (M**2)																								
		Case	Case	Potential	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Bryan Creek		14208	14208	High																	-4000	-10000	-208							-14208
		1480	1480	Low																	-1480									-1480
																			Reclaimed Mynheer Pit			15688							15688
Hay Creek		2325	6363	Low												-5000	-1363													-6363
																														0
Erith River	Main	67485	67485	High		-3000	-2000	-3000	-30000	-1000	-1000	-8500	-1000			-15000	-1000	-1000	-985											-67485
	ERT1	5834	1000	High										-1000																-1000
	ERT1A	102	0																											0
	ERT2	406	406	Low			-406																							-406
	ERT3	7751	7751	Low				-7751																						-7751
									20000	20000	5000	5000					10000	6000	2861											68861
Bacon Creek		2777	2777	High								-2500	-277																	-2777
																2777														2777
Halpenny Creek	Main	7601	4129	Low								-3500	-500	-129																-4129
	HLT1	2239	0													4129														4129
	HLT2	219	0																											0
																														0
Lendrum Creek	Main	17468	17468	Moderate										-16000	-1468															-17468
	LET1	1923	3282	Moderate										-3282																-3282
	LET3	22161	7959	High										-7959																-7959
															7500	5000	7000	6163												25663
Lund Creek	Main	11026	16033	Moderate																	-7000	-3000	-4000	-2033						-16033
	LDT1	2991	2991	Low												-2000	-500	-491												-2991
	LDT1A	1091	1091	Low												-1091														-1091
	LDT2	209	209	Low														-209												-209
	LDT3	2507	3831	Low																-3500	-331									-3831
	LDT4	542	542	Low																	-542									-542
	LDT5	154	154	Low																	-154									-154
																		500	500	500	500	1500	1445							4945
Pembina East	PET1	5236	660	High																	-100	-560								-660
																						660								660
Total		177735	159819		0	-3000	-2406	-10751	-10000	19000	4000	-9500	-1777	-28370	6032	-11185	14137	10963	2376	-3000	-13107	3628	-2763	-2033	0	0	0	0	0	-37756
Cumulative					0	-3000	-5406	-16157	-26157	-7157	-3157	-12657	-14434	-42804	-36772	-47957	-33820	-22857	-20481	-23481	-36588	-32960	-35723	-37756	-37756	-37756	-37756	-37756	-37756	

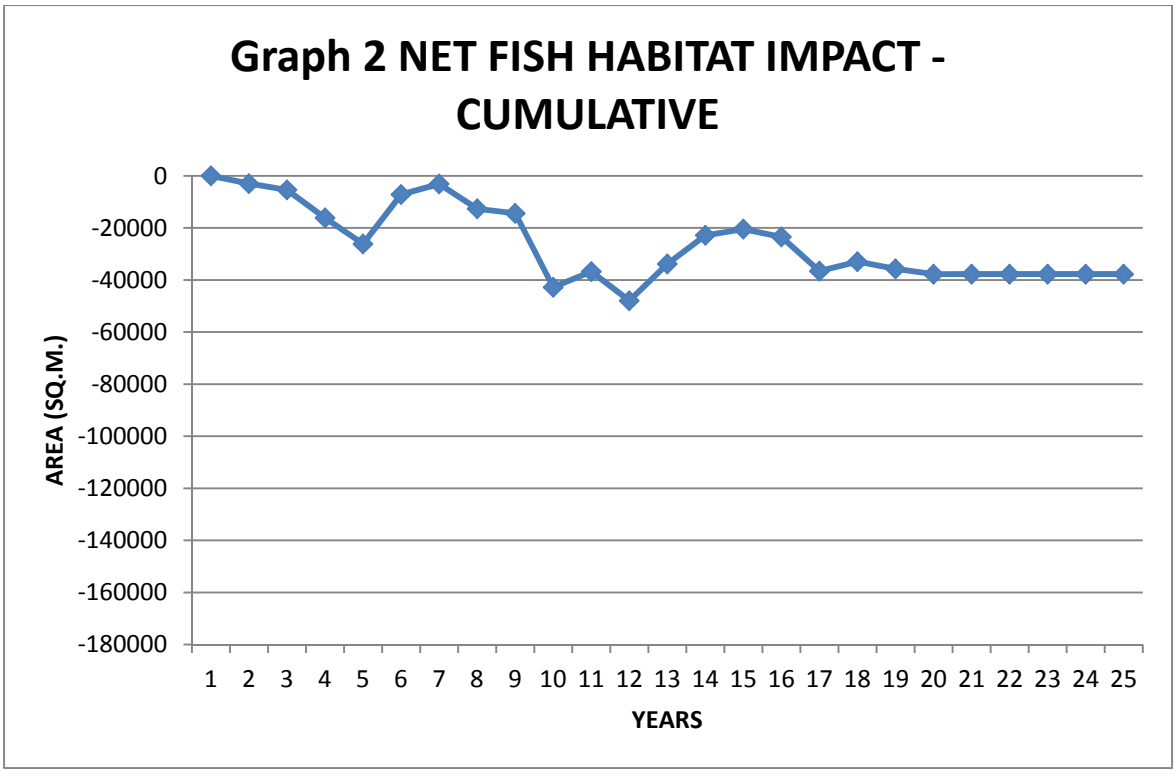
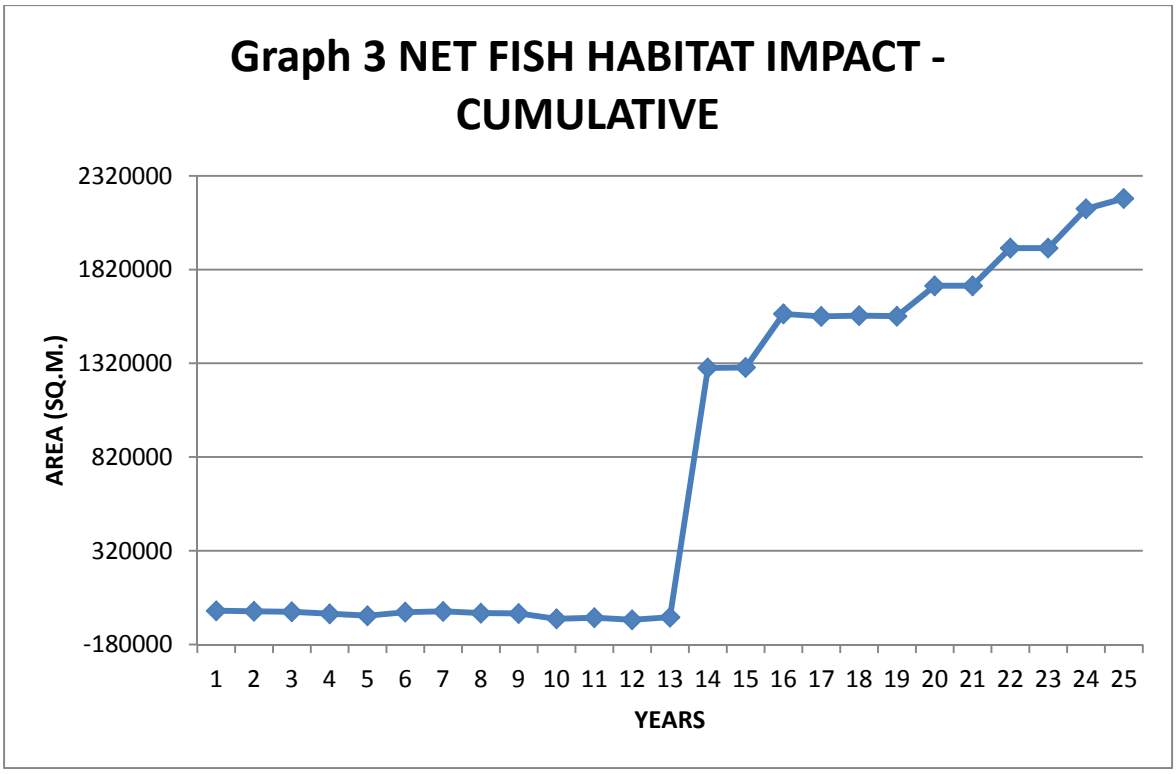


Table 7 provides a schedule which illustrates the inclusion of EPL habitat available during the Project timeline. The first lake (Lake 5) would not be available until mid-Project. Additional lakes would come on stream toward the end of the project life. Additional lakes would be available beyond the schedule timeline illustrated. EPL habitat has the opportunity to massively increase the fish habitat availability in the area.

Table 7 Net Fish Habitat Impact Over Life of Project

		Old	New	Habitat	HABITAT AREA (M**2)																								
		Case	Case	Potential	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total
Bryan Creek		14208	14208	High																	-4000	-10000	-208							-14208
		1480	1480	Low																	-1480									-1480
																			Reclaimed Mynheer Pit			15688							15688
Hay Creek		2325	6363	Low												-5000	-1363													-6363
																														0
Erith River	Main	67485	67485	High		-3000	-2000	-3000	-30000	-1000	-1000	-8500	-1000			-15000	-1000	-1000	-985											-67485
	ERT1	5834	1000	High										-1000																-1000
	ERT1A	102	0																											0
	ERT2	406	406	Low			-406																							-406
	ERT3	7751	7751	Low				-7751																						-7751
									20000	20000	5000	5000					10000	6000	2861											68861
Bacon Creek		2777	2777	High								-2500	-277																	-2777
																2777														2777
Halpenny Creek	Main	7601	4129	Low								-3500	-500	-129																-4129
	HLT1	2239	0													4129														4129
	HLT2	219	0																											0
Lake 5																		1318000												1318000
Lendrum Creek	Main	17468	17468	Moderate										-16000	-1468															-17468
	LET1	1923	3282	Moderate										-3282																-3282
	LET3	22161	7959	High										-7959																-7959
Lake 6															7500	5000	7000	6163		289000										314663
Lund Creek	Main	11026	16033	Moderate																	-7000	-3000	-4000	-2033						-16033
	LDT1	2991	2991	Low												-2000	-500	-491												-2991
	LDT1A	1091	1091	Low												-1091														-1091
	LDT2	209	209	Low														-209												-209
	LDT3	2507	3831	Low																-3500	-331									-3831
	LDT4	542	542	Low																	-542									-542
	LDT5	154	154	Low																	-154									-154
Lake 7, 8, 9, 10																		500	500	500	500	1500	1445	164000		201000		210000	55000	634945
Pembina East	PET1	5236	660	High																	-100	-560								-660
																						660								660
Total		177735	159819		0	-3000	-2406	-10751	-10000	19000	4000	-9500	-1777	-28370	6032	-11185	14137	1328963	2376	286000	-13107	3628	-2763	161967	0	201000	0	210000	55000	2199244
Cumulative					0	-3000	-5406	-16157	-26157	-7157	-3157	-12657	-14434	-42804	-36772	-47957	-33820	1295143	1297519	1583519	1570412	1574040	1571277	1733244	1733244	1934244	1934244	2144244	2199244	



The tables are based on revisions as indicated:

- CVRI has reduced the predicted HADD areas significantly through incorporating mine changes. Important stream channel habitat has been retained to aid continued fish populations and movement and to assist in recovery during reclamation.
- CVRI has introduced revisions to reduce EPL size and depths and increase littoral areas.
- CVRI has implemented revisions to reintroduce a greater degree of stream channel habitat.
- Sequence of mining will spread HADD levels over the life of the Project.
- Reclamation will begin to return fish habitat early in the Project life before HADD occurs in the remainder of the Project area. This limits the maximum exposure levels.
- EPL will begin to return fish habitat early in the mine Project in advance of later HADD in the later years of the Project. This staged return of EPL and corresponding fish habitat will limit overall HADD levels.
- Compensation plans for the Project can be established over time as the Project advances. CVRI's development of mining occurs in multiple stages in relation to each mine license. Each stage could include a specific compensation plan which would expand over time as the Project advances.

5. Deep online lakes are a concern with the potential increase in temperature and depleted oxygen levels. Has this concern been addressed in the mine plan revisions?

Response:

Early information collected from the Embarras Lakes system suggests that temperature and oxygen levels in EPL's are not a significant concern. See Pisces report (Appendix 2). As previously described above in the response to #2, there are several lakes that have very similar characteristics to the Embarras Lakes.

CVRI has a number of EPL's already established and additional lakes being currently developed. Monitoring of environmental conditions in these lakes is ongoing so that additional evidence regarding EPL conditions and design features will be available for EPL planning.

6. EPL fill times are a concern especially when some of the EPL's will require 57 years to reach a full water level. Has this concern been addressed in the mine plan revisions?

Response:

As previously indicated in the above response to #2, there are several lakes that have filling times that are within the recommended range for high success based on the EPL Development Guidelines.

CVRI has noted the resulting calculations indicating possible lake 'fill times'.

CVRI has incorporated changes into the proposed mine plan in order to reduce EPL volumes. Reduced volume will assist in reducing fill times. However, lake fill times will still vary considerably between the lakes. Fill times will depend on available groundwater flows and surface flows which can be directed into lakes while maintaining 'in stream' needs nearby.

Project changes (See Table 1 above) include:

- Four lakes have been predicted to be large and deep resulting in large volumes. Fill times of these would be expected to be lengthy since no direct stream flows would be available for filling. Future plans will investigate improvements to the lake designs and opportunity to import water from nearby sources for filling.
    - Lakes 1 and 2 will be adjusted through mine plan revisions to decrease volumes. Lake sizes will be decreased and depth decreased by increased in pit backfill volumes. Lake 2 has been shortened due to an adjusted in the limit of mining. Lake 3 will also be adjusted through mine plan sequencing to increase backfill. Water volume will be decreased.
- Lake 12 will also be modified through mine sequence changes.

7. **Note:** If lake/channel compensation doesn't meet regulatory standards, DFO will like a letter of credit. This process would occur at the Authorization stage.

Response:

CVRI acknowledges this DFO standard procedure.

CVRI will also anticipate proactive compensation opportunities off site as a method of establishing 'credit'.

8. Has CVRI identified any additional compensation options for example current lakes, culverts, areas off of the mine site?

Response:

CVRI has considered options regarding 'off site' compensation through habitat improvement projects in the regional area. Progress towards this option includes:

- Pisces evaluated existing culvert crossings in the Mercoal and Yellowhead Tower area with respect to fish passage limitations. Candidate crossings were identified including one site on Mercoal Creek downstream of the Mercoal Phase 1 area.
- CVRI has implemented fish habitat compensation at all stream crossings and diversions constructed for Mercoal and Yellowhead Tower mining areas. This work has included a haulroad crossing on Mercoal Creek tributary and diversion/reclamation of Mercoal Creek tributaries in Mercoal Phase 1. Mine activity in Yellowhead tower includes fish compensation features in the mine and reclamation planning.
- CVRI has continued partial funding of Foothills Research Institute (FRI) 'Stream Crossing' program by obtaining 'inventory' site reports on all stream crossings in the area surrounding the CVM and Robb Trend. In addition, information on fish species distribution has been obtained through the program. During 2013 the inventory of crossings was completed including roads for mining, wellsites, highways, railroads and mining. Such data provides opportunity to identify problematic crossings resulting in limiting fish passage or adverse stream sediment loading. CVRI now intends to move the program into evaluation of possible 'fish habitat improvement' projects for future presentation to ESRD and DFO.
- CVRI is actively developing plans for establishment of fish habitat in existing and future CVM EPL's. Field survey of current lakes have been undertaken to evaluate lake and outlet conditions regarding implementing introduction of fish utilization into the lakes. Hatfield (See Appendix 2) has completed an initial review of macrophyte conditions in the existing lakes. Continued monitoring will be used to identify changes in conditions over time. CVRI will also evaluate opportunities to establish shoreline and littoral zone vegetation. Pisces (See Appendix 2) has completed an initial review of inlet/outlet conditions on existing EPL with respect to flows and habitat conditions. CVRI will evaluate opportunities to establish improved fish habitat conditions in these channels.
- CVRI continues to initiate new and ongoing studies of many of the EPL's within the current mine site. Based on these studies CVRI is able to continue adapting reclamation procedures to improve success rates.

9. **Note:** DFO would like to provide Authorizations in stages.

Response:

CVRI agrees with this process and would wish to maintain a direct line of communication with DFO by having update meetings every few years to discuss future mining, mine progression and fish habitat related activities.

A 'staged' approach through the life of the Project will promote adaptation of reclamation technology based on experience gained from the existing and soon to be established EPL's at the CVM and in other jurisdictions. CVRI also notes that ESRD is reviewing and will likely enhance the Alberta End-Pit Lake Guidelines by incorporating 'lessons learned'.

10. Water quality of the EPL is a concern especially when they are to be directly connected to the surrounding watershed (i.e. online lakes). What actions will take place to ensure this water is suitable for fish populations?

Response:

No discharge of water from the EPL will occur unless water quality meets the Alberta water quality guidelines.

Standard practice for operation of reclaimed lakes includes:

- Completing the reclamation of areas surrounding EPL's to deter erosion.
- Completion of lake filling and control of any outflow. Any outflow is monitored for water quality.
- Reclamation of the lake including shoreline protection, inlet and outlet erosion control.
- Monitoring of lake water quality.
- Upon approval of ESRD the lake is permitted to outflow.

Long term monitoring of water quality, lake conditions, fish habitat and fish density is provided to document success of the EPL. Remediation of any problem areas is performed.

Monitoring of existing EPL's on the CVM suggest that water quality should not be of concern (Hatfield 2008, 2011).

11. Fish habitat compensation needs to focus on the species of concern in the area (i.e. Athabascan Rainbow) not just fish habitat in general.

Response:

Within the *Fish Compensation Document* CVRI has identified that the main focus of the fish habitat compensation is the Athabascan Rainbow Trout while Bull Trout and Arctic Grayling will act as secondary species of focus depending on fisheries management objectives.

CVRI will co-operate with ESRD in following fish management objectives of the region.

12. **Note:** CVRI could replace habitat that has limitations with improved habitat to increase certain fish species density.

Response:

CVRI agrees with this comment and would like to note that this statement is an objective/option within CVRI's *Fish Compensation Document*. Response to Question 8 indicates 'off-site' options that CVRI is investigating.

CVRI is currently co-operating with ESRD in following fish management objectives of the region including incorporation of fish habitat and fish movement features within the existing and current operational area. Response to Question 8 indicates some of the work ongoing.

13. Timing around habitat loss and replacement is a concern of DFO's. The example of the oil sands being given 3 years to compensate for habitat loss was given. Please provide some clarity around the timing of mining and reclamation activities.

Response:

Tables 5, 6, and 7 display the timing surrounding the removal of fish habitat and the associated mine reclamation. It needs to be stressed that the Project isn't developed all at the one time but rather in small blocks. At the licensing stage, CVRI will apply for pit and dump licenses for 3-5 year blocks. These detailed mine plans will show the location of the pit shells and dumps as well as the reclamation plan for that specific section of mining.

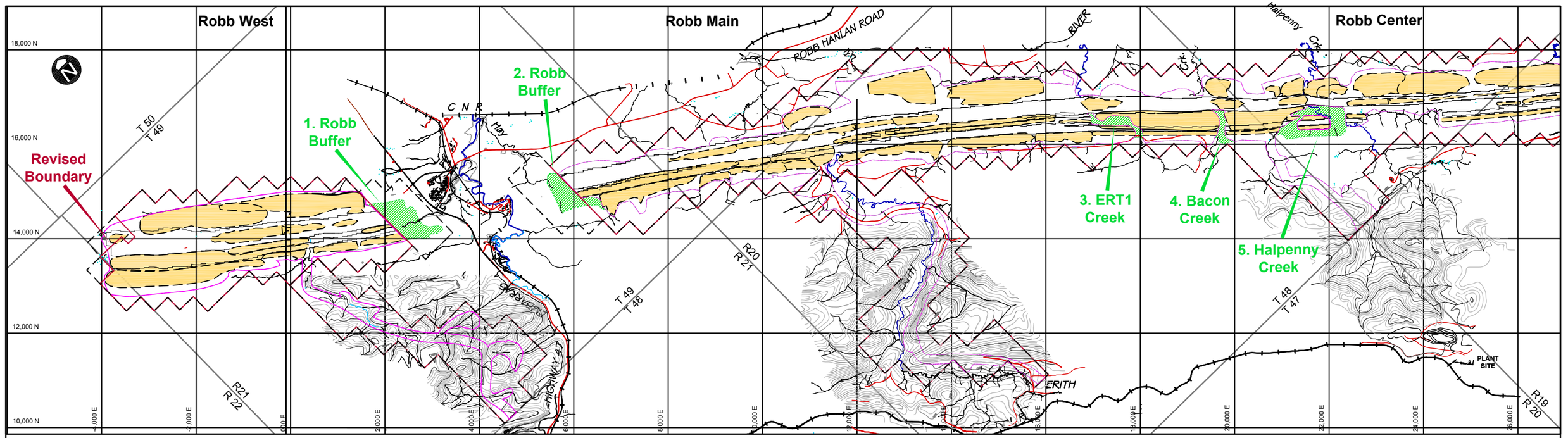
4.0 SUMMARY

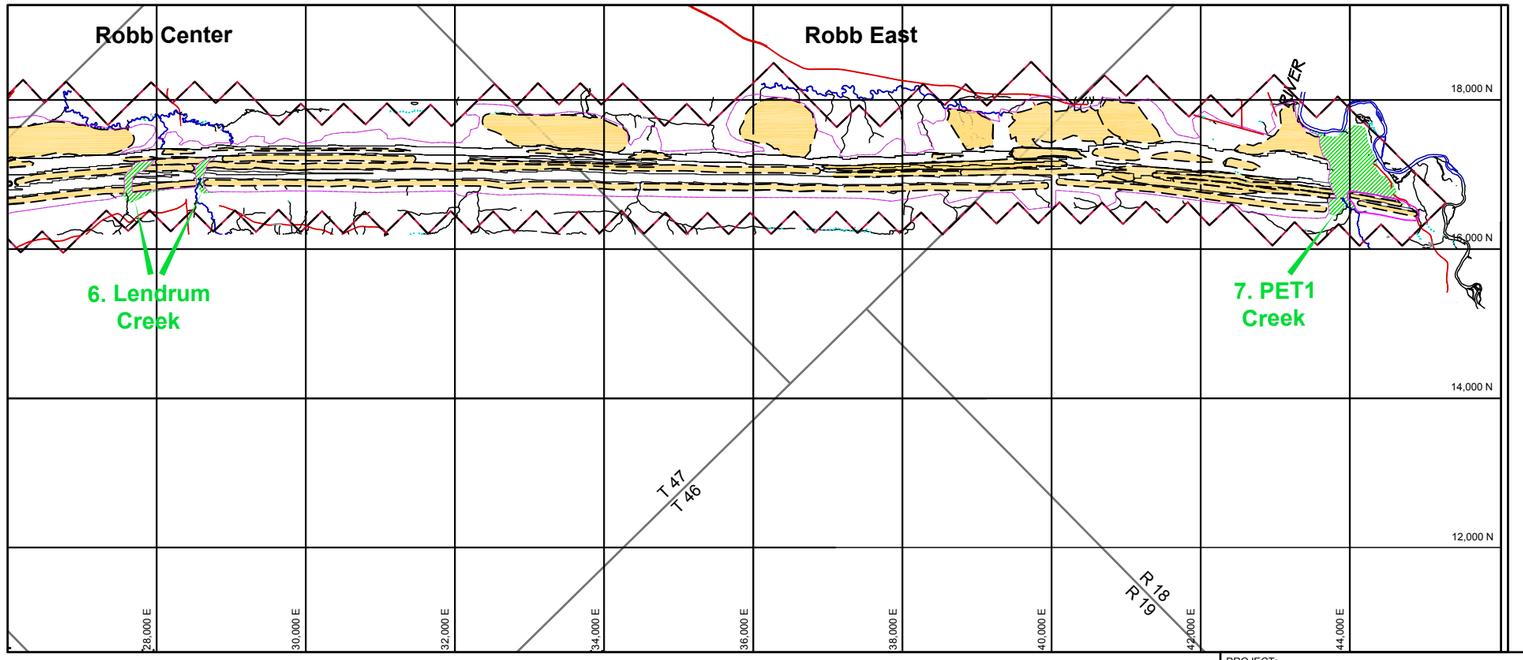
CVRI believes the information above along with the supporting documents provides DFO with adequate information to make an approval decision.

- Impact on fish habitat and populations has been minimized. Suggestions and advice gained through technical review of the application have been incorporated into the final Project proposal as improvements in the conceptual plan.
- Further improvements are expected to be incorporated in the final design phases over the life of the Project. A 'staged' development over several years is expected which will involve staged approvals. This will allow 'lessons learned' through the operational phases to be fit into design plans. Monitoring of results through the life of the Project will also aid in adaptation of results.
- Habitat impact will be spread over the life of the Project and will not occur in a concentrated period. Likewise, habitat compensation will be provided throughout the same period with some compensation established before impact that will occur in later years. Therefore, the 'maximum' level of 'exposure' is limited.
- A significant portion (~80%) of the compensation will be focused on creation/enhancement of 'stream channel' habitat.
- Approximately 1,096,000 m^2 of lentic habitat will be created in lakes that are expected to have a high probability of success based on the EPL Development Guidelines (Lakes 6 to 11).

- The remaining lakes have some limitations (as currently designed) as they do meet certain design parameters of the EPL Guidelines. However, these lakes are still expected to be able to function as viable ecosystems. These lakes could provide an additional 4,446,000 m^2 of habitat.
- A large 'lake' habitat focused on littoral zones of EPL is available for compensation. Nearly 1,000,000m^2 of littoral area will be available in EPL combined.
- Conditions found in current EPL appear to provide good conditions for fish utilization. Ongoing monitoring of regional EPL will continue to provide data for guidance in EPL development. Alberta End-Pit Lake Guidelines will be followed in EPL designs.

Figures





Legend

- Rock Dump
- Area of Revision
- Revised Mine Permit

REF: CVRI, 2013.

0 1 2 3 4 km

SCALE 1 : 80 000

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

TITLE:

Mine Plan Revisions

...Final Docs\08-041b\2013\Fig 1 Mine Plan.dwg

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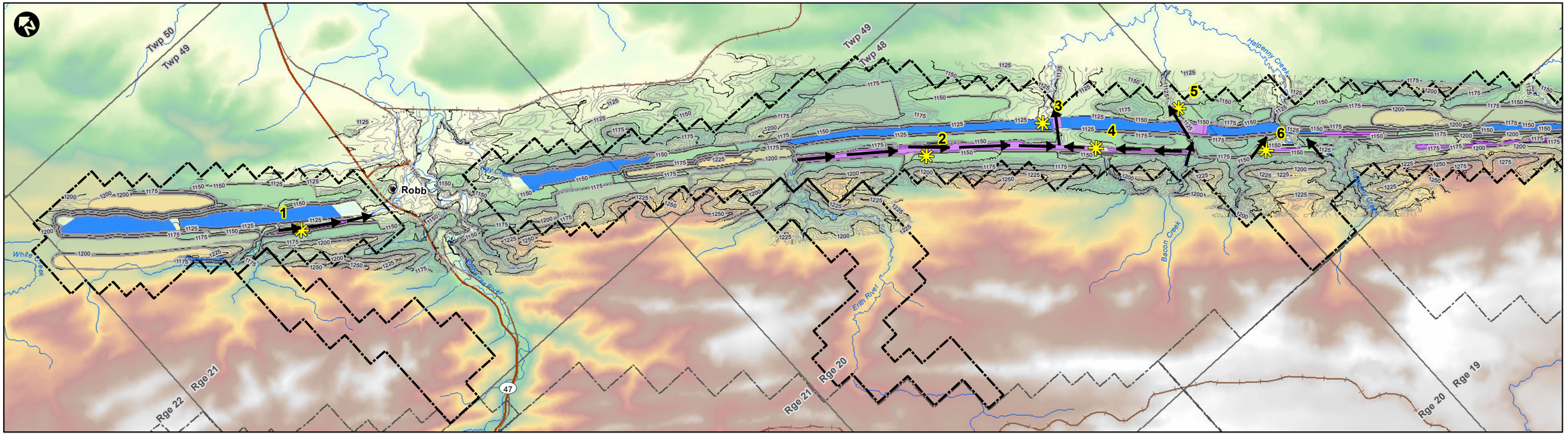
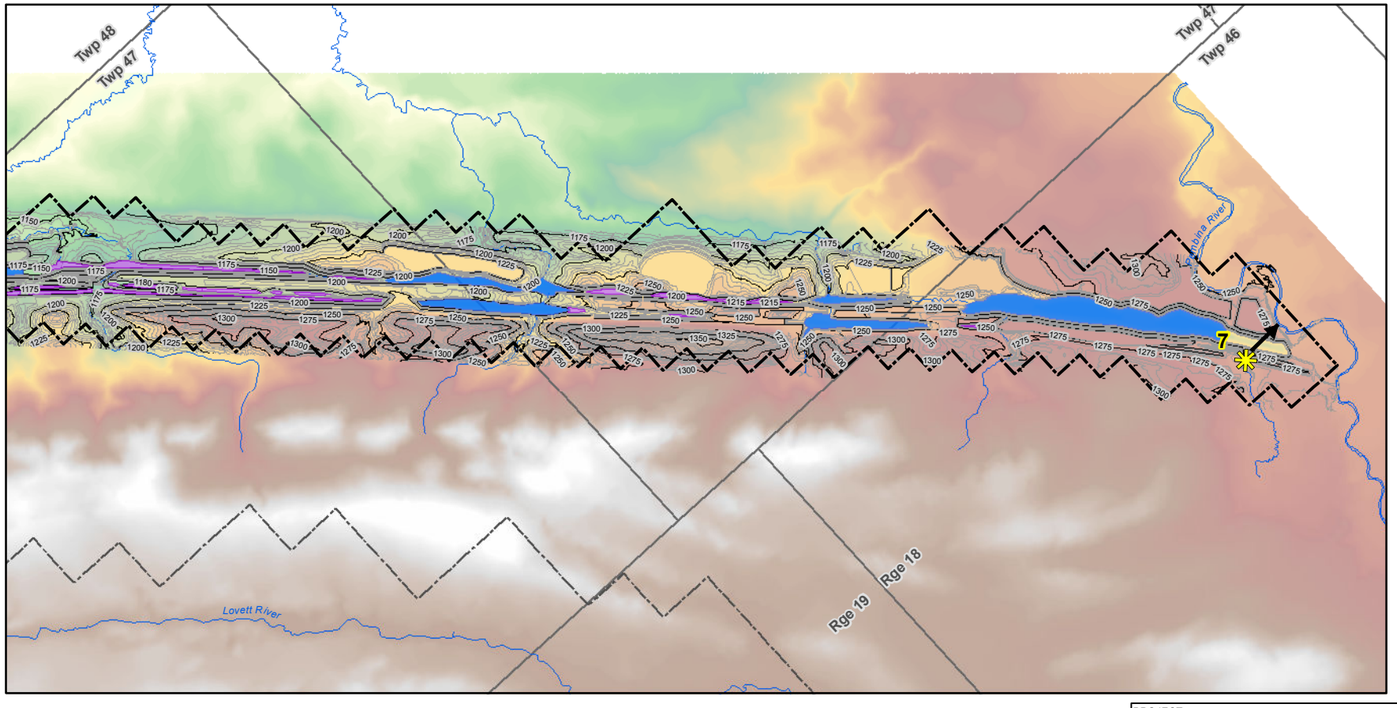
CHECKED: KP	
DATE: Mar 14/14	
PROJECT: 08-041b	





Legend

- Water Management Area
- Constructed Streams
- Contour (Interval 10m)
- Index Contour
- Reclaimed Lake
- Reclaimed Wetland
- Existing Mine Permit Boundary
- Proposed Robb Trend Mine Permit Boundary
- Paved Road
- Railway
- Permanent Watercourse

Topography (masl)
- High : 1500
- Low : 1050

0 1 2 4
Kilometres

REF: CVRI, Robb Trend Project Extents 2B.dwg, Feb 7, 2011.

Document Path: K:\Active Client\CVRI\Final Docs\08-041b\DFO\Fig 2 Conceptual Reclaimed Landscape.mxd

PROJECT:
Coal Valley Mine
Robb Trend Project

TITLE:
Conceptual Reclaimed Landscape - Revisions

DRAWN:	KD/JG
CHECKED:	KP
DATE:	Mar 13/14
PROJECT:	08-041

FIGURE: **2**

Appendix 1: Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies, Pisces Environmental Consulting Services Inc., August 2013.

CVRI Robb Trend Project
Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies

Prepared for: Coal Valley Resources Inc. Edson, AB

August 2013

PISCES ENVIRONMENTAL CONSULTING SERVICES LTD.

CVRI Robb Trend Project

Summary of Fish Habitat Impacts and Mitigation and Habitat Compensation Strategies

Prepared for:
Coal Valley Resources Inc.
Edson, Alberta

Submitted to:
Fisheries and Oceans Canada (DFO)

Prepared by:
Pisces Environmental Consulting Services Ltd.
Red Deer, Alberta

August 2013

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APPENDICES

1.0 INTRODUCTION

Coal Valley Resources Inc. (CVRI) is proposing an extension of the existing Coal Valley Mine (CVM) operation approximately 100 kilometres southwest of Edson, Alberta. Termed the Robb Trend Project (Project), the mine expansion includes development of areas to the northeast of existing operations. The Project mine permit area is approximately two kilometres wide and almost 50 kilometres long, extending in a northwest direction from the Pembina River past the Hamlet of Robb. A Project Application for the proposed expansion entitled *Robb Trend Coal Mine Expansion Project* was submitted to government regulators in April 2012 (CVRI 2012).

This document is intended to address key information requests that have been communicated by Fisheries and Oceans Canada (DFO) to CVRI. Specifically, this document provides:

- A description of updated mine plans and reclamation strategies that have been developed since the Project Application was submitted.
- A summary of direct habitat impacts resulting from the Project based on review of the updated mine plans.
- A discussion of other potential indirect impacts to fish habitat (if it was determined that the updated mine plans had changed the impact assessment scenario presented in the Project Application).
- A discussion of updated mitigation initiatives proposed by CVRI.
- A description of the proposed habitat compensation framework for the Project. It is expected that this conceptual plan will form the basis of agreement from which CVRI and DFO will work in consultation to satisfy the requirements of the federal *Fisheries Act*.
- A discussion of monitoring initiatives proposed by CVRI.

Much of the information provided in this document is summarized from, and makes reference to, sections of the Project Application as well as the responses to Supplemental Information Requests (SIRs) that were submitted as part of the review process. The analysis and conclusions presented in these documents remain applicable and should be referred to if additional details to the points raised in this document are required.

2.0 UPDATED MINE PLANS

To facilitate mine planning, the Project was divided into four areas referred to as Robb West, Robb Main, Robb Centre, and Robb East (Figure 1). The estimated Project lifespan is expected to be approximately 25 years with mine activities expected to progress as indicated below:

- Mining in the Robb West Area: 2032 to 2034
- Mining in the Robb Main Area: 2017 to 2031
- Mining in the Robb Centre Area: 2023 to 2026
- Mining in the Robb East Area: 2027 to 2039

After consultation with stakeholders, CVRI initiated a review of the original mine plan to identify solutions for concerns raised by regulators. Through this process CVRI has produced an updated mine plan that will result in reduced impacts to fish habitat and fewer on-stream/flow-through end pit lakes post reclamation.

The Project will consist of 13 main watercourse diversions; a description of each of the diversions is provided below. The anticipated schedule for development along with the predicted impacts to fish habitat are illustrated in Figure 2.

Erith River Diversion

Diversion of the Erith River involves several phases as illustrated on Figure 5.

Short sections of stream channel to route the Erith River out of the proposed McPherson Pit area will be constructed. These sections would be short, cutting off small meanders of the river and forcing the river toward the south. Once construction is completed the flow would be moved into the new channels. This diversion would last approximately three years while the McPherson Pit is mined and a new channel built in the floor of the McPherson Pit. The river would then be moved to the new McPherson Pit channel, which would be constructed to provide habitat for fish. This diversion would be in place for approximately five years while the Mynheer Pit was mined and reclaimed with a new channel in the base of the Mynheer Pit. Once the Mynheer Pit is complete, the Erith River would be moved into the new channel routed through the Mynheer Pit. This channel replaces Lake 4 (previously proposed in the Project Application). Mining of the Val d'Or Pit will also require movement of the Erith River channel to accommodate mining beneath the river. This will be accomplished by moving the river to the east into a constructed channel so that mining can be conducted on the west side of the river. Once mining is completed, a land bridge will be backfilled to the west and a new channel constructed on the land bridge as the final reclaimed river channel. All channels will be constructed to provide fish habitat. The 'switch' will take approximately four years to accomplish. Lake 5 (West and East) will outlet into the new channel.

ERT1 Diversion

Plans involving ERT1 have been revised to reduce direct impacts to fish habitat (Figure 5).

A short portion (~500 m) of the Mynheer Pit is being excluded from development in order to maintain spawning habitat in ERT1. Flows in ERT1 will be maintained to flow into the Erith River. A short diversion channel on the north side of the Mynheer Pit (highwall side) will be used to direct flows below sensitive habitat (spawning sites) that was identified during baseline investigations. This diversion will be in place approximately two years before it is discontinued as it is replaced by a new channel in the pit floor of Mynheer Pit. All channels will be constructed to provide fish habitat.

Bacon Creek Diversion

Plans involving Bacon Creek have been revised to reduce direct impacts to fish habitat (Figures 5 and 6).

A short section of the Mynheer Pit will be excluded from development in order to maintain certain sections of the existing Bacon Creek channel. However mining of the Val d'Or Pit will require that portions of Bacon Creek be moved to accommodate mining beneath the creek. This will be accomplished moving the creek to the east into a constructed channel so that mining can be conducted on the west side of the river. Once mining is completed a land bridge will be backfilled to the west and a new channel constructed on the land bridge as the final reclaimed river channel. All channels will be constructed to provide fish habitat. The 'switch' will take approximately four years to accomplish. The new channel will be located between Lake 5 and 6. Lakes will outlet into the creek.

Halpenny Creek Diversion

Plans involving Halpenny Creek have been revised to reduce direct impacts to fish impact. (Figure 6).

Two short sections of the Mynheer Pit will be excluded from development in order to ensure continued flow in the Halpenny Creek basin. Mining which directly impacted HLT1 will no longer be completed and HLT1 will continue to flow into Halpenny Creek (Main). Mining which interrupted HLT2 will no longer be completed and HLT2 will continue to flow into Halpenny Creek (Main). Mining which interrupted Halpenny Creek (Main) in the Mynheer Pit area will no longer be completed. Mining of the Val d'Or Pit will require movement of Halpenny Creek to accommodate mining beneath the creek. This will be accomplished by moving the creek to the east into a constructed channel so that mining can be conducted on the west side of the river. Once mining is completed a land bridge will be backfilled to the west and a new channel constructed on the land bridge as the final reclaimed creek channel. All channels will be constructed to provide fish habitat. The 'switch' will take approximately four years to accomplish. Lake 6 will not outlet into Halpenny Creek as it will flow westward into Bacon Creek.

Lendrum Creek Diversions

Plans involving Lendrum Creek have been revised to reduce direct impact to fish habitat (Figures 7 and 8).

Flow in LET1 will be ditched or pumped to LET3 during mining of the Mynheer Pit. This transfer is expected to be in place for approximately one year. Afterwards, the flow can be accommodated in the pit floor.

Flow in LET3 will be handled with a diversion ditch or pumping during mining of the Mynheer Pit. This transfer is expected to be in place for approximately one year. Afterward a constructed channel will be put in place as part of reclamation to handle LET1 and LET3. Flow in LET3 will be handled with a diversion ditch or channel during mining of the Val d'Or Pit. This transfer is expected to be in place for approximately two years. Further mining to the east can be isolated from LET3. Final flow of LET3 will be through Lake 7. This diversion is expected to be in place for approximately three years.

Upper Lendrum Creek will be handled by ditching during the mining of the Mynheer Pit. This transfer is expected to be in place for approximately three years until the Mynheer Pit is reclaimed. Flow would then be moved into a new channel established in the pit floor and connected to LET3. The ditching is expected to be in place for approximately three years.

Hay Creek Diversion

Mining in the Mynheer Pit will intercept drainage of the upper portion of this creek. Water caught by the mining area will be collected, treated and returned to Hay Creek. This transfer is expected to be in place for approximately four years. Lake 3 will outlet to Hay Creek (Figure 4).

Lund Creek Diversions

LDT1 will be intercepted by mining in both Mynheer and Val d'Or Pits. Land bridges provided in both pits will provide uninterrupted flow during mining. Lakes 8 and 9 will be developed as part of the reclaimed profile (Figures 8 and 9). LDT1 will flow through both Lakes 8 and 9 with a short channel between the two lakes. These relocations are expected to last approximately four years and may be completed concurrently.

LDT3 will be intercepted by mining in both Mynheer and Val d'Or Pits. Flows in both pits will be handled by pumping. Alternatives for ditching flows either to the east or west could also be considered. Lakes 10 and 11 will be developed as part of the reclaimed profile. LDT3 will flow through both Lake 10 and 11 with a short channel between the two lakes. Lake 12 will outlet into Lake 10. This interruption is expected to extend over approximately two years.

Bryan Creek Diversion

Plans involving Bryan Creek have been revised to provide restored channel on the final reclamation landscape rather than a flow-through end pit lake (Figure 3).

Short sections of stream channel to route Bryan Creek out of the proposed Mynheer Pit area will be constructed. These sections would be short, cutting off small meanders of the creek and forcing the creek toward the north. Channels would be constructed to provide fish habitat. Once construction is completed the flow will be directed into the new channels. This diversion would last approximately three years while the Mynheer Pit was completed and reclaimed with a stream channel in the base of the pit. Flow will be routed through the Mynheer Pit channel. This will be the final, reclaimed channel for the creek and would be constructed to provide fish habitat. Lake 2 will outlet into Bryan Creek below the new channel.

PET1 Diversion

Plans involving PET1 have been revised to provide restored channel on the final reclamation landscape rather than a flow-through end pit lake (Figure 9).

The easternmost end of the Val d'Or Pit nearest the Pembina River is being excluded from development. This provides an increased buffer between development and the Pembina floodplain. This revision allows for diversion of PET1 around the eastern end of the proposed Val d'Or Pit. This diversion can be accomplished prior to mining. The channel will be constructed to provide fish habitat.

3.0 SUMMARY OF EXISTING CONDITIONS

Baseline fish and fish habitat conditions within the Project area were described in detail in the Project Application (CVRI 2012). A brief summary of the information gathered during the baseline investigations is provided below.

3.1 FISH POPULATIONS

During baseline field investigations fish presence was confirmed at 53 of the 84 sites sampled (electrofishing and angling sites) in 42 waterbodies in and adjacent to the Project. Overall, 15 fish species were captured and identified (Table 1).

Rainbow Trout were the most common and widespread species within the Local Study Area (LSA) and Regional Study Area (RSA), captured 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 rare and found in one or two waterbodies. Rainbow Trout densities and catch-per-unit-effort (CPUE) for all sport fish captured in streams sampled during baseline investigations are presented in Figures 10 and 11 respectively.

3.2 FISH HABITAT

Habitat inventories were conducted on all streams within the LSA that exhibited habitat potential (i.e. exhibited a defined channel, did not have an excessive gradient (>12%)). Information obtained from the habitat inventories and fish sampling (local field data) was used to provide a conservative ranking of study streams in terms of their overall habitat potential/ability to support various life cycle phases of fish. The rating system was designed to provide a general understanding of habitat potential of subject watercourses based on local field data but should not be considered as a habitat suitability (HSI) ranking system. Photos depicting typical habitat conditions within Low, Moderate, and High habitat potential ranked watercourses are provided in Figure 12.

Preliminary scoping identified a total of 42 potential study streams in or immediately adjacent to the Project. A list of watercourses and general habitat characteristics is provided in Table 2.

A summary of habitat potential/utilization information and a habitat potential/utility ranking for watercourses that exhibited fish habitat potential are provided in Table 3 and Figure 13.

Table 1. Fish species distribution in watercourses in and adjacent to the Robb Trend Project.

Mine Area	Water Body	Reach	Arctic Grayling	Brook Stickleback	Brook Trout	Bull Trout	Burbot	Lake Chub	Longnose Dace	Longnose Sucker	Mountain Whitefish	Northern Pike	Pearl Dace	Rainbow Trout	Spoonhead Sculpin	Trout-perch	White Sucker
Robb West	Bryan Creek (BR-1 to BR-3)													✔✖			
	BRT2													✔✖			
	Embarras River (EM-1 & EM-2)		✔✖		✔✖	✖	✖	✔		✔	✔✖			✔✖	✔✖	✔✖	
	EMT1											✔					
	Jackson Creek				✔									✖			
Robb Main	Hay Creek (HA-1 to HA-4)	1 2 3					✔							✔✖ ✔ ✔			
	Erith River (ER-3, ER-4, & ER-5)	1 2 3	✖ ✖			✔✖	✖	✔ ✔	✔	✔ ✔✖	✔✖			✔ ✔✖ ✔	✔ ✔✖	✔	✔ ✖
	Erith River (ER-7)					✔								✔			
	ERT1					✔								✔✖	✔		
	ERT2													✔✖	✔		
	ERT3													✔			
	ERT4													✔			
	ERT5									✔✖				✔✖			
	ERT6					✖								✔✖			
	ERT7													✔✖			
	ERT10					✖								✔✖			
	ERT12													✔✖			
	Bacon Creek (BA-2)					✖								✔✖			
Robb Centre	Halpenny Creek (HL-2 & HL-3)	1 2				✖				✖	✖		✔	✔✖ ✔	✖		
	Halpenny Creek (HL-5)													✔			
	Halpenny Creek (HL-6)													✔			
	HLT1													✔✖			
	HLT2			✔													
	HLT5													✔			
	Lendrum Creek (LE-2 & LE-3)						✔							✔			
	LET1						✔							✔✖			
	LET1B													✔			
	LET3													✔			
Robb East	Lund Creek (LD-5 & LD-7)													✔			
	LDT1					✖								✔✖			
	LDT3													✔			
	PET1				✔		✔										

✔Pisces baseline investigations (2005-2013)
✖Historical Reference (FWMIS)

Table 2. Summary of watercourses identified in the Project area.

Mine Area	Watercourse	Code	Scoping Results	Stream Class[1]
Robb West	Bryan Creek	BR	• Defined channel (3.6 m wide), perennial flow	P
	Bryan tributary #1	BRT1	• Poorly defined channel, limited discharge	E
	Bryan tributary #2	BRT2	• Defined channel (1.2 m wide), perennial flow likely	P
	Embarras tributary #1	EMT1	• Poorly defined channel that transitions to quantifiable habitat downstream near mine permit boundaries, limited discharge	I
	Jackson Creek	JA	• Defined channel (0.8 m wide), perennial flow	P
Robb Main	Bacon Creek	BA	• Defined channel (2.0 m wide), perennial flow	P
	Erith River	ER	• Defined channel (6.2 m wide), perennial flow	P
	Erith tributary #1	ERT1	• Defined channel (2.6 m wide), perennial flow likely	P
	Erith tributary #2	ERT2	• Defined channel (1.4 m wide), limited discharge, Class 3 (<0.5 m deep) habitat only	I
	Erith tributary #3	ERT3	• Defined channel (1.0 m wide), limited flows	I
	Erith tributary #4	ERT4	• Defined channel (0.7 m wide), high gradient, natural impediments to fish movement	I
	Erith tributary #5	ERT5	• Defined channel (1.4 m wide), perennial flow likely	P
	Erith tributary #6	ERT6	• Defined channel (1.8 m wide), perennial flow likely	P
	Erith tributary #7	ERT7	• Defined channel (1.7 m wide), perennial flow likely	P
	Erith tributary #8	ERT8	• Defined channel (1.3 m wide), perennial flow likely	P
	Erith tributary #10	ERT10	• Defined channel (2.2 m wide), perennial flow likely	P
	Erith tributary #12	ERT12	• Defined channel (1.3 m wide), perennial flow likely	P
	Hay Creek	HA	• Defined channel (2.5 m wide), perennial flow	P
	Hay tributary #1	HAT1	• Poorly defined channel, limited discharge, Class 3 habitat only, natural impediments to fish movement	I
	Mitchell tributary #1	MIT1	• Small channel to poorly defined channel, limited discharge, high gradient, natural impediments to fish movement	E
	Mitchell tributary #2	MIT2	• Small channel to poorly defined channel, limited discharge, high gradient, natural impediments to fish movement	E
Robb Centre	Halpenny Creek	HL	• Defined channel (4.0 m wide), perennial flow	P
	Halpenny tributary #1	HLT1	• Defined channel (1.8 m wide), perennial flow likely	P
	Halpenny tributary #2	HLT2	• Defined channel (0.9 m wide), limited discharge, natural barrier to fish movement	I
	Halpenny tributary #3	HLT3	• No defined channel	E
	Halpenny tributary #4	HLT4	• Defined channel (1.1 m wide), limited discharge, Class 3 habitat only, natural impediments to fish movement	I
	Halpenny tributary #5	HLT5	• Defined channel (0.8 m wide), limited discharge, Class 3 habitat only	I
	Halpenny tributary #8	HLT8	• Poorly defined to undefined channel	E
	Halpenny tributary #9	HLT9	• Defined channel (1.3 m wide), perennial flow likely	P
	Lendrum Creek	LE	• Defined channel (3.3 m wide), perennial flow	P
	Lendrum tributary #1	LET1	• Defined channel (2.0 m wide), perennial flow likely	P
	Lendrum tributary #2	LET2	• Poorly defined, limited discharge	E
	Lendrum tributary #3	LET3	• Defined channel (3.2 m wide), perennial flow likely	P
Robb East	Lund Creek	LD	• Defined channel (2.5 m wide), perennial flow	P
	Lund tributary #1	LDT1	• Defined channel (2.4 m wide), perennial flow likely	P
	Lund tributary #2	LDT2	• Defined channel (1.0 m wide), limited discharge, Class 3 habitat only	I
	Lund tributary #3	LDT3	• Defined channel (2.1 m wide), perennial flow likely	P
	Lund tributary #4	LDT4	• Defined channel (0.8 m wide), limited discharge, Class 3 habitat only	I
	Lund tributary #5	LDT5	• Defined channel (0.9 m wide), limited discharge, Class 3 habitat only	I
	Lund tributary #6	LDT6	• Poorly defined to undefined channel	E
	Lund tributary#7	LDT7	• Defined channel (1.3 m wide), limited discharge, Class 3 habitat only	I
	Pembina tributary #1	PET1	• Defined channel (2.5 m wide), perennial flow likely	P

[1] Stream Classification:
E = Ephemeral, not fish habitat, no defined channel or discontinuous channel over length of survey reach
I = Intermittent, marginal fish habitat, defined channel over length of survey reach, flow present only seasonally
P = Permanent, fish habitat, flowing most or all of the year

Table 3. Habitat potential/utilization, limiting factors, and overall ranking for watercourses in the Project area.

Waterbody	Habitat Potential/Utilization					Limiting Factors	Overall Rank
	Spawning		Rearing	Overwintering	Feeding		
Robb West							
Bryan Creek Reach 1	High	RNTR	High	Moderate	High	- limited cover, presence of beaver dams, absence of Class 1 (>1m deep) habitat	High
Bryan Creek Reach 2	None		Low	Moderate	Moderate	- limited cover, presence of beaver dams, lack of gravel/cobble, low pool frequency	Low
Bryan Creek Reach 3	High	RNTR	High	Low	Moderate	- limited cover, beaver dams, limited Class 1 habitat, low pool frequency	High
Bryan Creek Reach 4	None		Low	Moderate	Moderate	- beaver dams, lack of gravel/cobble, absence of pool habitat	Low
BRT2	Low	RNTR	Low	None	Low	- limited flows, absence of Class 1 habitat, absence of pool habitat	Low
Embarras River	Moderate	ARGR BKTR MNWH RNTR	Moderate	High	High	- low pool frequency, limited cover	High
EMT1	Low	NRPK	Low	None	Moderate	- absence of Class 1 habitat, low pool frequency, lack of gravel/cobble, low winter dissolved oxygen	Low
Jackson Creek	None		Low	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency	Low
Robb Main							
Hay Creek Reach 1	None		Moderate	None	Low	- absence of Class1 habitat, absence of pool habitat, no winter flow	Low
Hay Creek Reach 2	None		Low	None	Low	- limited Class 1 habitat, low pool frequency, beaver dams, no winter flow	Low
Hay Creek Reach 3	None		None	None	Low	- beaver dams, absence of pool habitat, lack of gravel/cobble, no winter flow	Low
Erith River Reach 1	Moderate	MNWH RNTR	High	Moderate	High	- limited cover, beaver dams, low pool frequency	High
Erith River Reach 2	Low	MNWH RNTR	Moderate	Moderate	High	- limited cover, beaver dams, low pool frequency, limited Class 1 habitat	High
Erith River Reach 3	Moderate	RNTR	High	Moderate	High	- limited cover, beaver dams, absence of pool habitat, limited Class 1 habitat	High
Erith River (ER-7)	Low	RNTR	Moderate	Low	Moderate	- limited Class 1 habitat, low pool frequency	Moderate
ERT1	High	RNTR	High	None	High	- absence of Class 1 habitat, limited flows	High
ERT2	Low	RNTR	Low	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency, lack of gravel	Low
ERT3	None		None	Low	Low	- beaver dams, low winter dissolved O_2, lack of gravel/cobble, limited flows	Low
ERT4	Low	RNTR	Low	None	Low	- absence of Class 1 habitat, steep gradient	Low
ERT5	Low	RNTR	Moderate	None	Moderate	- absence of Class 1 habitat	Low
ERT6	Moderate	BLTR RNTR	Moderate	None	Moderate	- absence of Class 1 habitat	Moderate
ERT7	Moderate	RNTR	Low	None	Low	- limited flows, absence of Class 1 habitat	Low
ERT8	None		Low	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency	Low
ERT10	None		Moderate	None	Moderate	- absence of Class 1 habitat, lack of gravel	Low
ERT12	Low	RNTR	Low	None	Moderate	- limited flows, absence of Class 1 habitat, absence of pool habitat	Low
Bacon Creek	High	RNTR	High	Low	Moderate	- absence of Class 1 habitat, limited pool frequency, limited cover	High
Robb Centre							
Halpenny Creek Reach 1	Moderate	RNTR	Moderate	Moderate	Moderate	- absence of Class 1 habitat, low pool frequency	High
Halpenny Creek Reach 2	None		Low	High	Low	- absence of gravel/cobble, lack of cover, beaver dams	Low
Halpenny Creek Reach 3	High	RNTR	High	Low	High	-absence of Class 1 habitat, low pool frequency, low winter flows	High
HLT1	High	RNTR	Moderate	None	Moderate	- fish passage issues, low pool frequency, absence of Class 1 habitat	Moderate
HLT2	None		Low	Moderate	Low	- limited flows, low pool frequency, lack of gravel/cobble	Low
HLT4	None		Low	None	Low	- limited flows, absence of Class 1 habitat, absence of pool habitat, lack of gravel/cobble	Low
HLT5	None		Low	None	Low	- limited flows, absence of Class 1 habitat, absence of pool habitat, lack of gravel	Low
HLT9	Low	RNTR	Low	None	Low	- limited flows, absence of Class 1 habitat, lack of cover	Low
Lendrum Creek Reach 1	Moderate	RNTR	High	High	Moderate	- low pool frequency, lack of gravel/cobble, limited cover, beaver dams, low winter dissolved O_2	High
Lendrum Creek Reach 2	Low	RNTR	Moderate	Low	Moderate	- absence of Class 1 habitat, low pool frequency, lack of gravel/cobble, limited cover, beaver dams	Moderate
LET1	Moderate	RNTR BURB	Moderate	Low	Moderate	- limited flows, absence of Class 1 habitat, low pool frequency, limited cover, beaver dams	Moderate
LET3	High	RNTR	High	Moderate	Moderate	- low pool frequency, limited cover, lack of gravel/cobble	High
Robb East							
Lund Creek	High	RNTR	Moderate	None	Moderate	- absence of Class 1 habitat, low pool frequency	Moderate
LDT1	Low	RNTR	Low	Low	Moderate	- limited flows, absence of Class 1 habitat, limited cover	Low
LDT1A	None		Low	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency	Low
LDT1C	None		Low	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency	Low
LDT1D	None		None	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency, steep gradient, fish passage issues	Low
LDT2	None		None	None	Low	- limited flows, absence of Class 1 habitat, low pool frequency, lack of gravel	Low
LDT3	Low	RNTR	Low	None	Moderate	- limited flows, absence of Class 1 habitat	Low
LDT3A	None		None	None	Low	- limited flows, absence of Class 1 habitat, lack of gravel, steep gradient, limited cover	Low
LDT4	None		None	None	Low	- limited flows, absence of Class 1 habitat, lack of gravel, limited cover	Low
LDT5	None		None	None	Low	- limited flows, absence of Class 1 habitat, lack of gravel	Low
LDT7	None		None	None	Low	- limited flows, absence of Class 1 habitat, lack of gravel	Low
PET1	High	BKTR	Moderate	Moderate	Moderate	- limited cover, lack of gravel/cobble	High
PET1A	None		None	None	Low	- limited flows, discontinuous channel	Low
PET1B	None		None	None	Low	- limited flows, discontinuous channel	Low

4.0 IMPACTS TO FISH HABITAT

The potential impacts to fisheries resources as a result of the Project are addressed in the Project Application (CVRI 2012). For the assessment presented in this document, the most recent information regarding mine planning, surface water management, and reclamation was reviewed to determine if there are resultant changes to the impact assessment scenario in terms of direct and indirect impacts to fish habitat.

4.1 DIRECT HABITAT IMPACTS

Components of the Project with the potential to result in direct habitat loss/alteration are summarized in Table 4.

Table 4. Summary of project components potentially resulting in direct habitat loss/alteration in waterbodies within the Robb Trend Project area.

Mine Area	Project Phase	Waterbody	Project Component Potentially Impacting Habitat
Robb West	Construction	Bryan Creek	• Watercourse crossing construction
		BRT2	• Watercourse crossing construction
		Jackson Creek	• Watercourse crossing construction
	Operation	Bryan Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
	Reclamation	Bryan Creek	• Reclamation of watercourse crossing • Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		BRT2	• Reclamation of watercourse crossings
		Jackson Creek	• Reclamation of watercourse crossing
Robb Main	Construction	Erith River	• Watercourse crossing construction
		ERT4,5,6,8,10	• Watercourse crossing construction
	Operation	Erith River	• Temporary diversion to maintain downstream flows during mining • Development of mine pits
		ERT1,2,3	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		Bacon Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		Hay Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
	Reclamation	Erith River	• Reclamation of watercourse crossing • Permanent diversion • Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		ERT4,5,6,8,10	• Reclamation of watercourse crossings
		ERT1,2,3	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		Bacon Creek	• Reclamation of aquatic ecosystem to include stream reconstruction
		Hay Creek	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction

Note: Table 4 continues on next page.

Table 4 continued.

Robb Centre	Construction	HLT1,9	• Watercourse crossing construction
	Operation	Halpenny Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		Lendrum Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		LET1,3	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
	Reclamation	Halpenny Creek	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		HLT1,9	• Reclamation of watercourse crossings • Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		Lendrum Creek	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		LET1,3	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
Robb East	Construction	None	• No haulroad watercourse crossing construction in this area
	Operation	Lund Creek	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		LDT1,3	• Temporary diversion to maintain downstream flows during mining • Development of mine pit
		PET1	• Diversion to maintain downstream flows during mining • Development of mine pit
	Reclamation	Lund Creek	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		LDT1,3	• Reclamation of aquatic ecosystem to include end pit lake and stream reconstruction
		PET1	• Reclamation of aquatic ecosystem to include stream reconstruction

4.1.1 HAULROAD CROSSINGS

In total there will be 12 haulroad crossings located on watercourses that provide fish habitat (Table 5). All of the watercourse crossings will be designed to provide for fish passage and to maintain habitat connectivity. Clear span arch structures or large culverts that are sized to accommodate fish passage will be constructed on watercourses that are fish bearing. Numerous additional culverts (minimum 0.6 m diameter) will be required in ephemeral draws to maintain natural drainage patterns (Matrix 2012).

Table 5. Description of habitat and analysis of direct habitat impacts for the haulroad crossings.

Watercourse	Culvert Diameter (m)[1]	Fish Habitat Present (overall rank)	Habitat Impact[2]
Bryan Creek	3.0	• Low habitat potential/utilization in this section of Bryan Creek	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
BRT2	2.4	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
Jackson Creek	2.0	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
Erith River	3.6	• High habitat potential/utilization	• Low since structure will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
ERT4	2.2	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
ERT5	3.0	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
ERT6	1.4	• Moderate habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
ERT8	2.2	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
ERT10	2.6	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
HLT1	3.0	• Moderate habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
HLT9	2.2	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width
HLT9A	2.2	• Low habitat potential/utilization	• Low since culvert will be designed to accommodate fish passage and will likely be sized to exceed bankfull width

[1] Subject to change based on final design
[2] A detailed assessment of the direct impacts to habitat will be completed once final design plans have been determined

4.1.2 WATERCOURSE DIVERSIONS AND PIT DEVELOPMENT

As previously described there will be a total of 13 main watercourse diversions required for the Project. A comparison of habitat impacts resulting from watercourse diversions for the original Project Application and the proposed updated mine plan is provided in Table 6.

Table 6. Planned diversions and the associated potential habitat impacts in the Robb Trend Project area.

Mine Area	Watercourse	Diversion #/ Pit Development	Fish Habitat Impacted				
			Application		Revision		
			Length (m)	Area (m^2)	Length (m)	Area (m^2)	Habitat Present (overall rank)
Robb West	Bryan Creek	13 Pit Dev.	4,244 TBD	14,208 TBD	4,244 1,382	14,208 1,480	• High habitat potential/utilization in Reach's 1 and 3 and low habitat potential/utilization in Reach 2 • Low habitat potential/utilization in upper Bryan Creek
Robb Main	Erith River	1	10,500	67,485	10,500	67,485	• High habitat potential/utilization • Most of Reach 1, all of Reach 2 and the lower part of Reach 3 will be impacted
	ERT1 ERT1A	2 Pit Dev.	2,315 157	5,834 102	400 0	1,000 0	• High habitat potential/utilization in ERT1 • Low habitat potential/utilization in ERT1A, no disturbances planned
	ERT2	Pit Dev.	264	406	264	406	• Low habitat potential/utilization
	ERT3	Pit Dev.	507	7,751	507	7,751	• Low habitat potential/utilization, habitat considered sub-marginal further upstream
	Bacon Creek	3	1,424	2,777 TBD	1,424	2,777	• High habitat potential/utilization • Originally was being diverted into Lake 4/5 but now flows will be maintained
	Hay Creek	10	1,368	1,804 TBD	1,368	2,325	• Low habitat potential/utilization
Robb Centre	Halpenny Creek	5	1,563	7,601	295	4,129	• Low habitat potential/utilization in Reach 2 • Mynheer Pit diversion no longer occurring
	HLT1	4	1,237	2,239	0	0	• Moderate habitat potential/utilization • No diversion planned
	HLT2	6	246	219	0	0	• Low habitat potential/utilization • No diversion planned
	Lendrum Creek	9/Pit Dev.	4,335	17,468	4,335	17,468	• Moderate habitat potential/utilization in Reach 2
	LET1	7	1,534	1,923	1,534	3,282	• Moderate habitat potential/utilization
	LET3	8	1,167	22,161	1,167	7,959	• High habitat potential/utilization
Robb East	Lund Creek	14 Pit Dev.	2,762	11,026	2,762	7,319	• Moderate habitat potential/utilization
	LDT1 LDT1A	11 Pit Dev.	909 785	2,991 1,091	909 785	2,991 1,091	• Low habitat potential/utilization
	LDT2	Pit Dev.	TBD	TBD	200	209	• Low habitat potential/utilization
	LDT3	12	1,194	2,507	1,194	3,831	• Low habitat potential/utilization
	LDT4	Pit Dev.	TBD	TBD	686	542	• Low habitat potential/utilization
	LDT5	Pit Dev.	198	154	198	154	• Low habitat potential/utilization, habitat considered sub-marginal further upstream
	PET1	15	1,587	5,236	200	660	• High habitat potential/utilization in PET1
Total			38,296	174,983	34,354	147,067	

4.2 CHANGES IN FLOW REGIME

The Project Application included a description of Project components that have potential to affect surface flows and provided discussion of the potential for these surface flow impacts to affect fish habitat availability. Table 7 provides an updated description of the anticipated changes in flow regime and the corresponding impacts to fish habitat.

Table 7. Summary of surface flow impacts and corresponding effects on fish habitat in major watercourses.

Mine Area	Watercourse	Potential Change to Flow Regime		Potential Impacts to Fish Habitat
		Application	Revision [1]	
Robb West	Bryan Creek	• Moderation of peak flows • Increase in low flows • Mean annual runoff may temporarily increase by as much as 20% during pit, groundwater dewatering	• Revised mine plan will allow for natural flow regime through the Project area	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high and low potential/utilization ranking
Robb Main	Bacon Creek	• Approximately 70% of lower basin lost due to diversion • 2.4 km long channel remaining with ~30% of flow	• Revised mine plan will allow for natural flow regime through the Project area	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high potential/utilization ranking
	Embarras River	• Small footprint upstream of Robb, impacts during mining expected to be negligible • Maximum estimated impacts downstream of Robb equate to: 3% decrease in high flows, 10% increase in low flows, and negligible change in mean annual flows	• No change to original impact scenario expected	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high potential/utilization ranking
	Erith River	• Flow regulation due to settling ponds • 10% reduction in peak flows • Maintenance or slight increase in low flows • Overall modest change in annual runoff	• Revised mine plan will allow for natural flow regime through the Project area	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high potential/utilization ranking
	Hay Creek	• Up to 50% reduction in peak flows • Up to 200% increase in low flows • Mean annual runoff may temporarily increase by as much as 25% during pit, groundwater dewatering	• Temporary reduction in flows during end pit lake filling • No change to original impact scenario expected once the end pit lake has been filled	• Reduced habitat availability for 2.25 kms downstream of pit during end pit lake filling (4,038 m^2) • Impacted habitat has low potential/utilization ranking
Robb Centre	Halpenny Creek	• Approximately 20% of flows altered depending on various diversions. • Impacts expected to be short term (temporary diversions) • Flow regulation due to settling ponds • Increased total annual runoff due to road runoff	• Revised mine plan will allow for natural flow regime through the Project area	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high potential/utilization ranking
	Lendrum Creek	• Moderation of peak flows • Increase in low flows • Mean annual runoff may temporarily increase by as much as 20% during pit, groundwater dewatering	• No change to original impact scenario expected	• Negligible, no significant impact to fish habitat expected • Impacted habitat has moderate potential/utilization ranking
Robb East	Lund Creek	• Moderation of peak flows • Increase in low flows • Mean annual runoff may temporarily increase by as much as 25% during pit, groundwater dewatering • Reduced flows and habitat availability downstream of pit (potential loss of upper portion of creek if flows are diverted through lakes permanently)	• No change to original impact scenario expected	• Reduced habitat availability for 2.66 kms (8,714 m^2) due to flows being diverted through lakes • Impacted habitat has moderate potential/utilization ranking
	PET1	• Small portion of watershed may be re-directed into Lund Creek	• Revised mine plan will allow for natural flow regime through the Project area	• Negligible, no significant impact to fish habitat expected • Impacted habitat has high potential/utilization ranking
	Pembina River	• Minor influence, <2% decrease in flows in Pembina River due to permanent diversion of PET1	• With revised mine plan there is no expectation for measurable changes in flows in the Pembina River	• Negligible, no significant impact to fish habitat expected

[1] Conclusions subject to review by Matrix as mine plans progress

4.3 SUMMARY OF HABITAT IMPACTS

With the updated mine plan, the Project is expected to impact almost 160,000 square metres of fish habitat (Table 8). This represents a decrease from the overall instream footprint presented in the Project Application, largely due to substantial reductions (31 %) in impacts to habitat with high potential/utilization (Table 8).

Table 8. Summary of fish habitat impacts in the Robb Trend Project area.

	Application (2012)	**Revision (2013)**
Impacts to habitat with low potential/utilization (m^2)	33,643	33,655
Impacts to habitat with moderate potential/utilization (m^2)	42,656	36,783
Impacts to habitat with high potential/utilization (m^2)	128,684	89,381
Total Habitat Impacts (m^2)	**204,983**	**159,819**

5.0 MITIGATION FOR HABITAT IMPACTS

Mitigation measures that will be implemented during the life of the Project were described in the Project Application (2012) and remain applicable. Some additional discussion regarding mitigation of potential impacts to fish habitat is provided below.

5.1 MINE PLANNING

As planning progresses, CVRI will continue to review options and scenarios to further minimize impacts to fisheries resources.

5.2 SURFACE WATER MANAGEMENT & EROSION CONTROL

Water management is a priority consideration throughout mine planning and development. Minimizing surface disturbance and completing timely reclamation are essential considerations that can affect water management. CVRI will implement a surface water management plan throughout the life of the Project to eliminate or minimize the potential adverse effects on the aquatic ecosystem associated with changes in water quality. The plan will include and/or incorporate the following:

- Mine planning to minimize the need for drainage diversions and runoff interception and to maximize vegetation buffers near waterbodies;
- Education/training of personnel to minimize disturbances while maintaining drainage and sediment controls;
- Design and construction details for settling ponds or retention and clean-out areas that will collect surface runoff and allow for settling treatment prior to release into receiving waterbodies;
- Design and construction details for watercourse diversions to ensure minimize changes of sediment loading to receiving waterbodies;

- General measures that will be implemented to contain road runoff including berms and haulroad sump/retention areas such that run-off will be intercepted and treated prior to release into the aquatic ecosystem; and
- Monitoring and maintenance of surface water management facilities.

It is assumed that the surface water management plan will provide effective mitigation of impacts to aquatic resources related to potential sediment introduction due to Project activities. TSS concentrations in the waterbodies in the LSA are not predicted to increase to be above baseline or guideline levels (Hatfield 2012). In addition, Matrix (2012) predicts that the Project will have insignificant effect on sediment loads compared to natural conditions. As such, potential increases in TSS are not expected to adversely affect aquatic resources.

Potential adverse effects associated with activities that are outside of normal operations are addressed by CVM's emergency response plan. The emergency response plan includes methods for spill containment in streams and site clean-up. Such incidents are considered highly unlikely to occur and designated emergency response personnel are on-site 24-hours/day in connection with current CVM activities. Emergency response procedures will be expanded to the Project. In order to mitigate the long term potential for sedimentation due to surface runoff it is assumed that exposed ground and riparian areas will be revegetated during reclamation.

5.3 WATERCOURSE CROSSING CONSTRUCTION

All defined watercourse crossings will be designed, and constructed to meet the regulatory requirements for approval under the provincial *Water Act* and federal *Fisheries Act*. It is the goal of CVM to adhere to the "No Net Loss Guiding Principle" (NNL principle) and minimize the instream footprint of all haulroad crossings to ensure that the productive capacity of streams is maintained. Depending on construction plans (to be developed at a later date), habitat compensation measures will be identified and implemented at specific sites as needed, in consultation with DFO, ESRD, and stakeholders, in order to ensure NNL of habitat productivity.

Watercourse crossing structures will consist of clear span arch structures or culverts that are sized to accommodate fish passage. Smaller culverts will be used to convey water in ephemeral non-fish bearing streams (Matrix 2012).

Standard practices that are proven to be effective measures to mitigate potential adverse effects during instream construction, associated with watercourse crossings, will be implemented and include the following:

- Consideration of sensitive periods during construction planning by either planning construction to avoid these periods or implementation of additional site specific mitigation;
- Design structures located on fish-bearing waters to provide fish passage;
- Isolation of instream work site if flowing water is present at time of construction;
- Completion of a fish rescue and release from isolated areas;

- Implementation of sediment and erosion controls prior to work and maintenance during the work phase until the site has been stabilized;
- Implementation of measures to minimize introduction of deleterious substances during construction including cleaning, servicing, and fuelling of equipment well away from water bodies;
- Revegetation of disturbed areas around crossing sites;
- Upon reclamation of crossings, streambed and stream banks will be reclaimed to similar pre-disturbance conditions; and
- Implementation of TSS/turbidity monitoring during instream work if deemed necessary due to site conditions or timing of works.

5.4 STREAM DIVERSION PLANS

Construction plans for planned diversions will be refined as Project plans are developed and will include detailed plans to mitigate adverse effects to aquatic resources. General mitigation measures that will be employed during the construction and operation of diversion channels will include:

- Maintenance of downstream flow and monitoring to ensure instream flow needs are met;
- Appropriate sizing of diversion channels and/or pump systems based on the design life of the diversion and considering ramifications of greater than design runoff;
- Armouring and/or lining of channels or use of flumes where appropriate;
- Installation of silt fences and/or other erosion control measures on areas adjacent to open channel diversions;
- Placement and stockpiling of excavated materials in a location that is well away from the channel route;
- Gradual diversion of flow into constructed channels to minimize potential erosion and mobilization of sediment;
- Fish rescue and release (fish salvage) of sections or channel that will be abandoned due to diversion;
- Implementation of TSS/turbidity monitoring during instream work if deemed necessary due to site conditions or timing of works;
- Consideration of sensitive periods during construction planning by either planning construction to avoid these periods or implementation of site specific mitigation; and
- Construction of open channel diversions that allow for the movements of fish. If diversions are deemed to be impassable and are impeding important spawning migration then a fish relocation programs will be implemented whereby fish will be trapped and relocated to appropriate habitat upstream of the impediment.

6.0 HABITAT COMPENSATION FRAMEWORK

Final reclamation will consist of reconstructed channels and end pit lakes (Figures 3 to 9).

6.1 PRIMARY HABITAT COMPENSATION CONCEPTS

CVRI is committed to developing and implementing habitat compensation to ensure 'no net loss' (NNL) to the productive capacity of fish and fish habitat. Key habitat compensation strategies include construction of enhanced stream channel habitat and creation of several end pit lakes. Overall, the updated closure landscape is expected to result in a 5,504,934 m^2 increase in available habitat (Table 13).

6.1.1 RECONSTRUCTED STREAM CHANNEL HABITAT

Key to the compensation strategy proposed by CVRI is the reconstruction of disturbed stream reaches to provide viable fish habitat. The updated mine plan was developed to maximize the amount of lotic habitat that will be reconstructed. Almost 100 % of habitat considered to have high potential/utilization will be reclaimed to channel (Table 9). In total, 77 % of all lotic habitat will be reclaimed to channel under the new plan (Table 9).

Table 9. Fish habitat reclaimed to channel.

	Application (2012)	**Revision (2013)**
Low habitat potential/utilization reclaimed to channel (m^2)	1,553 (7 % of total impacts to low potential/utilization streams)	13,163 (39 % of total impacts to low potential/utilization streams)
Moderate habitat potential/utilization reclaimed to channel (m^2)	982 (2 % of total impacts to moderate potential/utilization streams)	21,573 (59 % of total impacts to moderate potential/utilization streams)
High habitat potential/utilization reclaimed to channel (m^2)	12,021 (9 % of total impacts to high potential/utilization streams)	88,017 (98 % of total impacts to high potential/utilization streams)
Total Habitat Reclaimed to Channel (m^2)	**14,556 (7 % of total impacts)**	**122,753 (77 % of total impacts)**

Sections of disturbed stream habitat will be reconstructed with habitat enhancement added in order to compensate for habitat losses associated with creek diversions. Stream reconstruction will include:

- Reclamation of diversion channels to have a similar grade and channel dimensions as the pre-disturbance channel.
- Reclamation of diversion channels will be lined in this order: clay, sand/gravel, and cobble.
- Design and construction of diversion channels so that physical habitat characteristics in the new channel are similar to the pre-disturbance channel in terms of size, habitat composition, substrate and cover.
- Reclamation of riparian areas to be similar to pre-disturbance condition and revegetation of the areas with rapid establishing species and native species.

- Additional habitat enhancement (i.e. pools) on diversion channels to meet the NNL principle.

In order to meet the 'no net loss' of productivity requirement, CVRI proposes to evaluate productivity losses due to stream channel diversions versus productivity gains due to habitat restorations based on a Habitat Evaluation Procedures (HEP) type approach (USFWS 1980). This system estimates habitat productivity based on a combination of habitat area and habitat suitability.

In the HEP-type analysis, Habitat Units (HUs) are calculated by multiplying habitat quantity with habitat quality. Habitat quantity is represented by surface area measured in m^2 and habitat quality is an estimate of the suitability of the habitats for use by fish as defined by Habitat Suitability Index (HSI) models. HUs are dimensionless numbers representing the overall value of the habitat for fish species that are present and these HU values are used as a representation of habitat productivity. Comparison of the HUs altered as a result of stream diversions with the HUs gained through stream channel restoration will allow an assessment of the degree to which the compensation measures employed can achieve the principle of no net loss of fish habitat. The quantity of habitat lost due to stream channel diversions is known, and is presented above. Habitat quality will be estimated using the HSI value to rank the importance of available habitat for specific species and life stages of fish. HSI models are species-specific models that evaluate the suitability of the habitat in question based on specific habitat conditions, represented by model variables, that are each considered crucial to the development of a self-sustaining population. Under HEP-type analysis procedures, an HSI value ranging between 0 and 1 is determined for each waterbody or watercourse segment for each species present. This is sometimes further assessed by each life stage, for example, embryo, fry, juvenile and adult.

At this time, CVRI intends to focus quality rating on the habitat requirements of Rainbow Trout since they are the most ubiquitous fish within the Project area. However, there will be opportunity to assess habitat requirements for other species (i.e. Arctic Grayling or Bull Trout) if necessary depending on local reclamation strategies of CVRI and ESRD fisheries management objectives for the area.

6.1.2 END PIT LAKES

CVRI also proposed to construct end pit lakes to off-set habitat losses associated with the Project. There were 12 proposed end pit lakes in the Project Application; 11 end pit lakes will be constructed as part of the reclamation landscape for the revised Project (Lake 4 will no longer exist). Six of the lakes will be "flow-through" lakes (7, 8, 9, 10, 11, and 12) that are constructed on streams and will have an inlet and an outlet. Five of the lakes will be constructed "off-channel" (1, 2, 3, 5, and 6) and will have no inlet but will have an outlet to adjacent streams.

Robb West End Pit Lakes

Two end pit lakes are planned for Robb West. Figure 3 shows the location of the lakes and the drainage patterns post reclamation. Current reclamation plans indicate that Lake 1 will be connected with Lake 2 via a 700 metre constructed channel. Lake 2 will ultimately outlets into Bryan Creek.

Robb Main End Pit Lakes

Two end pit lakes will be constructed in Robb Main. Figures 4 and 5 show the location of the lakes and drainage patterns post reclamation. Current reclamation plans indicate that Lake 3 will be situated in the upper portion of the Hay Creek drainage and will flow into Hay Creek, and eventually the Embarras River. Lake 5 (West, Middle, and East) will be connected by short constructed channels and subsequently will outlet to the Erith River.

Robb Centre End Pit Lakes

Two end pit lakes are planned to be developed in Robb Centre. Figures 6 and 7 show the location of the lakes and general drainage patterns post reclamation. Current reclamation plans indicate that Halpenny Creek will flow around Lake 6. Lake 6 will outflow to Bacon Creek and Lake 7 will accept flows from LET3 and will outlet to Lendrum Creek.

Robb East End Pit Lakes

Five end pit lakes are planned to be developed in Robb East. Figures 8 and 9 show the location of the lakes and general drainage patterns post reclamation. Current reclamation plans indicate that two lakes (Lakes 8 and 9) will be situated on LDT1. The lakes will be connected by a 100 metre constructed channel. A similar configuration will exist on LDT3, with water flowing through two lakes (Lakes 10 and 11) before returning to the natural channel. The lakes will be connected by a 600 metre constructed channel. Lastly, Lake 12 will collect water from upper Lund Creek and will outlet to a 1,500 metre constructed channel that ultimately flows into Lake 10.

End Pit Lake Final Design

The flow-through lakes will be designed to maximize habitat and biological diversity and use by native fish populations. Final design will incorporate guiding principles that are described in the draft guidelines for end pit lake development at coal mine operations (EPLWG 2004) and/or procedures provided in similar guideline documents that may be available in the future. Some of the lakes may be constructed to preclude fish access but conceptually, the lakes will be designed to maximize habitat and biological diversity and use by native fish populations.

The off-channel lakes may be designed to be fishless, stocked fisheries, or possibly self-reproducing populations (depending on local conditions). The lakes may be designed to allow or preclude natural recruitment to the lake. Final design will incorporate the primary objective for the lake and will consider the guiding principles that are described in the draft guidelines for end

pit lake development at coal mine operations (EPLWG 2004) and/or procedures provided in similar guideline documents that may be available in the future.

Key design features that will be considered in the planning and creation of the end pit lakes are presented in Table 10.

Table 10. Key design parameters for a self-sustaining native salmonid end pit lake.

Design Factor	Parameter Ranges and Probability of Success (from EPLWG 2003)		
	High	Medium	Low
Sustainability (water balance)	Mean annual inflow > mean annual losses	Mean annual inflows = mean annual losses	Mean annual inflows< mean annual losses
Lake dynamics/function	Very stable water level (<1m annual variation)	Stable water level (1-2m annual variation)	Unstable water level (>2m annual variation)
Filling method/schedule	1-5yrs	5-10yrs	>10yrs
Lake geometry	<25m max depth	25-75m max depth	>75m max depth
Shoreline stability	>90% stable	60-90% stable	<60% stable
Stratification/mixing	<10m mean depth <20m max depth	10-15m mean depth 20-23m max depth	>15 m mean depth >23 m max depth
Water Quality	Close to median water quality values of natural water bodies in the region	Within the range of values for natural water bodies in the region	At the extreme, or outside of the range of natural water bodies in the region
Potential toxic substances	Meets water quality guidelines	Slightly exceeds guidelines	Significantly exceeds guidelines
Littoral zone	20-40%, <3m max littoral depth	10-20%	<10%, >40%, 3-6m max littoral depth
Substrate in littoral zone (high importance in truck/shovel lakes)	High density of boulders and fines in littoral zone		Low density of boulders and fines in littoral zone
Connectivity of lake to stream	Stable surface inlet and outlet	Ephemeral outlet only	No inlet/outlet
Riparian	High diversity of well-established plants	Medium diversity of well-established plants	Poor establishment of vegetation

6.2 RATIONALE

CVRI has successfully constructed stream channels and end pit lakes in the past and is therefore confident that they will be able to construct/implement the proposed compensation concepts to ensure that the productive capacity of fish habitat is maintained.

6.2.1 RECONSTRUCTED STREAM CHANNEL HABITAT

Over the last two decades, CVRI has reconstructed and/or enhanced a number of stream channels in the CVM area. A summary of these projects including photo documentation of current conditions and a discussion of monitoring results (and associated response plans) are provided in Appendix A.

6.2.2 END PIT LAKES

End pit lakes can exhibit various attributes and their potential to serve as fish habitat is often linked to the attributes and characteristics that they possess. The morphometric, geologic, hydrogeologic, geochemical and biological attributes of these lakes, directly influences the potential uses of these water bodies (Gammons et al. 2009). CVRI has accumulated considerable information regarding existing end pit lakes in the region. The following is a brief synopsis of how this existing information supports the idea that end pit lakes can provide good quality native fish species in the region.

Water quality is often the limiting factor in determining whether or not a pit lake has the potential to become fisheries habitat (Gammons et al. 2009). The local geology and the product being mined can have a profound effect on the water quality found in an end pit lake. Acidification and the introduction of heavy metals into ground and surface waters are often difficult to mitigate and can negatively impact biological environments due to contamination of ground and surface waters (Lemly 2007, Rudolf et al. 2008, Stekoll and Smoker 2009).

Silkstone, Lovett and Pit 24 (Stirling) Lakes are the oldest fish bearing end pit lakes located on the CVM lease; having been developed in the late 1980's and early 1990's. Water chemistry concerns with these end pit lakes have generally been negligible and the water quality in these pit lakes is very similar to Fairfax Lake, a naturally occurring lake in the area (Hatfield 2011). The CVM Lease is located in an area where acidification of ground and surface waters is rare due to the calcareous nature of the parent material. The thermal coal mined at the CVM Lease is also significantly different than the metallurgical coal found at the nearby Cheviot and Cardinal River Mine Leases and previously on the Gregg River Mine lease. Selenium enrichment of ground and surface waters is generally of lesser concern on the CVM lease.

One of the challenges with reclamation on the CVM is that there is often an insufficient amount of overburden material available to refill the end-pits. Left as is, these end-pits would naturally fill with surface and ground waters to form a body of water. Without prescribed reclamation procedures and guidelines, these lakes would have lesser ecological value. Guidelines for the development of end pit lakes are provided by Alberta Environment (EPLWG 2002) and include various design factors including hydrological, physical, chemical and biological design factors. Additional recommendations for developing end pit lakes in this area have also been identified in various pit lake studies (Hatfield 2011, Sonnenberg 2011). In addition, CVM is currently conducting research on existing end pit lakes on the mine to increase their understanding of these systems and to identify key design factors to maximize habitat productivity for target species.

End pit lakes have provided habitat and angling opportunities for Rainbow Trout (*Oncorhynchus mykiss*), Bull Trout (*Salvelinus confluentus*) and Brook Trout (*Salvelinus fontinalis*) on or near the CVM lease. Lakes such as Silkstone, Lovett, Pit 24 (Stirling), Pit 35, Pit 44 and Pit 45 are regularly stocked with Rainbow Trout and provide recreational angling opportunities (ESRD 2013). In addition to these "put and take" fisheries, fish have moved into end pit lakes on the CVM through channels that connect the lakes to natural drainages (Pisces 2013). Fisheries and Oceans Canada (Authorization No. ED 03-3080) have approved reclamation plans on the CVM

which include a series of pit lakes on the Upper Embarras River for the purpose of establishing a self-sustaining population of Athabasca Rainbow Trout. Preliminary results indicate that the barrier downstream of the lake system is working to preclude fish species downstream from moving upstream. Rainbow trout in the Embarras Lake system have also successfully spawned in the connecting channels (Pisces 2013).

Populations of Athabasca Rainbow Trout and Bull Trout have been documented in several end-pit lakes in the area including Lac des Roches, Sphinx Lake and Pit-lake CD (Schwartz 2002, Pisces 2008, Pisces 2009, Sonnenberg 2011). Spawning at the outlets and in the streams downstream of Sphinx Lake and Pit-lake CD is well documented and the Rainbow Trout populations are self-sustaining. Productivity downstream of Sphinx Lake and Pit-lake CD has increased from pre-mining conditions, likely due to the buffering and warming effect of the lake (Sonnenberg 2011).

In addition to Athabasca Rainbow Trout, Bull Trout, and Brook Trout, end pit lakes may have the potential to bolster the dwindling Arctic Grayling (*Thymallus arcticus*) population in the CVM area. Arctic Grayling are native to portions of the McLeod watershed (SRD 2005). Arctic Grayling populations are found in several lakes in Alberta and natural recruitment has been documented in several of these water bodies (SRD 2005). End-pit lakes with outlet channels may provide suitable habitat for Arctic Grayling if reclamation plans include barriers that preclude the movement of other fish species from downstream. The planned and calculated development of end pit lakes is an important part of reclamation practices on the CVM.

6.3 QUANTIFICATION OF PREDICTED EFFECTS AND HABITAT GAINS

Table 12 provides a summary of predicted impacts for each watercourse and identifies the type of habitat (lotic or lentic) that will be available after final reclamation.

Table 12. Summary of predicted impacts to fish habitat by watercourse.

Mine Area	Watercourse	Impacted Habitat Area (m^2)	Reclaimed Habitat	
			Reconstructed Channel (m^2)	Lake
Robb West	Bryan Creek	15,688	15,688	
Robb Main	Bacon Creek	2,777	2,777	
	Erith River	67,485	67,485	
	ERT1	1,000	1,000	
	ERT2	406	406	
	ERT3	7,751		Lake 5
	Hay Creek	6,363		Lake 3
Robb Centre	Halpenny Creek	4,129	4,129	
	Lendrum Creek	17,468	17,468	
	LET1	3,282	1,600	Lake 7
	LET3	7,959	6,595	Lake 7
Robb East	Lund Creek	16,033	2,505	Lake 12
	LDT1	2,991	640	Lake 8 & 9
	LDT1A	1,091		Lake 8 & 9
	LDT2	209		Lake 10
	LDT3	3,831	1,800	Lake 10 & 11
	LDT4	542		Lake 10
	LDT5	154		Lake 12
	PET1	660	660	
Total		**159,819**	**122,753**	***5,542,000 m^2** (total lake habitat available upon final reclamation)

* Lake dimensions presented are consistent with Project Application but are likely subject to change as mine plans progress

Table 13 compares the predicted effects and habitat gains from the original application to the updated mine plan. In total, the predicted amount of fish habitat impacted is estimated at 159,819 m^2, which is a 22 % decrease from the original application. Final reclamation of aquatic resources will consist of reconstructed channel and 11 end pit lakes, for a total habitat gain of 5,504,934 m^2. With the updated mine plan, the amount of reconstructed channel will increase from 14,556 m^2 in the original application to 122,753 m^2 (approximately 77 % of impacted habitat will be reclaimed to channel).

Table 13. Summary of predicted effects and habitat gains in the Project area.

	Habitat Loss (m^2)		Habitat Gain (m^2)		
	Application (2012)	**Revision (2013)**	**Type of Reclamation**	**Application (2012)**	**Revision (2013)**
Natural Channel	204,983	159,819	Reconstructed Channel	14,556	122,753
			*End Pit Lake	*6,253,000	*5,542,000
Total Habitat Loss	**204,983**	**159,819**	**Total Habitat Gain**	**6,267,556**	**5,664,753**
Net Change (m^2)				**+6,062,573**	**+5,504,934**

* Lake dimensions presented are consistent with Project Application but are likely subject to minor change as mine plans progress

6.4 ADDITIONAL COMPENSATION OPTIONS

As a precautionary measure CVRI has identified several other habitat compensation initiatives that could be initiated if it is determined that the primary habitat compensation concepts are not sufficient to ensure no net loss of the productive capacity of fish habitat. These include:

- Habitat Defragmentation – CVRI has partnered with the Foothills Research Institute to complete a watercourse crossing inventory in the vicinity of the CVM to document fish presence and identify potential problem sites where fish passage or sediment deposition are issues. The compensation initiative would involve the repair and/or remediation of identified problem sites.
- Habitat Enhancement in RSA – CVRI is currently investigating other instream enhancement opportunities in the Erith River outside of the Project area. The compensation initiative would involve the completion of instream enhancement work to improve habitat suitability or address potential limiting factors.
- Rainbow Trout Research Initiative – CVRI is aware that an Athabasca Rainbow Trout Recovery Plan is likely to be released in the near future. The compensation initiative would involve participation or coordination of specific projects to address identified knowledge gaps, or contribute to research, or recovery techniques identified in the Recovery Plan.

7.0 MONITORING

7.1 CONSTRUCTION PHASE

All instream construction sites will be monitored to ensure best management practices are implemented and for compliance with the conditions and requirements of any and all regulatory permits applicable to construction. The most significant aspect of instream construction monitoring will be implementation of a sediment monitoring program. Sediment monitoring protocols will be designed site-specifically, but will be based on industry standards.

7.2 OPERATION PHASE

7.2.1 SURFACE WATER MONITORING

Surface water monitoring plans were originally discussed in the Project Application, (CVRI, 2012). Monitoring will be similar to existing CVM mine areas.

Surface water quality monitoring for the Project will include:

- A water quality monitoring program designed to meet the requirements of the Project approval will be implemented for the life of the Project (Hatfield 2012; CR#11);
- Flows and TSS will be monitored at all settling ponds (Matrix 2012; CR#6);
- Regular inspections of all drainage works will be conducted (Matrix 2012; CR#6); and
- Long term monitoring of flow in each main creek will be conducted to document critical low flow conditions during pit filling periods and to define the need for any bypass pumping to maintain in-stream flows (Matrix 2012; CR#6).

7.2.2 BIOLOGICAL MONITORING

The existing CVM aquatics monitoring program will be expanded to include additional benthic macroinvertebrate sample sites. Results of the monitoring will be used to assess the effectiveness of the surface water management plan and modifications will be made, if necessary.

Fish population monitoring programs to assess fish distribution, relative abundance and population structure will be developed as the Project progresses

7.3 FOLLOW-UP MONITORING

CVRI recognizes that periodic monitoring will be required to evaluate fisheries habitat components and populations in re-established aquatic environments (reconstructed channels). Monitoring protocols will be developed in conjunction with the details of the currently proposed compensation strategies. The general monitoring approach will be to monitor habitat created or enhanced by evaluation of the physical and biological characteristics of the habitats as well as

fish utilization of the habitats. Habitat improvements would be implemented, as part of an adaptive management approach, if new or enhanced habitat were not providing the required habitat components for the target fish species (i.e. Rainbow Trout).

A detailed end pit lake monitoring program will be developed two to five years prior to construction of each lake allowing for CVRI to take advantage of information regarding end pit lake development that may become available in the future and to design the lake to meet future end-use objectives and regional management strategies. In general CVRI anticipates implementing a monitoring program that will include but is not necessarily limited to the following:

- Post-construction monitoring to assess physical stability of end pit lakes and connecting channels.
- Assessment of fish community and habitat within the end pit lakes and associated channel systems.
- Assessment of various biological and chemical parameters in end pit lakes including:
    - Fish, benthic invertebrates, zooplankton, phytoplankton, macrophytes.
    - Measurement of temperature, dissolved oxygen, conductivity profiles, as well as select water quality variables.

Monitoring results will be used, if necessary, to adjust mitigation and habitat compensation measures and make design improvements as required. Habitat monitoring will be key to confirming the no net loss objective can be achieved. Should, for some reason, the proposed habitat compensation not be sufficient to achieve no net loss of the productive capacity of fish habitat, additional habitat compensation would then be developed in consultation with the appropriate regulators.

8.0 SUMMARY

This document is intended to provide an updated outline of the impacts to fish habitat and proposed strategies to mitigate and compensate for the impacts that may occur as a result of the Project. Detailed habitat compensation plans will be developed for specific phases as the project progresses. Given that this project will be developed over the next 25 years there will be opportunity to adjust and adapt mitigation and compensation strategies to ensure that the project will not result in the loss of productive capacity of fish and fish habitat.

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Figures

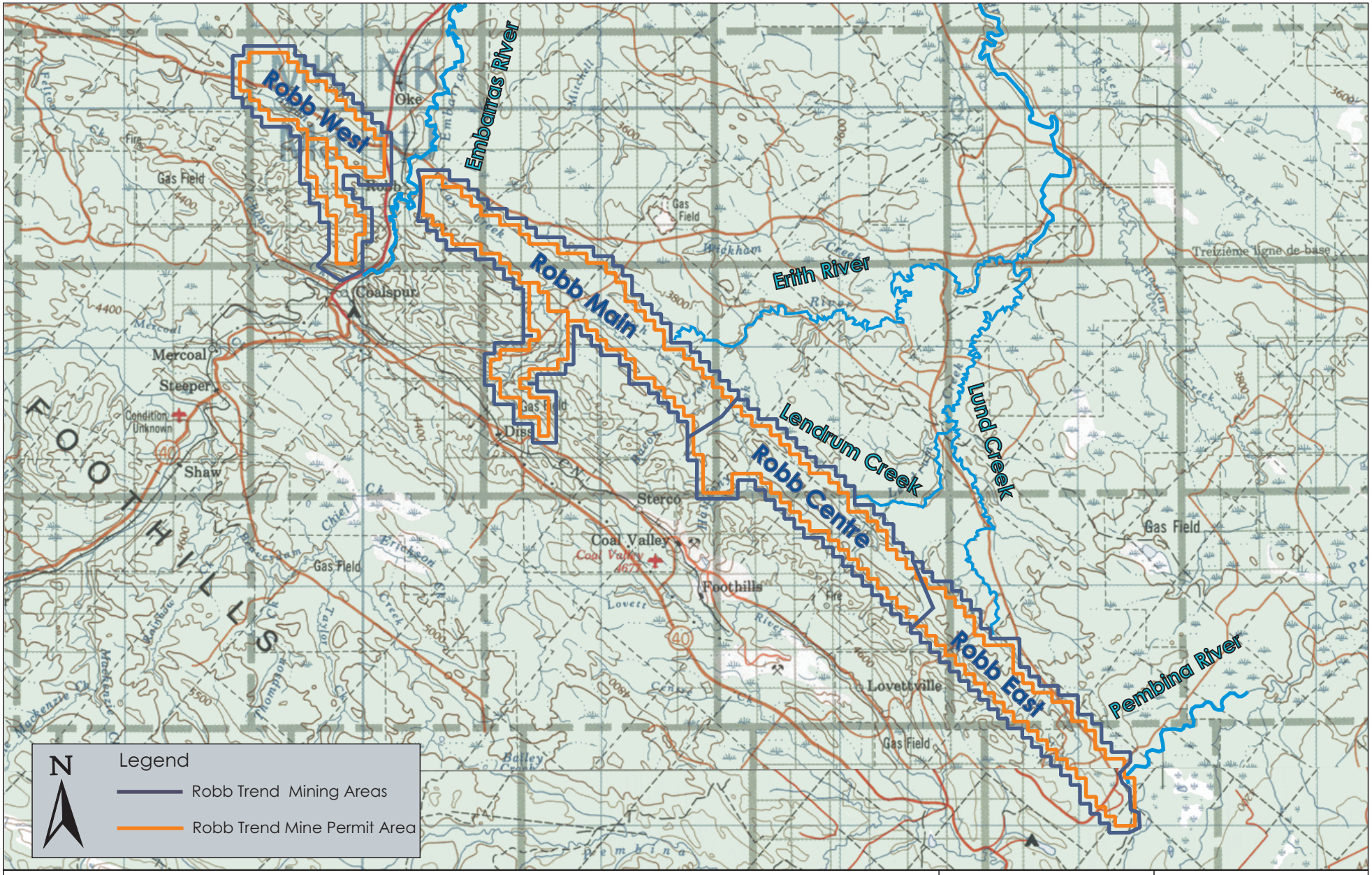


Figure 1. Robb Trend Project Area (adapted from Project Application)	Drawn by: JM	Checked by: ES
	August 2013	
Pisces Environmental Consulting Services Ltd.	CVRI Coal Valley Mine	
	Scale 1:250,000	

ORIGINAL SCENARIO

Watercourse	Watercourse Code	Diversion #	Fish Habitat Impacted (m²)	2016 1	2017 2	2018 3	2019 4	2020 5	2021 6	2022 7	2023 8	2024 9	2025 10	2026 11	2027 12	2028 13	2029 14	2030 15	2031 16	2032 17	2033 18	2034 19	2035 20	2036 21	2037 22	2038 23	2039 24	2040 25
Erith River	ER	1	67,485																								
Erith River Trib #1	ERT1	2	5,834																								
Bacon Creek	BA	3	2,777																								
Halpenny Creek Trib#1	HLT1	4	2,239																								
Halpenny Creek	HL	5	7,601																								
Halpenny Creek Trib#2	HLT2	6	219																								
Lendrum Creek Trib#1	LET1	7	1,923																								
Lendrum Creek Trib#3	LET3	8	22,161																								
Lendrum Creek	LE	9	17,468																								
Hay Creek	HA	10	1,804																								
Lund Creek Trib#1	LDT1	11	2,991																								
Lund Creek Trib#3	LDT3	12	2,507																								
Bryan Creek	BR	13	14,208																								
Lund Creek	LD	14	11,026																								
Pembina River Trib#1	PET1	15	5,236																								

REVISED SCENARIO

Watercourse	Watercourse Code	Diversion #	Fish Habitat Impacted (m²)	2016 1	2017 2	2018 3	2019 4	2020 5	2021 6	2022 7	2023 8	2024 9	2025 10	2026 11	2027 12	2028 13	2029 14	2030 15	2031 16	2032 17	2033 18	2034 19	2035 20	2036 21	2037 22	2038 23	2039 24	2040 25
Erith River	ER	1	67,485		1A			1B							1C												
Erith River Trib #1	ERT1	2	1,000										2														
Bacon Creek	BA	3	2,777								3																
Halpenny Creek Trib#1	HLT1	4	0																								
Halpenny Creek	HL	5	4,129								5																
Halpenny Creek Trib#2	HLT2	6	0																								
Lendrum Creek Trib#1	LET1	7	3,282										7														
Lendrum Creek Trib#3	LET3	8	7,959										8														
Lendrum Creek	LE	9	17,468										9														
Hay Creek	HA	10	2,325												10												
Lund Creek Trib#1	LDT1	11	2,991												11												
Lund Creek Trib#3	LDT3	12	3,831																		12						
Bryan Creek	BR	13	14,208																	13							
Lund Creek	LD	14	7,319																	14							
Pembina River Trib#1	PET1	15	660																	15							

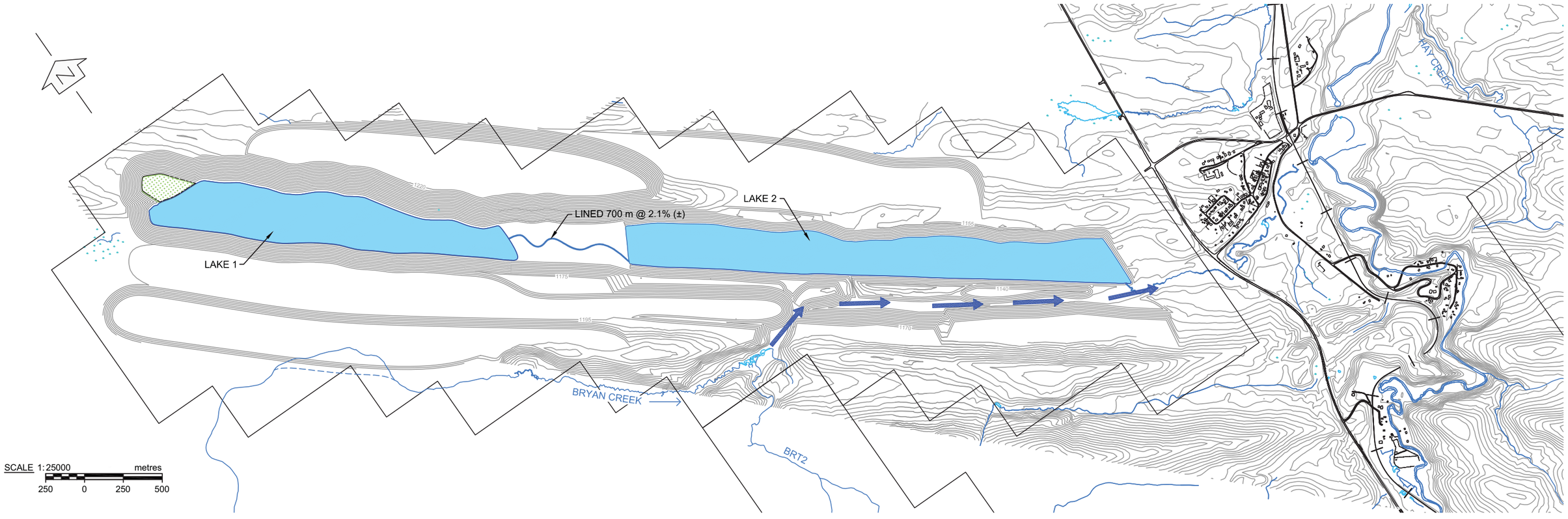
Existing Channel, Normal Flow

Final, Reclaimed Channel

Diverted Flow (Diversion, Pumping)

Constructed Diversion Channel, Fish Habitat
Flow Through End Pit Lake

Figure 2. Anticipated schedule for mine development along with the predicted impacts to fish habitat



LEGEND

- Lake
- Wetland
- Constructed Steams

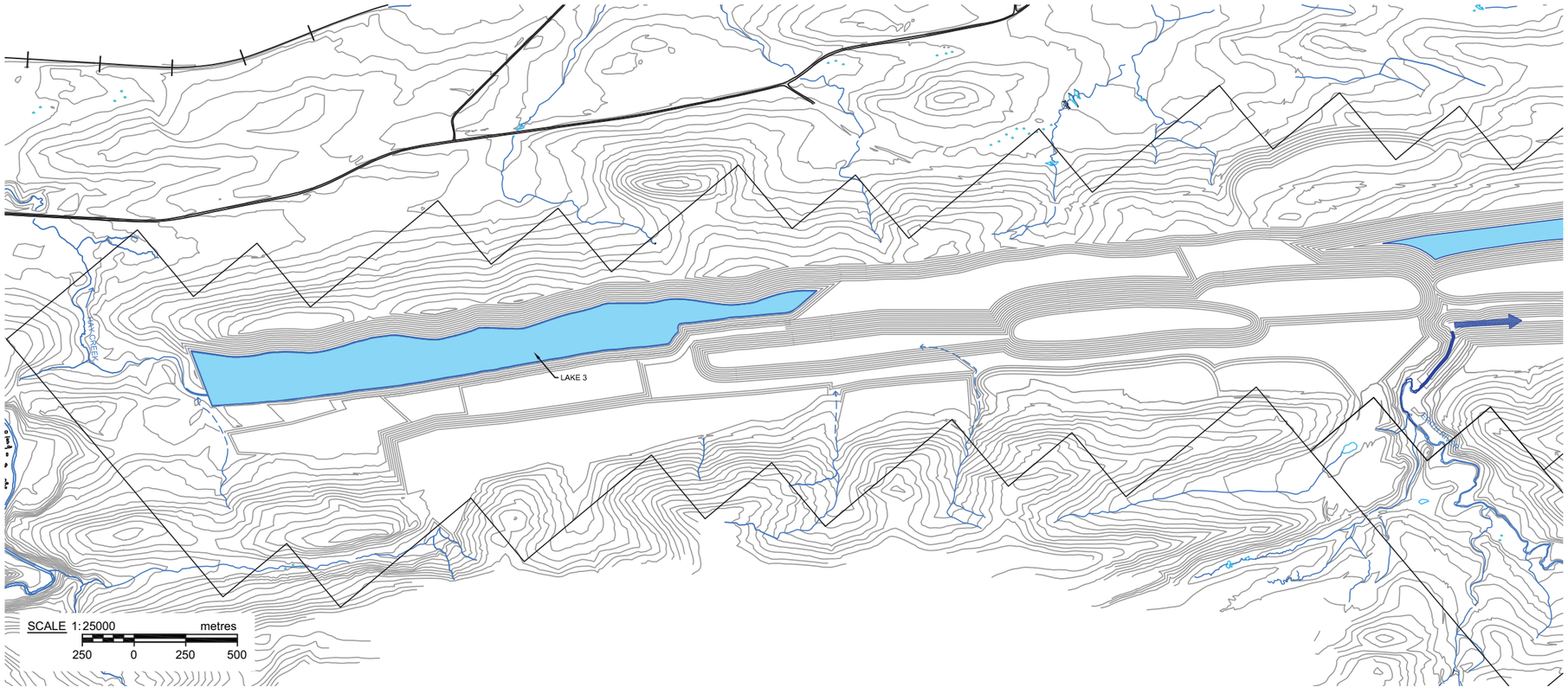
REF: Matrix Solutions Inc., December 2011.

PROJECT:
Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:
Figure 3. Lakes 1 and 2 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

DRAWN: JG	FIGURE:
CHECKED: KP	
DATE: Aug 1/13	
PROJECT: 08-041b	



LEGEND

- Lake
- Wetland

REF: Matrix Solutions Inc., December 2011.

PROJECT:
Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:
Figure 4. Lake 3 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

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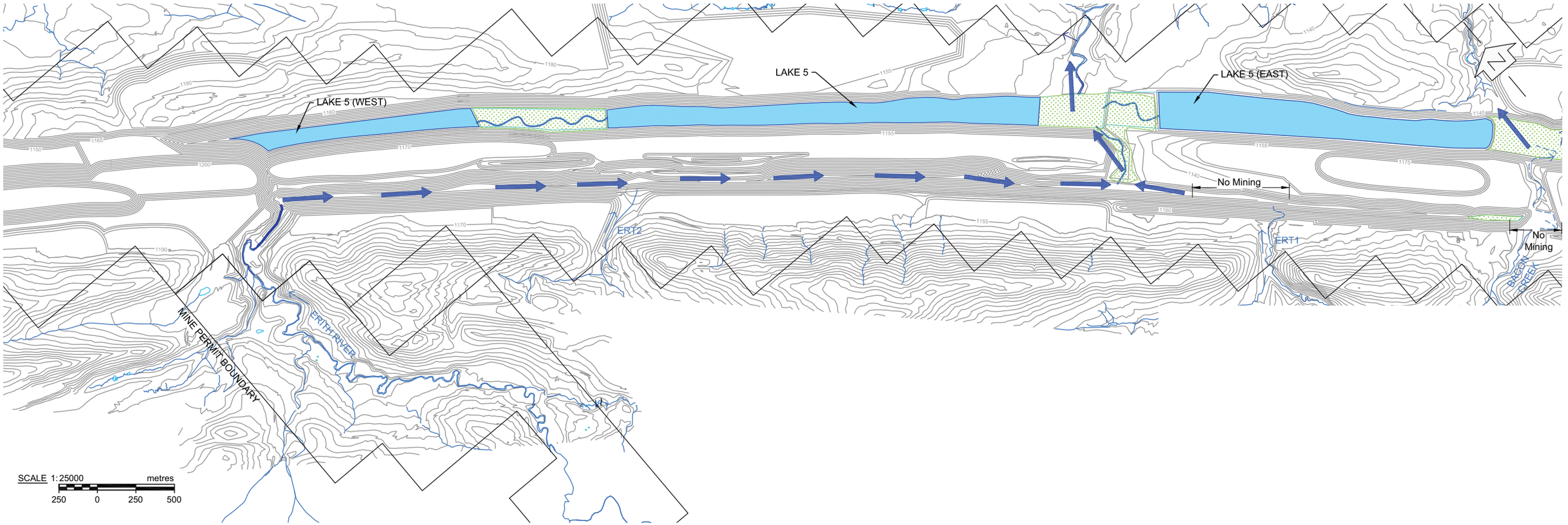
CHECKED: KP	
DATE: Aug 1/13	
PROJECT: 08-041b	



LEGEND

- Lake
- Wetland
- Constructed Streams

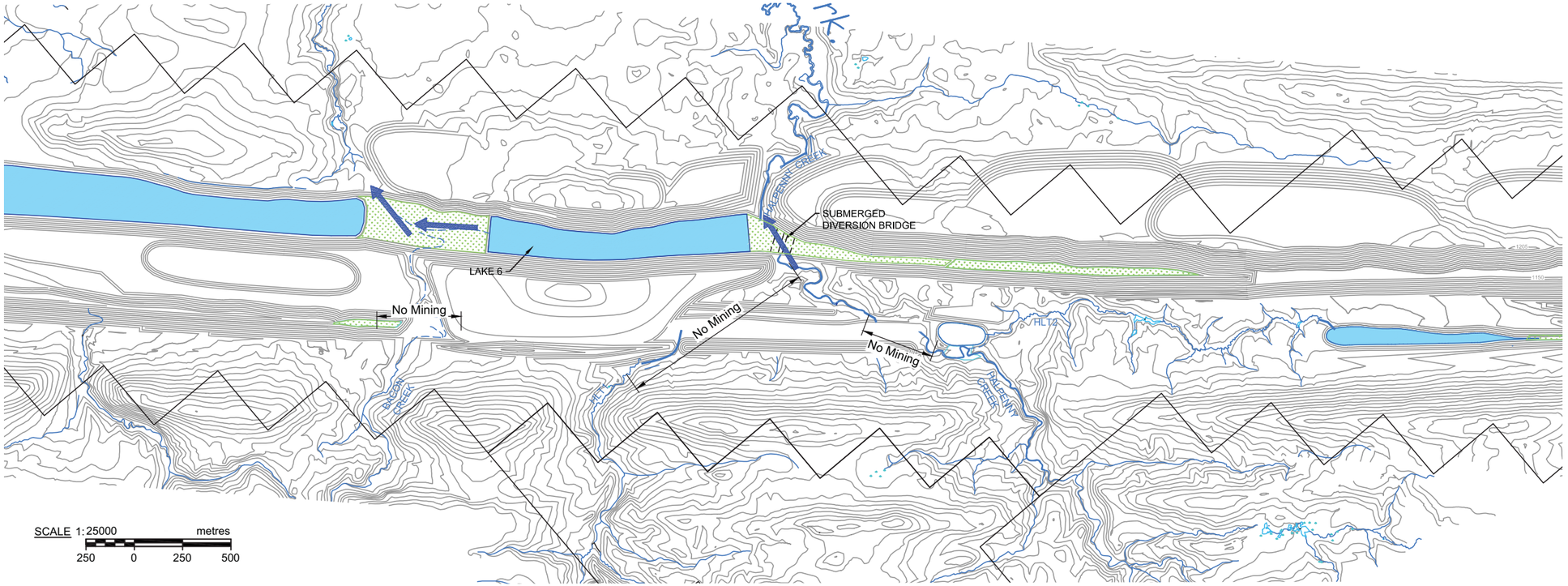
REF: Matrix Solutions Inc., December 2011.

PROJECT:
Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:
Figure 5. Lake 5 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

DRAWN: JG	FIGURE:
CHECKED: KP	
DATE: Aug 2/13	
PROJECT: 08-041b	



SCALE 1:25000 metres

250 0 250 500

LEGEND

- Lake
- Wetland
- Constructed Streams

REF: Matrix Solutions Inc., December 2011.

PROJECT:

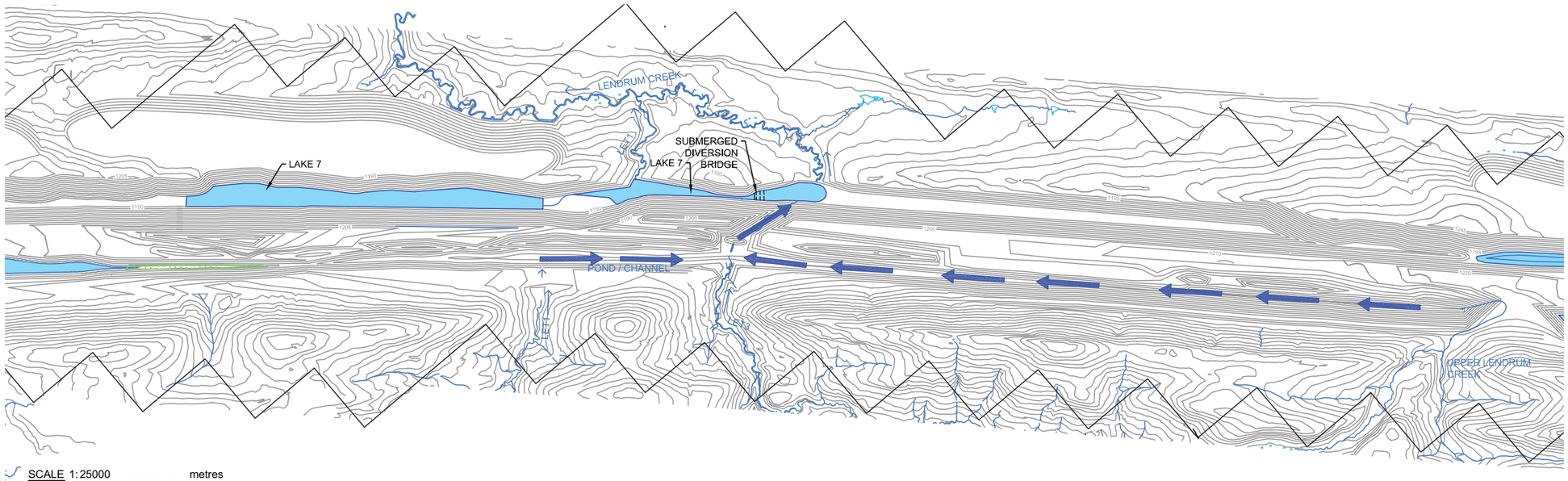
Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:

Figure 6. Lake 6 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

DRAWN: JG	FIGURE:
CHECKED: KP	
DATE: Aug 2/13	
PROJECT: 08-041b	



LEGEND

- Lake
- Wetland
- Constructed Streams

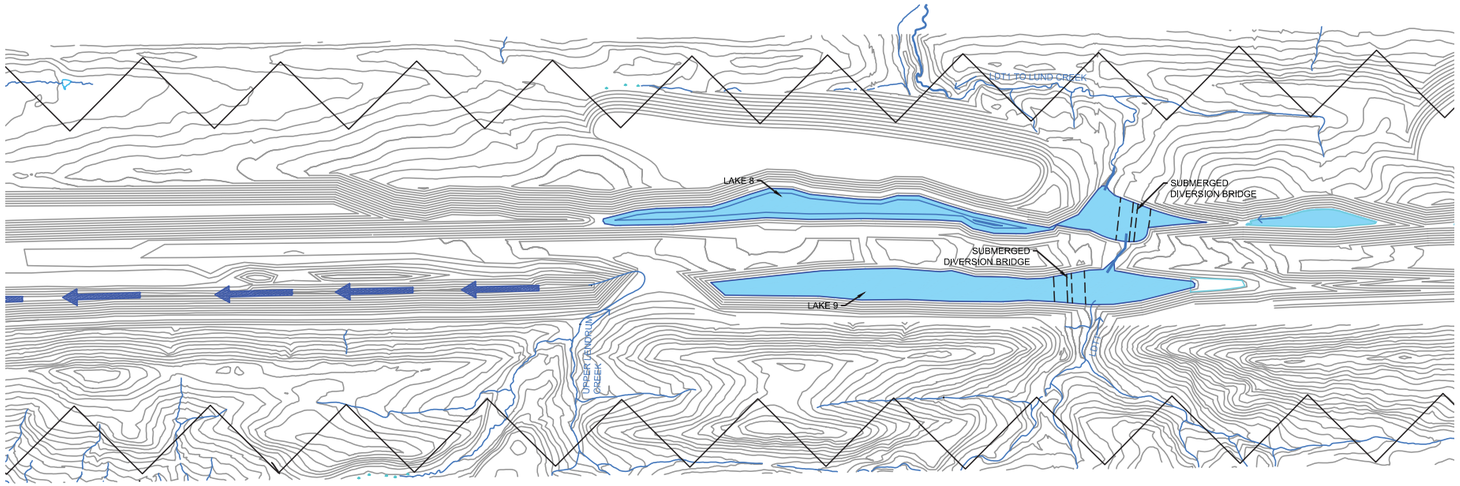
REF: Matrix Solutions Inc., December 2011.

PROJECT:
Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:
Figure 7. Lake 7 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

DRAWN: JG	FIGURE:
CHECKED: KP	
DATE: Aug 2/13	
PROJECT: 08-041b	



SCALE 1:25000 metres

250 0 250 500

LEGEND

- Lake
- Wetland
- Constructed Streams

REF: Matrix Solutions Inc., December 2011.

PROJECT:

Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:

Figure 8. Lakes 8 and 9 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

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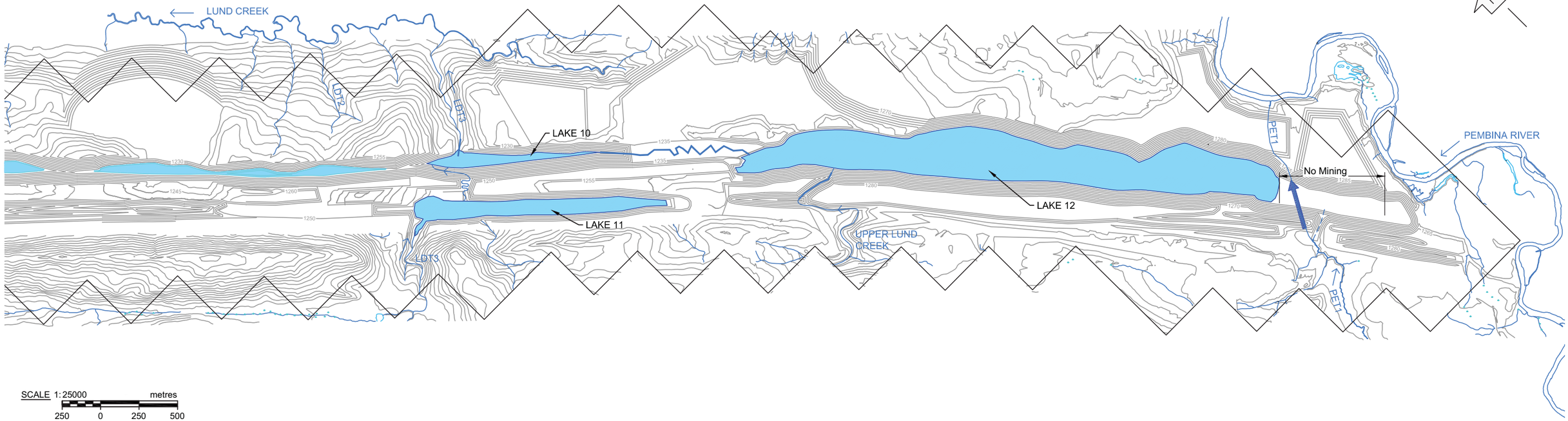
PROJECT: 08-041b	



SCALE 1: 25000 metres

250 0 250 500

LEGEND

- Lake
- Wetland
- Constructed Streams

REF: Matrix Solutions Inc., December 2011.

PROJECT:

Coal Valley Mine
Robb Trend SIR - DFO Compensation Plan

TITLE:

Figure 9. Lakes 10 - 12 Reclamation Plan

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

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DATE: Aug 22/13	
PROJECT: 08-041b	

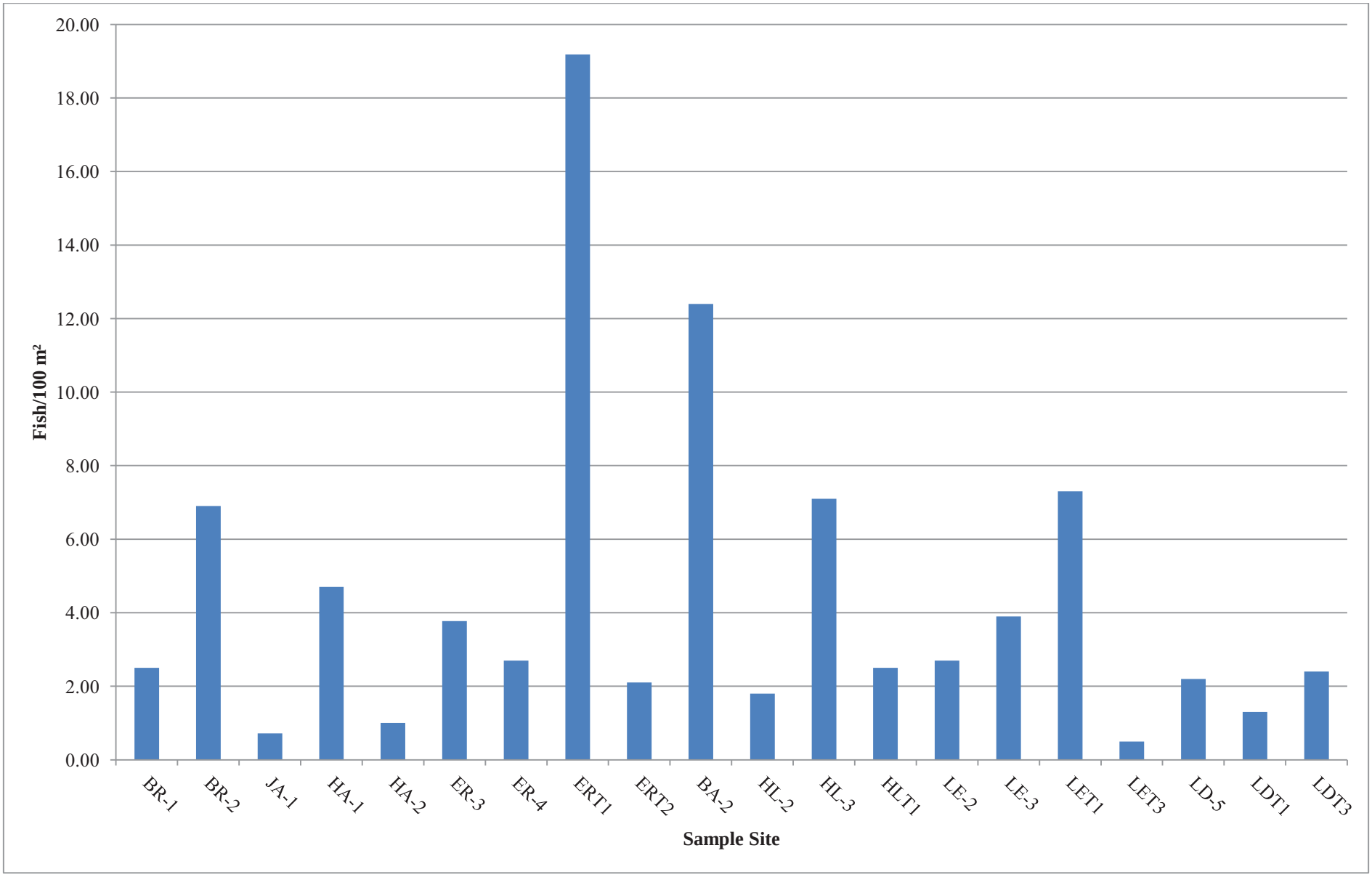

Figure 10. Rainbow Trout densities (fish/100 m^2) for population estimates performed in the Robb Trend Mine Area.

CVRI Robb Trend Project

August 2013

Pisces Environmental Consulting Services Ltd.

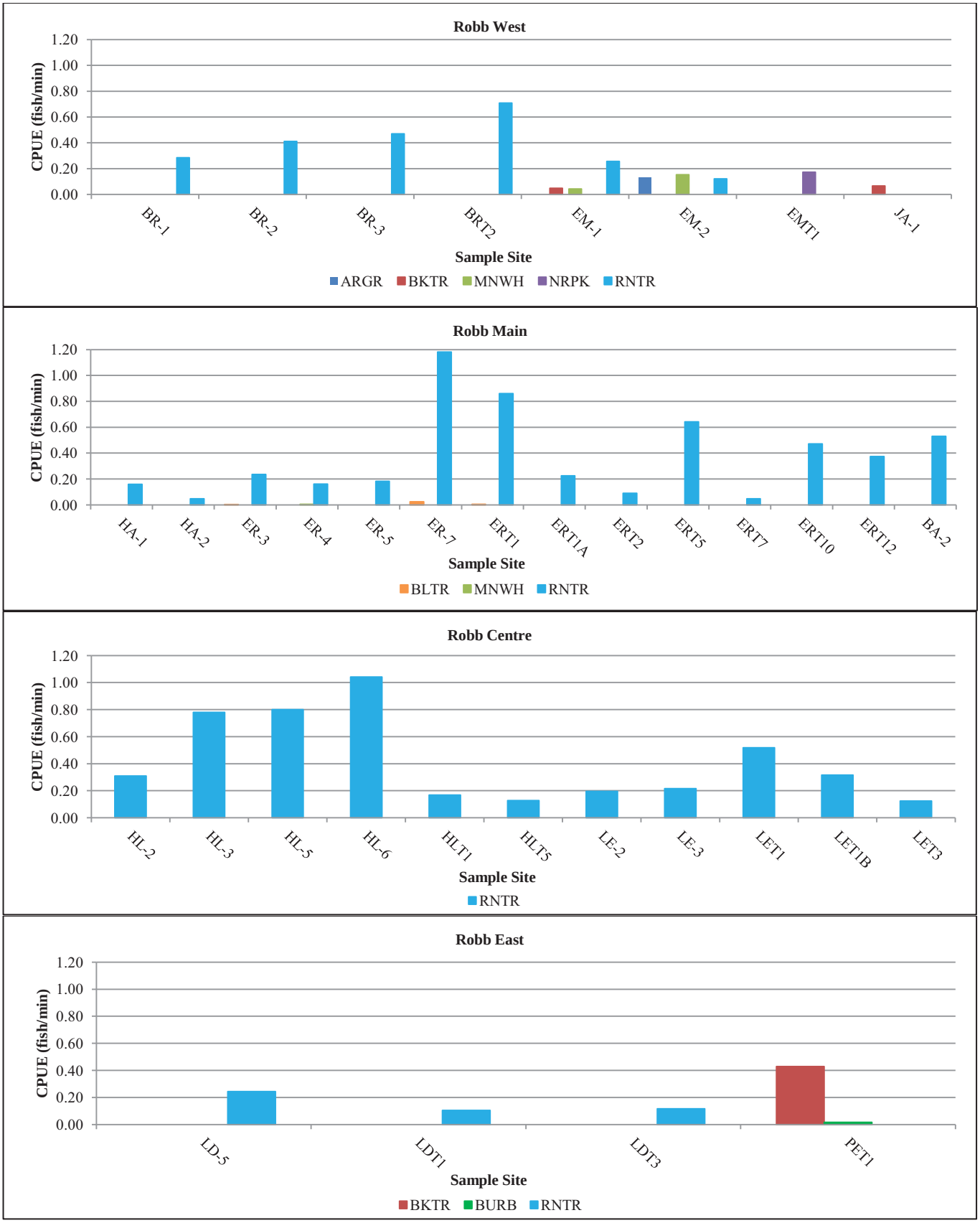

Figure 11. First-pass catch per unit effort (CPUE) for sport fish captured at Robb Trend sample sites.

CVRI Robb Trend Project

August 2013

Pisces Environmental Consulting Services Ltd.

Low	Moderate	High
		
Photo 1. Upper Hay Creek.	Photo 3. Unnamed tributary to Halpenny Creek #1 (HLT1).	Photo 5. Unnamed tributary to the Erith River #1 (ERT1).
		
Photo 2. Unnamed tributary to the Erith River #2 (ERT2).	Photo 4. Lendrum Creek.	Photo 6. Erith River.

Figure 12. Photos of typical habitat conditions found within Low, Moderate, and High habitat potential rankings.

CVRI Robb Trend Project

August 2013

Pisces Environmental Consulting Services Ltd.

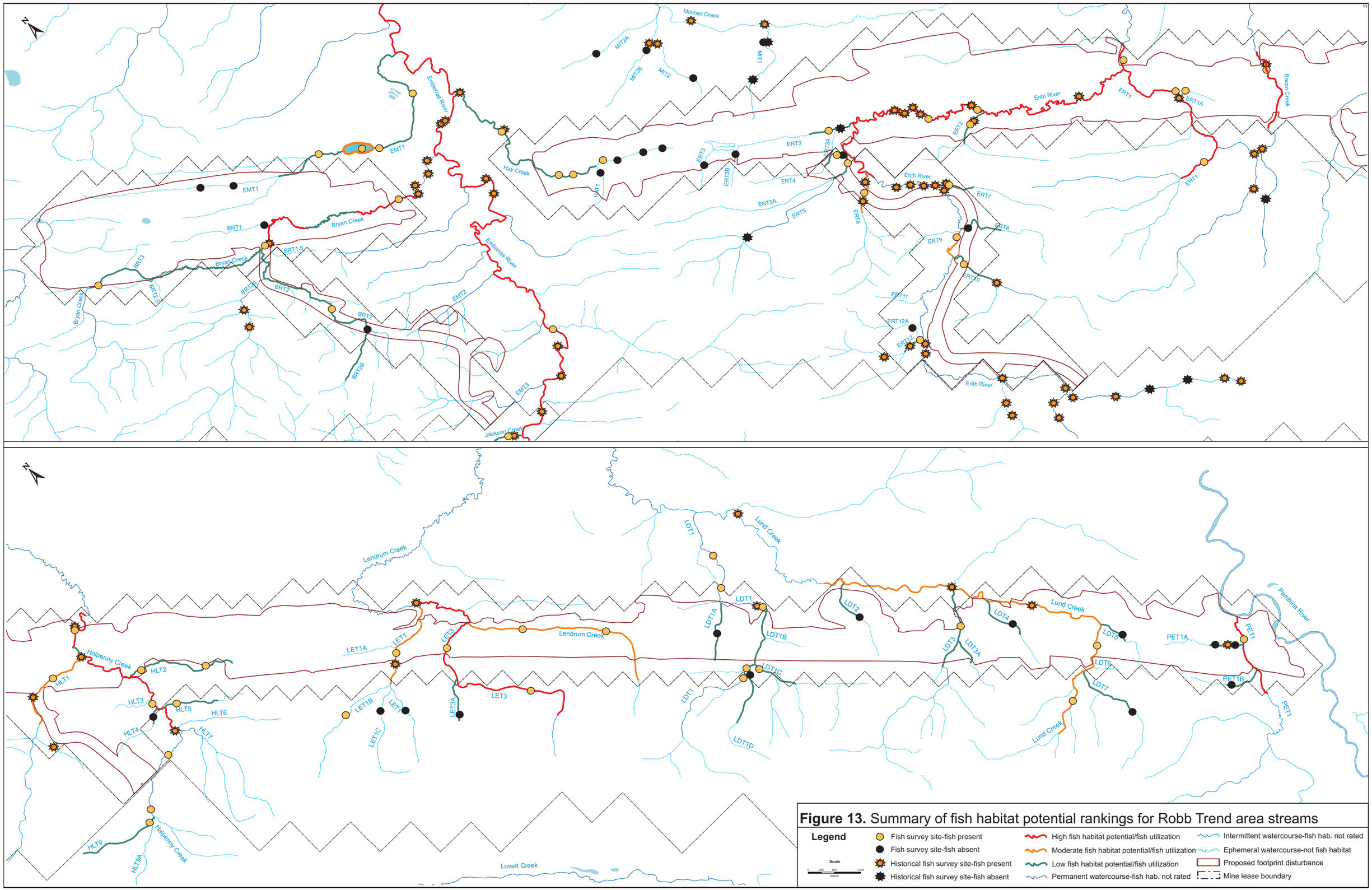

Figure 13. Summary of fish habitat potential rankings for Robb Trend area streams

Legend

Scale 0 250 500 1,000 Metres

- Fish survey site-fish present
- Fish survey site-fish absent
- Historical fish survey site-fish present
- Historical fish survey site-fish absent
- High fish habitat potential/fish utilization
- Moderate fish habitat potential/fish utilization
- Low fish habitat potential/fish utilization
- Permanent watercourse-fish hab. not rated
- Intermittent watercourse-fish hab. not rated
- Ephemeral watercourse-not fish habitat
- Proposed footprint disturbance
- Mine lease boundary

Appendix A

CVRI has reconstructed several stream channels as part of past reclamation efforts. The following summarizes past work and discusses challenges and improvements in channel construction proposed for the future.

Centre Creek Tributary (1989)

In the winter of 1989, a 2.3 kilometer stretch of an unnamed tributary to Centre Creek was diverted to facilitate mining (Pisces 1989). Habitat assessments completed following the reconstruction showed the reconstructed channel exhibited good diversity, increased the amount of deep water habitat, and increased the overall habitat area of the unnamed tributary (Pisces 1989). During sampling conducted in 1996 this channel was found to have the highest Brook Trout density of all sites sampled with 56 fish/100m^2 being captured (Carson and Allan 1999). Carson and Allan (1999) also classified the habitat within the tributary as high quality habitat. Brook trout were observed spawning within the reconstructed channel during the fall of 1999 (Allan 1999).

The diverted channel as it currently exists (fall 2012) is portrayed in Figure 1.

Figure 1. Centre Creek Tributary Diversion fall 2012 (Dean Woods Photograph).

Pit 45 Lake Outflow (2000)

The Pit 45 Lake outflow channel drains Pit 45 Lake, which is managed as a quality stocked lake by AESRD. The channel has well established vegetation and exhibits no slumping or instability. No fisheries enhancements were completed within the channel and minimal discharge was noted in spring 2013.

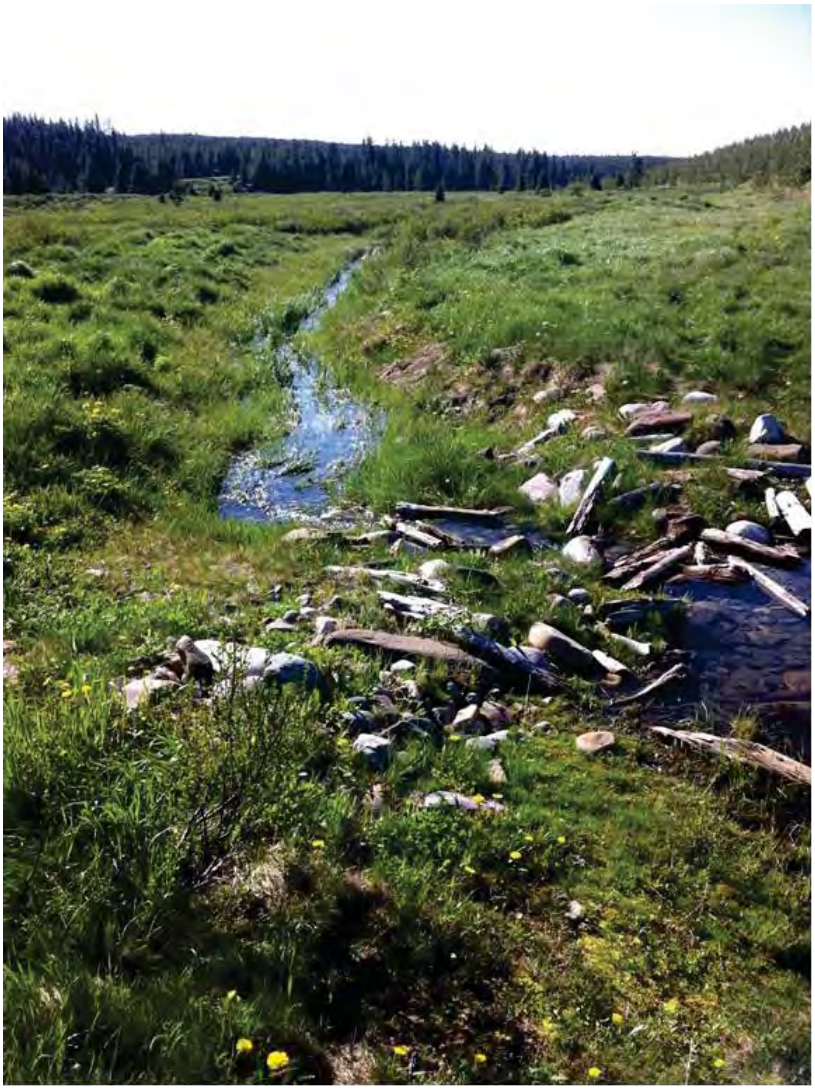

Figure 2. Pit 45 Lake Outflow Summer 2011 (Dean Woods photo)

Pit 43 W Outflow (2004)

The Pit 43W Outflow drains a small end pit lake and connects to the Lovett River (Figure 3 and 4). Fish were observed in the bottom 50 metres of channel but no sampling has been completed. Monitoring was initiated in spring 2013 and is ongoing.

Figure 3. Pit 43W outflow channel spring 2013.

Figure 4. Pit 43 W outflow channel downstream section.

Pit 34 Lake Outflow (2004)

The Pit 34 Lake outflow was constructed in 2004 but final reclamation and enhancement is ongoing in the area. Preliminary investigations conducted in spring 2013 indicate Brook Trout are occupying the constructed habitat. The channel is stable and vegetation is slowly becoming established (Figure 5). Monitoring was initiated in spring 2013 and is ongoing.

Figure 5. Pit 34 Lake Outflow spring 2013.

25E Creek Channels (2010)

CVRI has more recently completed construction of several lake outlet channels as part of the reclamation process. Monitoring of many of these outlets is ongoing but early indicators show the reclaimed landscape is providing habitat for colonizing fish species. 25E creek was heavily influenced during mining and has been reconstructed (Figure 6 and 7). Fish were observed in 25E Creek in the constructed inlet and outlet channels of Pit 25E Lake in spring 2013. Additional fisheries surveys are scheduled for summer 2013. Brook Trout were documented in 25E Lake during the winter of 2010.

Figure 6. 25E Creek immediately upstream of 25E Lake spring 2013.

Figure 7. 25E Creek at outlet of 25E Lake (looking downstream) spring 2013

Fish presence has not been documented in the headwaters of 25E Creek but monitoring of the constructed 25E Creek channel was initiated in the spring of 2013. The constructed channel exhibited significant discharge in spring 2013 and preliminary measurements indicate it is capable of providing fish habitat (Figure 8 and 9). Monitoring was initiated in spring 2013 and is ongoing.

Figure 8. 25E Creek immediately downstream of 25S Lake spring 2013

Figure 9. 25E Creek approximately 100 metres downstream of 25S Lake.

Upper Mercoal Creek Diversion (2009)

A portion of the headwaters of Mercoal Creek was diverted into an enhanced channel in the summer of 2009. The reconstructed channel appears to provide an increased amount of fish habitat compared to baseline conditions (Figure 10) and vegetation is becoming established (Figure 11). No fish have been captured in the vicinity of the diversion during fish salvage operations in 2009 or during subsequent monitoring (2010, 2012). However, large beaver dams located a substantial distance downstream of the diversion are suspected of impeding fish movements into this constructed habitat.

Figure 10. Baseline conditions of upper Mercoal Creek during fish salvage operations in 2009.

Figure 11. Upper Mercoal Creek diversion channel in summer 2012.

Embarras Lakes (2011)

The Embarras Lakes system was constructed to connect three end-pit lakes located in the headwaters of the Embarras River. Prior to mining, low densities of fish were present a short distance downstream of the mining area (Figure 12). Though the system is early in its developmental stages and some final reclamation work still needs to be completed, the constructed channels have been found to provide habitat for native Athabasca Rainbow Trout (Pisces 2013).

Although vegetation and instream habitat enhancements still need to be constructed (Figure 13 and 14) preliminary investigations show increased fish densities in the upper Embarras drainage compared to baseline conditions. Prior to mining, very few fish were present in the vicinity of the existing Embarras Lakes (single Rainbow Trout captured) while low densities of Rainbow Trout (2.6/100m^2), Brook Trout (0.34/100m^2), and a single Bull Trout were captured downstream of where the existing fish exclusion barrier is located (Boorman 2003). In August 2012, 85 Rainbow Trout were captured from within constructed channels upstream of the exclusion barrier during single pass surveys. Population estimate data collected downstream of the fish exclusion indicates Rainbow and Brook Trout densities have increased orders of magnitude over baseline conditions.

Figure 12. Upper Embarras Baseline condition (2004) downstream of existing fish exclusion barrier.

Figure 13. Reconstructed channel downstream of Lower Embarras Lake spring 2012.

Figure 14. Outlet channel of Upper Embarras Lake spring 2012.

Challenges and Future Work

Monitoring of existing diversions and reconstructed channels continues in 2013 as CVRI prepares for future reclamation projects. A significant amount of the Chance Creek channel will be constructed in the Yellowhead Tower area following mining.

CVRI has acknowledged limited fisheries work/enhancement has been carried out in several of the diversion channels. Monitoring is ongoing and preliminary results will be relied to make recommendations for enhancements. A lack of woody vegetation and fish cover components in several of the existing channels will be addressed as final replanting and reclamation occurs. Gravel and instream habitat placements are proposed in systems where self-sustaining fish populations are desired.

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Pisces. 1989. Habitat assessment of a diversion channel on an unnamed tributary to Centre Creek. Prepared by Pisces Environmental Consulting Services for Luscar Sterco Ltd. 9pp

Pisces. 2011. Aquatic Monitoring Program for End Pit Lakes in the Headwaters of the Embarras River, 2011-12. Prepared by Pisces Environmental Consulting Services Ltd. for Coal Valley Resources Inc. Edson, AB

Appendix 2: Various Supporting Reports

Hatfield
CONSULTANTS

Macrophyte and Bathymetry Surveys in End-Pit Lakes in the Coal Valley Mine Area

February 2014

Prepared for:

Coal Valley Resources Inc.
Edson, Alberta

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MACROPHYTE AND BATHYMETRY SURVEYS IN END-PIT LAKES IN THE COAL VALLEY MINE AREA

Prepared for:

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FEBRUARY 2014

MEMS6300.2.0

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1.0 INTRODUCTION AND BACKGROUND

The reclamation activities of Coal Valley Resources Inc. (CVRI) in operations in the Coal Valley Mine (CVM) area include the creation of end-pit lakes. This report presents the results of an assessment of bathymetry and macrophyte communities in select, representative end-pit lakes in the CVM area, located approximately 90 km south of Edson, in west-central Alberta, on the eastern slopes of the Canadian Rocky Mountains. This study was conducted by Hatfield Consultants Partnership (Hatfield) for CVRI as part of the ongoing efforts of CVRI to improve the ecological sustainability of end-pit lakes in the CVM area. This report contains the results of surveys conducted from August 26, 2013 to August 31, 2013 on nine existing end-pit lakes in the CVM area.

1.1 BACKGROUND

1.1.1 Creation of End-Pit Lakes in Coal Mining

The development and maintenance of end-pit lakes is an integral component of the CVRI reclamation programs in the CVM area. End-pit lakes as part of a reclamation strategy provide opportunities to support productive terrestrial and aquatic environments.

Upon completion of mining, reclamation begins when pits are back filled with overburden material. End-pit lakes are created where there is an insufficient amount of overburden material available to backfill mined pits and reclaim the natural profile of the landscape. Lakes are developed when the pits are filled with water from constructed surface inflows, surface runoff, and/or groundwater intrusion. End-pit lakes are generally characterized by high maximum depth to low surface area ratio. End-pit lake morphology is a function of the original mining techniques. Dragline operations tend to produce long and narrow lakes that are asymmetrical on the long axis. These lakes tend to have one steep slope side or drop off with the opposite shore having more gradual slope. End-pit lakes created from truck and shovel operations tend to be rounder, deeper, and have consistently high slopes at one end of the lake (Mackay 1999).

Ultimately, the design of end-pit lakes provides a framework for ecological stability and functionality enhancing the landscape of the region. The objective of end-pit lakes is to provide aquatic habitat for the development and maintenance of productive and diverse lake ecosystems, supporting fish communities (End-Pit Lakes Working Group 2004). End-pit lakes in Canada are considered as potential alternatives to restoration of original landscapes in part because of their potential for fish and aquatic habitat. End-pit lakes may also provide hydrological functions such as buffers for flooding, water storage, and decreasing the movement of surface and ground water (End-Pit Lakes Working Group 2004).

1.1.2 Summary of Existing Information for End-Pit Lakes in the Coal Valley Area

Limnological, ecological, and water quality studies have been conducted on end-pit lakes in the CVM area:

1. In the 1990s, studies were conducted on Lovett, Silkstone, and Stirling (Pit 24) lakes by Luscar (1994), Agbeti (1998) and Mackay (1999);

2. In 2006, studies were conducted on Lovett, Silkstone, and Stirling (Pit 24) lakes plus Pit 35 and Pit 45 lakes (Hatfield 2008). Hatfield (2008) focused on overall limnological characterization of end-pit lakes in the CVM area and comparing and contrasting the limnological characteristics of end-pit lakes in the CVM area to limnological characteristics of Fairfax Lake, a natural lake located in the vicinity of the CVM area; and

3. In 2010 and 2011, water quality evaluations were conducted on Lovett, Silkstone, and Stirling (Pit 24) lakes plus Pit 35, Pit 45, Pit 44, Pit 142, Pit 25E and Pit 25S lakes (Hatfield 2011). A natural lake in the CVM area, Fairfax Lake, was also sampled.

The Hatfield (2008) study concluded that, because of the variation in water quality, sediment quality, and biological characteristics among the end-pit lakes and in comparison to Fairfax Lake, it was unclear which factors (i.e., time since establishment, presence of inflows and outflows, type of mixing, flushing rates, bathymetry, habitat complexity, or other characteristics), were more important to end-pit lake development, to what degree these factors influenced the ecological viability of end-pit lakes, and how these factors interacted to produce sustainable lake ecosystems.

The Hatfield (2011) study suggested that there may be fewer constraints of water quality on the ecological viability of end-pit lakes in the CVM area than those described in End-Pit Lake Working Group (2004):

1. The concentration of a number of water quality variables, such as nutrients and major ions, are higher in 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;

2. There are relatively few instances of measured water quality variables, including metals, exceeding provincial or federal water quality guidelines;

3. The incidence of water quality guideline exceedance is not measurably greater in end-pit lakes than in natural lakes in the CVM area; and

4. The trophic status of end-pit lakes is similar to that of natural lakes in the CVM area.

The results of the study reported in Hatfield (2011) suggest that the effects of chemoclines in end-pit lakes on water quality, particularly dissolved oxygen concentrations, and the consequent inability for end-pit lakes to turnover, may be less than initially thought, and the ability of end-pit lakes to be holomictic may be less of an factor in determining amount of viable aquatic habitat than previous studies have indicated. Hatfield (2011) notes that while lake turnover is generally considered an important ecological process in most productive lakes (Hutchinson 1938, Effler and Perkins 1987 and Wetzel 2001) it is not a necessary process governing the ability of a lake to sustain healthy fish populations (Effler and Perkins 1987, Trimbee and Prepas 1988).

1.1.3 Macrophytes in the Aquatic Community

This report presents an assessment of the development of macrophyte communities in nine end-pit lakes within the CVM area. The examination of macrophyte communities aims to provide information regarding aquatic habitat of the end-pit lakes in the CVM area as an additional indicator of their ecological sustainability. In this regard, this study complements and augments the previous end-pit lake studies described in Section 1.1.2 and the guidelines for end-pit lakes provided in End-Pit Lake Working Group (2004).

Macrophytes (or aquatic plants) are fundamental in contributing to a productive lake environment (Lacoul and Freedman 2006). Aquatic plants form the base for each trophic level in a lake, providing habitat for microorganisms, invertebrates and fish. Fish depend on vegetation for habitat (cover structures), foraging opportunities, and oxygen regulation (Barko et al. 1986; Duarte et al. 1986; Randall et al. 1996; Oslon et al. 1998).

The establishment, distribution and abundance of macrophytes is dependent on several environmental factors. These include physical, chemical and biological factors that can be influenced on spatial and temporal scales (Lacoul and Freedman 2006). Several studies have documented the importance of factors such as light (including turbidity and photosynthetic potential), water chemistry and nutrient requirements, geomorphology (e.g., lake depth, slope, wave action), sediment composition, and ecology (e.g., competition between plants, role as a food source) on the development of macrophyte communities. Few studies, however, have documented how macrophytes develop in end-pit lakes.

1.2 STUDY OBJECTIVES

Because end-pit lakes are part of ongoing reclamation activities being implemented by CVRI in the CVM area and will form part of reclamation and closure plans for new and proposed mining projects, CVRI updated and expanded the bathymetric information on end-pit lakes. Macrophytes can be used as a parameter for measuring lake production leading into measuring viable

aquatic habitat. This information increases understanding of ecological sustainability of end-pit lakes created from surface coal mine pits using conventional techniques and provides guidance to the design and management of future end-pit lakes.

The key objectives for this study were to:

1. Conduct updated bathymetry mapping on select, representive end-pit lakes in the CVM area;

2. Assess macrophyte communities: abundance and composition (taxonomic richness) on selected end-pit lakes in the CVM area;

3. Assess changes in macrophyte communities as lakes mature; and

4. Derive recommendations for increasing viable aquatic habitat and productivity in end-pit lakes based on macrophyte assessment.

2.0 STUDY DESIGN AND FIELD METHODOLOGIES

2.1 LAKES SAMPLED

Nine end-pit lakes were sampled from August 26, 2013 to August 31, 2013; basic information on surveyed lakes is provided in Table 1. Lakes were selected based on age, size, depth and previous monitoring history. Some lakes were included in previous studies, whereas others have not yet been studied due to age or other factors specific to the study.

Macrophyte communities were assessed using digital echo sounder technology and visual surveys. The digital echo sounder was used for both bathymetric and macrophyte mapping (canopy characterization, depth) configured for the Submersed Aquatic Vegetation Early Warning System Jr. software (hereafter SAVEWS Jr.; Sabol et al. 2002). Visual surveys included identification of macrophytes (lowest possible taxa) and underwater photography at depths. Detailed methods are described in the following sections.

2.2 BATHYMETRIC AND MACROPHYTE MAPPING

Bathymetric and macrophyte mapping were conducted simultaneously using a Lowrance depth sounder with a 200 KHz transducer combined with a downward-looking Lowrance side-scan sonar with 455 and 800 KHz transducers according to the SAVEWS Jr. User's Manual (Sabol 2002). Transducers were attached to an outboard bracket fixed to the stern of a 15' Zebec Armada boat equipped with a 6 HP Honda engine.

Table 1 Summary information on the lakes sampled as part of this study.

Lake	Year Created (Age)[1]	Type	Location	Approximate Surface Area (ha)	Maximum Depth (m)	Mean Depth (m)	Inflow	Outflow	Monitoring History
Lovett Lake	1985 (28)	Dragline	10-47-19-W5M	6.0	18	5.5		✓[2]	1987, 1989, 1991, 1993, 1998, 2006, 2010, 2011
Silkstone Lake	1986 (28)	Dragline	9-47-19-W5M	6.4	14.8	4.7	✓	✓	1987, 1989, 1991, 1993, 1998, 2006, 2010, 2011
Pit 24 (Stirling)	1993 (20)	Truck and shovel	4-47-19-W5M	4.9	23.5	8.1			1998, 2006, 2010, 2011
Pit 34	2007 (6)	Dragline	34-46-19-W5M	5.9	5.5	2.9			None
Pit 35	1999 (14)	Dragline	26-46-19-W5M	3.5	11.4	5.7		✓	2006, 2010, 2011
Pit 43[3]	2008 (5)	Dragline	34-46-19-W5M	n/a	n/a	n/a			None
Pit 45	1999 (12)	Dragline	26-46-19-W5M	6.5	12.5	6.3	✓	✓	2006, 2010, 2011
Pit 122	2009 (4)	Dragline	29-47-21-W5M	7.8	17.3	7.0			None
Pit 142	2008 (5)	Dragline	24-47-21-W5M	7.24	7.4	2.2	✓	✓	2011

[1] Lake age is based on the last year of topsoil placement and re-contouring of the lakes.

[2] Outflow is through a subsurface connection to Lovett River.

[3] Data collected could not be used in analysis due to issues with SAVEWS Jr. program.

A series of transects consisting of datapoints configured by Sabol et al. (2002) were run across the width of each lake, moving to and from opposite shores for the entire length of each lake. The boat speed while running transects ranged from 4 km/hr to 5 km/hr to make the rate of datapoint collection consistent. The transducer and sonar created echograms (Figure A1.1) which illustrated data (.SL2 files) of lake depth and if detected, canopy height of vegetation. Data were recorded on an 8 GB memory card inserted into the Lowrance depth sounder. While the number and length of transects varied depending on the size of the lake, approximately 20 transects were conducted on each lake. Individual transect information such as survey times, locations (latitude, longitude, UTMs) and file names were also recorded in the Lowrance unit.

Digital sonar data from the Lowrance unit were transferred to SAVEWS Jr. software (version 1.1), and echograms (Figure A1.1) displaying canopy height and lake depth data were used with default configuration files from Sabol et al. (2002). The use of configuration files with echograms generated a graphic output (Figure A1.2) that allowed for visual checks of data and optimizing the accuracy of macrophyte height and lake depth interpretations of each transect. Each lake was individually checked and configured to account for unique characteristics such as surface noise (wind/wave action), length of transect, and sediment composition (soft versus rocky bottom) that may influence data interpretation by the software. Not all transects collected in the field were successfully processed by the SAVEWS Jr. program for a variety of reasons. Only complete and correctly processed transect data was used in the analysis of each lake. Factors such as wave/wind interference sometimes caused too much surface noise which prevented the program from detecting the bottom of the lake. The SAVEWS Jr. software also had unknown incompatibility issues with some of the data that the developer was unable to correct for this study. This was a particular problem with Pit 43 Lake, where none of the data could be used for analyses even after attempts to reconfigure data were made by the software developer. This was an unknown issue until data analysis began. Completion of a new survey of Pit 43 Lake would be required to reattempt the analysis of this lake.

2.3 ANALYSIS OF SONAR DATA

Once transect data were processed and visually assessed in SAVEWS Jr. they were run through a second program, FINALIZE (version 1.0; Sabol et al. 2002) to compile transect data for each lake. In some cases, data from transects could not be interpreted by the software program (as explained in Section 2.2). Outputs from FINALIZE were ASCII files (accessed in Microsoft Excel) displaying time, location (i.e., latitude and longitude), bottom depth and calculated height (if present) and percent cover of macrophytes for each datapoint. From these data, macrophyte biovolume (defined as the percentage of the water column occupied by macrophytes) of the macrophytes was calculated for each transect using the following formula:

$$Biovolume = \frac{Percent\ cover \times Macrophyte\ height}{Bottom\ depth}$$

The ASCII files were also subsequently used for geographic information systems (GIS). The GIS data were used to interpolate depth profiles, plant height and cover within each lake, enabling the production of maps for bathymetry and macrophyte cover (biovolume). Five of the nine lakes surveyed had previously been studied by Hatfield (2008, 2011) and had accurate bathymetric maps. Old maps were updated, and new maps for newly-surveyed lakes were created.

2.4 MACROPHYTE COMMUNITY SURVEYS

In addition to digital mapping and characterization of macrophyte communities, visual assessments of macrophytes were conducted (i.e., macrophyte taxa) to determine community composition as described below. Macrophytes for the purpose of this report included flowering aquatic plants (angiosperms), mosses (bryophytes) and algae. Characterization of the macrophyte community was recorded using the same hardware and configuration used to collect bathymetry data once bathymetric transects for the entire length of the lake had been collected.

A total of 10 visual assessments were conducted within each of the three depth categories in each lake: 0 m to 1.5 m, >1.5 m to 3 m, and >3 m to 5 m. Visual assessments were conducted by the field crew from the boat for the first depth category (0 m to 1.5 m). Macrophytes were identified to the lowest possible taxonomic level (species where possible), as well as ranked dominant taxa by percent (%) composition. Macrophytes that could not be identified were numbered by lake with detailed photos by an underwater camera for later identification. Voucher specimens of the macrophytes that could not be identified were taken from Silkstone and Lovett lakes to assist with species identification after completion of the field surveys. Vouchers were kept in sealed bags with water, stored in a cool, dark place. In some cases, clarity of photos made macrophyte identification difficult and therefore unidentified specimens were grouped into "unknown species" categories.

For the other two depth categories (>1.5 m to 3 m, and >3 m to 5 m), a GoPro (Hero 3) camera in a waterproof case was attached to an apparatus (constructed stand with measured rope attachment), along with a dive light (Light and Motion SOLA Video1200) to collect underwater images. The apparatus was designed with four legs and mounts to hold the camera and a dive light approximately 0.5 m from the substrate so that any vegetation present at that depth would be illuminated and captured in a photo. With camera settings to capture images every two seconds, the apparatus was lowered to the lake bottom. After allowing time for two images to be captured, the apparatus was raised 0.5 m and held for another five seconds in order to capture taller plants and canopy structure. Details regarding location coordinates, date, time, lake bottom depth and associated depth category were recorded for each assessment. Following the assessments, images were sorted and macrophytes, if present were identified to lowest possible taxonomic levels. Macrophytes that could not be identified due to image quality were labelled as "unknown". Examples of photographs taken at depth are provided in Appendix A1 (Figure A1.3, Figure A1.4 and Figure A1.5).

3.0 RESULTS

3.1 LOVETT LAKE

3.1.1 Summary of Observations and Conditions

Lovett Lake, an end-pit lake established 28 years ago and was studied by Luscar (1994), Agbeti (1998), Mackay (1999) and Hatfield (2008, 2011), with this latter study characterizing Lovett Lake as meromictic. Lovett Lake has been and is currently being stocked with rainbow trout (*Oncorhynchus mykiss*) (Alberta Government 2013). Field observations noted evidence of recreational use of the lake, as well as well-established riparian communities including forested areas surrounding the end-pit lake.

3.1.2 Bathymetric Mapping

The bathymetric map for Lovett Lake obtained as a result of this study is presented in Figure 2.

3.1.3 Macrophyte Surveys and Analysis

Data from 14 of the 20 transects taken on Lovett Lake were used for the macrophyte analysis. The most prevalent species of macrophytes were narrowleaf bur-reed, northern watermilfoil, and bryophyte spp., comprising approximately 60% of all macrophytes identified in Lovett Lake. A total of 11 macrophyte taxa were identified across all depth categories and to a maximum depth of 4.7 m. A complete description of the macrophytes identified in Lovett Lake is presented in Table A2, and the biovolume map of macrophytes in Lovett Lake is presented in Figure 3.

3.2 SILKSTONE LAKE

3.2.1 Summary of Observations and Conditions

Silkstone Lake was studied by Luscar (1994), Agbeti (1998), Mackay (1999), and Hatfield (2008, 2011). Silkstone Lake has been characterized as meromictic (Hatfield 2008) and is 28 years old. Silkstone Lake has been and is currently being stocked with rainbow trout (Alberta Government 2013). Field observations noted evidence of recreational use of the lake area, as well established riparian communities including forested areas surrounding the end-pit lake.

3.2.2 Bathymetric Mapping

The bathymetric map for Silkstone Lake obtained as a result of this study is presented in Figure 4.

3.2.3 Macrophyte Surveys and Analysis

Data from 15 of the 21 transects taken on Silkstone Lake were used for the macrophyte analysis. The most prevalent types of macrophytes identified were *Chara* sp. and an unknown species, comprising approximately 50% of all

macrophytes identified in Silkstone Lake. A total of 12 taxa were identified. The maximum depth at which macrophytes were identified in Silkstone Lake was 5 m. A complete description of the macrophytes identified in Silkstone Lake is presented in Table A2, and the biovolume map of macrophytes in Silkstone Lake is presented in Figure 5.

3.3 STIRLING (PIT 24) LAKE

3.3.1 Summary of Observations and Conditions

Stirling Lake has been studied by Luscar (1994), Agbeti (1998), Mackay (1999) and Hatfield (2008, 2011). Silkstone Lake has been characterized as meromictic (Hatfield 2008) and is 20 years old. This end-pit lake has been historically stocked with both brown (*Salmo trutta*) and rainbow trout but is currently only being stocked with rainbow trout (Alberta Government 2013). Field observations noted well-used trails around the end-pit lake indicating recreational use. The drainage area of Stirling Lake consists of steep, grass-covered slopes with some gentle sloping areas. Portions of the riparian area are forested with coniferous species.

3.3.2 Bathymetric Mapping

The bathymetric map for Stirling Lake obtained as a result of this study is presented in Figure 6.

3.3.3 Macrophyte Surveys and Analysis

Data from 13 of the 15 transects taken on Stirling Lake were used for the macrophyte analysis. A total of 10 taxa were identified, the most prevalent species were mare's tail, vernal starwort and *Chara* sp., comprising more than 60% of all macrophytes identified in Stirling Lake. Macrophytes were present at all three depth categories that were assessed and the maximum depth at which macrophytes were identified was 4.6 m. A complete description of the macrophytes identified in Stirling Lake is presented in Table A2, and the biovolume map of macrophytes in Stirling Lake is presented in Figure 7.

3.4 PIT 35 LAKE

3.4.1 Summary of Observations and Conditions

Pit 35 Lake was studied by Hatfield (2008, 2011) and is 14 years old. Field observations noted steep, grass-covered slopes with some adjacent, young tree plantations in the drainage of this end-pit lake.

3.4.2 Bathymetric Mapping

The bathymetric map for Pit 35 Lake obtained as a result of this study is presented in Figure 8.

3.4.3 Macrophyte Surveys and Analysis

Data from all 15 transects taken on Pit 35 Lake were used for the macrophyte analysis. Five taxa were identified, where *Chara* sp., comprised over 50% of the identified community of Pit 35 Lake. Macrophytes were present at all three depth categories that were assessed and the maximum depth at which macrophytes were identified in Pit 35 Lake was 5.5 m. A complete description of the macrophytes identified in Pit 35 Lake is presented in Table A2, and the biovolume map of macrophytes in Pit 35 Lake is presented in Figure 9.

3.5 PIT 45 LAKE

3.5.1 Summary of Observations and Conditions

Pit 45 Lake has been studied by Hatfield (2008, 2011). Pit 45 Lake has been characterized as meromictic (Hatfield 2008) and is 12 years old. Field observations noted steep, grass-covered slopes with some adjacent, young tree plantations in the drainage of this end-pit lake.

3.5.2 Bathymetric Mapping

The bathymetric map for Pit 45 Lake obtained as a result of this study is presented in Figure 10.

3.5.3 Macrophyte Surveys and Analysis

Data from 18 of the 20 transects taken on Pit 45 Lake were used for the macrophyte analysis. Eight taxa were identified in Pit 45 Lake. The most prevalent type of macrophyte identified was *Chara* sp., comprising approximately 80% of all macrophytes. Macrophytes were present at all three depth categories that were assessed and the maximum depth at which macrophytes were identified in Pit 45 Lake was 4.9 m. A complete description of the macrophytes identified in Pit 45 Lake is presented in Table A2, and the biovolume map of macrophytes in Pit 45 Lake is presented in Figure 11.

3.6 PIT 142 LAKE

3.6.1 Summary of Observations and Conditions

Pit 142 Lake, one of the shallower end-pit lakes in this study with a mean depth of 2.2 m, was studied by Hatfield (2011), which assessed the end-pit lake as holomictic. Pit 142 Lake is five years old. Field observations noted steep slopes with dense grass and terrestrial vegetation in the drainage of this end-pit lake. No trails or evidence of recreational use were noted.

3.6.2 Bathymetric Mapping

The bathymetric map for Pit 142 Lake obtained as a result of this study is presented in Figure 12.

3.6.3 Macrophyte Surveys and Analysis

Data from 14 of the 16 transects taken on Pit 142 Lake were used for the macrophyte analysis. Narrowleaf bur-reed and mare's tail were the only two types of macrophyte identified in Pit 142 Lake. Macrophytes were present only in the 0 m to 1.5 m depth category. A complete description of the macrophytes identified in Pit 142 Lake is presented in Table A2, and the biovolume map of macrophytes in Pit 142 Lake is presented in Figure 13.

3.7 PIT 34 LAKE

3.7.1 Summary of Observations and Conditions

This study is the first conducted on Pit 34 Lake, which is six years old. Field observations noted high turbidity in many sections of this end-pit lake. Exposed sediment was also noted along many sections of the shoreline. The riparian community consisted of grasses, sedges and some shrub species.

3.7.2 Bathymetric Mapping

The bathymetric map for Pit 34 Lake obtained as a result of this study is presented in Figure 14.

3.7.3 Macrophyte Surveys and Analysis

Data from all 23 transects taken on Pit 34 Lake were used for the macrophyte analysis. Large-sheath pondweed and narrowleaf bur-reed were the only two types of macrophyte identified in Pit 34 Lake. Macrophytes were present in the 0 m to 1.5 m and >1.5 m to 3 m depth categories. A complete description of the macrophytes identified in Pit 34 Lake is presented in Table A2, and the biovolume map of macrophytes in Pit 34 Lake is presented in Figure 15.

3.8 PIT 43 LAKE

3.8.1 Summary of Observations and Conditions

This study is the first conducted on Pit 34 Lake, which is five years old. The data from this end-pit lake could not be used to create either a bathymetric or macrophyte biovolume map because of problems with the SAVEWS Jr. software. Field observations noted large areas of exposed sediment and erosion occurring on steeper slopes of the drainage of the end-pit lake; and riparian communities consisted of grass and sedge species.

3.8.2 Bathymetric Mapping

No bathymetric map is available for Pit 43 Lake.

3.8.3 Macrophyte Surveys and Analysis

Visual surveys documented the presence of four taxa in Pit 43 Lake. *Chara* sp. accounted for over 80% of the community and were observed to depths of 2.7 m. A total of four taxa were identified. A complete description of the macrophytes identified in Pit 43 Lake is presented in Table A2. No figure is available for biovolume of Pit 43 Lake.

3.9 PIT 122 LAKE

3.9.1 Summary of Observations and Conditions

This study is the first conducted on Pit 122 Lake, which is four years old. Field observations noted a number of factors that may be inhibiting development of macrophyte communities such as lack of terrestrial vegetation, high turbidity, and steep lake basin slopes with exposed soil.

3.9.2 Bathymetric Mapping

The bathymetric map for Pit 122 Lake obtained as a result of this study is presented in Figure 16.

3.9.3 Macrophyte Surveys and Analysis

No macrophytes were observed during visual surveys and no macrophytes were detected by sonar in Pit 122 Lake.

3.10 RELATIONSHIPS BETWEEN MACROPHYTE COMMUNITIES AND AGE OF END-PIT LAKES

3.10.1 Taxonomic Richness

Taxonomic richness of macrophyte communities in end-pit lakes in the CVM area increases significantly with the age of the end-pit lake (R^2 = 0.88, P <0.001; Figure 17). Results show that end-pit lakes in the CVM area require a minimum of 4 to 5 years in order to begin developing a community. This relationship is significant in the shallow areas (0 m to 1.5 m depth) of the end-pit lakes as well (R^2 = 0.72, P <0.01) and greater depths (R^2 = 0.83, P < 0.001; R^2 = 0.83, P < 0.001 for >1.5 m to 3 m and >3 m to 5 m depth categories, respectively), there is a trend towards increasing taxonomic richness of macrophyte communities with increasing age of end-pit lakes at these greater depths (Figure 17).

3.10.2 Biovolume of Macrophytes

Similar to taxonomic richness, mean macrophyte biovolume in end-pit lakes in the CVM area generally increases with age, but at more shallow depths (R^2 = 0.44, P = 0.07; Figure 18). Results show that as the end-pit lakes mature, macrophyte communities continue developing, however, the rate of development changes

with increasing depth (0 m to 1.5 m: R^2 = 0.62, P <0.05; >1.5 m to 3 m: R^2 = 0.41, P = 0.08; >3 m[1]: R^2 = 0.44, P = 0.24; Figure 18). Colonization of macrophytes is greatest in shallow areas of the lake, moving to deeper areas more gradually.

4.0 DISCUSSION

4.1 MACROPHYTE DEVELOPMENT IN END-PIT LAKES

Several factors including sediment type, depth, and water chemistry can influence macrophyte colonization and growth (Barko et al. 1986; Duarte and Kalff 1986; Duarte et al. 1986; Lacoul and Freedman 2006; Caffrey et al. 2007; Gammons et al. 2009). End-pit lakes have been documented to go through four stages during the development of macrophytes (Gammons et al. 2009). These stages cover the initial stage after creation where no macrophytes are present in pit lakes, through to transition stages and lastly, the "old-age" stage (Gammons et al. 2009). End-pit lakes in the CVM area that were surveyed in this study generally reflected these various stages demonstrating movement towards increasingly diverse and abundant macrophyte communities with increasing age. Only one end-pit lake, the youngest (Pit 122 Lake), at four years of age, had no vegetation growth. Results indicate that after end-pit lakes are created, they require a minimum of 4 to 5 years before macrophyte establishment begins. In the CVM area, macrophyte colonization in end-pit lakes begins in shallow areas (i.e., 0 to 1.5 m depth). Development of areas >1.5 m begins after five years, gradually increasing establishment and richness of macrophytes in deeper areas. Overall, the greatest increases in macrophyte establishment (biovolume and taxonomic richness appears to occur after end-pit lakes reach 10 years of age.

Taxonomic richness of macrophyte communities in end-pit lakes in the CVM area has been shown in this study to increase with age of end-pit lake across each depth category. The two oldest end-pit lakes, Lovett and Silkstone at 28 years, contained the highest taxonomic richness in the macrophyte community. A total of 13 taxa (excluding unknown species) were found across all end-pit lakes. Shallow sections of end-pit lakes (0 to 1.5 m) contain greater taxonomic richness than deeper areas. Each end-pit lake, when organized by age displayed trends on community composition. Macrophyte communities in younger end-pit lakes are generally comprised of known "pioneer" species such as mare's tail, bryophytes, algae species, *Chara* species, large-sheath pondweed and narrowleaf bur-reed. Some macrophyte species, such as white water buttercup, vernal starwort and small-leaf pondweed, were only found in older end-pit lakes (>20 years old). Overall, it appears the greatest increase in taxonomic richness in macrophytes occurs after an end-pit lake reaches 10 years of age.

[1] Biovolume was calculated from sonar output data for all depths surveyed in end-pit lakes and therefore exceeds the maximum depth used in visual surveys of 5 m.

Similarly, biovolume of macrophytes in end-pit lakes in the CVM area has also been shown in this study to increase with end-pit lake age, although there is greater variability in this relationship among end-pit lakes than the relationship between taxonomic richness and end-pit lake age. It should be noted that the biovolume data used in this analysis were generated from data obtained over the entire end-pit lakes and therefore included lake depths that in many cases exceeded depths that macrophytes can be reasonably expected to occur. The growth of many macrophyte species is optimal at depths less than 2 m, but range to maximum of 9 m (Caffrey et al. 2007). Biovolume of macrophytes overall was low in areas greater than 3 m in depth. In shallow areas, biovolume has significantly increased over time and is highest overall in those parts of the end-pit lakes 0 m to 1.5 m in depth. Silkstone Lake, an end-pit lake that is 28 years old contains the largest biovolume of macrophytes among the end-pit lakes that were surveyed in this study.

4.2 CONCLUSIONS AND RECOMMENDATIONS

The results of this study suggest that end-pit lakes in the CVM area, as measured by macrophyte communities, become more biologically-productive with age. The oldest end-pit lakes in this study, Lovett and Silkstone lakes are examples of end-pit lakes that over time have developed into productive systems supporting aquatic life. The presence of increasingly diverse and abundant (biovolume) macrophyte communities suggests that reclaimed end-pit lakes in the CVM area can develop the macrophyte component of the ecological requirements for fish populations. The performance of macrophyte establishment in end-pit lakes however has not been compared against natural lakes. A method to verify the success of developing aquatic communities in end-pit lakes would be a direct comparison against nearby natural lakes (e.g., Fairfax Lake). This would provide the opportunity to evaluate the development of macrophytes (taxonomic richness and biovolume across various depths) in end-pit lakes against a natural lake ecosystem.

Macrophytes are ecologically-important in maintaining fish productivity by supporting many life history stages of fish populations (Randall et al. 1996; Olson et al. 1998; Gammons et al. 2009). Studies from other lakes have linked macrophyte abundance with significantly higher densities of small fish in comparison to areas lacking vegetation (Olson et al. 1998; Randall et al. 1996). Aquatic vegetation in lakes provides feeding opportunities through the support of the invertebrate community and habitat diversity as cover structures (Barko et al. 1986).

To encourage macrophyte communities in the early stages of development of end-pit lakes in the CVM area, introduction of aquatic vegetation may be manually initiated through the dispersal of seeds, or transplant of whole plants, winter buds or tubers (Alberta Environment 1989; Lacoul and Freedman 2006). Seeds and plant donors can be attained from other developed lakes in the area, and should focus on known native, pioneer or early colonizing species such as

mare's tail (*Hipprus vulgaris*), Canada waterweed (*Elodea canadensis*), and pondweed species (*Potamogeton* spp). These species are associated with higher production, and in particular, mare's tail is known to establish well in areas following environmental disturbance (Lacoul and Freedman 2006). Canada waterweed has also been documented to successfully grow at depths of up to 12 m (Caffrey et al. 2007).

If manual planting is to be undertaken, it is recommended that it occur in shallow, sheltered areas of the end-pit lakes. As seen in the results of this study, highest taxonomic richness and biovolume of macrophytes were found in depths of 0 m to 1.5 m. Areas with steep slopes and/or areas that are exposed to wave action will decrease the success of vegetation establishment (Canfield et al. 1985; Barko and Smart 1986; Duarte and Kalff 1986; Olson et al. 1998). Depths of tuber transplant should not exceed 2 m due to light requirements of plants, and should avoid sandy, rocky or organic rich sediment (Canfield et al. 1985; Caffrey et al. 2007).

Similar to Lovett and Silkstone lakes, enhancing riparian areas of young end-pit lakes in the CVM area would greatly contribute to end-pit lake productivity. Factors such as slope can have significant impacts on developing vegetation. Sediment run-off into lakes caused by erosion on steep slopes can inhibit productivity by smothering vegetation and other aquatic life (Lacoul and Freedman 2006). Areas with gradual slopes in the littoral areas of end-pit lakes are optimal establishment sites for vegetation and would contribute to species diversity, as well as habitat diversity for both aquatic and terrestrial life. Pioneer species that establish in the transitional riparian-littoral zone include emergent species such as cattails (*Typha* spp), bulrushes (*Scirpus* spp) and sedges (*Carex* spp) (Gammons et al. 2009). Tree and brush plantation would provide short-term and long-term benefits for the aquatic and terrestrial environments. Benefits would include the reduction of erosion and runoff, contributions of woody debris, and increasing nutrient input into the end-pit lake building a foundation for the development of trophic levels to support fish populations (Gammons et al. 2009).

Figure 1 Location of lakes sampled in current study.

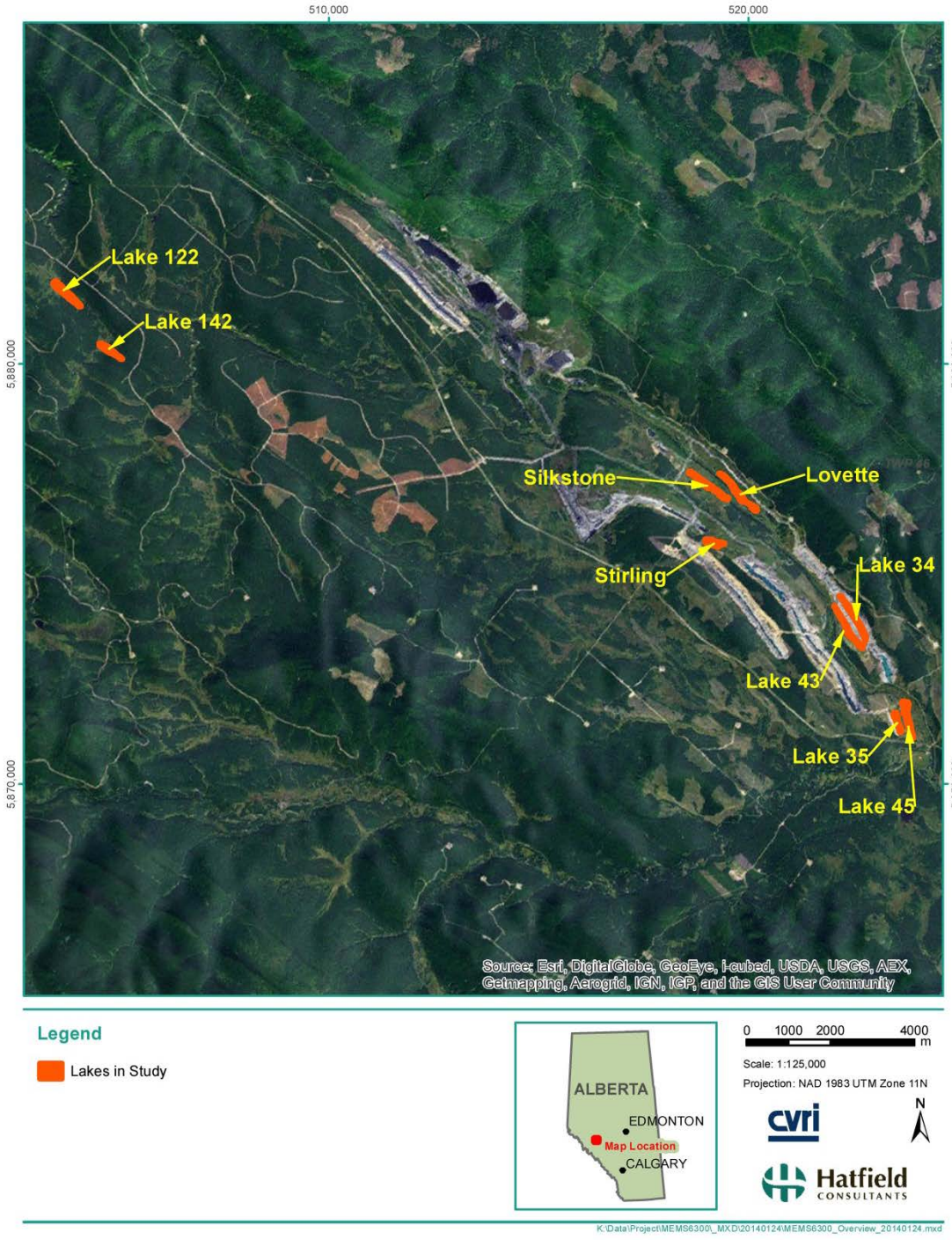


Figure 2 Bathymetric map of Lovett Lake.

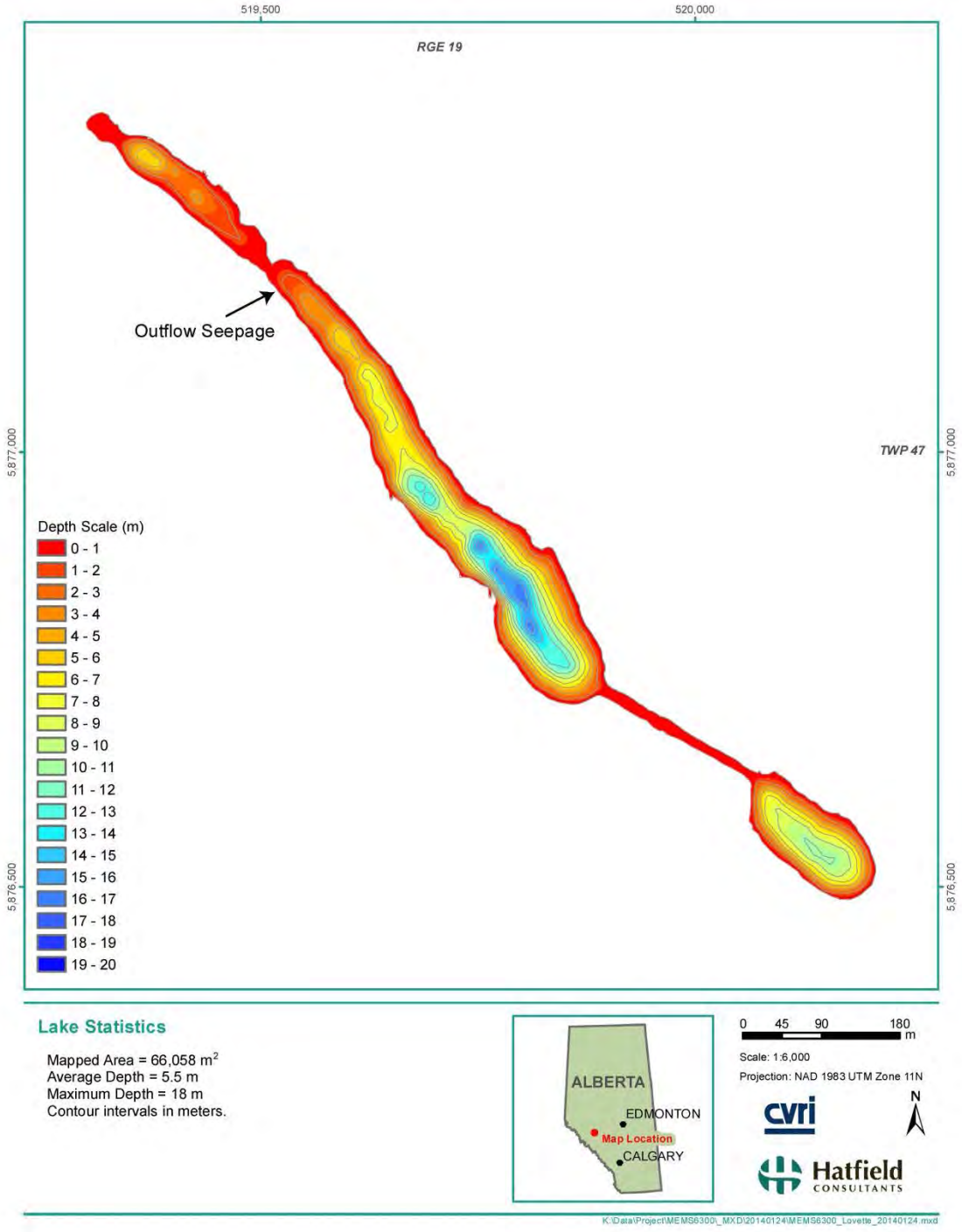


Figure 3 Biovolume map of Lovett Lake.

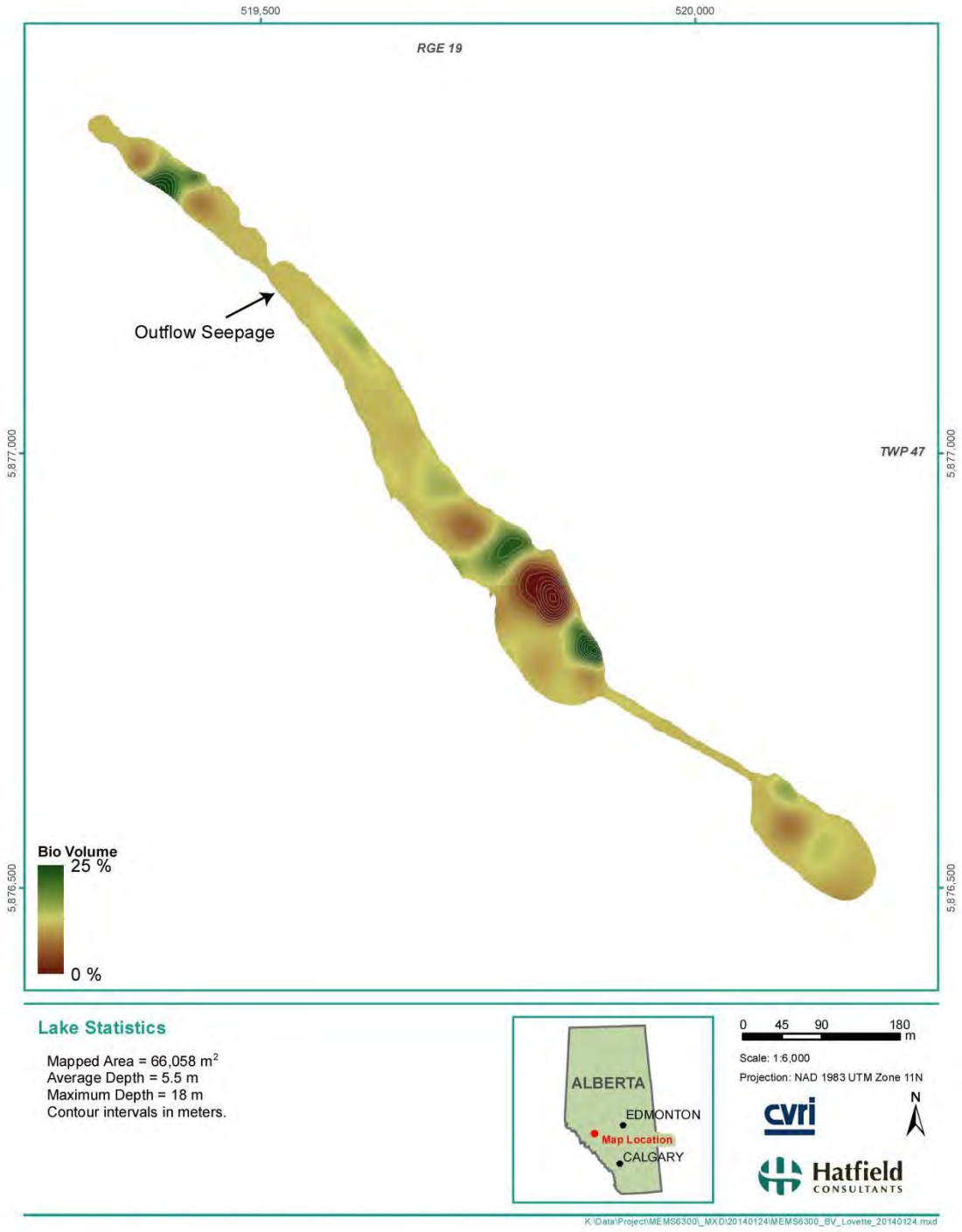


Figure 4 Bathymetric map of Silkstone Lake.

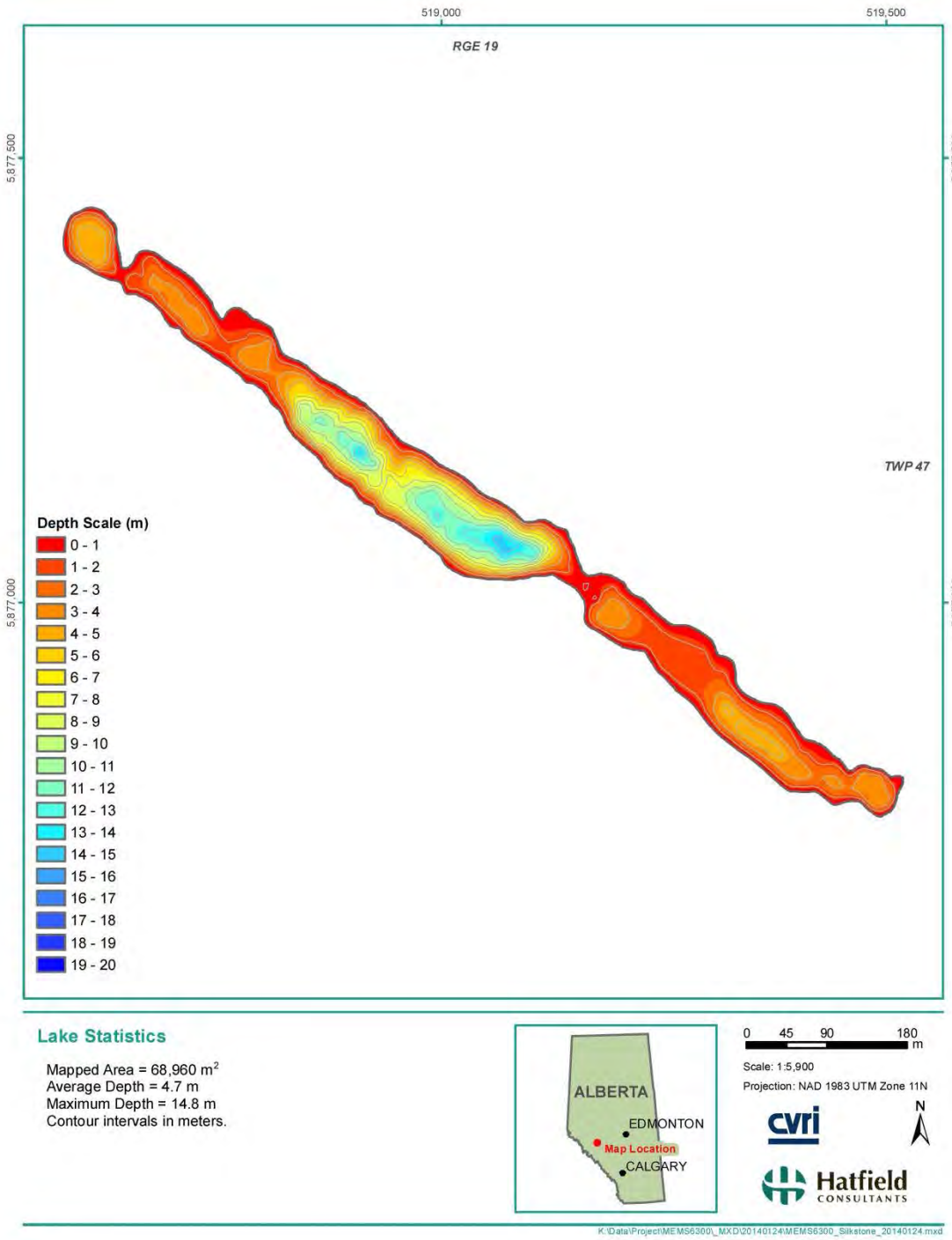


Figure 5 Biovolume map of Silkstone Lake.

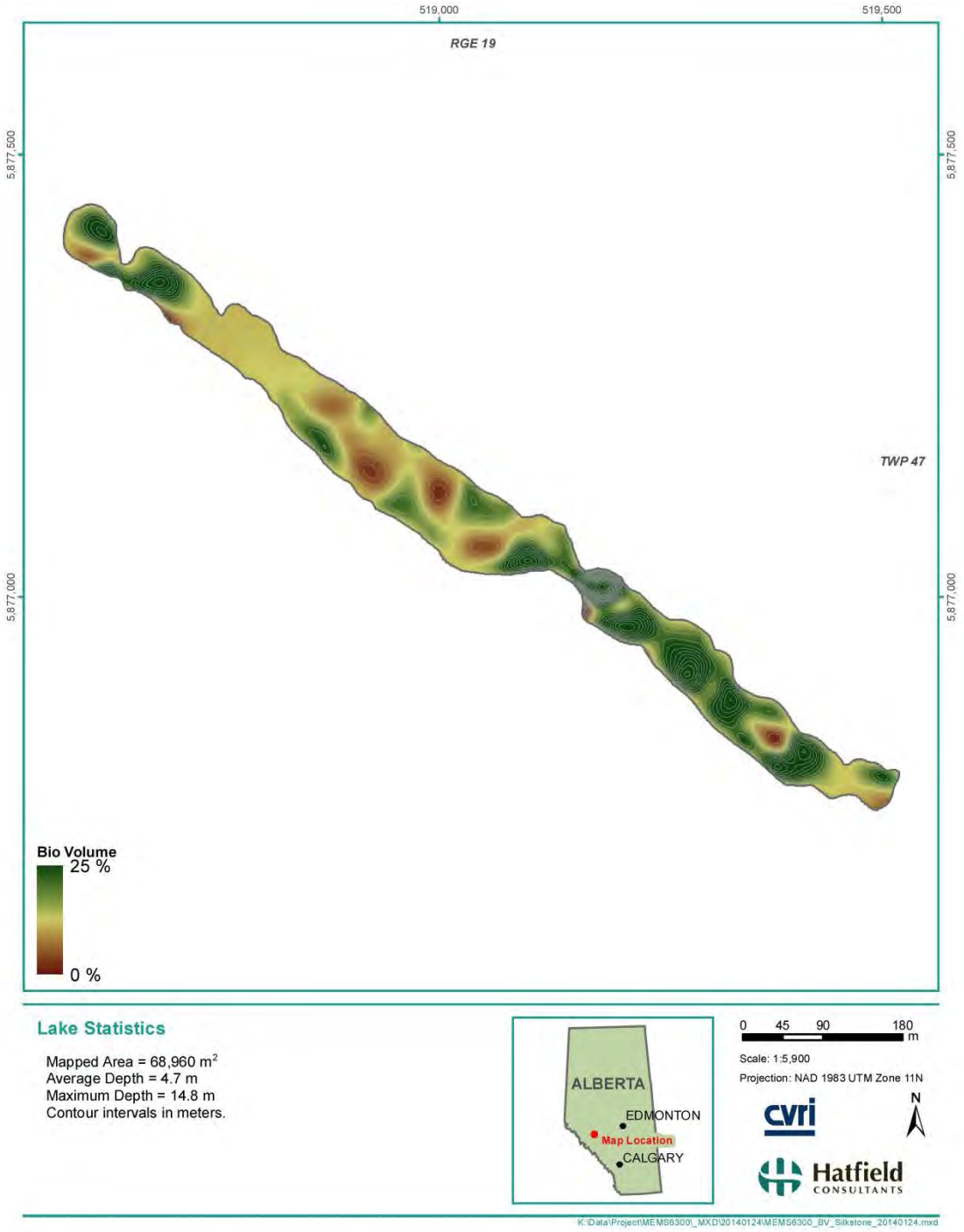


Figure 6 Bathymetric map of Stirling (Pit 24) Lake.

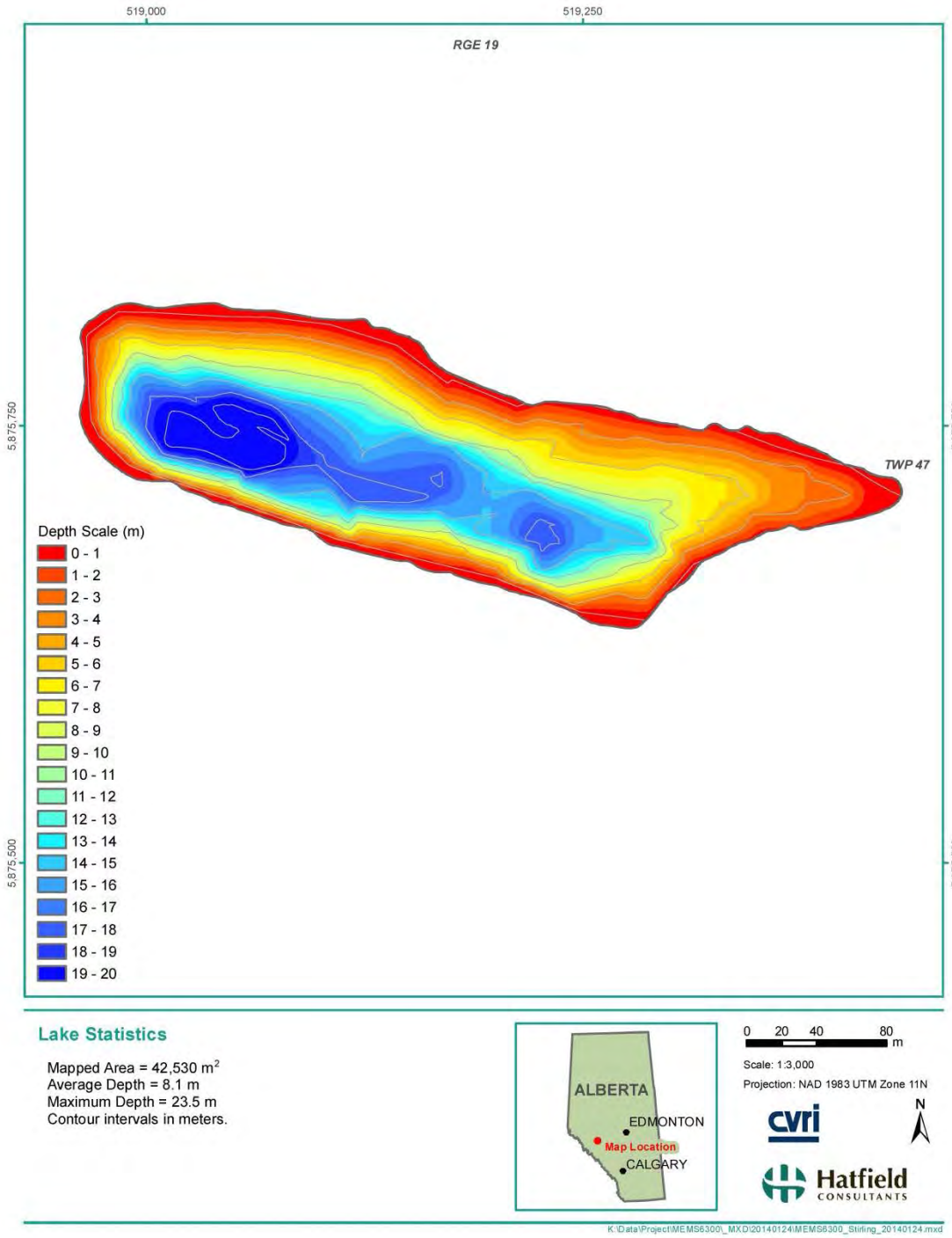


Figure 7 Biovolume map of Stirling (Pit 24) Lake.

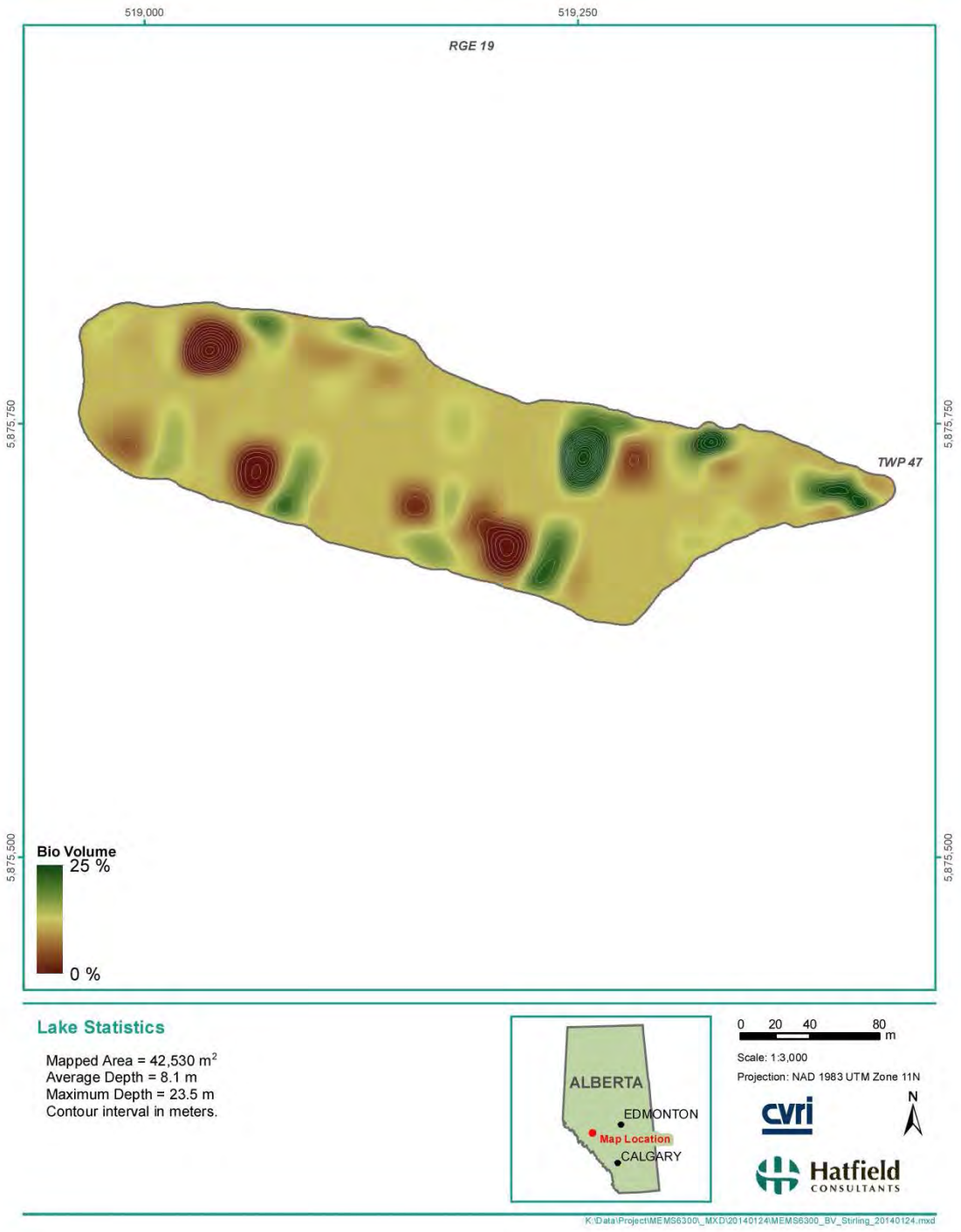


Figure 8 Bathymetric map of Pit 35 Lake.

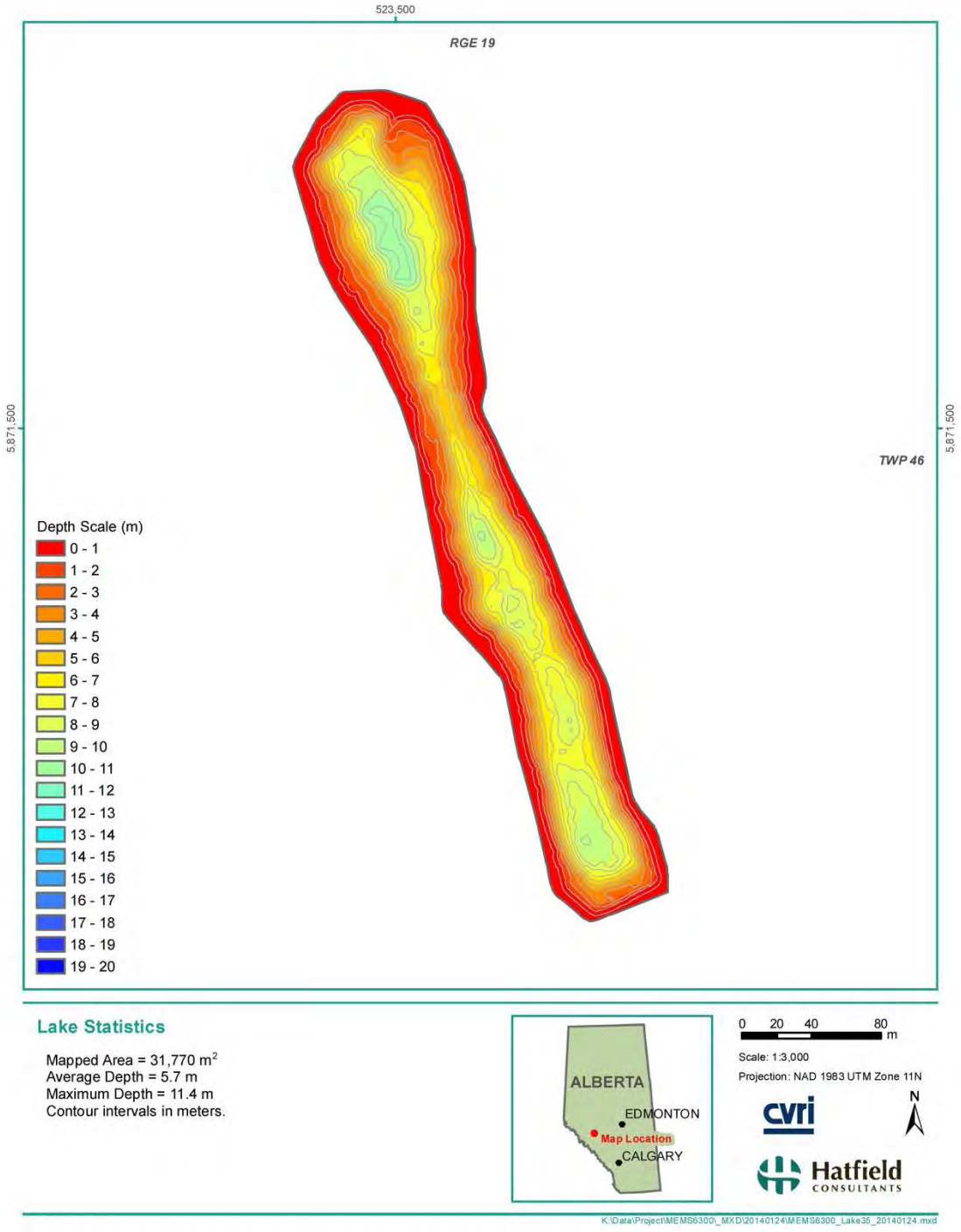


Figure 9 Biovolume map of Pit 35 Lake.

Figure 10 Bathymetric map of Pit 45 Lake.

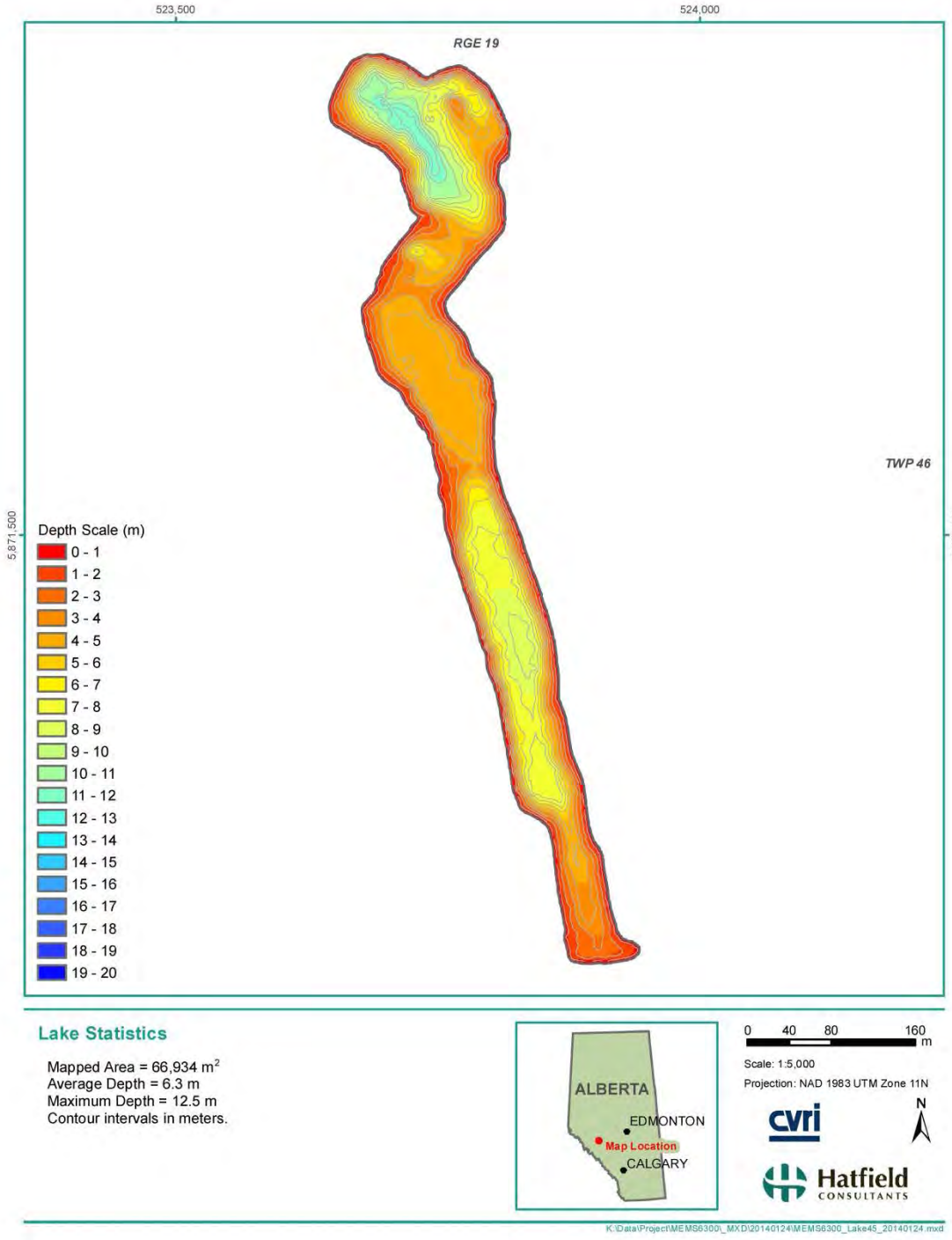


Figure 11 Biovolume map of Pit 45 Lake.

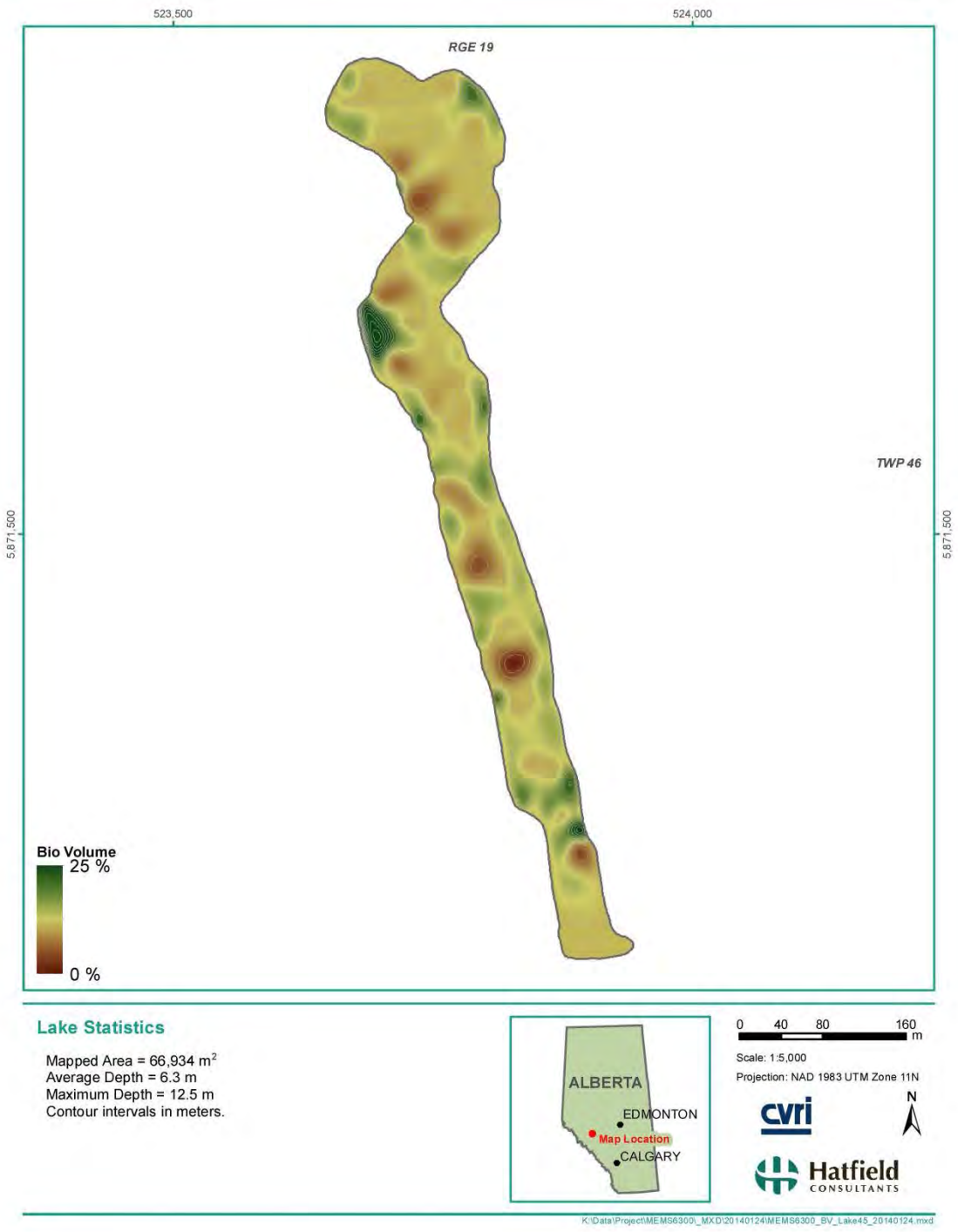


Figure 12 Bathymetric map of Pit 142 Lake.

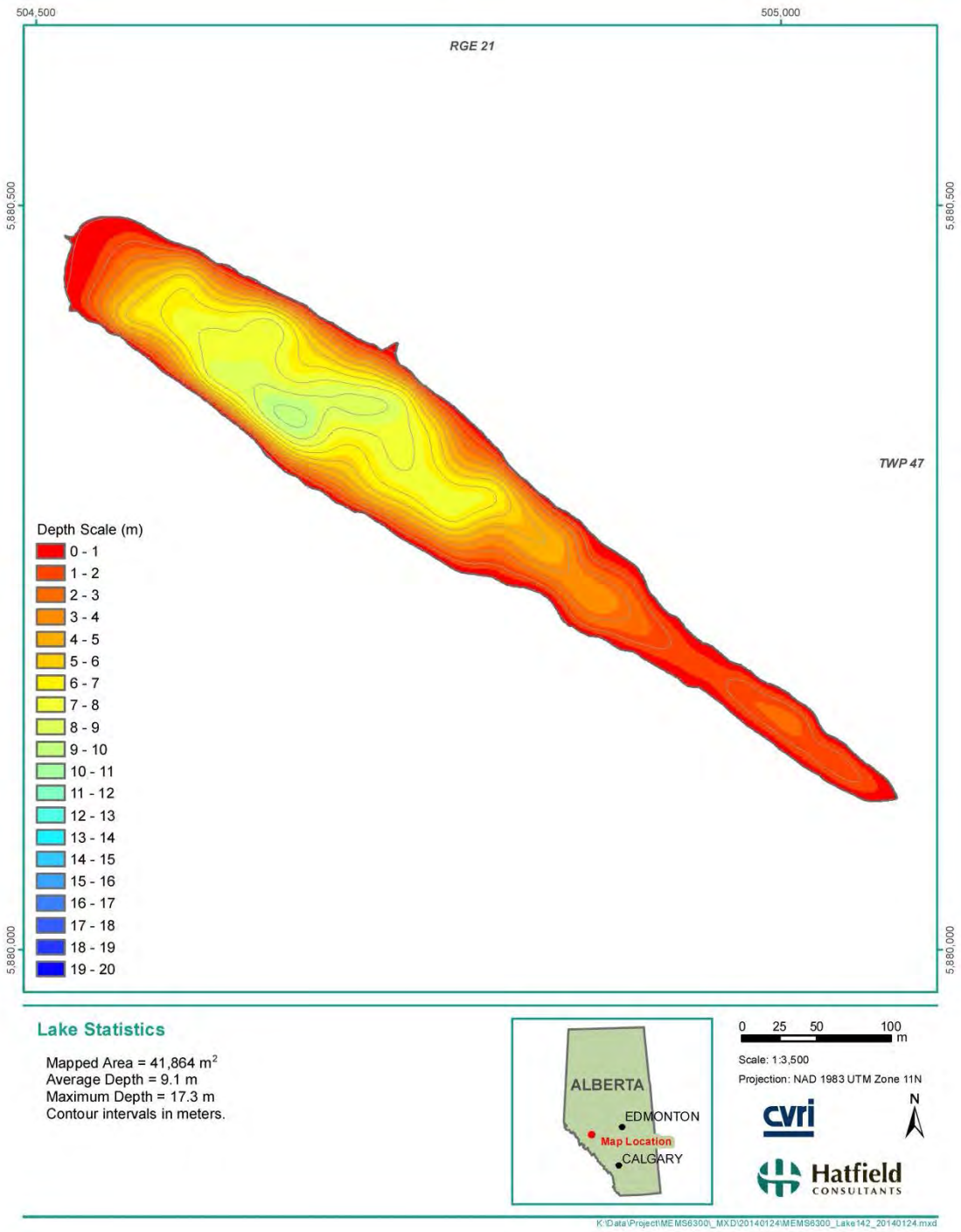


Figure 13 Biovolume map of Pit 142 Lake.

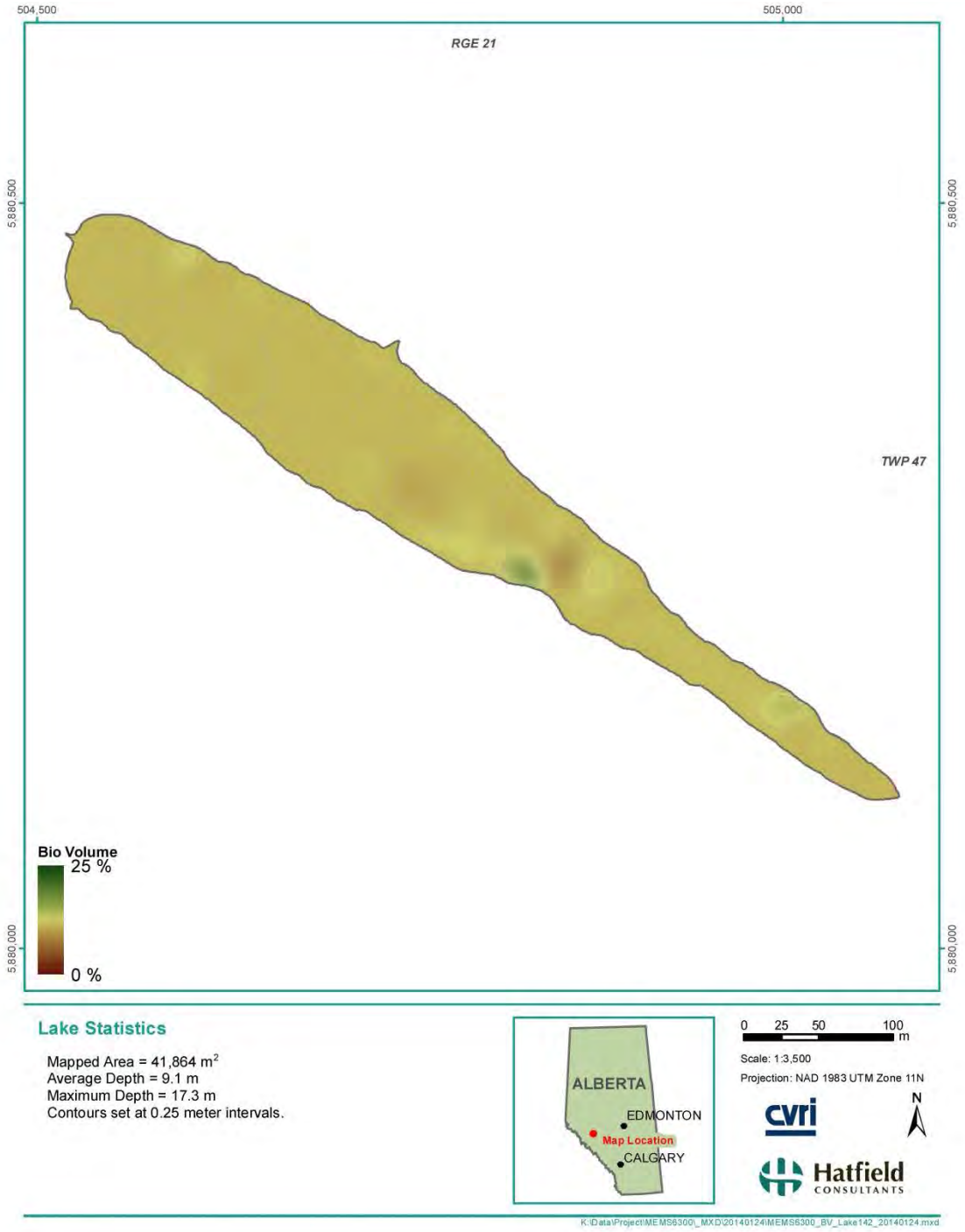


Figure 14 Bathymetric map of Pit 34 Lake.

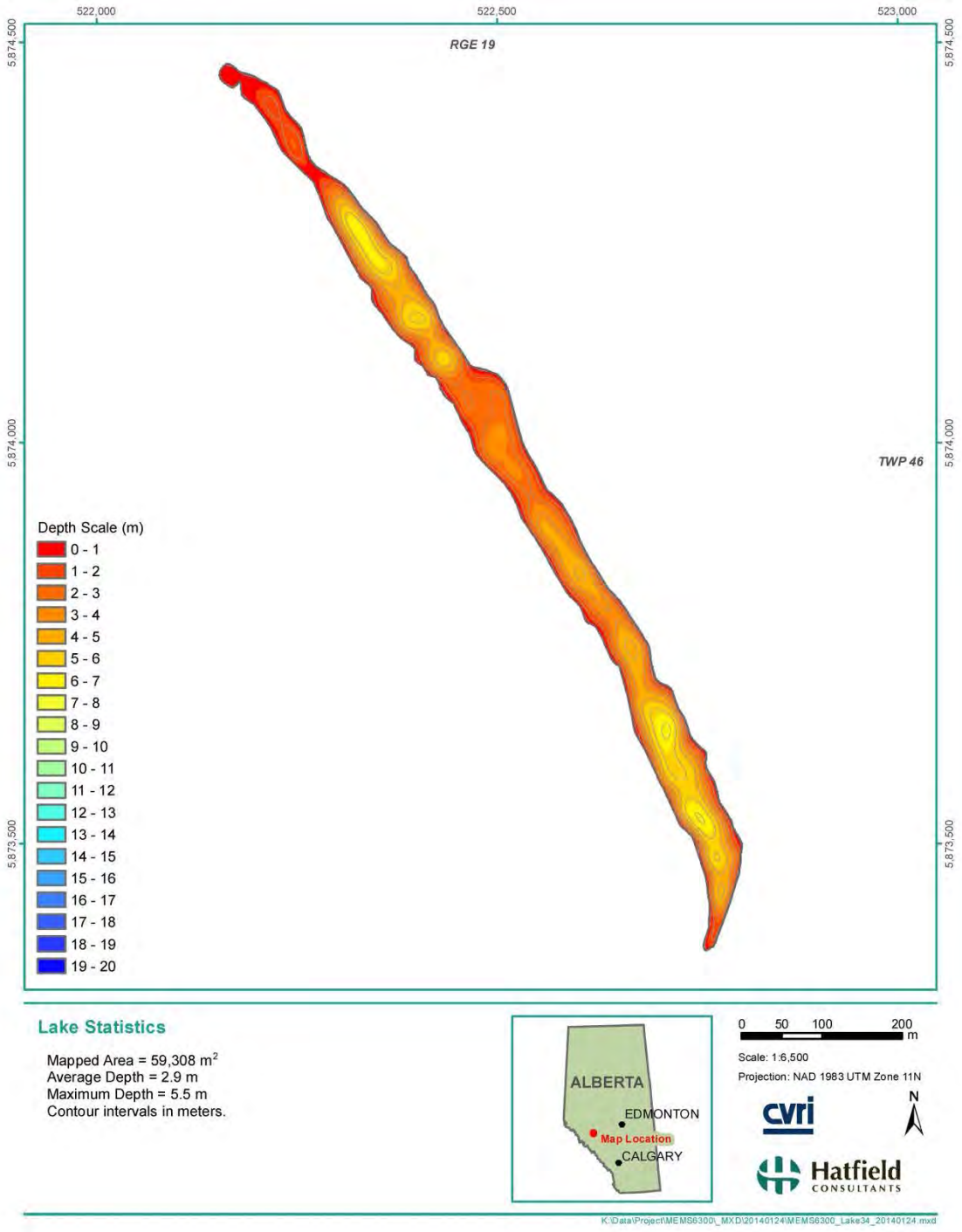


Figure 15 Biovolume map of Pit 34 Lake.

Figure 16 Bathymetric map of Pit 122 Lake.

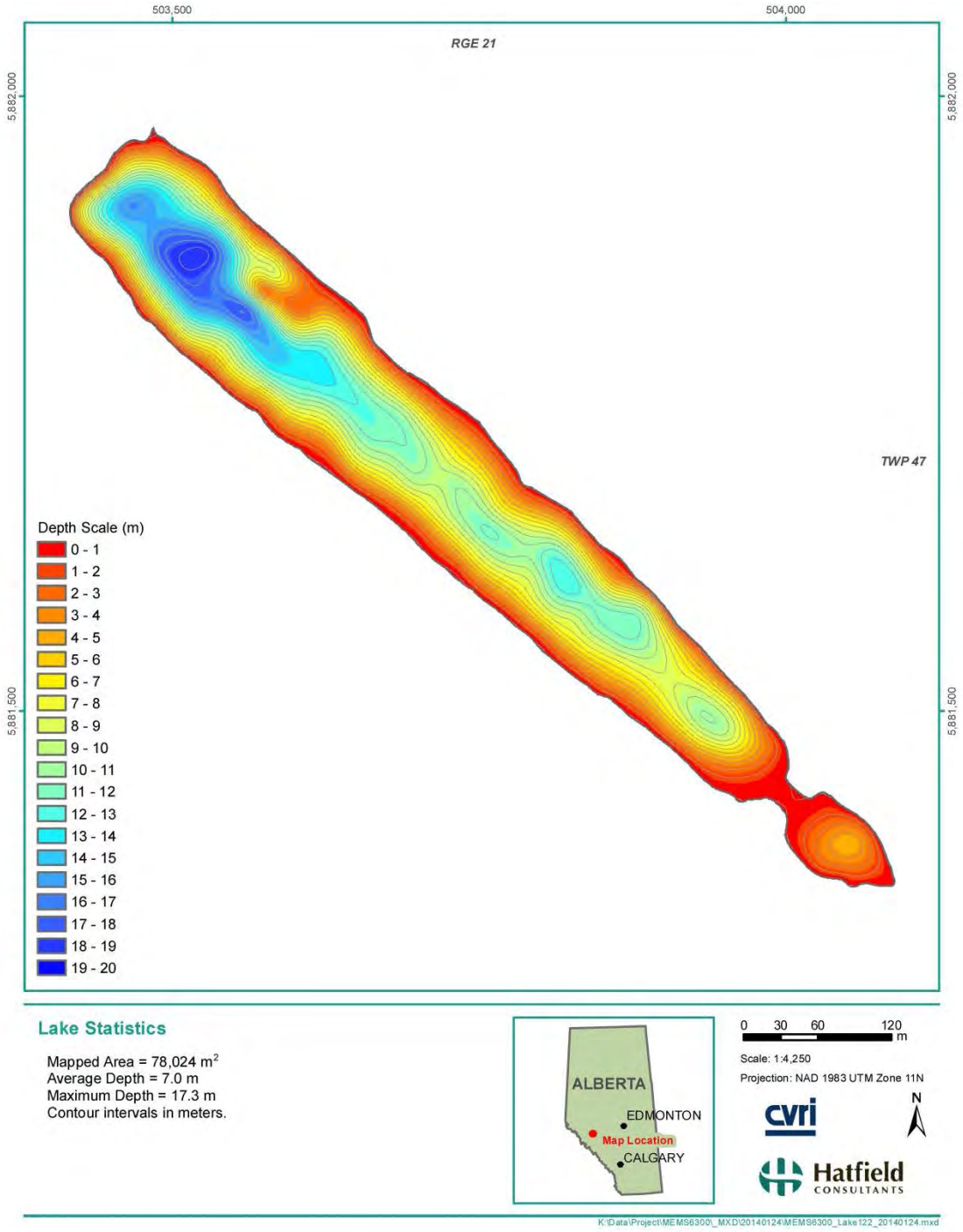


Figure 17 **Relationships between macrophyte taxonomic richness and age of end-pit lakes.**

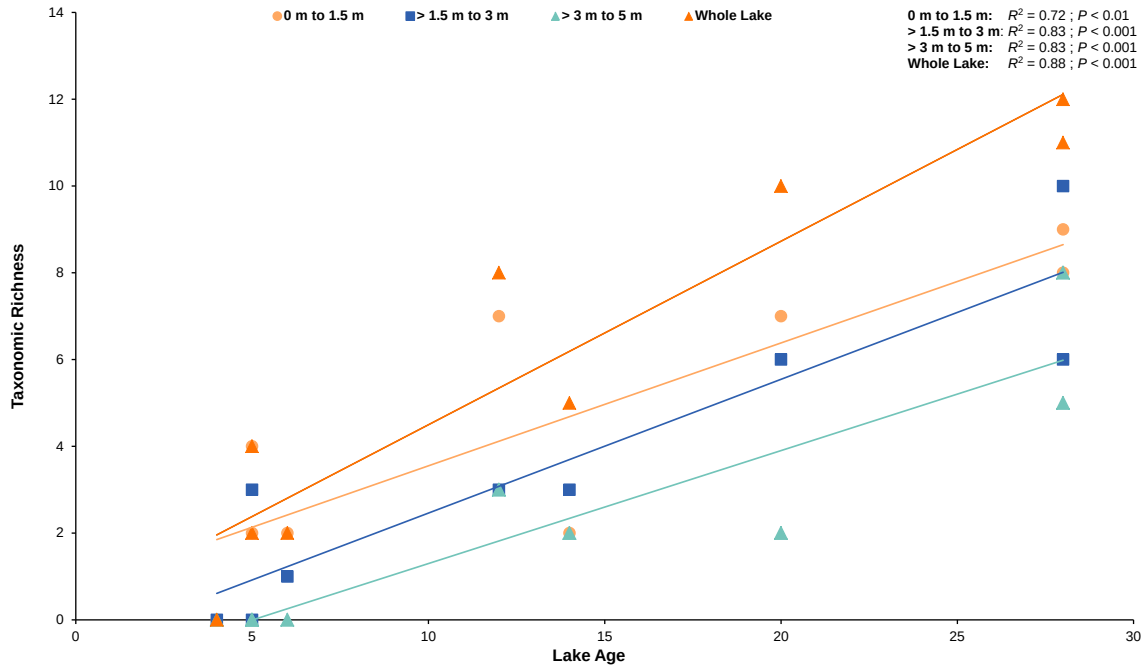
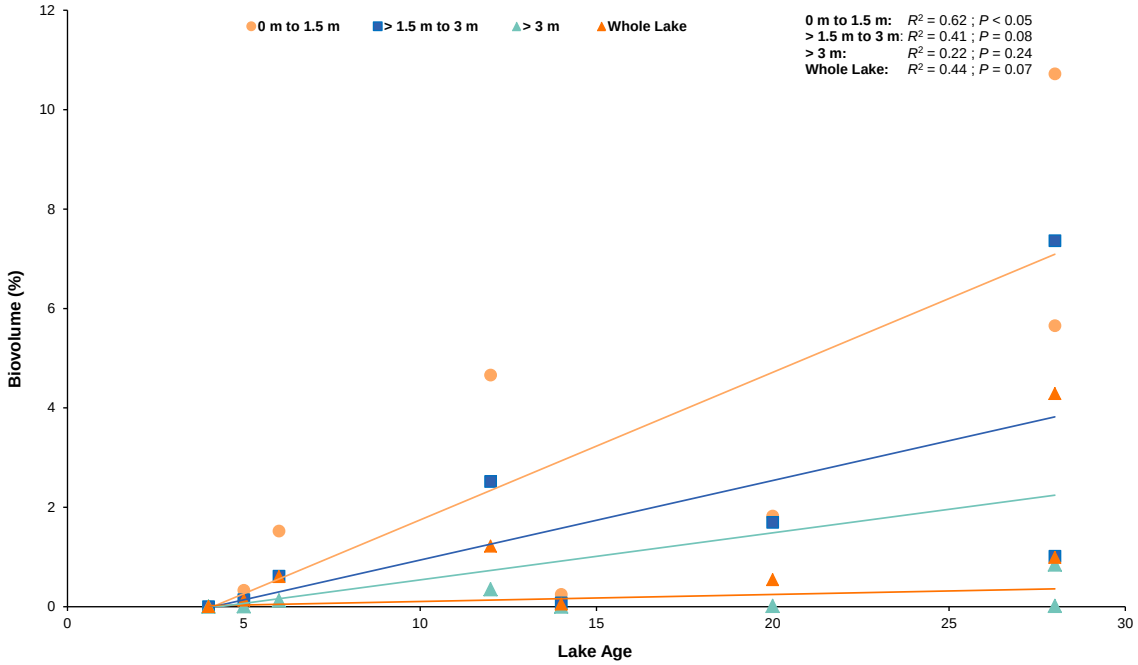


Figure 18 **Relationships between biovolume of macrophytes and age of end-pit lakes.**



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6.0 CLOSURE

We trust the above information meets your requirements. If you have any questions or comments, please contact the undersigned.

HATFIELD CONSULTANTS:

Approved by:	<original signed by>	February 19, 2014
	Sarah Quesnelle Project Manager	Date

Approved by:	<original signed by>	February 19, 2014
	Peter McNamee Project Director	Date

APPENDICES

Appendix A1

Sonar Imagery and Underwater Photography

APPENDIX A1 -
SONAR IMAGERY AND UNDERWATER PHOTOGRAPHY

Figure A1.1 **Example of a transect echogram taken from Silkstone Lake. Increasing colour warmth (i.e., increasing blue to red) corresponds to increased reflection of objects in the water column including macrophytes and lake bottom.**

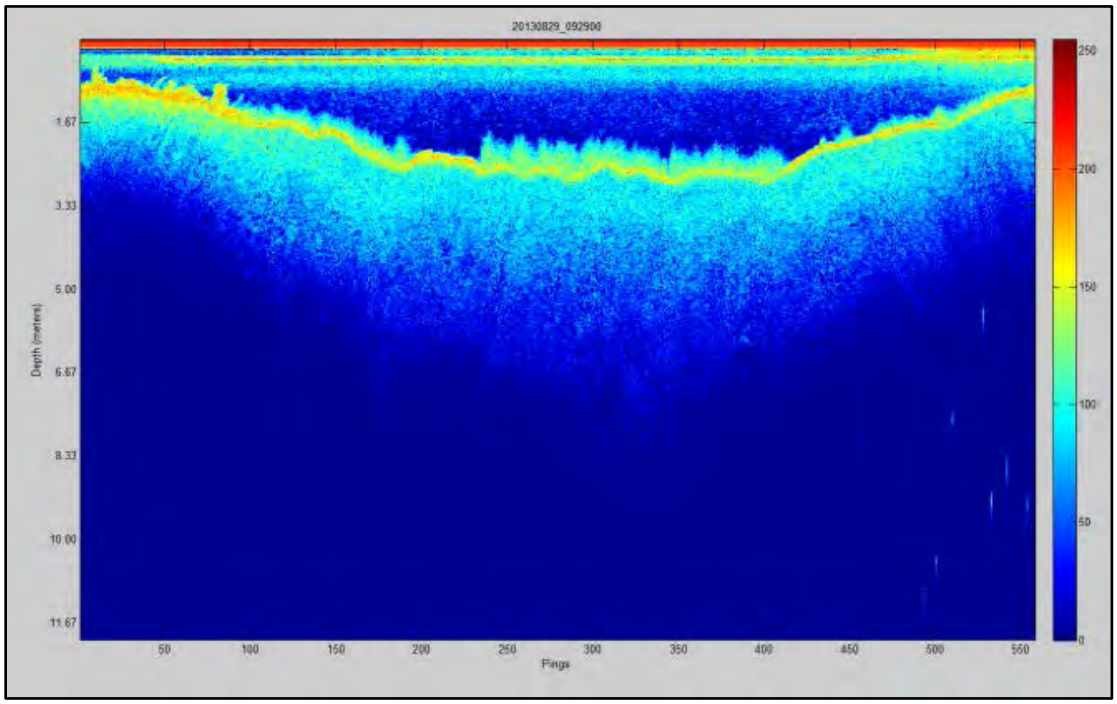


Figure A1.2 Example of graphic output of a transect in Silkstone Lake from SAVEWS Jr. software using the configuration files and echograms used to interpret recorded data of lake depth and macrophyte canopy height.

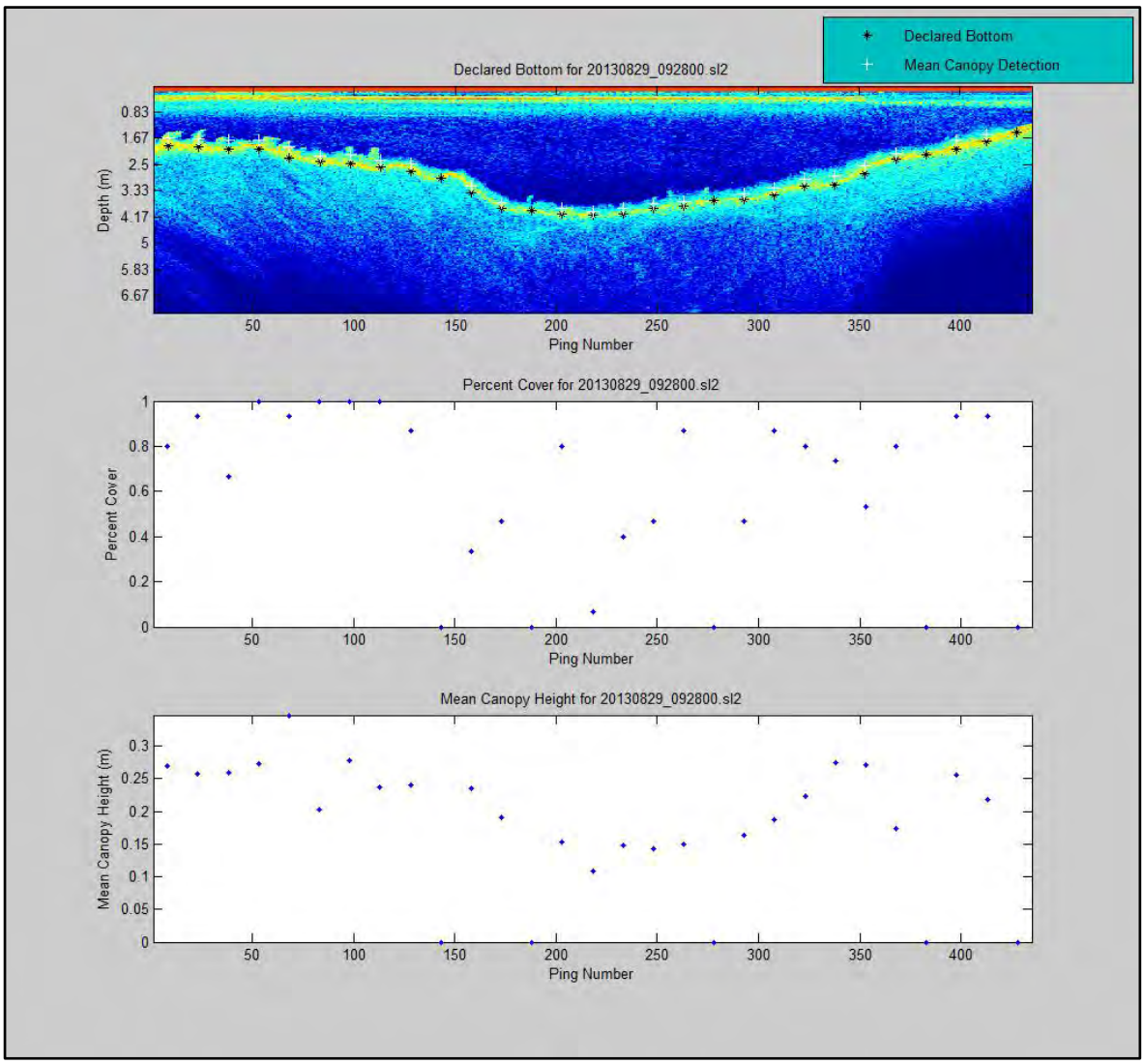


Figure A1.3 Underwater photo of macrophytes from Lovett Lake.

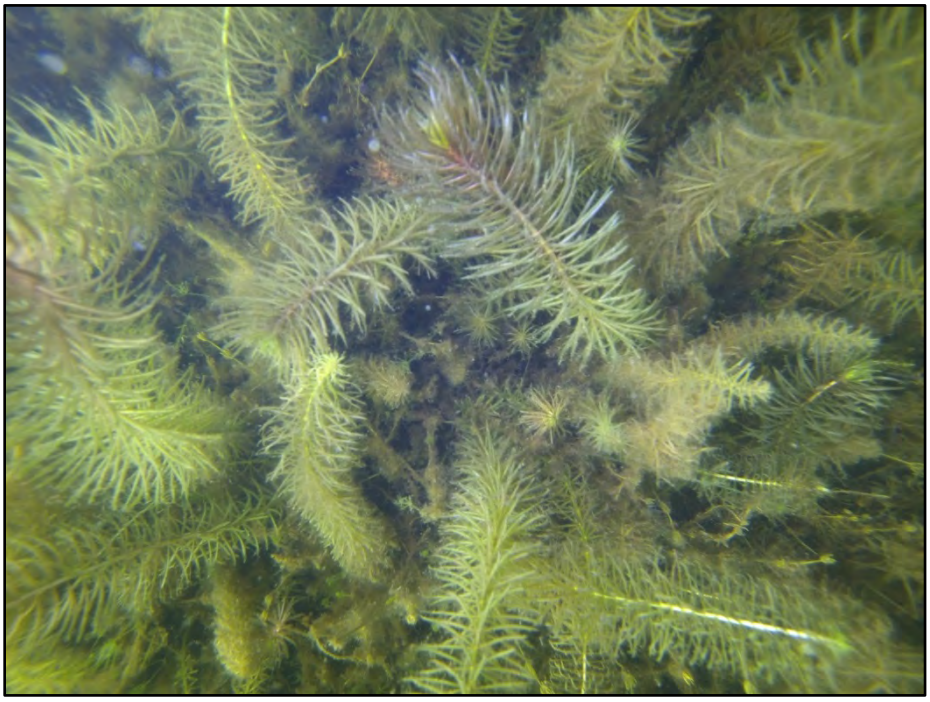


Figure A1. 4 Underwater photo of aquatic macrophyte community from Lovett Lake.

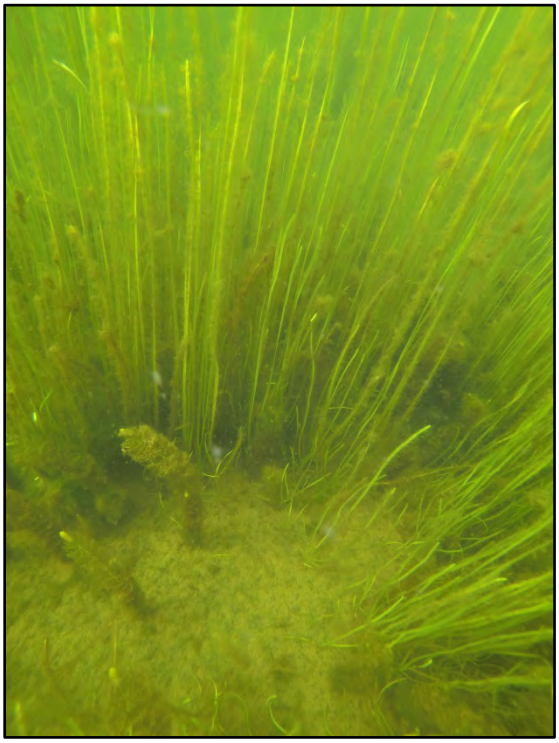
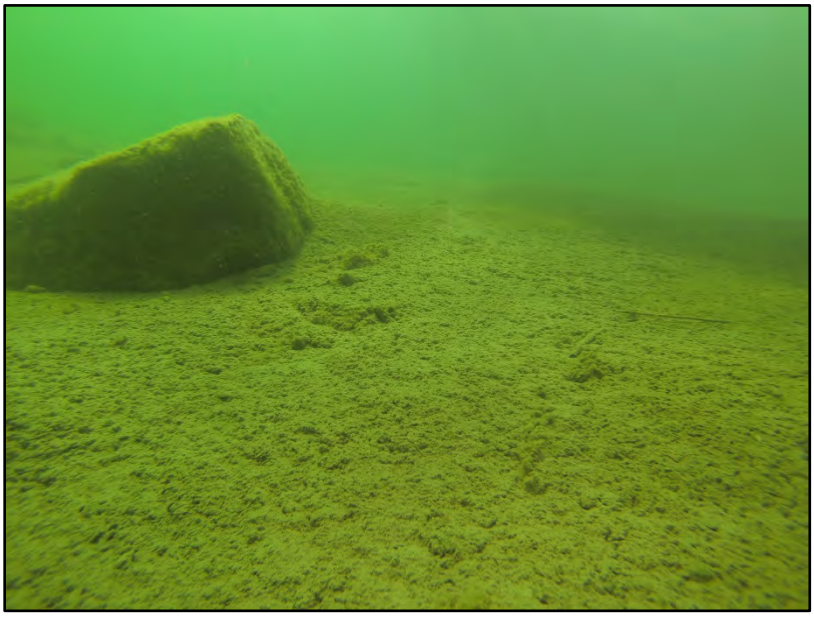


Figure A1.5 Underwater photo of lake bottom lacking vegetation of Pit 35 Lake.



Appendix A2

Macrophyte Composition in End-Pit Lakes

Table A2 Macrophyte compostition of end-pit lakes (whole lake and individual depth categories).

Scientific name	*Chara* species	*Potamogeton vaginatus*	*Potamogeton richardsonii*	*Sparganium augustifolium*	*Myriophyllum exalbescens*	*Bryophytes*	*Ceratophyllum demersum*		*Ranunculus circinatus*	*Hipprus vulgaris*	*Callitriche palustris*	*Potamogeton zosteriformis*	*Potamogeton pusillus*	
Common name		**Large-Sheath Pondweed**	**Richardson Pondweed**	**Narrowleaf bur-reed**	**Northern Watermilfoil**		**Coontail**	**Algae**	**White Waterbuttercup**	**Mare's Tail**	**Vernal Starwort**	**Flat-stemmed pondweed**	**Small-Leaf Pondweed**	**Unknown species**
Lovett Lake														
0 m to 1.5 m Composition (%)	4.5	5.5	2.0	25.5	11.0	27.0	0.0	1.5	0.0	23.0	0.0	0.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	7.5	14.5	0.5	27.5	24.0	9.0	5.0	3.5	0.0	8.0	0.0	0.0	0.5	0.0
> 3 m to 5 m Composition (%)	13.6	0.0	0.0	13.1	17.6	17.1	0.0	10.6	0.0	14.6	0.0	0.0	8.5	5.0
Whole Lake Composition (%)	8.5	6.7	0.8	22.0	17.5	17.7	1.7	5.2	0.0	15.2	0.0	0.0	3.0	1.7
Silkstone Lake														
0 m to 1.5 m Composition (%)	20.0	15.3	8.0	3.7	7.3	2.2	0.0	0.0	2.0	37.5	0.0	0.0	4.0	0.0
> 1.5 m to 3 m Composition (%)	47.5	0.0	0.0	0.0	0.6	23.1	13.8	1.3	0.0	0.0	0.0	0.0	0.0	13.8
> 3 m to 5 m Composition (%)	17.8	0.0	0.0	0.0	0.0	4.4	0.0	12.2	0.0	0.0	0.0	0.0	11.1	54.4
Whole Lake Composition (%)	27.4	5.7	3.0	1.4	2.9	9.1	4.1	4.4	0.7	13.9	0.0	0.0	5.2	22.2
Stirling Lake														
0 m to 1.5 m Composition (%)	0.0	26.9	0.0	0.8	7.7	9.2	0.0	0.0	0.0	29.2	15.4	0.0	10.8	0.0
> 1.5 m to 3 m Composition (%)	20.0	4.4	0.0	0.0	47.8	0.0	14.4	0.6	0.0	12.8	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	85.7	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole Lake Composition (%)	34.7	9.6	0.0	0.2	25.8	2.7	5.8	0.2	0.0	13.5	4.4	0.0	3.1	0.0
Pit 35 Lake														
0 m to 1.5 m Composition (%)	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	66.7	16.7	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	75.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole Lake Composition (%)	53.8	7.7	0.0	0.0	0.0	15.4	7.7	15.4	0.0	0.0	0.0	0.0	0.0	0.0
Pit 45 Lake														
0 m to 1.5 m Composition (%)	56.7	13.1	3.5	0.7	8.0	16.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	96.7	1.8	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	85.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3
Whole Lake Composition (%)	78.9	5.7	1.3	0.3	3.5	5.9	0.0	0.0	0.0	0.0	0.0	0.7	0.0	3.7
Pit 142 Lake														
0 m to 1.5 m Composition (%)	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole Lake Composition (%)	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
Pit 34 Lake														
0 m to 1.5 m Composition (%)	0.0	25.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole Lake Composition (%)	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pit 43 Lake														
0 m to 1.5 m Composition (%)	85.2	11.8	0.0	0.0	0.0	0.4	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0
> 1.5 m to 3 m Composition (%)	61.7	6.7	0.0	0.0	0.0	0.0	0.0	31.7	0.0	0.0	0.0	0.0	0.0	0.0
> 3 m to 5 m Composition (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Whole Lake Composition (%)	81.1	10.9	0.0	0.0	0.0	0.3	0.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0

Pisces Environmental Consulting Services Ltd.

• Unit 118, 239 Spruce Street • Red Deer County • Alberta • T4E 1B4 •
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• www.piscesenvironmental.com •

August 21, 2013

CVRI
Coal Valley Mine
Bag 5000
Edson, Alberta
T7E 1W1

ATTN: Megan Hill

RE: Recommendations for channel enhancement in the Embarras Lakes End Pit Lake System.

1.0 Introduction

Pisces Environmental Consulting Services Ltd. (Pisces) is conducting ongoing fisheries monitoring in the Embarras Lakes end-pit lake system located in 25-47-21-W5. As requested, the following summarizes Pisces' recommendations for habitat enhancement of the connecting channels in the Embarras Lakes End Pit Lake System. Information provided is based on data gathered from site investigations conducted in May, June, and July 2013 as well as water temperature monitoring and habitat utilization studies that have been ongoing since 2011.

2.0 Background

In August 2004, Fisheries and Oceans Canada (DFO) issued Fisheries Act Authorization ED-03-3080 to Coal Valley Resources Incorporated (CVRI) for the diversion of the Embarras River to facilitate mining in the Mercoal Phase 1 (MP1) area. Part of the final reclamation strategy for the MP1 extension included the development of an end pit lake system that would support a self-sustaining native fish population.

The Embarras End Pit Lake system is located in the extreme headwaters of the Embarrass River in 25-47-21-W5. The Embarras River flows into the McLeod River approximately 86 kilometers downstream of the lakes, which in turn flows into the Athabasca River near Whitecourt, Alberta. Historically, fish densities in the upper Embarras River were low and pre-mining investigations of this part of the river found fish habitat potential to be limited (Boorman 2003). Habitat diversity within this area was considered to be marginal and substrates were comprised almost exclusively of fines (Boorman 2003). However, Rainbow Trout (Oncorhynchus mykiss), Bull Trout (Salvelinus confluentus) and Brook Trout (Salvelinus fontinalis) were found just downstream of the proposed MP1 pit area during baseline investigations (Boorman 2003).

The Embarras End Pit Lake system consists of three lakes and approximately 1100 metres of constructed connecting channels. The naming convention for the lakes is as follows:

- Upper Embarras Lake (Pit 142E);
- Middle Embarras Lake (Pit 122); and
- Lower Embarras Lake (Pit 122).

The Embarras River enters the Upper Lake from a beaver pond via a constructed inlet channel that is approximately 30 metres long (Upper Embarras Channel). There are approximately 500 metres of connecting channel between the Upper and Middle Lakes (Middle Embarras Channel B) including the haulroad culvert crossing that is located just upstream of the Middle Lake. Between the Middle Lake and Lower Lake there is approximately 150 metres of connecting channel (Middle Embarras Channel A) and there is approximately 400 metres of constructed channel downstream of the Lower Lake (Lower Embarras Channel). A fish exclusion weir has been constructed at the bottom of this constructed channel to preclude Brook Trout from entering the end pit lake system.

3.0 Recommendations

Recommendations for habitat enhancements in the constructed channels include placement of instream habitat features as well as stabilization and vegetation of streambanks. Optimally a Qualified Aquatic Environment Specialist (QAES) would be onsite to provide advice and feedback during the construction of the habitat enhancements. As summary of these recommendations and suggested enhancement locations are provided in Tables 1 to 4. Additional are provided in Sections 3.1 to 3.4 and Figures 1 to 26.

Table 1. Lower Embarras Channel (exclusion weir to Lower Embarras Lake)

Site	Location (UTM's)	Enhancement Details
Figure 1	0503422 5882249	Vegetate, tree cover installations
Figure 2	503463 5882217	Vegetate, tree cover installations
Figure 3	503495 5882187	Vegetate, gravel addition, tree cover installations
Figure 4	503513 5882166	Vegetate, gravel addition, tree cover installations
Figure 5	503544 5882127	Vegetate, tree cover installations
Figure 6	503566 5882092	Vegetate, tree cover installations
Figure 7	503563 5882058	Vegetate to maximize future shade
Figure 8	503544 5882028	Stabilize, vegetate, tree cover and gravel installations
Figure 9	503510 5882022	Stabilize, vegetate, tree cover installations
Figure 10	503492 5882014	Stabilize, vegetate, tree cover and gravel installations

Table 2. Middle Embarras Channel A (Lower Embarras Lake to Middle Embarras Lake)

Site	Location (UTM's)	Enhancement Details
Figure 11	504077 5881362	Vegetate with willows and conifers.
Figure 12	504112 5881343	Vegetate, gravel addition, tree cover installations

Table 3. Middle Embarras Channel B (Middle Embarras Lake to Upper Embarras Lake)

Site	Location (UTM's)	Enhancement Details
Figure 13	504746 5880771	Vegetate with willows and conifers.
Figure 14	504793 5880736	Vegetate with willows and conifers.
Figure 15	504863 5880695	Vegetate, gravel addition, tree cover installations
Figure 16	504791 5880616	Vegetate with willows and conifers.
Figure 17	504787 5880581	Supplemental tree/ willow plantings
Figure 18	504787 5880581	Supplemental tree/ willow plantings
Figure 19	504746 5880465	Supplemental tree/ willow plantings, substrate enhancement (if possible)
Figure 20	504746 5880465	Vegetate, substrate enhancement (if possible)
Figure 21	504756 5880427	Vegetate with willows and conifers.
Figure 22	504733 5880400	Vegetate, gravel addition, tree cover installations

Table 4. Upper Embarras Channel (upstream of Upper Embarras Lakes

Site	Location (UTM's)	Enhancement Details
Figure 23	504521 5880434	Vegetate with willows and conifers.
Figure 24	504497 5880409	Vegetate, gravel addition, tree cover installations
Figure 25	504497 5880409	Vegetate, gravel addition, tree cover installations
Figure 26	504364 5880240	Vegetate, gravel addition, tree cover installations

3.1 Lower Embarras Channel

Pisces recommends the following components be incorporated into the reclamation plans for the Lower Embarras Channel. Additional details are shown on Figures 1 to 10. Existing water temperature data suggests that an important design consideration for this channel reach is to maximize stream shading. In addition, observations in 2012 and 2013 suggest lake resident fish are moving downstream past the fish exclusion weir; recommended channel enhancements (improve cover, holding habitat and spawning habitat) are intended to reduce these losses.

- Streambank cover should be installed along the reclaimed channel. Willows and/or other deciduous plantings should be established as close to the stream as possible. Coniferous tree seedling should also be established where feasible to promote long-term stream shading that will mimic natural channel conditions in the area. Plantings should be relatively dense where warranted with riparian planting densities averaging at least one tree per meter of bank. Faster growing species such as willows, aspen or balsam poplar should be considered in addition to conifers along this channel reach in order to maximize stream shading as quickly as possible. Willows should only be planted near the water, as establishment will likely be difficult at drier locations.

- Large woody debris (conifers with intact limbs anchored or embedded into the banks and protruding into the channel or brush piles) should be placed within the reclaimed channel to provide cover for fish where channel conditions allow. Bushy conifers at least three metres tall with intact root wads (if feasible) should be installed where indicated (Figures 1-10). If possible, instream conifer placements should be anchored utilizing boulders or cable/ posts. Perpendicular installations should aim to maximize stream shade area; the largest tree's that can be handled practically would be optimal. The recommended location of these habitat features could be changed slightly to accommodate the materials available for the enhancement works.
- Though successful spawning is occurring within the channel reach salmonid spawning habitat enhancements should be undertaken (Figure 3, 4, 8, and 10). These enhancements should include placement of appropriately sized gravels, and habitat suited for rearing of juvenile salmonids. The gravel should be 5 to 30 mm in size and preferably rounded rather than crushed with sharp edges. A diversity of gravel size will be appropriate as the Embarras Lakes are occupied by adult Rainbow Trout of varying size. Gravel depths should exceed 0.30 meters to increase the longevity of the enhancements since the surrounding area is unlikely to provide for much natural recruitment of this type of substrate.
- Areas of instability within the Embarras River constructed channel have been identified (Figure 8-10). Bank re-contouring should be completed with the aim of reducing slopes and reducing erosion so vegetation can be established. If re-contouring and planting is not feasible CVRI may want to consider riprap placement in problem areas. Currently, sediment is being generated from these unstable areas predominantly during spring rainstorms when Rainbow Trout reproduction is occurring. Stabilizing these areas will help protect incubating Rainbow Trout eggs and rearing fry that could be present in the connective channel.

Figure 1. Looking upstream

Figure 2. Looking upstream

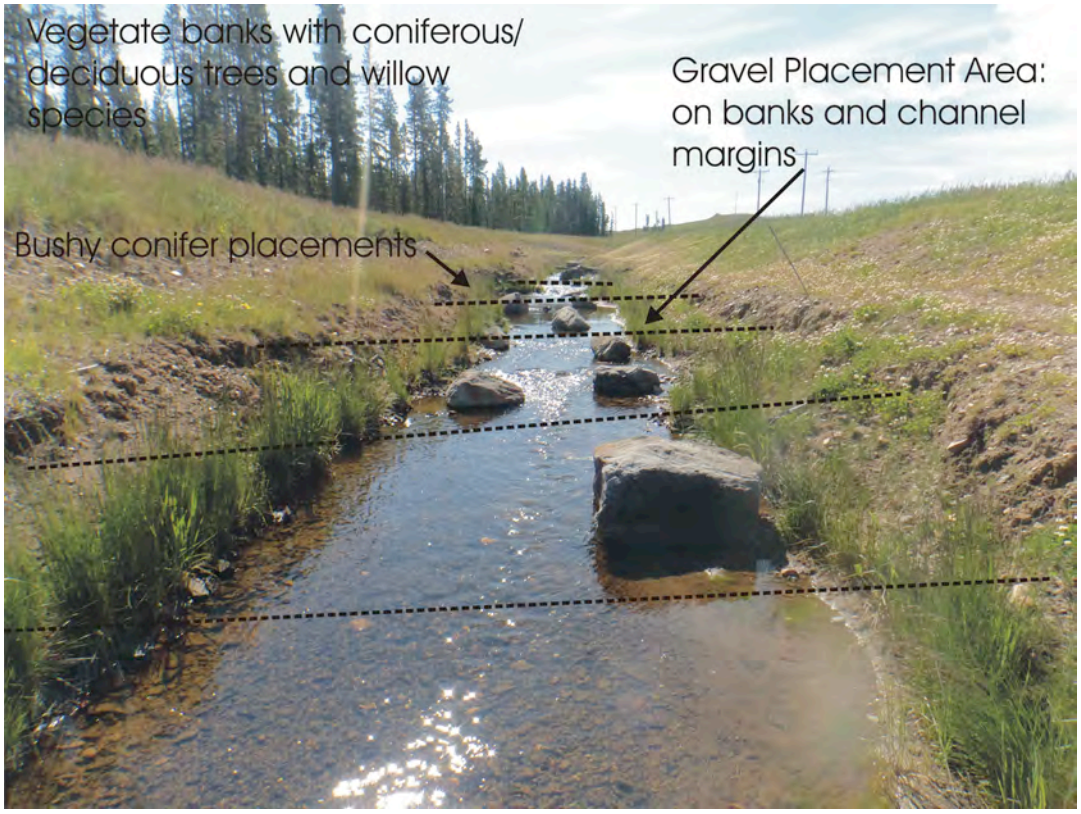

Figure 3. Looking upstream

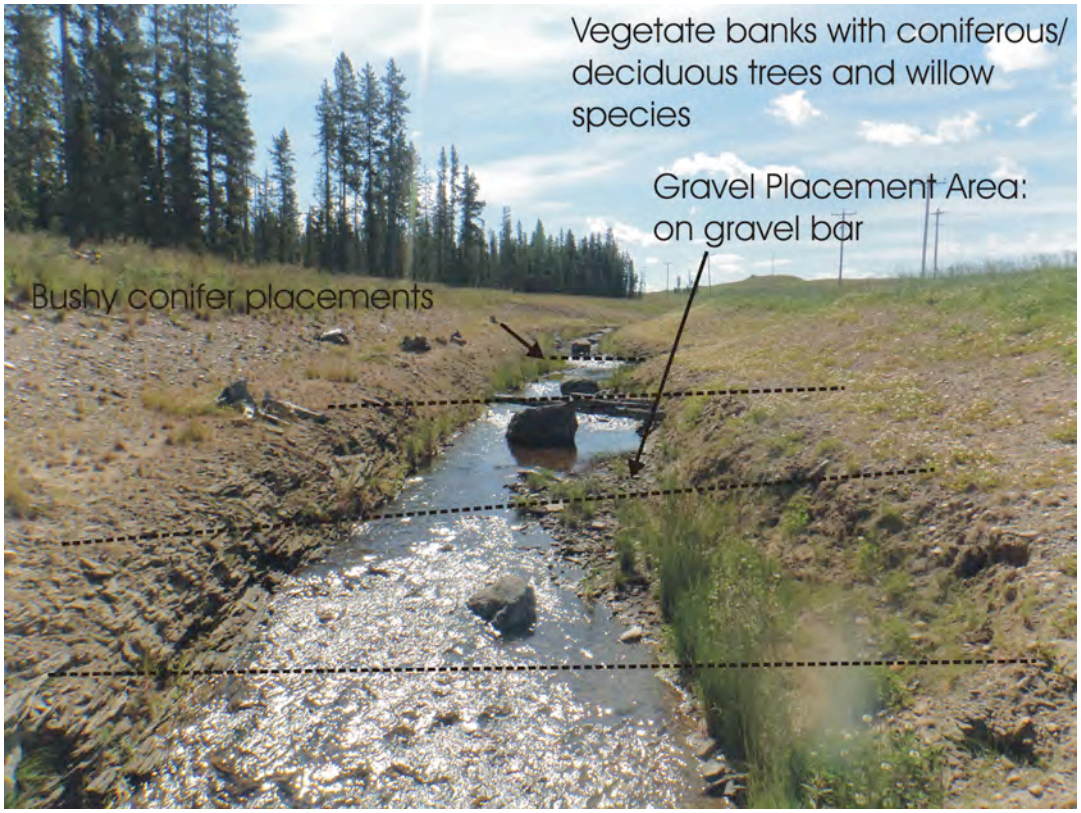

Figure 4. Looking upstream

Figure 5. Looking upstream

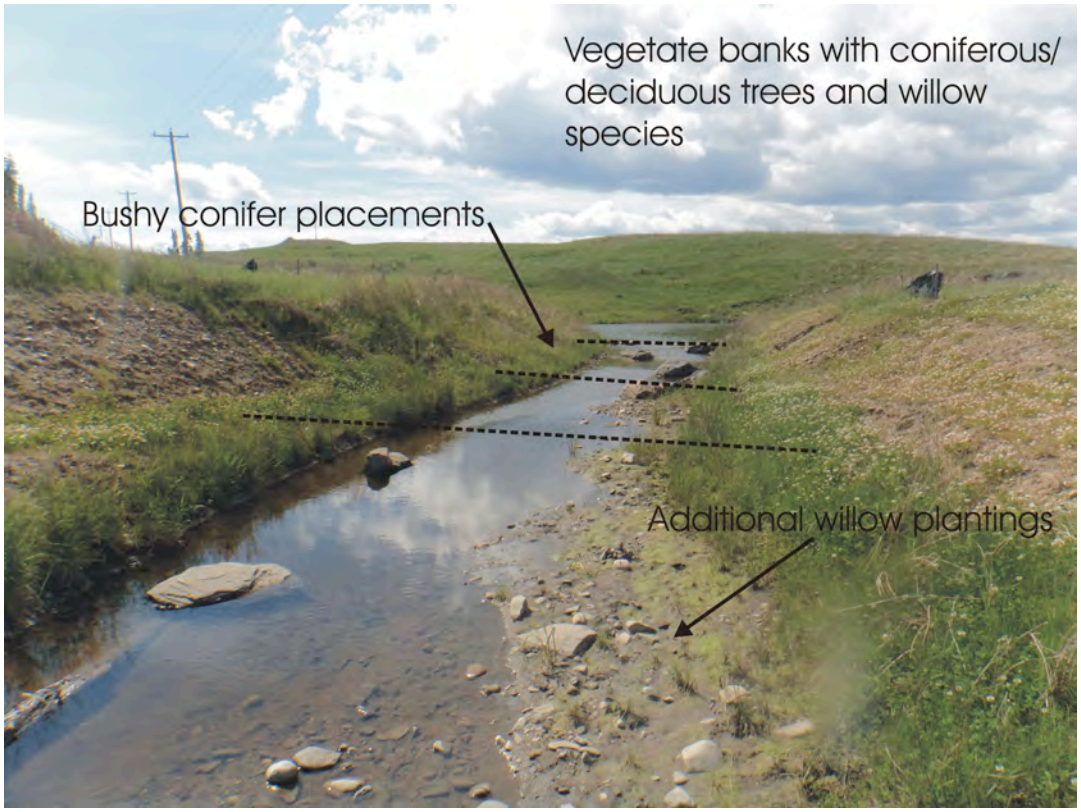

Figure 6.Looking upstream

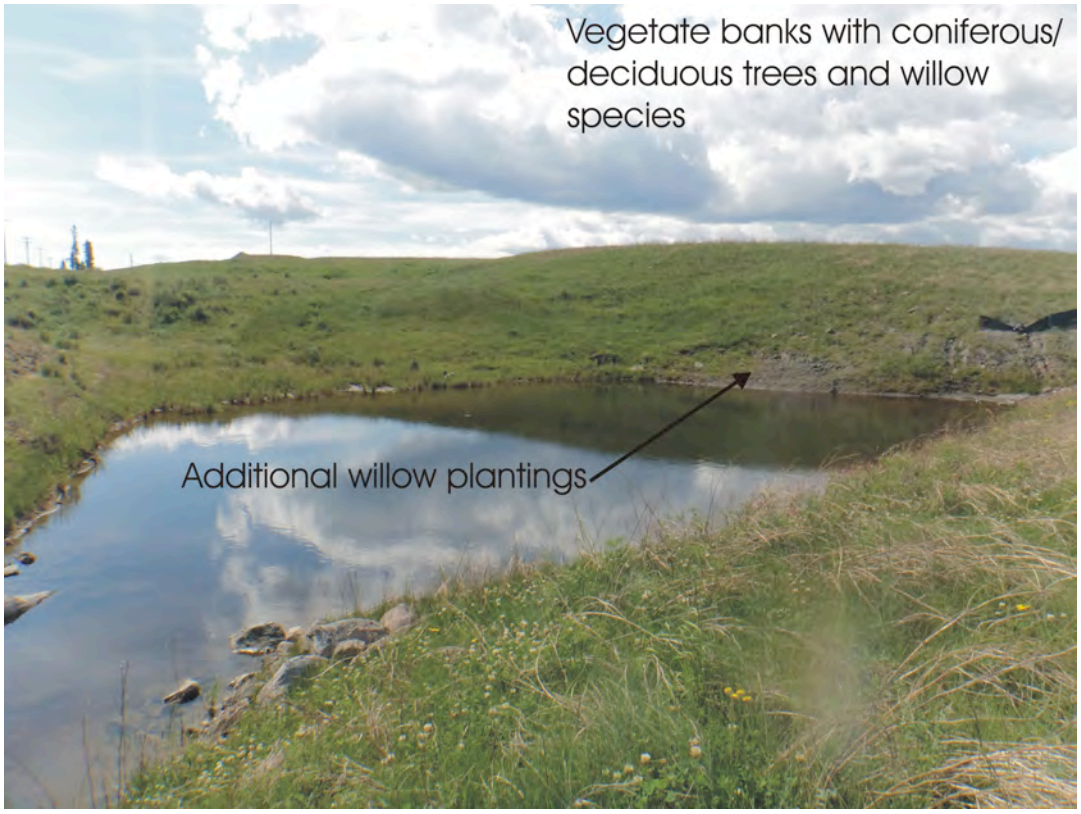

Figure 7. Looking upstream

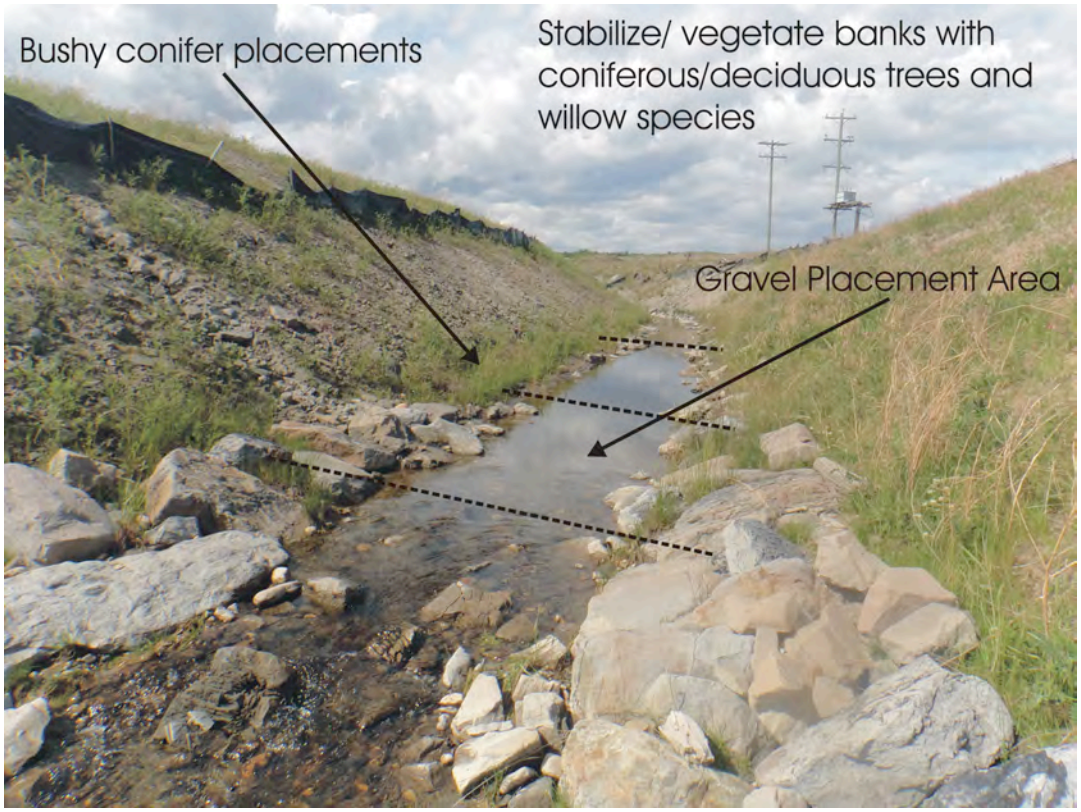

Figure 8. Looking upstream

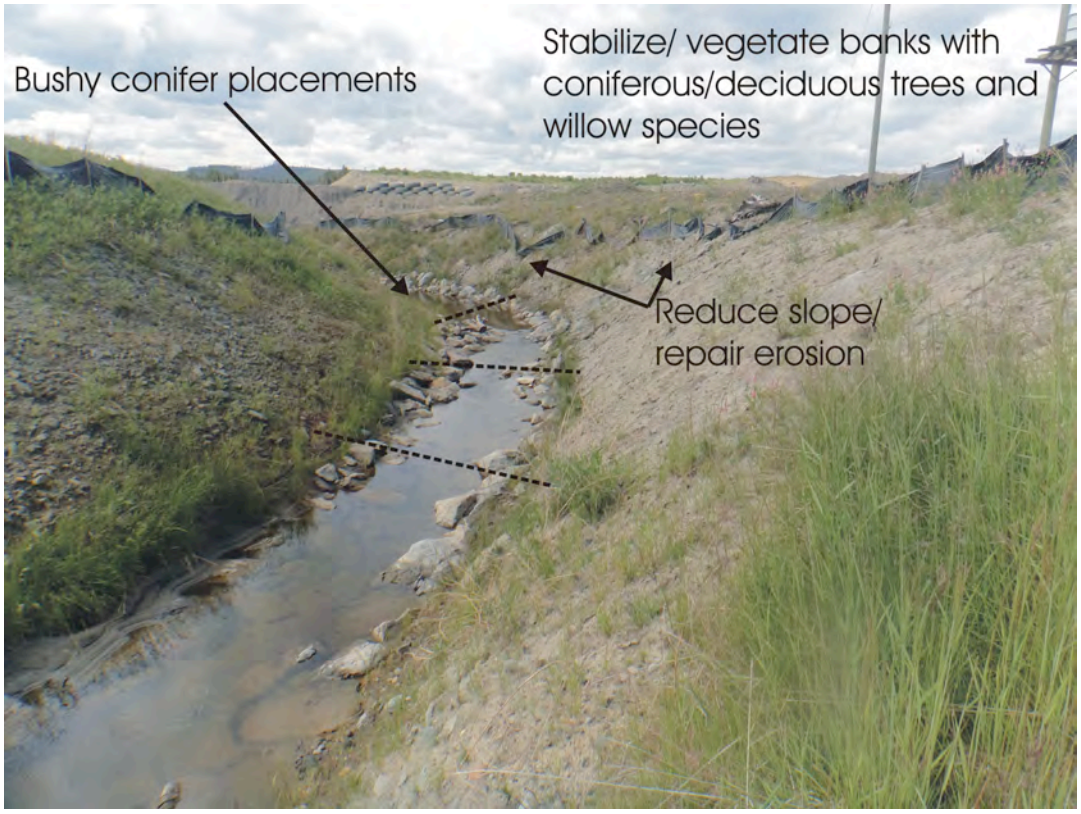

Figure 9. Looking upstream

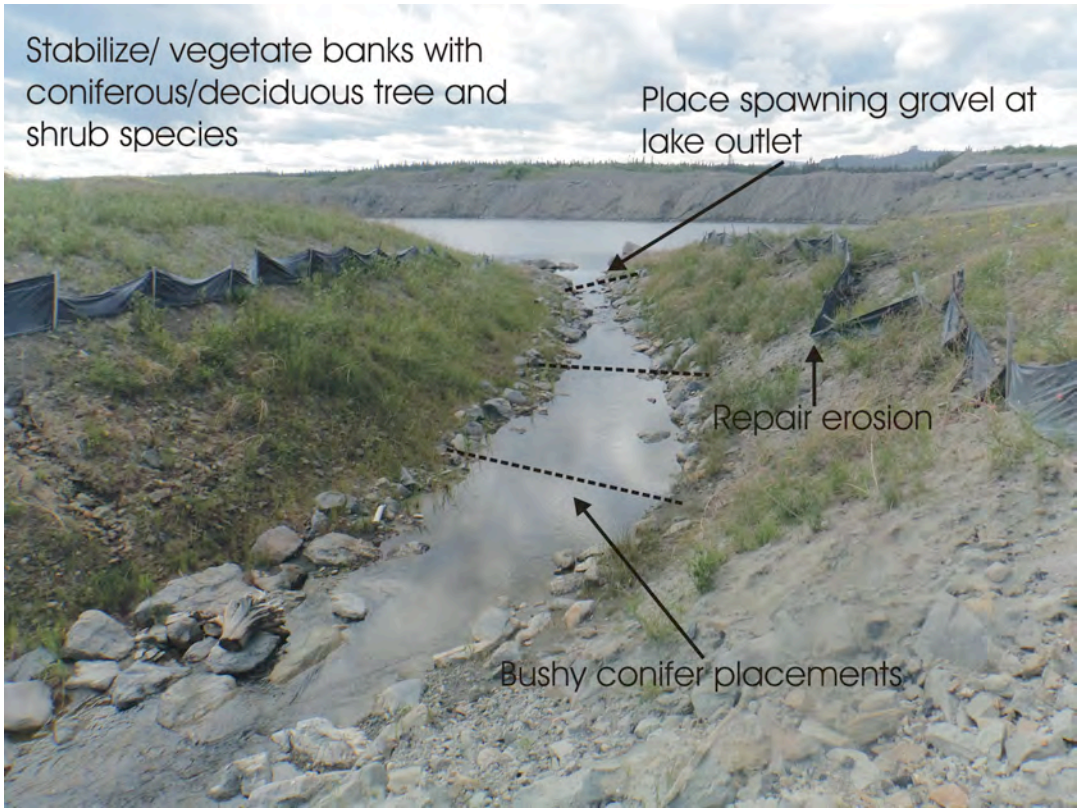

Figure 10. Looking upstream

3.2 Middle Embarras Channel A

Pisces recommends the following components be incorporated into the reclamation plans for the Middle Embarras A Channel. Additional details are shown on Figures 11 and 12. Existing water temperature data suggests that an important design consideration for this channel reach is to maximize stream shading. The substrate and cover enhancements are expected to promote the long-term success of the Embarras Lakes System.

- Streambank cover should be installed along the reclaimed channel. Willows and/or other deciduous plantings should be established as close to the stream as possible. Coniferous tree seedling should also be established where feasible to promote long-term stream shading that will mimic natural channel conditions in the area. Plantings should be relatively dense where warranted with riparian planting densities averaging at least one tree per meter of bank. Faster growing species such as willows, aspen or balsam poplar should be considered in addition to conifers along this channel reach in order to maximize stream shading as quickly as possible.
- Though successful spawning is likely occurring within the channel reach salmonid spawning habitat enhancements should be undertaken (Figure 11 and 12). These enhancements should include placement of appropriately sized gravels, and installation of woody debris cover at the outlet of the Middle Embarras Lake. The gravel should be 5 to 30 mm in size and preferably rounded rather than crushed with sharp edges; a diversity of gravel size will be appropriate as the Embarras Lakes are occupied by adult Rainbow Trout of varying size. Gravel depths should exceed 0.30 meters to increase the longevity of the enhancements since the surrounding area is unlikely to provide for much natural recruitment of this type of substrate.

Figure 11. Looking upstream

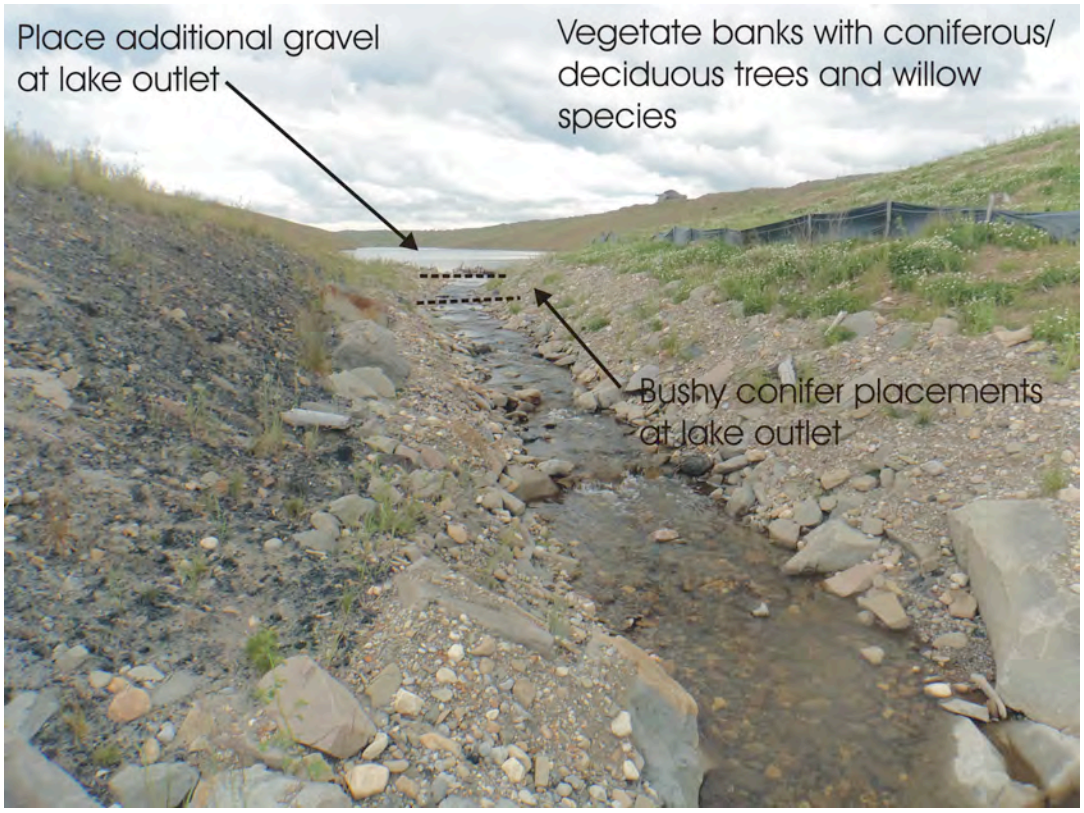

Figure 12. Looking upstream.

3.3 Middle Embarras Channel B

Pisces recommends the following components be incorporated into the reclamation plans for the Middle Embarras B Channel. Additional details are shown on Figures 13 and 22. Existing water temperature data indicates that this channel reach has exhibited a near optimal thermal regime for Rainbow Trout in 2012 and 2013. The focus of recommended enhancements is to maximize habitat use and promote the long-term success of the Embarras Lakes System. The goal of the enhancement work is to maintain and improve fry production, reduce fish egg mortality, and increase the suitability of the habitat for juvenile rearing. In addition, the vegetation of streambanks and surrounding slopes is expected to improve overall habitat conditions.

- Streambank cover should be installed along the reclaimed channel. Willows and/or other deciduous plantings should be established as close to the stream as possible. Coniferous tree seedling should also be established where feasible to promote long-term stream shading that will mimic natural channel conditions in the area. Plantings should be relatively dense where warranted with riparian planting densities averaging at least one tree per meter of bank. Faster growing species such as willows, aspen or balsam poplar should be considered in addition to conifers along this channel reach in order to maximize stream shading as quickly as possible. Fine material may be required in the margins of riprap areas in order to establish riparian vegetation.
- If possible, conifer placements should be anchored utilizing boulders or cable/ posts. Perpendicular installations should aim to maximize stream shade area. Cover enhancements within this channel will provide habitat for spawning and rearing fish. Enhancements at the outlet of the Upper Embarras Lake should also prevent ungulate trampling of incubating Rainbow Trout eggs that is suspected to have occurred in 2012 and 2013.
- Although successful spawning is occurring within this channel reach and monitoring indicates near optimal temperature regimes for Rainbow Trout reproduction, additional enhancements directed at improving salmonid spawning habitat are recommended. These enhancements should include placement of appropriately sized gravels, and habitat suited for rearing of juvenile salmonids. The gravel should be 5 to 30 mm in size and preferably rounded rather than crushed with sharp edges; a diversity of gravel size will be appropriate as the Embarras Lakes are occupied by adult Rainbow Trout of varying size. Gravel depths should exceed 0.30 meters to increase the longevity of the enhancements since the surrounding area is unlikely to provide for much natural recruitment of this type of substrate.

Figure 13. Looking upstream

Figure 14. Looking upstream

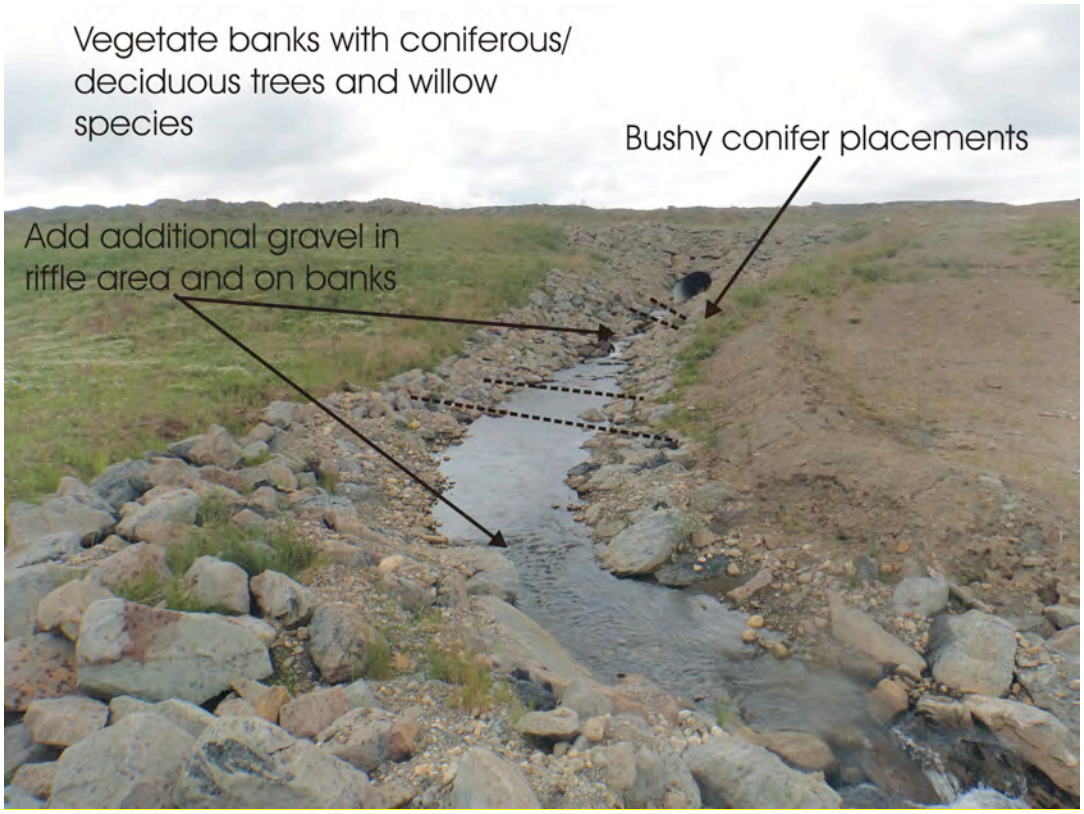

Figure 15. Looking upstream

Figure 16. Looking upstream

Figure 17. Looking upstream

Figure 18. Looking upstream

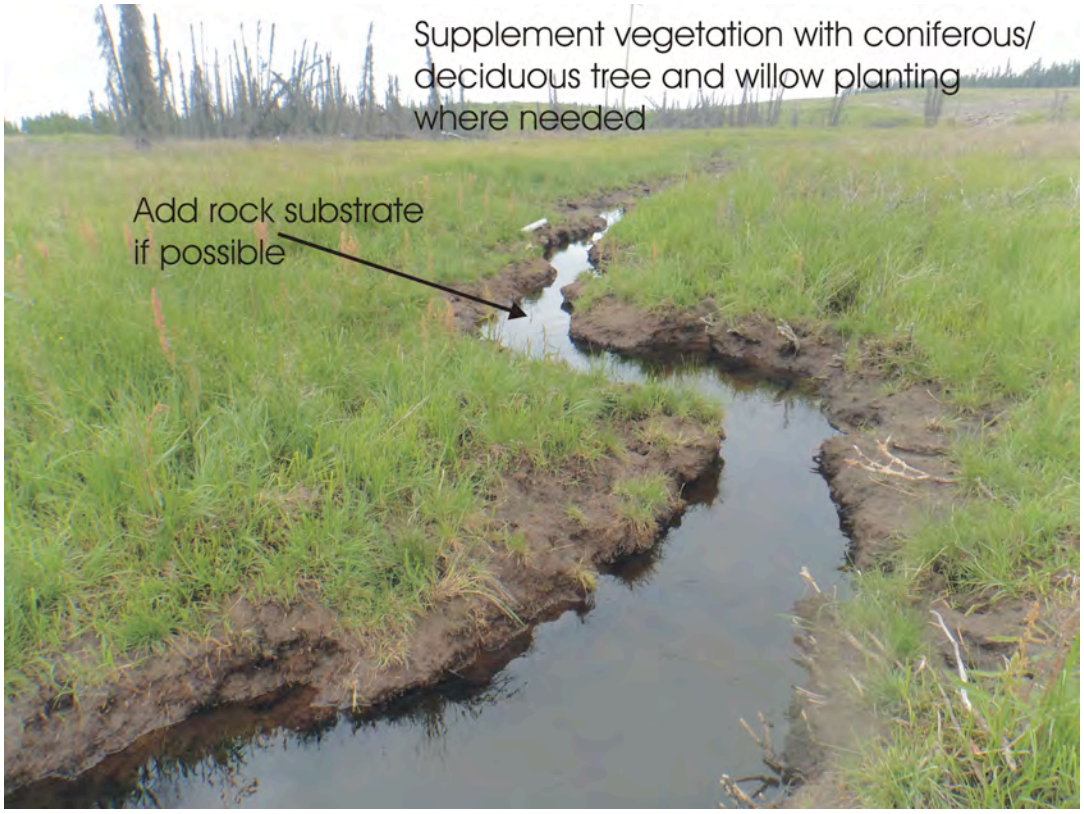

Figure 19. Looking downstream.

Figure 20. Looking upstream

Figure 21. Looking upstream

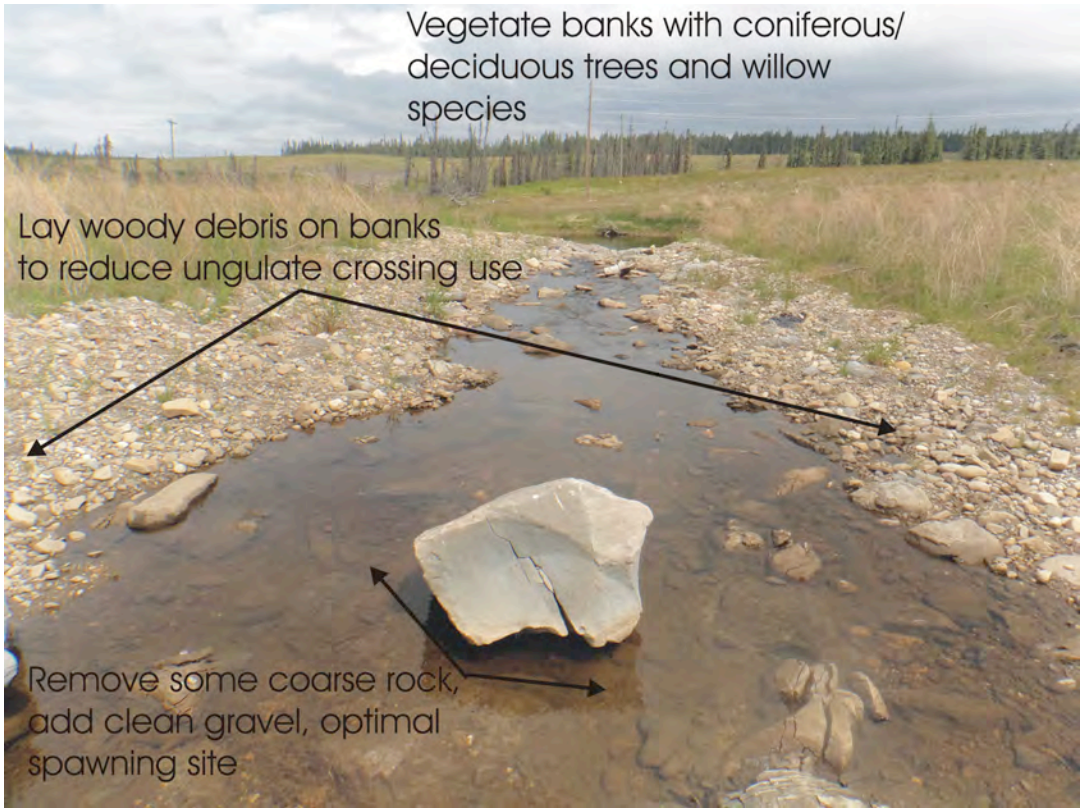

Figure 22. Looking downstream

3.4 Upper Embarras Channel

Pisces recommends the following components be incorporated into the reclamation plans for the Upper Embarras Channel. Additional details are shown on Figures 23 and 26. Existing water temperature data indicates that while channel reach is relatively cold (especially upstream of the beaver pond), it is likely suitable for Rainbow Trout reproduction during most years. However, the enhancement of habitat in this channel reach may provide a thermal refuge that would likely be beneficial during warmer than average years.

- Streambank cover should be installed along the reclaimed channel. Willows and/or other deciduous plantings should be established as close to the stream as possible. Coniferous tree seedling should also be established where feasible to promote long-term stream shading that will mimic natural channel conditions in the area. Plantings should be relatively dense where warranted with riparian planting densities averaging at least one tree per meter of bank.
- Perpendicular woody cover installations should aim to maximize stream shade area and as large of trees as possible should be utilized. Enhancements within this channel will benefit Rainbow Trout by providing cover for adults during spring spawning.
- Although successful spawning is likely occurring within this channel reach additional habitat enhancements are recommended. The Upper Embarras Channel is consistently colder than the other channel reaches and may be of particular importance for Rainbow Trout spawning during abnormally warm years. Enhancements should include placement of appropriately sized gravels, and habitat suited for rearing of juvenile salmonids. The gravel should be 5 to 30 mm in size and preferably rounded rather than crushed with sharp edges; a diversity of gravel size is appropriate since the Embarras Lakes are occupied by adult Rainbow Trout of varying size. Gravel depths should exceed 0.30 meters to increase the longevity of the enhancements since the surrounding area is unlikely to provide much natural recruitment of this type of substrate.

Figure 23. Looking upstream

Figure 24. Looking upstream

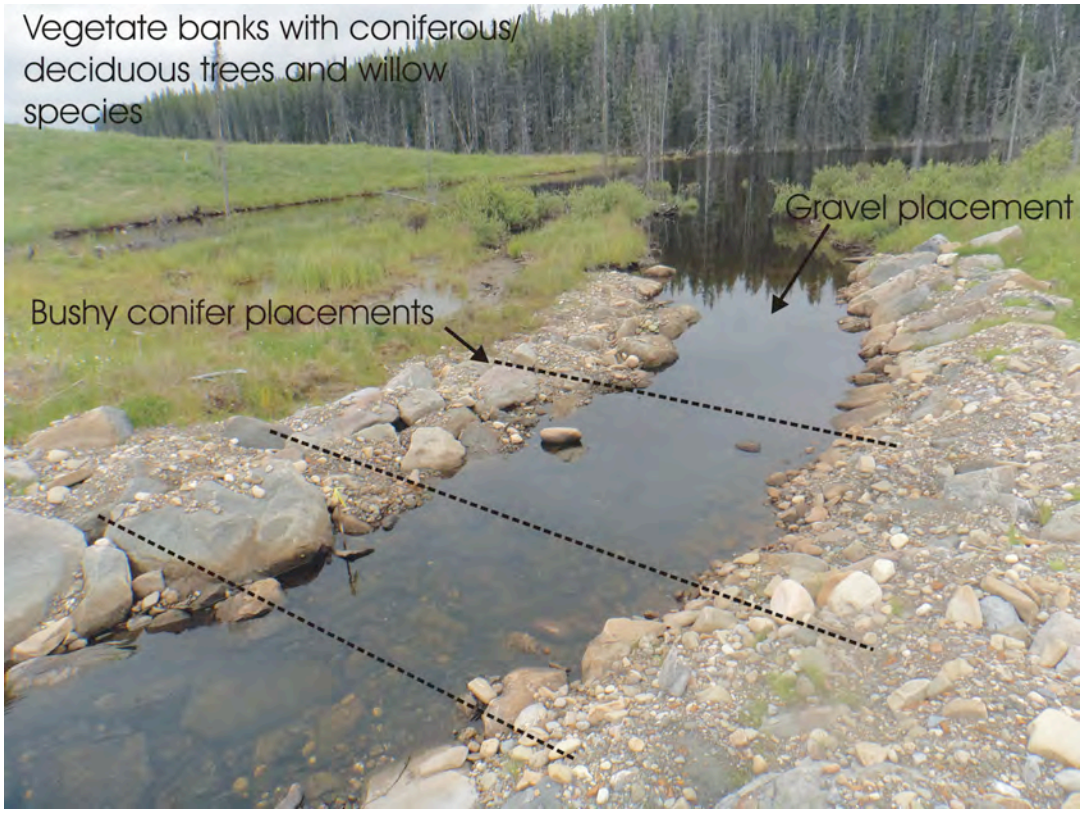

Figure 25. Looking upstream

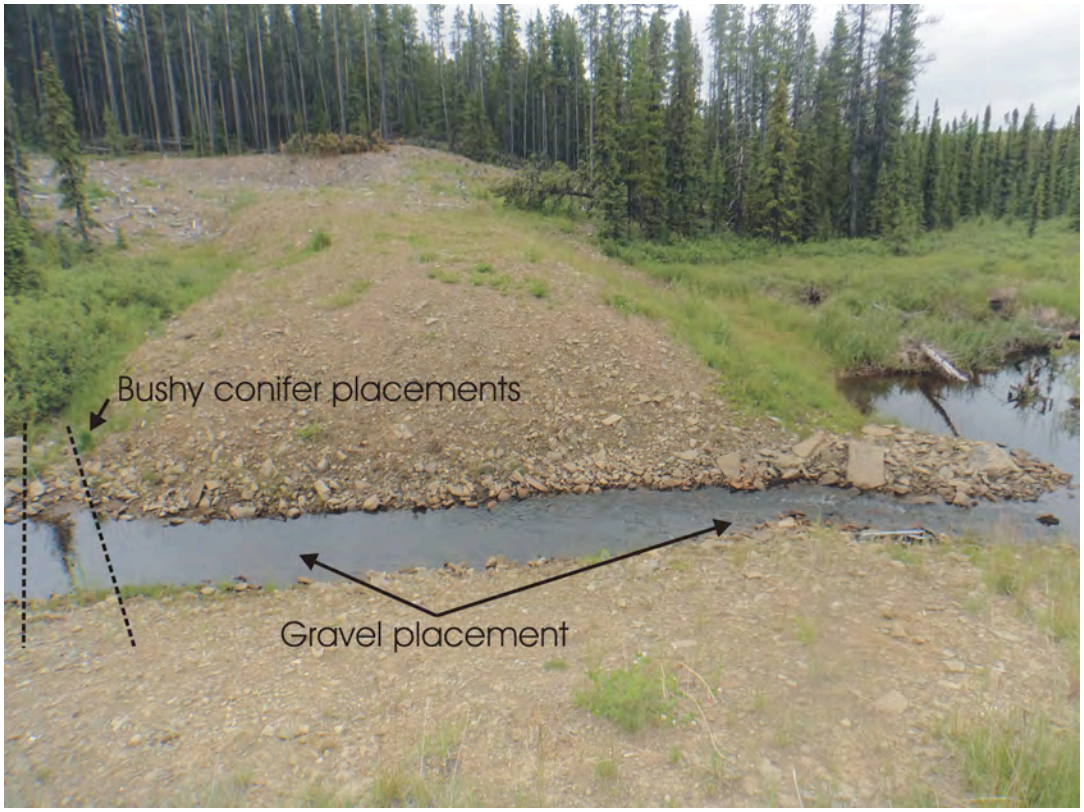

Figure 26. Looking from right upstream bank.

4.0 Other Considerations

Dependent on final reclamation objectives and the direction of AESRD there may be potential to create a seasonal or permanent connection between the Upper Embarras Lake and the Pit 142W Lake. The water level of Pit 142W Lake has not risen above the outflow channel elevation since final channel work was completed (Figure 27), under the current configuration the lake would likely require stocking if a fishery end use is desired. However, adjustment to the channel grade could be attempted to allow for seasonal recruitment of fish from the Embarras system. Alternatively, the possibility of this pit undergoing a change in final surface elevation so it could be connected via a permanent channel could be investigated if CVRI and/or AESRD wish to reduce the number of lakes that will require stocking in the future. A channel between this lake and the beaver pond upstream of the Embarras Lakes could also be investigated if connectivity is a desired end use and water surface elevations were appropriate. However, providing a surface connection to Pit 142W should likely not be completed until it is confirmed that the Rainbow Trout currently in the Embarras End Pit Lake System are native Athabasca Rainbow Trout.

Figure 27. Existing channel between Pit 142W Lake and Upper Embarras Lake.

While we recognize that the haulroad between Pit 122W and the Lower Embarras Lakes is still active there may be merit in exploring the possibility of developing a final reclamation plan that involves construction of a connecting channel between the lakes. Depending on fisheries objectives this may provide an opportunity to reduce the need for long-term fish stocking in the area.

5.0 Closure

I trust this meets your information requirements at this time. If you have any questions regarding the foregoing please contact our office at your convenience.

Sincerely,

<original signed by>

Joe Sonnenberg, B.Sc.
Fisheries Biologist

<original signed by>

Erik Stemo, P. Biol.
Senior Fisheries Biologist

Pisces Environmental Consulting Services Ltd.

References

Boorman, J. 2003. Baseline fisheries resources assessment of waterbodies on and adjacent to the proposed Mercoal East extension. Report of Pisces Environmental Consulting Services Ltd. to Luscar Ltd. Coal Valley Mine, Edson, AB. 35 pp. + App.

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• www.piscesenvironmental.com •

CVRI
Coal Valley Mine
Bag 5000
Edson, Alberta
T7E 1W1

March 19, 2013

ATTN: Mr. Les LaFleur

RE: 2012 post-construction monitoring of the permanent diversion channel on upper Mercoal Creek for the MP2 development.

Introduction

The Mercoal Phase 2 (MP2) project, part of ongoing mining operations at the Coal Valley Mine, required the permanent diversion (known as diversion D-E) of a portion of Mercoal Creek to facilitate mining. As required by Fisheries and Oceans Canada (DFO), a habitat compensation plan that included enhancement of the constructed channel with a goal of maximizing its productive capacity was developed for the project. In order to meet the requirements of the DFO Section 35(2) *Fisheries Act* Authorization (# ED-04-3170) issued for the project, the mine committed to conducting fish and fish habitat monitoring within the constructed channel. Key components of the monitoring program included:

- Sampling 1, 3, and 5 years following construction of the channel.
- Habitat surveys 1 and 5 years following construction of the channel.

This document presents Year 3 (post construction) monitoring results obtained by Pisces Environmental Consulting Services Ltd. (Pisces).

Background

Baseline investigations of Mercoal Creek found that fish densities were very low in the vicinity of the diversion and that Rainbow Trout (*Oncorhynchus mykiss*) were the only species to occupy this part of the creek (Boorman 2003). Habitat inventory during baseline investigations found that the majority of habitat (>75 %) affected by the diversion consisted of Class 3 habitat (<0.5 m depth, Boorman 2003). Pool habitat comprised about 2 % of the affected habitat and there was no Class 1 habitat (>1.0 m depth) in the impacted area (Boorman 2003). Modeling of the habitat suitability of Mercoal Creek for Rainbow Trout (Raleigh et al. 1984) found that both the percent pools and the pool class rating variables were limiting factors (Stemo 2005). As a result, habitat compensation efforts included the construction of pools on every meander and the placement of large woody debris within the constructed pools (Stemo 2005).

Monitoring Results

The 2012 monitoring program included sampling of the compensation area as well as the natural channel adjacent to the compensation area. In addition, channel stability, general habitat conditions, and instream sedimentation was also assessed. The investigations were completed on August 14, 2012.

Habitat Condition

The channel was mostly stable and vegetated at the time of the 2012 assessment; some channel instability and erosion had occurred within the reconstructed channel (see attached photos).

The habitat inventory completed in 2010 found that the channel provided an additional 750 m^2 of habitat compared to the pre-disturbance condition. In 2012, habitat conditions were judged to be very similar to what was present in 2010. A full assessment of habitat within the study area is scheduled for 2014.

The August 14th, 2012 assessment included measurement of water quality parameters within the compensation channel (Table 1). No water quality factors were judged to be limiting for fish at the time of assessment though flows were considered to be low.

Table 1. Select Water Quality Measurements of Mercoal Creek on August 14th, 2012

Dissolved Oxygen (mg/l)	7.44
Temp (^{0}C @ time)	12.6 @ 10:00
Cond (uS)	423.3
Discharge (m^3/s)	0.0135

Fish Sampling

The 2012 fish sampling program consisted of electrofishing and angling surveys:

- 350 metres of the diversion channel was electrofished for 1381 seconds of on-time. No fish were captured or observed during this survey.
- Deep portions of 4 pools were angled due to the limited effectiveness of electrofishing within deeper water. No fish were captured or observed during 2 hours of total angling effort.
- A 200 metre section of the natural channel downstream of the diversion was electrofished for 996 seconds of on-time. No fish were captured or observed during this survey.

Summary

Consistent with the Habitat Compensation Plan (Stemo 2005), the constructed diversion channel still had substantially more Class 1 pools in 2012 as compared to the pre-disturbance condition. Based on Habitat Suitability Modelling (Raleigh et al. 1984), compensation efforts have resulted in an increase in the overall habitat quality within this portion of Mercoal Creek.

Utilization of the diversion channel was not confirmed in 2010 or 2012, however fish were also absent in the natural channel downstream of the diversion which suggests that fish densities in the headwaters of Mercoal Creek remain low (as was found during baseline studies (Boorman 2003)).

References

Boorman, J. 2003. Baseline fisheries resource assessment of waterbodies on and adjacent to the proposed mercoal east mine extension. Report of Pisces Environmental Consulting Services Ltd. to Luscar Ltd. Coal Valley Mine. Edson, AB. 35pp. + App.

Raleigh, R.F., T. Hickman, R.C. Solomon, and P.C. Nelson. 1984. Habitat suitability information: Rainbow Trout. U.S. Department of the Interior Fish and Wildlife Service. FWS/OBS-82/10.60. 64 pp.

Stemo, E. 2005. Coal Valley Mine Mercoal Phase 2 Extension Fish Habitat Compensation. Report of Pisces Environmental Consulting Services Ltd. to Luscar Ltd. Coal Valley Mine. Edson, AB. 10pp. + App.

Closure

I trust this meets your information requirements at this time. If you have any questions please contact our office at your convenience.

Sincerely,

<original signed by>

Joe Sonnenberg
Fisheries Technician

<original signed by>

Ricki-Lynn Boorman, P.Biol
Senior Fisheries Biologist

Pisces Environmental Consulting Services Ltd.

Attch.

Photo 1. Looking across at anchored tree within the diversion channel.

Photo 2. Looking downstream at typical habitat within the diversion channel.

Photo 3. View of typical habitat within the diversion channel.

Photo 4. Looking at partially exposed bank along diversion channel.

Photo 5. Looking at large pool with anchored trees.

Photo 6. View of typical habitat within the diversion channel.

	
Photo 7. Looking at large pool with anchored trees.	Photo 8. Looking at small pool with anchored trees.

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MEMO

Date: 18 February 2014

To: Mr. Les LaFleur

From: Mr. Joe Sonnenberg

RE: Preliminary results for investigations conducted on existing end pit lakes in the South Block Area of the Coal Valley Mine.

INTRODUCTION

Coal Valley Resources Inc. (CVRI) has established several end pit lakes in the South Block Area of the Coal Valley Mine (CVM). Reclamation in this area is ongoing and CVRI would like to develop more specific reclamation objectives for the end pit lakes. To assist CVRI with their ongoing effort to improve the design and functionality of end pit lakes, Pisces Environmental Consulting Services Ltd (Pisces) initiated some preliminary investigations to assess the fisheries potential of a number of the end pit lakes. This document provides a summary of results for investigations completed in 2013.

STUDY AREA

Investigations in 2013 were focused on five end pit lakes (Figure 1 - attached). Summary information for the lakes is provided in Table 1.

Table 1. Summary information for CVRI lakes (Hatfield 2011, Hatfield 2014).

Lake	Year Created	Approximate Surface Area (ha)	Maximum Depth (m)	Mean Depth (m)	Inflow	Outflow
Pit 44	1998	8.76	18.5	7.4	Yes	Yes
Pit 25S	1999	6.8	12.5	4.7	Yes	Yes
Pit 25E	1996	6.8	16.2	7.4	Yes	Yes
Pit 43W	unknown	unknown	unknown	unknown	Yes	Yes
Pit 34	unknown	5.9	5.5	2.9	Yes	Yes

OBJECTIVES AND METHODS

The principal objectives of the 2013 investigations were to:

- Obtain information regarding fish use of inlet/outlet streams adjacent to the end pit lakes;
- To gain a general understanding of fish habitat potential and the feasibility of establishing fish populations within the end pit lakes;
- To contribute to an overall plan for reclamation of end pit lakes on CVM.

Fish Sampling

Fish sampling consisted of single pass electrofishing surveys on streams adjacent to the end pit lakes (Table 2).

Table 2. Summary of fish sampling in 2013.

Lake	Sample Section	UTM's (zone 11U)	Date (all 2013)	Section Size (m)	Electrofishing Duration (s)	Comments
Pit 44	Pit 44 Outlet	523398E 5872396N	Jul 15	250 x 0.5	871	• Fish exclusion barrier located approximately 250 meters downstream of pit.
Pit 25S	Pit 25S Outlet (upper 25E Creek)	520806E 5872969N	Jul 17	150 x 1	408	• Habitat not suitable for sampling further downstream due to extensive overhanging bank and vegetation.
Pit 25E	Pit 25E Outlet (middle 25E Creek)	522691E 5821560N	Jul 17	200 x 1.5	1399	• All available habitat was sampled, excessive cover/ depth precluded sampling further downstream. • Numerous fish observed in lake.
	Lower 25 E Creek	523272E 5871040N	Jun 7th	50 x 2	242	• Sampled immediately downstream of Hwy 47. • Fish observed trying to pass Hwy culvert, which appears to be a barrier at high flows.
Pit 43W	Pit 43W Outlet	521219E 5875396N	Jul 18	200 x 1.5	1392	• Sampled from confluence of Lovett River to Pit 43W. • Numerous fish observed in lake.
Pit 34	Pit 34 Outlet	51973E 5874417N	Jul 18	205 x 2	1243	• Sampled from road culvert to Pit 34. • Culvert may be a partial barrier at some flows.

Habitat Potential

Habitat was visually assessed to identify major limiting factors to fisheries productivity (i.e. flows and habitat diversity). In addition, temperature loggers were deployed throughout the area to see if the thermal regime is suitable for target species.

RESULTS

Fish Sampling and Habitat Potential

Pit 44

Rainbow Trout was the only species captured from the Pit 44 outlet channel in 2013 (Table 3). All fish were captured near a patch of gravel located close to the lake outlet; these fish likely represent young of the year (YoY) fish, which suggests that stocked Rainbow Trout have successfully reproduced in the system. Rainbow Trout, Brook Trout and Brown Trout have all been stocked in Pit 44 in the past (FWMIS 2013, Miller 2011).

Table 3. Pit 44 outlet sampling summary for July 15th, 2013.

Species	Number Captured	Length (mm)	Weight (g)
RNTR	12	24.1 (21-29)	<1

Low flows likely limit habitat potential during most of the year. The Pit 44 outlet channel had minimal flow during the summer and was dry on several occasions. Based on the local habitat conditions it seemed likely that Rainbow Trout spawning occurred in an area that was back-flooded by the lake. Although there were a few deeper pools located throughout the outlet channel, no fish were captured or observed in these areas.

Pit 25S and Pit 25E and 25E Creek

There is no record of fish stocking in this system. Sampling of the channel downstream of Pit 25S failed to capture any fish, which suggests that fish have yet to colonize upper 25E Creek or Pit 25S.

Brook Trout were captured in middle 25E Creek (Table 4) and are known to occupy Pit 25E lake (Pisces 2010). Large schools of Brook Trout were observed feeding near the lake outlet on July 17th, 2013.

Table 4. Pit 25E outlet sampling summary for July 17, 2013.

Species	Number Captured	Length (mm)	Weight (g)
Brook Trout	18	144.8 (59-191)	37.6 (2-85)

Investigations on June 7, 2013 found a large congregation of fish downstream of the Highway 47 culvert. Electrofishing of the habitat resulted in the capture of Brook Trout and Mountain Whitefish (Table 5) however, sampling effectiveness was limited due to high stream flows.

Table 5. 25E Creek downstream of HWY 47 sampling summary June 7th, 2013.

Species	Number Captured	Length (mm)	Weight (g)
Brook Trout	5	181.4 (118-344)	99.4 (2-354)
Mountain Whitefish	1	283	97

25E Creek originates in the 25S Pit and flows through a small channel and reclaimed wetland area before entering Pit 25S. The outlet channel from Pit 25S contained gravel and cobble substrates but lacked instream cover and riparian vegetation. A short distance downstream of Pit 25S the creek flows through a muskeg area where beaver activity was very evident and the channel was poorly defined in places. Fines were the dominant substrate throughout this section. The habitat in the inlet to Pit 25E consisted mainly of riffle – pool complexes with cobble and boulder substrates. 25E Creek outlets from the south end of the 25S Pit, flowing over a relatively steep boulder section. The natural channel further downstream is generally low gradient with fines substrates dominant. The Highway 47 culvert appeared to be a barrier to fish movements during high flows but may be passable when discharges are lower. Downstream of this culvert the creek meanders through washed out beaver ponds.

Pit 43W

There is no record of fish stocking in this system but fish resident to the Lovett River appear to be able to access the area. A number of fish species were captured in the outlet channel from Pit 43W (Table 6). Brook Trout and Longnose Dace were the most abundant while White Sucker and Lake Chub were only captured once each.

Table 6. Pit 43W outlet sampling summary for July 17, 2013

Species	Number Captured	Length (mm)	Weight (g)
Brook Trout	33	127.8 (46-183)	32.2 (1-183)
Lake Chub	1	83	7
Longnose Dace	19	88.3 (83-93)	7.3 (4-12)
White Sucker	1	140	36

Shallow runs with cobble and boulder substrate dominated habitat within the outlet channel. There was one section, located approximately 75 metres downstream of Pit 43W, where the channel was quite steep and fish movement may be impeded at certain times of the year. Further downstream the channel transitioned to a small wetland area before flowing through a short channel that entered into the Lovett River. A limited amount of spawning gravel (suitable for salmonids) was identified downstream of the culvert located at the outlet of the lake.

Pit 34

There is no record of fish stocking for Pit 34 or Pit 43-2 (that outlets to Pit 34). Fish sampling conducted in the Pit 34 outlet channel captured Brook Trout and Longnose Dace (Table 7).

Table 7. Pit 34 outlet sampling summary for July 18th, 2013.

Species	Number Captured	Length (mm)	Weight (g)
Brook Trout	31	154.1 (103-207)	59.9 (15-140)
Longnose Dace	1	76	5

Reconnaissance conducted in the summer found that habitat within the inlet channel (from Pit 43-2) was extremely shallow and generally lacked cover for fish. Habitat within the outlet channel consisted mainly of shallow runs when assessed in the spring. Substrates consisted mainly of cobble and boulder. A culvert located in the outlet channel may impede fish movements at some flows.

Temperature Logging

Data was collected from June 11th to September 18th, 2013 (Table 8). The logger installed in the Lovett River downstream of the lakes was unusable since the logger was not submerged for long periods of time.

Table 8. Temperature logging results for end pit lake systems in the South Block Area.

			June 11- Sept 18th 2013		
Site	Start	End	Average Daily (^{0} C)	Max Hourly Temperature (^{0} C)	Average Hourly Daily Fluctuation (^{0} C)
Upper Lovett River	10-Jun	21-Sep	11.98	18.25	4.21
Pit 25S Lake Outlet	10-Jun	21-Sep	16.9	22.1	2.53
Pit 25E Lake Inlet	7-Jun	21-Sep	12.56	19.63	4.44
Pit 25E Lake Outlet	7-Jun	21-Sep	15.92	21.03	2.01
Lower 25E Creek	7-Jun	21-Sep	14.89	20.29	2.64
Pit 43W Pond Outlet	10-Jun	21-Sep	15.53	21.41	3.28
Pit 34 Lake Outlet	10-Jun	21-Sep	15.85	22.54	2.66

The highest stream temperatures recorded during the summer 2013 monitoring period occurred in the Pit 34 outlet and Pit 25S outlet respectively (Table 8). Under existing conditions, these channels have a high degree of sun exposure and bank cover has not been established. A significant cooling trend occurred between the Pit 25S outlet and the Pit 25E inlet in 2013 (Table 8). This is mostly attributable to cold water flow inputs from surrounding muskeg areas as well as a significant tributary which enters a short distance downstream of Pit 25S Lake.

The suitability of the systems for selected fish species is provided in the summary section of this report (Table 9) while ongoing monitoring will assess early spring conditions in 2014.

SUMMARY

The preliminary assessment data suggests that in most cases there is a moderate to high potential for development of sport fisheries in the end pit lake systems that were investigated (Table 9). Hatfield (2011) found physical characteristics and water quality values were sufficient for fish survival in Pit 44, 25S, and 25E lakes while lake investigations have not been completed in the other systems. The existing inlet and outlet channels are in reasonable condition but most would benefit from implementation of habitat enhancement. In some cases, habitat enhancement would likely be a critical step in establishing self-sustaining salmonid populations. Measurements taken during the 2013 investigations indicate that water temperatures were suitable and/or near optimal when compared to the requirements of fish species that could occupy these systems.

Table 9. Preliminary summary of fisheries potential for select pit lakes systems at the Coal Valley Mine.

Pit	Sample Section	Temperature Regime Suitability	Fisheries Potential of Inlet/Outlet Streams
Pit 44	Pit 44 Outlet	Insufficient water depth to submerge temperature logger	• Limited potential, primarily due to chronically low discharge. • Currently managed as put and take fishery by AESRD. • Some limited potential for salmonid reproduction at lake outlet during optimal years. • Evidence of RNTR reproduction in 2013.
Pit 25S	Pit 25S Outlet (upper 25E Creek)	RNTR – High BKTR – Mod ARGR - High	• High potential during spring and summer when there is sufficient discharge. Limited potential during the fall and winter when flows are lower. • No fish captured or observed in 2013. • Habitat potential of channels could be improved by increasing amount of coarse substrates and installing instream and riparian habitat enhancements.
Pit 25E	Pit 25E Lake Outlet (middle 25E Creek)	RNTR – High BKTR – High ARGR - High	• High potential. • Currently supports BKTR population but population size and production have not been assessed. • BKTR reproduction is known to occur in the outlet of Pit 25E. • Habitat potential of channels could be improved by increasing amount of coarse substrates and installing instream and riparian habitat enhancements.
	Lower 25 E Creek	RNTR – High BKTR – High ARGR - High	• High potential. • Currently supports BKTR population. Mountain Whitefish present downstream of Hwy 47. • Potential to enhance habitat upstream of Hwy 47 by increasing amount of coarse substrates.
Pit 43W	Pit 43W Lake Outlet	RNTR – High BKTR – High ARGR - High	• Moderate potential, flows are limiting factor in some months. • Appeared to support BKTR reproduction in 2013. • Existing fish community has not been assessed but appears substantial. • Habitat potential of channels could be improved by increasing amount of coarse substrates and installing instream and riparian habitat enhancements.
Pit 34 and Pit43-2	Pit 34 Lake Outlet	RNTR – High BKTR – High ARGR - High	• High potential during spring and summer when there is sufficient discharge. Limited potential during the fall and winter when flows are lower. • BKTR/forage fish utilize channel seasonally. • Habitat potential of channels could be improved by increasing amount of coarse substrates and installing instream and riparian habitat enhancements.
	Pit 43-2 Lake Outlet	RNTR – High[1] BKTR – High[1] ARGR – High[1]	• Low to moderate potential due to low flows and lack of habitat diversity (high width to depth ratio).

1. Data logger exposed during monitoring period, partial data set applied.

CLOSURE

I trust that the foregoing meets your requirements at this time. Please do not hesitate to contact me if you have any questions.

<original signed by>

Joe Sonnenberg B.Sc.
Fisheries Biologist
Author

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Erik Stemo, P.Biol.
Senior Fisheries Biologist
Review

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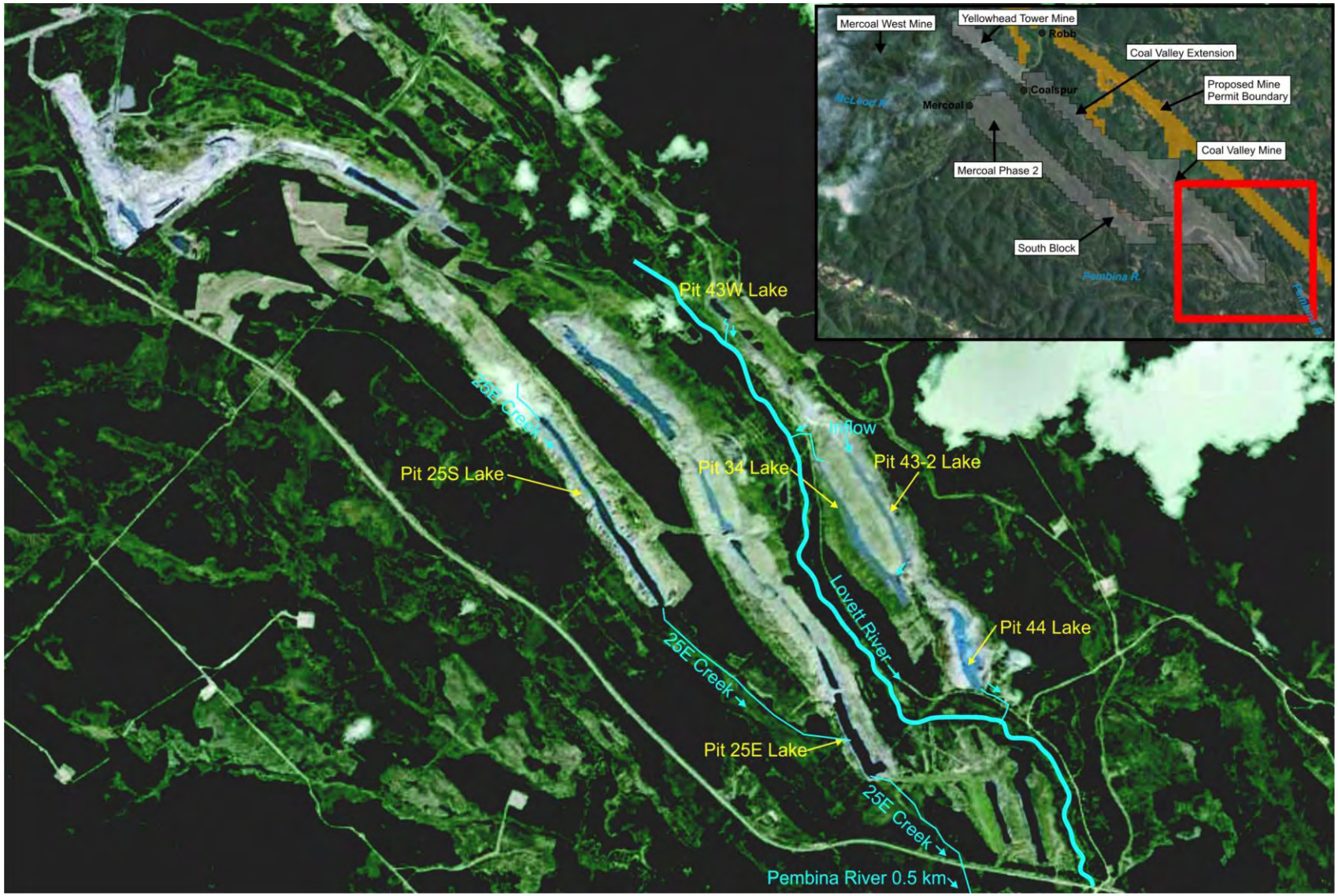

Figure 1. Location of lake systems.

Pisces Environmental Consulting Services Ltd.

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MEMO

Date: 4 February 2014

To: Mr. Les LaFleur

From: Mr. Erik Stemo

RE: Preliminary results for fish sampling conducted in the Embarras Lakes System.

INTRODUCTION

Coal Valley Resources Inc. (CVRI) developed several end pit lakes in the headwaters of the Embarras River as part of the reclamation strategy for the Mercoal Phase 1 Project. The objective was to develop a self-sustaining Athabasca Rainbow Trout (*Oncorhynchus mykiss)* population in the lakes. The purpose of this memo is to provide a brief update regarding fish sampling that has been conducted within and adjacent to the lake system to date.

BACKGROUND

The Embarras Lakes are located in the extreme headwaters of the Embarras River southwest of Robb, Alberta. Baseline habitat assessment in the area of the lakes indicated that habitat conditions were poor and fish densities were low (Boorman 2003).

CVRI completed the majority of physical works to reclaim the lake system in 2010 and 2011. As part of this reclamation, CVRI installed a fish exclusion barrier downstream of the lakes and Pisces Environmental Consulting Services Ltd. (Pisces) conducted intensive fish sampling upstream of the barrier to capture and remove Brook Trout that had moved into the diversion channel. During the latter stages of reclamation (in early 2011) approximately 80 to 100 Rainbow Trout were found to have colonized the Lower Embarras Lake (Dean Woods Personal Communication).

In September 2011, Alberta Environment and Sustainable Resource Development (AESRD) stocked 208 native Athabasca Rainbow Trout into the Upper Embarras Lake (Ryan Cox Personal Communication). The stocked fish ranged in size from 29 mm to 119 mm with a mean length of 80 mm (Ryan Cox Personal Communication).

At the request of CVRI, Pisces implemented an annual monitoring program that included seasonal assessment of the lakes and connecting channels starting in the summer of 2011. The first annual report that included assessment results for the period of summer 2011 to spring 2012 was completed in early 2013 (Sonnenberg and Stemo 2013). The second annual report (summer 2012 to spring 2013) is currently being prepared.

RESULTS SUMMARY

Fish sampling has been conducted at an established monitoring section (the Hinton Wood Products (HWP) Bridge Section) downstream of the fish exclusion barrier and also at several locations within the connecting channels and end pit lakes upstream of the exclusion barrier (Figure 1).

Fish Sampling Downstream of End Pit Lake System

Sampling of the Embarras River near the HWP Bridge has been completed on several occasions starting in 2002 (Table 1). The upstream limit of this sample section is located approximately 100 metres downstream of the exclusion device that was constructed on the Embarras River (Figure 1). Results indicate that Rainbow Trout density (n/100m^2) and catch per unit effort (CPUE) in the Embarras River downstream of pit lakes have increased substantially since the lake system was reclaimed.

Table 1. Summary of electrofishing results for the Embarras River HWP Bridge Section.

Date	Method	Section Length (m)	# RNTR	# BKTR	RNTR CPUE (fish/min/ 100m^2)	BKTR CPUE (fish/min/ 100m^2)	RNTR Density (n/100m^2)	BKTR Density (n/100m^2)
16-Jul-02	E-Fish Removal (4 pass) [1]	305	10	2	0.010	0.005	2.6[1]	0.3
15-Aug-02	E-Fish Removal (2 pass)	305	13	3	0.054	0.010	2.2	0.5
23-Jun-08	E-Fish Survey	305	6	1	0.044	0.007	n/a	n/a
18-Aug-11	E-fish Survey	300	21	50	0.081	0.194	n/a	n/a
04-Sep-12	E-Fish Mark/Recap	400	76	179	0.135	0.317	16.2[2]	49.3
27-Sep-13	E-Fish Mark/Recap	300	367	152	1.205	0.499	180.8[2]	41.0

[1]16-Jul-2002 removal estimate exhibited low capture probability (Boorman 2003)
[2]Mark/recapture estimate utilizing Chapman variation of the Lincoln-Peterson Method.

Fish Sampling Within the End Pit Lake System

Preliminary sampling indicates that relatively large Athabasca Rainbow Trout are occupying the end-pit lakes. Test angling completed by Pisces' personnel in the Upper Embarras Lake on August 20, 2013 resulted in the capture of 23 Rainbow Trout ranging in size from 213 mm fork length and 95 grams to 521 mm fork length and 1024 grams. Table 2 provides a summary of fish capture events in stream channels upstream of the fish exclusion device.

Table 2. Summary of results for single-pass electrofishing conducted in the Embarras Lake System.

Sample Section	Date	n	RNTR CPUE (fish/min/100m^2)	RNTR Density[1] (n/ 100m^2)	Section Characteristics and General Comments
ELS-1 (Upstream of Embarras Lakes)	17-Aug-12	10	1.520	8.89	• 75 m section extending upstream from the Upper Lake to a ponded area. Average channel width of 1.5 m
	25-Aug-13	74	6.016	65.78	
ELS-2 (Upstream of Middle Embarras Lake)	16-Aug-12	60	0.340	10.00	• 400 m section between the Middle and Upper lakes. Average channel width of 1.5 m. • Extremely high fish densities encountered in 2013 necessitated a reduction in section length to 150 m.
	25-Aug-13	190	3.221	84.44	
ELS-3 (Upstream of Lower Embarras Lake)	27-Sept-12	6	0.548	4.00	• 150 m section between the Lower and Middle Lakes. Average channel width of 1.0 m.
	9-Aug-13	71	1.902	47.33	
ELS-4 (Upstream of fish exclusion barrier)	18-Aug-11	25	0.087	3.47	• 400 m section extending upstream from the fish exclusion structure to the Lower Embarras Lake. Average channel width of 2 m. • Deep-water pond habitat not sampled. • Capture probability was likely limited due to water depth and small size of average fish captured.
	5-Oct-11	1	0.008	0.16	
	4-Sept-12	13	0.070	1.63	
	27-Sept-12	13	0.058	1.63	
	9-Aug-13	41	0.071	5.13	

[1] Estimated density is based on total catch from single pass electrofishing survey.

Rainbow Trout Spawning in the Vicinity of the End Pit Lake System

Spawning surveys conducted during spring 2012 and 2013 confirmed that Rainbow Trout spawning has occurred upstream and downstream of the fish exclusion structure (Table 3). Schools of Rainbow Trout fry numbering in the hundreds ranging from 25-30 mm length were first observed on July 14th, 2013 in the constructed channel downstream of the Lower Embarras Lake. This suggests that spawning occurred in mid to late May and indicates that successful emergence likely occurred early July.

Table 3. Summary of results for Rainbow Trout spawning surveys conducted in the vicinity of the Embarras Lake System.

Survey Date	Downstream of Exclusion	Upstream of Exclusion
May 26th, 2012	• 2 possible redds[1]	• 1 possible redd upstream of middle lake[1]
June 1st, 2012	• No spawning observed • 3 large RNTR observed attempting to move upstream at the exclusion barrier	• No spawning observed
June 21st, 2012	• No spawning observed	• No spawning observed
May 22nd, 2013	• 8 RNTR pairs observed • Numerous possible redds observed[1]	• 10 RNTR pairs observed upstream of middle lake and upper lake • Possible redds observed at outlet of lower and middle lakes[1]
May 31st, 2013	• No spawning observed	• No spawning observed
June 1st, 2013	• No spawning observed	• No spawning observed

[1]Redd defined as "possible" if there was evidence of disturbed streambed gravels but the distinct pit and tail spill associated with characteristics of a positive redd were absent.

DISCUSSION

Performance of Fish Exclusion Barrier

The fish exclusion barrier appears to be effectively precluding the movement of Brook Trout into the Embarras Lake System since Brook Trout are numerous downstream of the barrier but have not been recorded upstream.

Athabasca Rainbow Trout Population

Results obtained to date indicate that a robust population of Athabasca Rainbow Trout occupy the lake system with all life stages being supported upstream of the fish exclusion barrier. In addition to the newly established Rainbow Trout population upstream of the barrier, populations of Rainbow Trout and Brook Trout downstream of the barrier have increased dramatically compared to baseline conditions. Preliminary results, based on two years of spawning surveys, suggest that conditions in the vicinity of the lake system are beneficial to Rainbow Trout reproduction. It appears that spawning in the vicinity of the lakes may be occurring earlier than in natural systems and the capture of fry in mid-July suggests that emergence and growth of fry is accelerated compared to natural systems.

When compared to Rainbow Trout densities reported in the Alberta Status Report for Athabasca Rainbow Trout (AESRD and ACA 2009) the estimated densities (based on preliminary sampling) within the connecting channels of the lake system and in the natural channel downstream of the fish exclusion barrier appear to be among the highest in the region. For example, the density of Rainbow Trout in the HWP Bridge Section in 2013 (180.8/100m^2) compares favorably with the densities reported for Deerlick Creek (23.9/100m^2) and Wampus Creek (31.1/100m^2) (AESRD and ACA 2009). Both Deerlick and Wampus Creeks report some of the highest densities of Athabasca Rainbow Trout in the region and are considered low risk systems (ASRD and ACA 2009). The status report classified stream fish populations across the region as low risk (>5 fish/100m^2), medium risk (2-5 fish/100m^2), or high risk (<2 fish/100m^2) based on fish density. Prior to mining, densities of Rainbow Trout in the HWP Bridge Section ranged from 2.2 to 2.6/100m^2 while fish were uncommon or possibly absent within the proposed mine area (Boorman 2003). Based on this information it appears that the Athabasca Rainbow Trout population in the vicinity of the Embarras Lakes System has shifted from a medium to high risk population to a low risk population.

While additional monitoring will be required to assess the development of this fish community over the longer term and the initial monitoring results should be considered preliminary, it appears that habitat conditions for Athabasca Rainbow Trout in the upper Embarras River have improved post-reclamation.

CLOSURE

I trust that the foregoing meets your requirements at this time. Please do not hesitate to contact me if you have any questions.

<original signed by>

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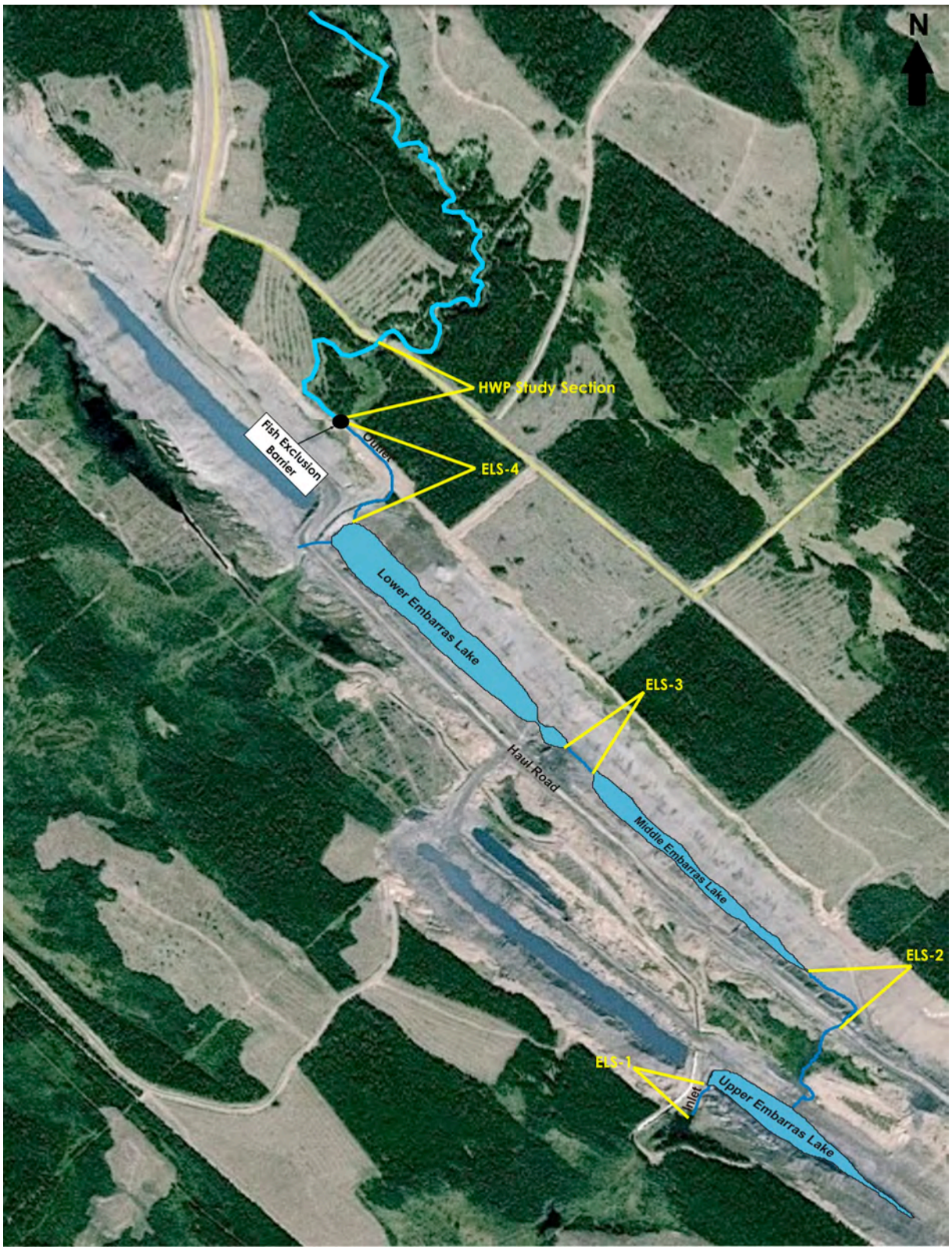

Figure 1. Embarras Lakes System

AQUATIC MONITORING PROGRAM FOR END PIT LAKES IN THE HEADWATERS OF THE EMBARRAS RIVER, 2011-2012

Prepared for: Coal Valley Resources Inc. Edson, Alberta

April 2013

PISCES ENVIRONMENTAL CONSULTING SERVICES LTD.

AQUATIC MONITORING PROGRAM FOR END PIT LAKES IN THE HEADWATERS OF THE EMBARRAS RIVER, 2011-12

Prepared For:
Coal Valley Resources Inc.
Edson Alberta

Prepared by:
Pisces Environmental Consulting Services Ltd.
Red Deer, Alberta

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Joe Sonnenberg
Senior Fisheries Technician

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Erik Stemo, P.Biol.
Senior Fisheries Biologist

April 2013

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1.0 INTRODUCTION

In August 2004, Fisheries and Oceans Canada (DFO) issued *Fisheries Act* Authorization ED-03-3080 to Coal Valley Resources Incorporated (CVRI) for the diversion of the Embarras River to facilitate mining in the Mercoal Phase 1 (MP1) area. Part of the final reclamation strategy for the MP1 extension included the development of an end pit lake system that would support a self-sustaining native fish population. Key to the fish habitat compensation plan for this diversion was the implementation of a study to assess the viability of the end pit lakes once they were constructed. CVRI completed the physical works to reclaim the aquatic ecosystem in 2010 and monitoring was initiated in 2011. This document presents results of monitoring conducted by Pisces Environmental Consulting Services Ltd. (Pisces) from summer 2011 to spring 2012.

1.1. OBJECTIVES

The 2011-12 monitoring program was designed to evaluate the initial development of the aquatic ecosystem of the Embarras End Pit Lake system in consideration of the following:

- Requirements specified in the DFO Authorization;
- End Pit Lake Working Group (EPLWG) Guideline performance evaluation/criteria; and
- Alberta Environment and Sustainable Resource Development (AESRD) objectives for End Pit Lake closure landscape.

The primary objectives of the program are listed below. Additional study parameters will be assessed in future years as the lake system develops.

- Describe physical and chemical limnological characteristics of the End Pit Lakes;
- Assess fish population in Embarras River downstream of the Lake System;
- Assess benthic macroinvertebrate populations in End Pit Lakes and Embarras River;
- Assess zooplankton and phytoplankton communities in the End Pit Lakes;
- Assess macrophyte communities in the End Pit Lakes.

2.0 STUDY AREA

The Embarras End Pit Lake system is located in the extreme headwaters of the Embarrass River in 25-47-21-W5 (Figure 2.1). The Embarras River flows into the McLeod River approximately 86 kilometres downstream of the lakes, which in turn flows into the Athabasca River near Whitecourt, Alberta. Historically, fish densities in the upper Embarras River were low and pre-mining investigations of this part of the river found fish habitat potential to be limited (Boorman 2003). Habitat diversity within this area was considered to be marginal and substrates were comprised almost exclusively of fines (Boorman 2003). However, Rainbow Trout (*Oncorhynchus mykiss*), Bull Trout (*Salvelinus confluentus*) and Brook Trout (*Salvelinus fontinalis*) were found just downstream of the proposed MP1 pit area during baseline investigations (Boorman 2003).

The Embarras End Pit Lake system consists of three lakes and approximately 1100 metres of constructed connecting channels (Figure 2.1). The naming convention for the lakes is as follows:

- Upper Embarras Lake (Pit 142E);
- Middle Embarras Lake (Pit 122); and
- Lower Embarras Lake (Pit 122).

The Embarras River enters the Upper Lake from a natural beaver pond via a constructed inlet channel that is approximately 30 metres long. There are approximately 500 metres of connecting channel between the Upper and Middle Lakes including the haulroad culvert crossing that is located just upstream of the Middle Lake. Between the Middle Lake and Lower Lake there is approximately 150 metres of connecting channel and there is approximately 400 metres of constructed channel downstream of the Lower Lake. A fish exclusion weir has been constructed at the bottom of this constructed channel to preclude Brook Trout from entering the end pit lake system. Photos of the lake and connection channels are presented in Appendix A.

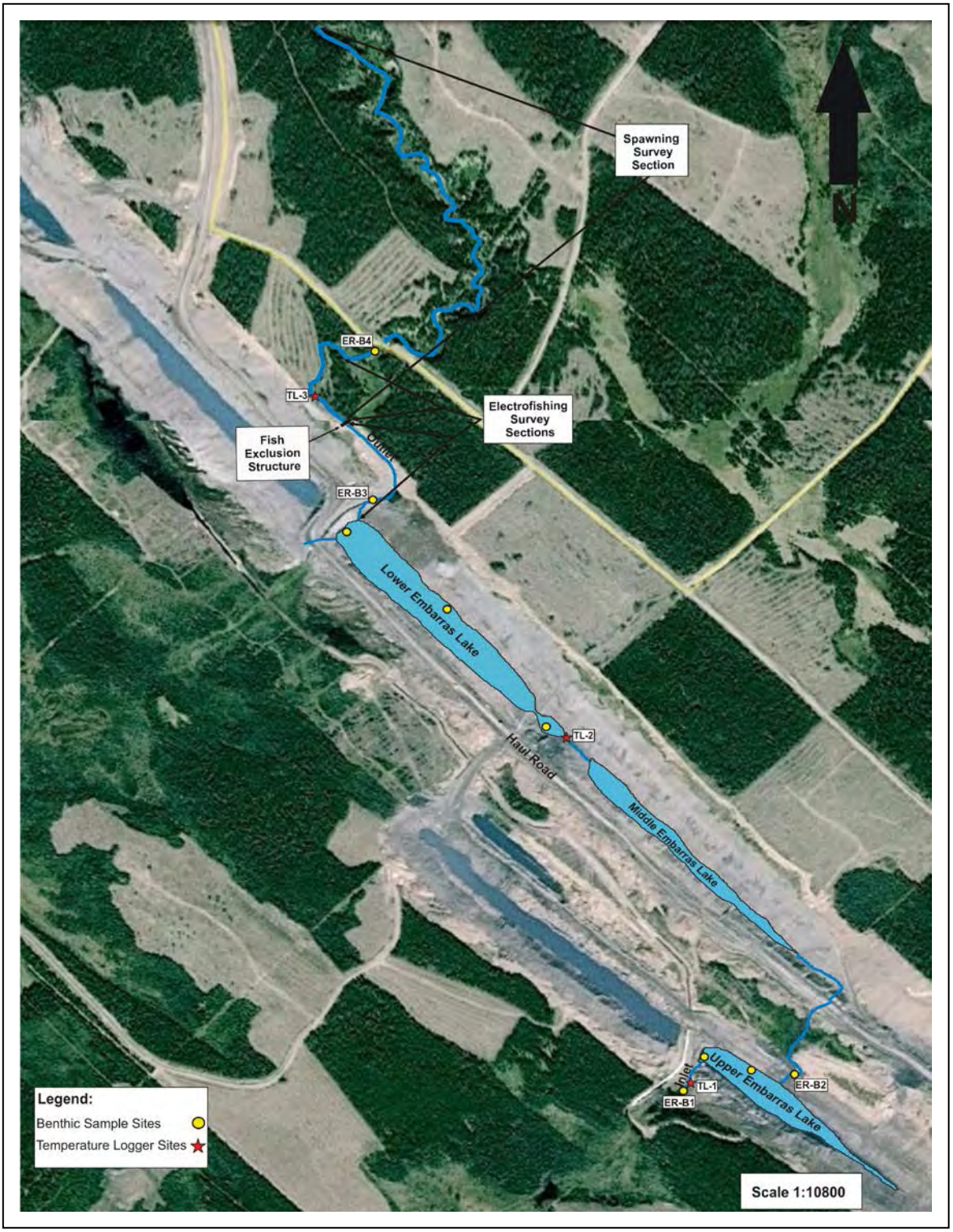


Figure 2.1. Study area and location of lakes.

3.0 METHODS

3.1. LENTIC HABITAT

3.1.1. Physical Characteristics

The basic morphology of each lake was determined based on field investigations and information provided by Sherritt Coal.

3.1.2. Limnology

A limnology station was established near the middle of each lake. Temperature, dissolved oxygen, and electrical conductivity were measured seasonally (summer, fall, winter, spring with a YSI model 85 meter at one metre intervals to a maximum depth of 30 metres. Water transparency was measured with a 20-centimetre Secchi disk during open water sampling.

3.1.3. Water Quality

In August 2011 water samples were obtained from the epilimnion and hypolimnion of the Upper and Lower Lakes using a Kemmerer bottle. Samples for chlorophyll analysis were taken from the photic zone. All samples were sent to Exova Laboratories in Edmonton, Alberta for analysis of select water quality variables (Table 3.1).

3.1.4. Benthic Invertebrates

Benthic macroinvertebrate sampling stations were established at random in the littoral zone of the Upper and Lower Lakes in October 2011. A 0.023 square metre Eckman grab sampler was used to obtain substrate samples at depths of 1.8 to 6.1 metres. Five replicate samples were taken, washed through a 583 μm sized sieve, stored and preserved with 85% ethanol. All benthic collections were submitted to an independent contractor for taxonomic analysis. Sample processing consisted of sorting, identifying and enumerating benthic invertebrates (Appendix B).

3.1.5. Zooplankton

In August 2011, five sample sites were established on both the Upper and Lower Lakes with one site located at or near the centre of the lake and the four remaining samples located in each of four quadrants. Vertical hauls were made at each site using a No. 20 Wisconsin net. The net was lowered to critical depth or near bottom of the lake and raised at 0.5 to 1.0 metres per second. The sample was rinsed into a jar, preserved with 95% ethanol and shipped to a qualified independent contractor for identification, enumeration, and population density calculations (Appendix C).

Table 3.1. Water chemistry variables measured in the Embarras End Pit Lake System in 2011-12 and Provincial and Federal water quality objectives.

Variable	Units	Surface Water Quality Objectives	
		Provincial[1]	Federal[2]
pH		6.5-8.5	6.5-9.0
EC	µMHOS/cm		
TDS	mg/L		
TSS	NTU		
T. Alkalinity	mg/L$CACO_3$		
Carbonate	mg/L		
Bicarbonate	mg/L		
Calcium	mg/L		
Magnesium	mg/L		
Sodium	mg/L		
Potassium	mg/L		
Hardness	mg/L$CACO_3$		
Chloride	mg/L		
Sulphate	mg/L		
Nitrate	mg/L as N		
Nitrite	mg/L as N		0.06
TKN	mg/L as N		
TP	mg/L as P	0.05	
Chlorophyll a (*)	µg/L		
Arsenic	mg/L	0.01	0.005
Antimony	mg/L		
Aluminium	mg/L	1	0.1 @ pH> 6.5
Barium	mg/L		
Beryllium	mg/L		
Bismuth	mg/L		
Boron	mg/L	0.5	
Cadmium	mg/L	0.01	0.0008(**) 0.0013(***) 0.0018(****(
Chromium	mg/L	0.05	0.02
Cobalt	mg/L		
Copper	mg/L	0.02	0.002(**) 0.003(***) 0.004(****)
Iron	mg/L	0.3	0.3
Lead	mg/L	0.05	0.002(**) 0.004(***) 0.007(****)
Lithium	mg/L		
Manganese	mg/L	0.05	
Mercury	mg/L	0.0001	0.0001
Molybdenum	mg/L		
Nickel	mg/L		0.065(**) 0.11(***) 0.15(****)
Selenium	mg/L	0.01	0.001
Silicon	mg/L		
Silver	mg/L	0.05	0.0001
Strontium	mg/L		
Sulphur	mg/L		
Thallium	mg/L		
Titanium	mg/L		
Uranium	mg/L		
Vanadium	mg/L		
Zinc	mg/L	0.05	0.03

1 Alberta Environment (1999)
2 Canadian Council of Ministers of Environment (2006)
Elements/Metals as Total
(*) Chlorophyll measured in photic zone (composite sample)
(**) @Hardness 60-120 mg/L $CaCO_3$, (***) @ Hardness 120-180mg/L $CaCO_3$, (****) @ Hardness > 180mg/L $CaCO_3$

3.1.6. Phytoplankton

Three composite samples were taken randomly from undisturbed areas of the epilimnion near the limnology station in the Upper and Lower lakes. Sampling was completed in August 2011. All samples were transferred to one litre amber bottles and shipped to an independent contractor for analysis.

3.1.7. Aquatic Macrophytes

A survey of the submergent and emergent aquatic macrophyte community in the lakes was conducted during August investigations. Aquatic macrophytes were identified to species and the abundance of each species was approximated in square metres (m^2).

3.2. LOTIC HABITAT

3.2.1. Spawning Surveys

Spawning surveys were conducted in connecting channels and in the natural channel downstream of the Lake system during the spring and fall. Spawning surveys targeting Brook Trout and Bull Trout were conducted on October 5th 2011 while surveys targeting Rainbow Trout were completed in May 2012 (Figure 2.1). The location of spawning activity was noted and the number and appropriate size of the fish on redds was recorded. To be confirmed as a positive redd the redd need to exhibit the typical depression and tail spill mound associated with salmonid spawning sites. A redd was considered to be a possible redd if there was evidence of disturbed stream bed gravels but the distinct pit and tail spill associated with characteristics of a positive redd were absent.

3.2.2. Fish Capture

Single pass electrofishing surveys using a Smith Root LR24 electrofisher were completed in connecting channels and in the natural channel downstream of the Lake system in August and October 2011 (Figure 2.1). All fish captured were identified to species, measured to fork length (mm) and weighted (g).

3.2.3. Benthic Invertebrates

Benthic invertebrate sampling sites were established at four locations on the Embarras River including: one upstream of the lakes, two within the constructed connecting channels, and one downstream of the lake system (Figure 2.1). Sample sites were selected to maintain a consistency of substrate across sites. Habitat at all sites was erosional, consisting of riffle and run habitat. Water velocity and mean

depth was measured at three locations along an established transect within the sampling area and substrate composition was recorded at each site.

Three replicate samples were collected at each site using a Neill-Hess cylinder (250 micron mesh). Samples were transferred to jars, preserved with 85% ethanol and transported to a qualified independent contractor for analysis.

3.2.4. Temperature Regime

StowAway®TidbitTM temperature data loggers (Onset Computer Corporation) were installed in the Embarras River at three locations within the end pit lake system. One was located upstream of the lakes, one was located in the connecting channel between the Middle and Lower Lake, and one was located in the channel downstream of Lower Lake near the fish exclusion weir (Figure 2.1). The data loggers recorded a water temperature on an hourly basis between June 9th, 2011 and October 5th, 2011.

4.0 RESULTS

4.1. LOWER EMBARRAS LAKE

4.1.1. Morphometric Data

Morphometric data are summarized in Table 4.1. A bathymetric map of the lake showing benthic, zooplankton, and limnological sampling sites is presented on Figure 4.1.

Table 4.1. Morphometric data for Lower Embarras Lake.

Parameter	Value
Area (ha)	6.6
Volume (m^3)	483 000
Maximum length (m)	853
Maximum width (m)	111
Maximum depth (m)	18
Mean depth (m)	7.34
Surface elevation (m)	1430
Percent Littoral (<3m deep)	30%

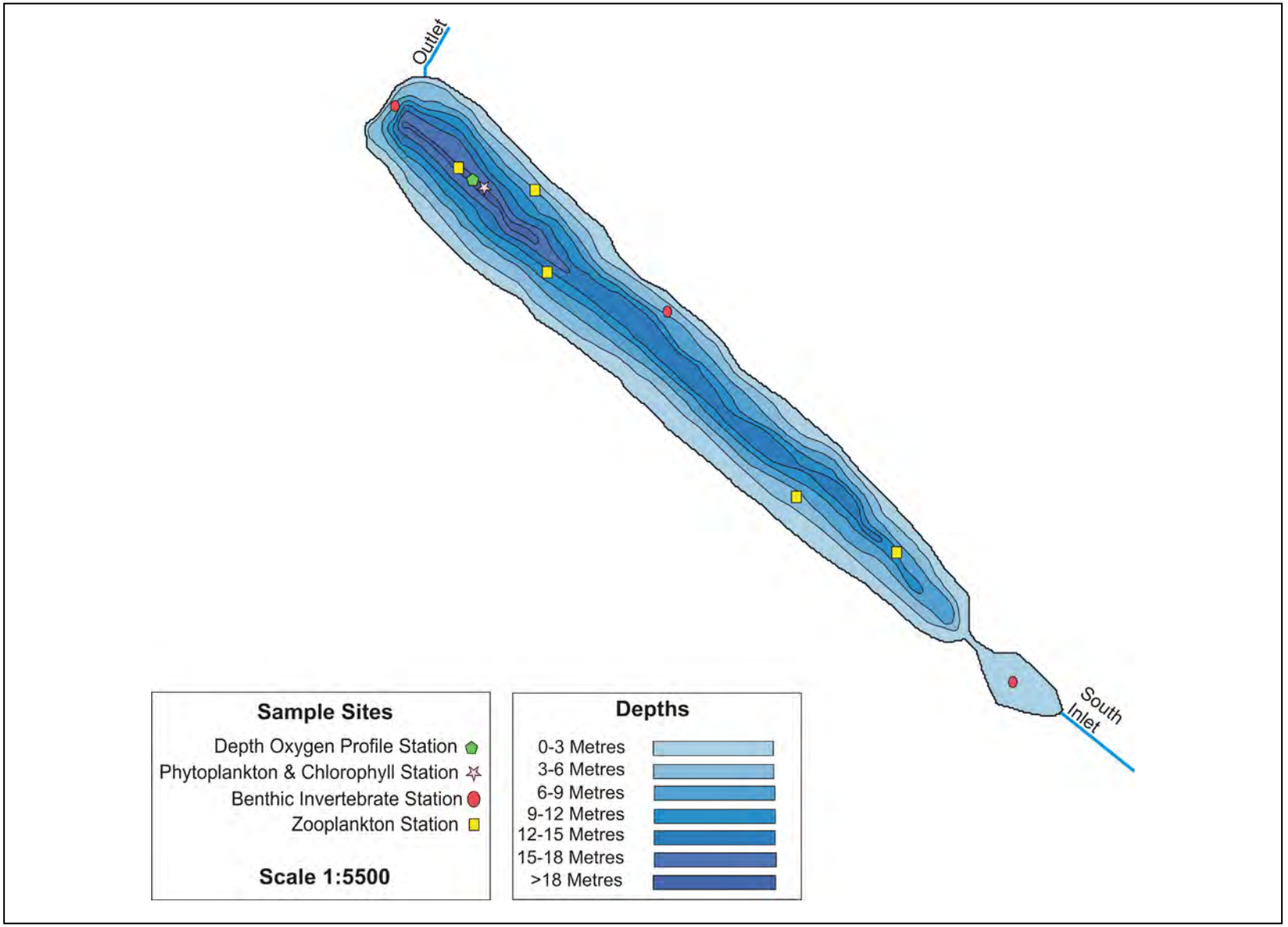


Figure 4.1. Bathymetry and Sample Locations on Lower Embarras Lake.

4.1.2. Physical and Chemical Conditions

Seasonal values for the Secchi disc transparency in Lower Embarras Lake are presented in Table 4.2.

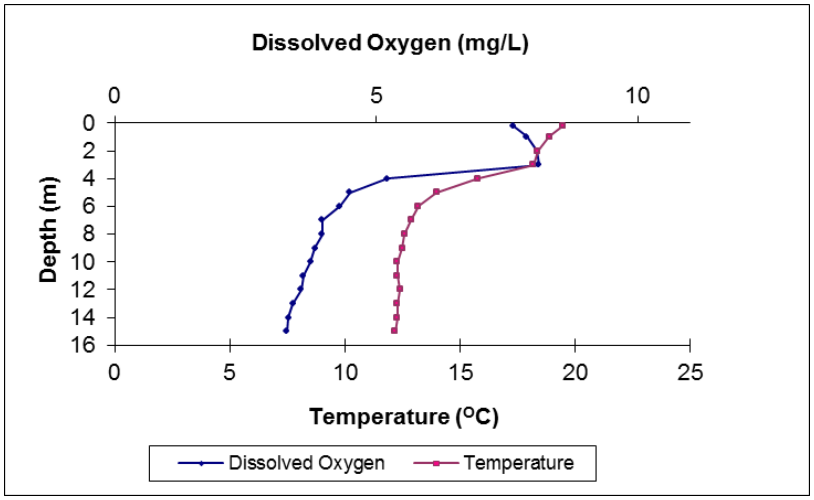
Table 4.2. Secchi disc transparency for Lower Embarrass Lake.

Date/ Season	Secchi Depth (m)	Climatic Conditions
17-Aug-11 (Summer)	1.3	Overcast- light rain
06-Oct-11 (Fall)	1.7	Overcast
26-May-12 (Spring)	1.9	Clear, strong wind

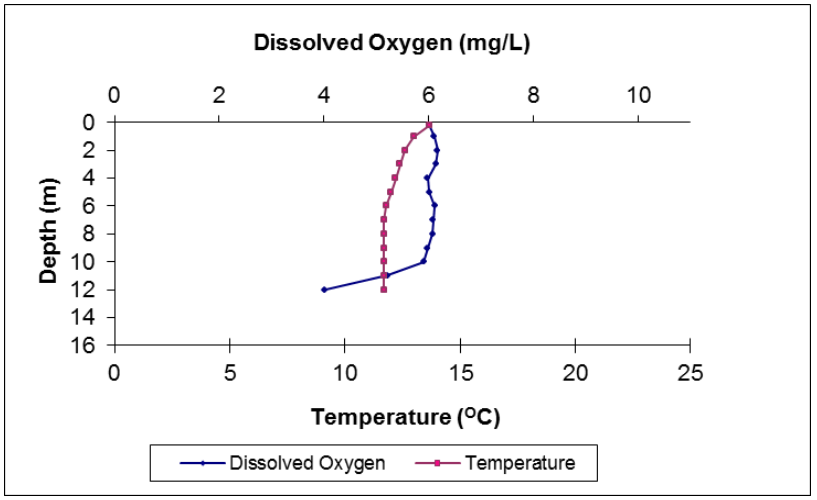
The lake was thermally stratified in the summer with the thermocline situated between 4 and 7 metres (Figure 4.2). Lake temperatures were relatively consistent through the water column in the fall ranging from all most 14^{O}C at the surface to just less than 12^{O}C near lake bottom. The lake was covered by approximately 0.70 metres of ice and 0.05 metres of snow when surveyed in February; surface temperatures had decreased to 0.6^{O}C while temperatures below 10 metres were relatively constant around 4^{O}C. The lake was beginning to stratify in the spring; temperatures ranged from 10.7^{O}C at the lake surface to 6.2^{O}C at the lake bottom with the thermocline situated between 6 and 8 metres.

The Lower Embarras Lake exhibited a clinograde oxygen profile. Oxygen concentrations were lower in the hypolimnion compared to the epilimnion in the summer and winter and were relatively constant within the water column in the spring and fall (Figure 4.2).

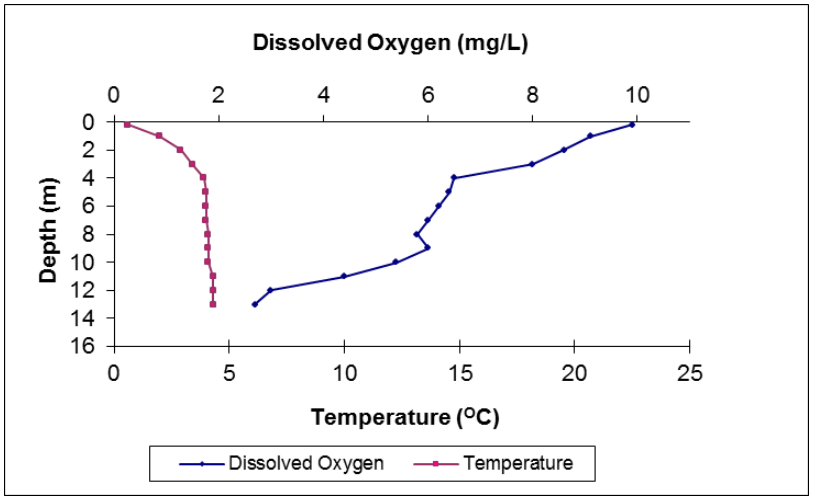
Specific conductivity varied seasonally but values were generally higher in the hypolimnion compared to the epilimnion in each season (Figure 4.3). The lowest conductivity values occurred during the spring and summer sampling period while the highest values were recorded during the winter.



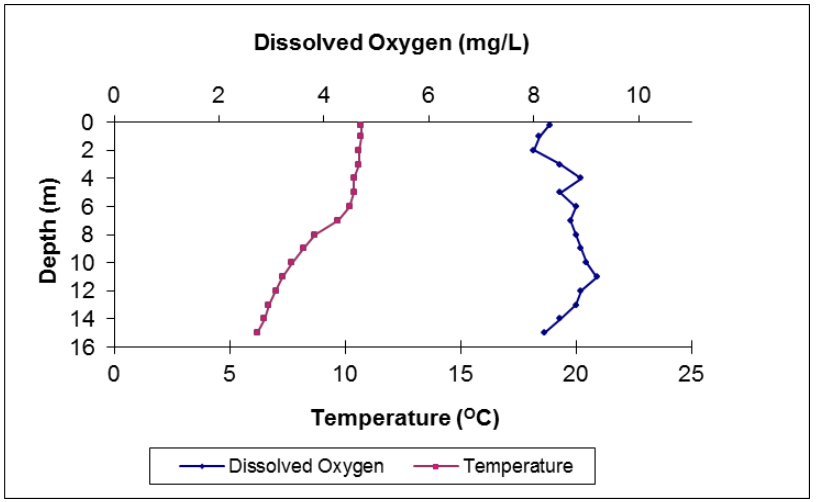
Summer



Fall



Winter



Spring

Figure 4.2. Oxygen and Temperature Profiles for Lower Embarras Lake.

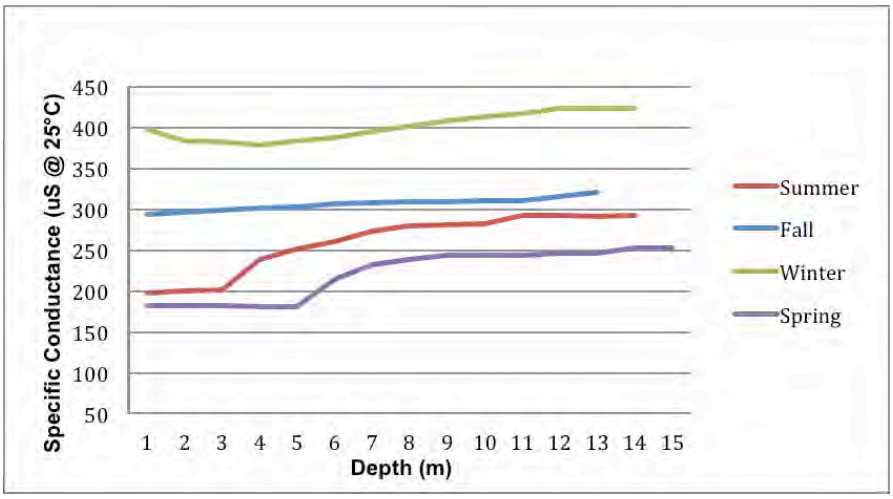


Figure 4.3. Conductivity Profiles for Lower Embarras Lake.

Alkalinity and pH values indicate that the lake was well buffered and non-acidic (Table 4.3). Water in the lake was of a bicarbonate type with an ionic hierarchy of $Ca^{+} > Na^{+} > Mg^{+} > K^{+}$ (cations) and $HCO_3^{-} > SO_4^{-} : Cl^{-}$. (anions). Two variables, iron (hypolimnion and epilimnion), and aluminum (hypolimnion and epilimnion). exceeded Canadian Council of Ministers of the Environment guidelines (CCME 2006) (Table 4.3). In addition, manganese (epilimnion and hypolimnion) exceeded Provincial guidelines (Alberta Environment 1999).

Table 4.3. Water quality data for Lower Embarras Lake.

Parameter	Units	Epilimnion	Hypolimnion
Kjeldahl Nitrogen	mg/L	0.19	0.07
Phosphorus	mg/L	<0.05	<0.05
Organic Carbon	mg/L	8.2	6.3
Calcium	mg/L	26.0	40.0
Iron	mg/L	0.85	1.09
Magnesium	mg/L	5.6	9.0
Manganese	mg/L	0.112	0.098
Potassium	mg/L	1.2	1.8
Silicon	mg/L	4.15	4.92
Sodium	mg/L	9.8	11.8
Sulfur	mg/L	9.0	14.5
Mercury	mg/L	<0.0001	<0.0001
Aluminum	mg/L	0.71	1.21
Antimony	mg/L	<0.0002	0.0002
Arsenic	mg/L	0.0019	0.0009
Barium	mg/L	0.090	0.109
Beryllium	mg/L	<0.0001	<0.0001
Bismuth	mg/L	<0.0005	<0.0005
Boron	mg/L	0.016	0.023
Cadmium	mg/L	0.00002	0.00005
Chromium	mg/L	0.0014	0.0024
Cobalt	mg/L	0.0005	0.0008
Copper	mg/L	0.002	0.003
Lead	mg/L	0.0004	0.0008
Lithium	mg/L	0.004	0.005
Molybdenum	mg/L	0.004	0.004
Nickel	mg/L	0.0035	0.0045
Selenium	mg/L	<0.0002	<0.0002
Silver	mg/L	0.00002	<0.00003
Strontium	mg/L	0.243	0.408
Thallium	mg/L	<0.00005	<0.00005
Tin	mg/L	0.004	0.004
Titanium	mg/L	0.0118	0.0528
Uranium	mg/L	0.0010	0.0020
Vanadium	mg/L	0.0016	0.0035
Zinc	mg/L	0.003	0.005
Solids	mg/L	<1	<1
pH		7.90	7.74
Electrical Conductivity	µS/cm at 25 C	214	313
Chloride	mg/L	0.5	0.5
Nitrate - N	mg/L	0.3	0.56
Nitrite - N	mg/L	0.012	<0.005
Nitrate and Nitrite - N	mg/L	0.31	0.56
Sulfate (SO4)	mg/L	28	45.6
Hydroxide	mg/L	<5	<5
Carbonate	mg/L	<6	<6
Bicarbonate	mg/L	98	142
P-Alkalinity	mg/L	<5	<5
T-Alkalinity	mg/L	80	116
Total Dissolved Solids	mg/L	120	180
Hardness	mg/L	89	138
Ionic Balance	%	102	100

* composite sample
- exceedences are shaded

4.1.3. Benthic Invertebrates

Diptera were numerically dominant in the assemblage and other taxa were comparatively rare (Table 4.4). A total of 6 taxa were present.

Table 4.4. Benthic Invertebrate Composition for Lower Embarras Lake.

Taxon	Density (per 0.023 m^2) Replicate			Mean #Organisms/Sample
	1	2	3	
Plecoptera				
Perlodidae				
Isoperla sp.	4			1.3
Dipters				
Ceratopogonidae				
Ceratopogoninae		2		0.7
Chironomidae				
Orthocladiinae		19	16	11.7
Tanypodinae		4		1.3
Tanytarsini		39		13
Crustacea				
Copepoda				
Cyclopoida	4	16		6.7
Total	8	80	16	34.7
Total taxa	2	5	1	2.7

4.1.4. Zooplankton

The zooplankton community was comprised of 10 taxa in 2011-2012; Rotifers were numerically dominant while Cyclopoids, Cladocerans, Calanoids, and Cilophora comprised the remainder of the zooplankton community (Table 4.5).

Table 4.5. Zooplankton Abundance for Lower Embarras Lake.

Taxa	Density per m^3					
	Replicate #					Mean
	1	2	3	4	5	#Organisms
Calanoid						
Leptodiaptomus sicilis	555	205	364	449	251	365
Calanoid copepodid	476	614	468	374	201	4267
Calanoid *nauplii*	5774	0	0	9775	0.0	3110
Cladocera						
Daphnia pulex	4837	716	2498	2320	201	2114
Others (Cilophora)						
Vorticella sp	0	0	0	9775	0	1955
Cyclopoid						
Dicyclops bicuspidatus	2537	3682	1822	5315	3518	3375
Cyclopoid copepodid	8246	6853	5673	6930	8085	7157
Cyclopoid *(nauplii)*	11547	6278	5282	19551	7140	9965
Rotifera						
Polyathra dolicoptera Idelson	0	0	0	0	7140	1785
Total	33972	18348	16107	54489	26536	30253
Total Taxa	7	6	6	8	7	6.8

4.1.5. Phytoplankton

Phytoplankton collections in Lower Embarras Lake found a total of 17 taxa present (Table 4.6). The chlorophyll *a* concentration for the lake was 0.550 mg/m^3.

Table 4.6. Phytoplankton Abundance for Lower Embarras Lake.

Genus/Species	Cell/Colony Density (cells/mL)
Bacillariophyta	
Achnanthes minutissima	0.62
Cymbella minuta	0.31
Navicula sp.	0.31
Nitzschia acicularis	2.99
Synedra sp. smaller	4.43
Cryptophyta	
Cryptomonas reflexa	7.86
Katablepharis ovalis	1.55
Rhodomonas	72.52
Chrysophyta	
D. divergens statospore	0.31
Kephyrion sp	111.94
Chlorophyta	
Ankistrodesmus setigera	51.90
Characium sp.	1.24
Oocystis sp.	35.87
Sphaerocystis schroeteri	26.75
Cyanophyta	
Aphanothece clathrata	36.80
Lyngbya limnetica	31.54
Phormidium	2.17
Total	389.1
Total Taxa	17

4.1.6. Aquatic Macrophytes

No submergent and/or floating leaf macrophytes were observed during the survey of the lake conducted in August.

4.2. MIDDLE EMBARRAS LAKE

4.2.1. Morphometric Data

Morphometric data are summarized in Table 4.7. A bathymetric map delineating sample sites is presented on Figure 4.4.

Table 4.7. Morphometric data for Middle Embarras Lake.

Parameter	Value
Area (ha)	3.0
Volume (m^3)	102000
Maximum length (m)	794
Maximum width (m)	62
Maximum depth (m)	10
Mean depth (m)	3.4
Surface elevation (m)	1443
Percent Littoral (<3m deep)	55

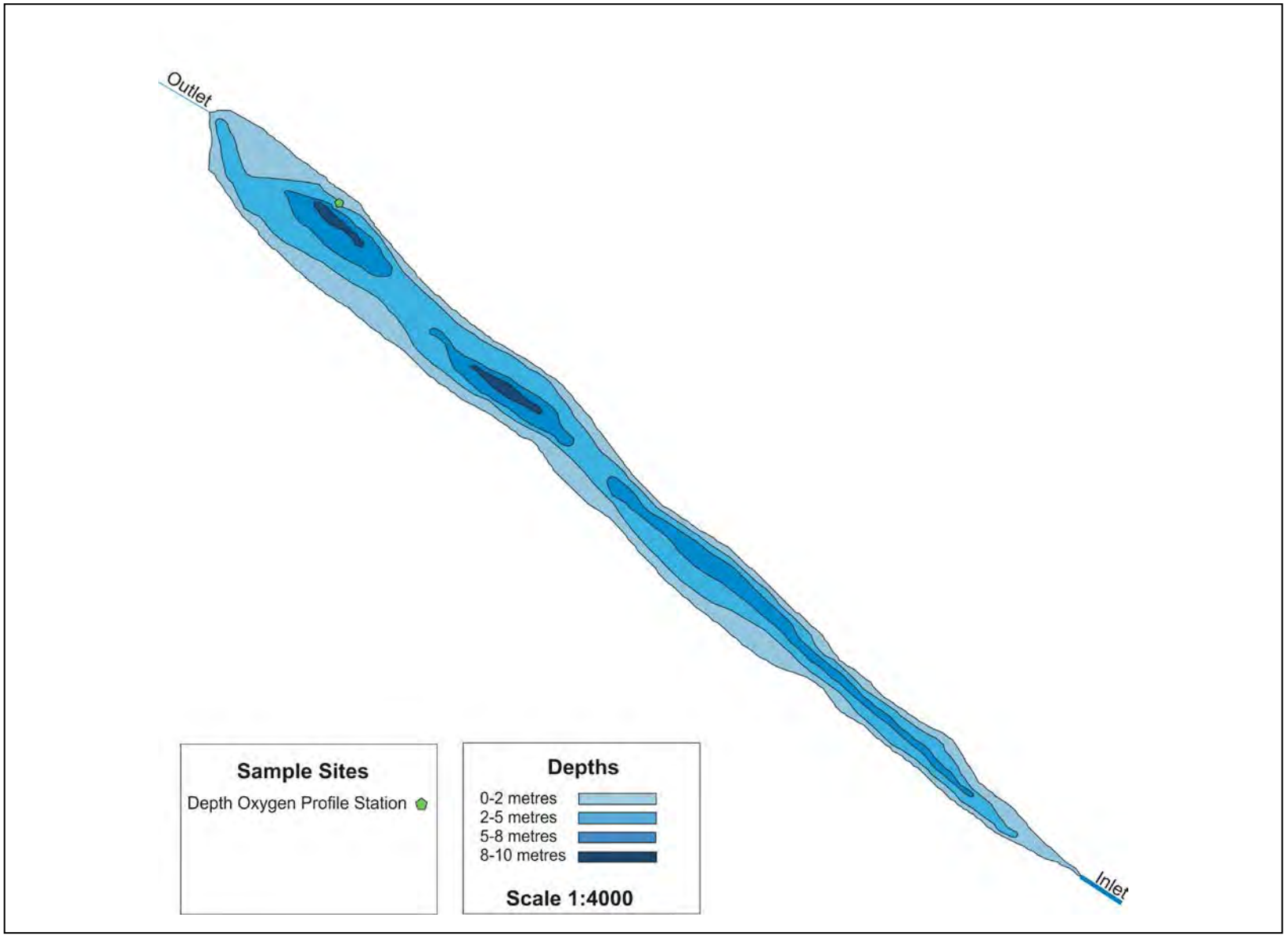


Figure 4.4. Bathymetry and Sample Locations on Middle Embarras Lake.

4.2.2. Physical and Chemical Conditions

Seasonal values for the Secchi disc transparency in Middle Embarrass Lake are presented in Table 4.8.

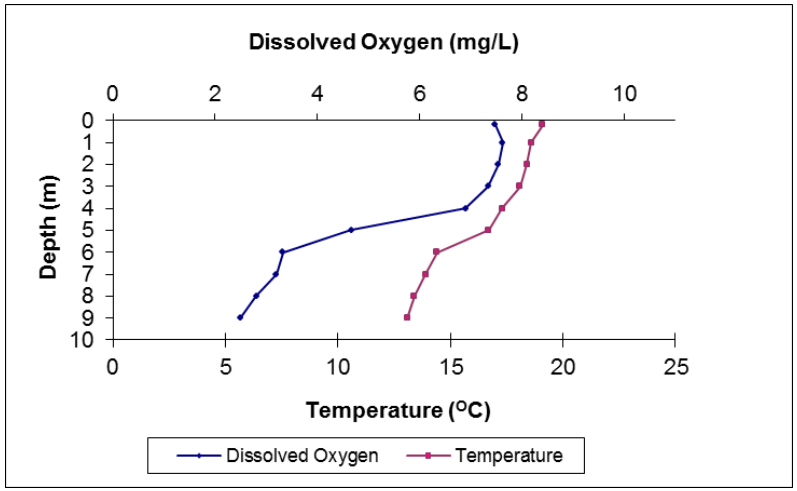
Table 4.8. Secchi disc transparency for the Middle Embarras Lake.

Date/ Season	Secchi Depth (m)	Climatic Conditions
17-Aug-11 (Summer)	0.5	Overcast, rain
5-Oct-11 (Fall)	0.5	Overcast
26-May-12 (Spring)	1.9	Clear, moderate wind.

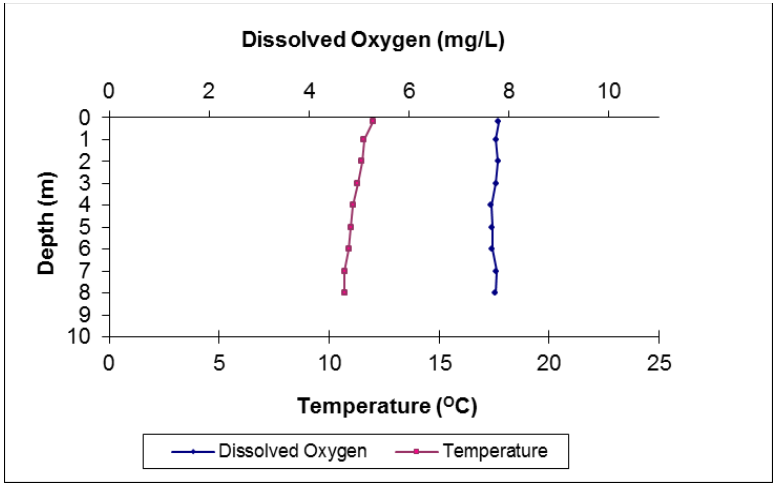
The seasonal temperature profiles obtained during the year indicated that the lake was thermally stratified during the summer with the thermocline situated between 4 and 6 metres (Figure 4.5). Isothermal conditions were present in the fall with temperatures in water column ranging from 12^{O}C near the surface to just under 11^{O}C at a depth of 8 metres. The lake was covered by approximately 0.61 metres of ice and 0.12 metres of snow when surveyed in February; surface temperatures had decreased to 0.4^{O}C while temperatures through the water column were at or near 4^{O}C. In the spring temperatures ranged from 10.5^{O}C at the surface to 6.1^{O}C near lake bottom (9 m depth) with the thermocline situated between 4 and 5 metres.

The Middle Embarras Lake exhibited a clinograde oxygen profile. Oxygen concentrations were lower in the hypolimnion compared to the epilimnion in the summer and winter and were relatively constant within the water column in the spring and fall (Figure 4.5).

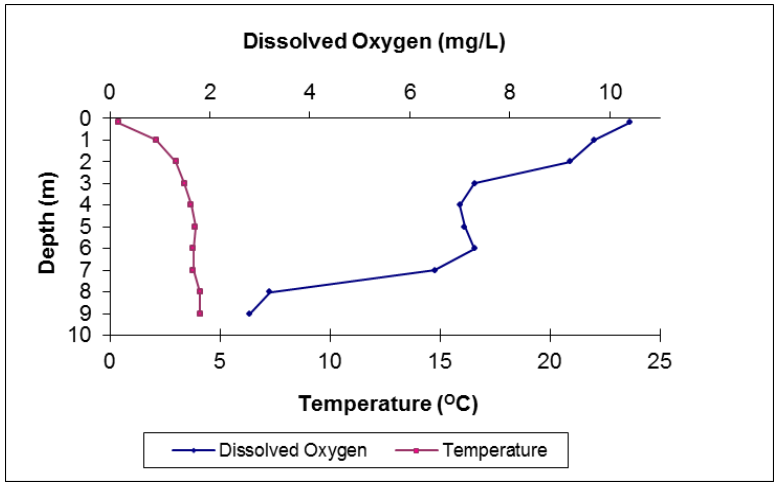
Specific conductivity within the water column was fairly constant during seasonal sampling events (Figure 4.6). However, the conductivity within the lake increased from spring season to winter season.



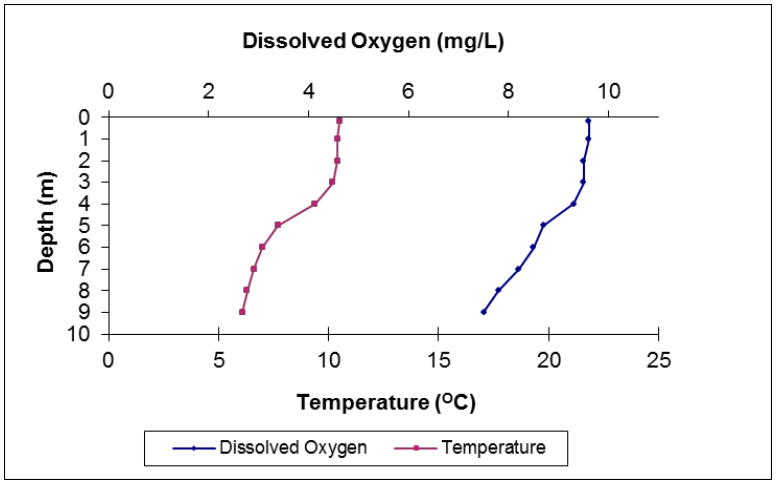
Summer



Fall



Winter



Spring

Figure 4.5. Oxygen and Temperature Profiles for Middle Embarras Lake.

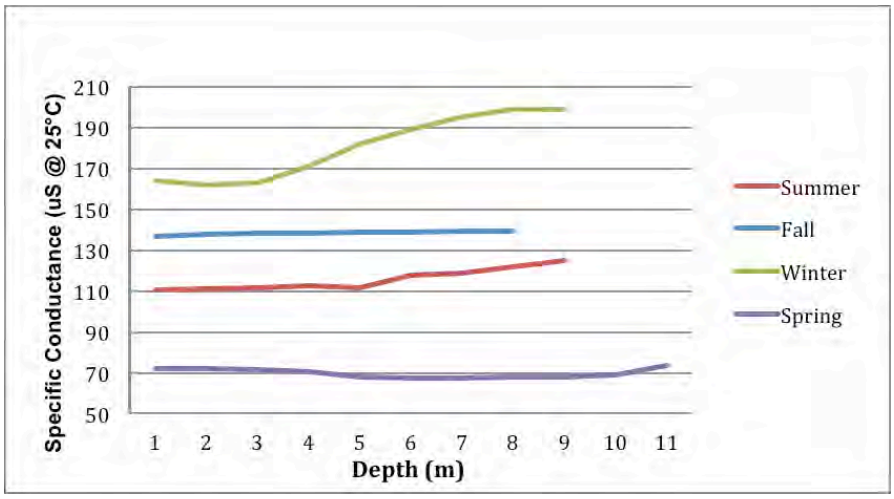


Figure 4.6. Conductivity Profiles for Middle Embarras Lake.

4.2.3. Aquatic Macrophytes

No submergent and/or floating leaf macrophytes were observed during the survey of the conducted in August.

4.3. UPPER EMBARRAS LAKE

4.3.1. Morphometric Data

Morphometric data are summarized in Table 4.9. A bathymetric map of the lake showing benthic, zooplankton, and limnological sampling sites is presented in Figure 4.7.

Table 4.9. Morphometric data for Upper Embarras Lake.

Parameter	Value
Area (ha)	5.0
Volume (m^3)	160 000
Maximum length (m)	851
Maximum width (m)	110
Maximum depth (m)	8.0
Mean depth (m)	3.2
Surface elevation (m)	1450
Percent littoral ((<3m deep)	56

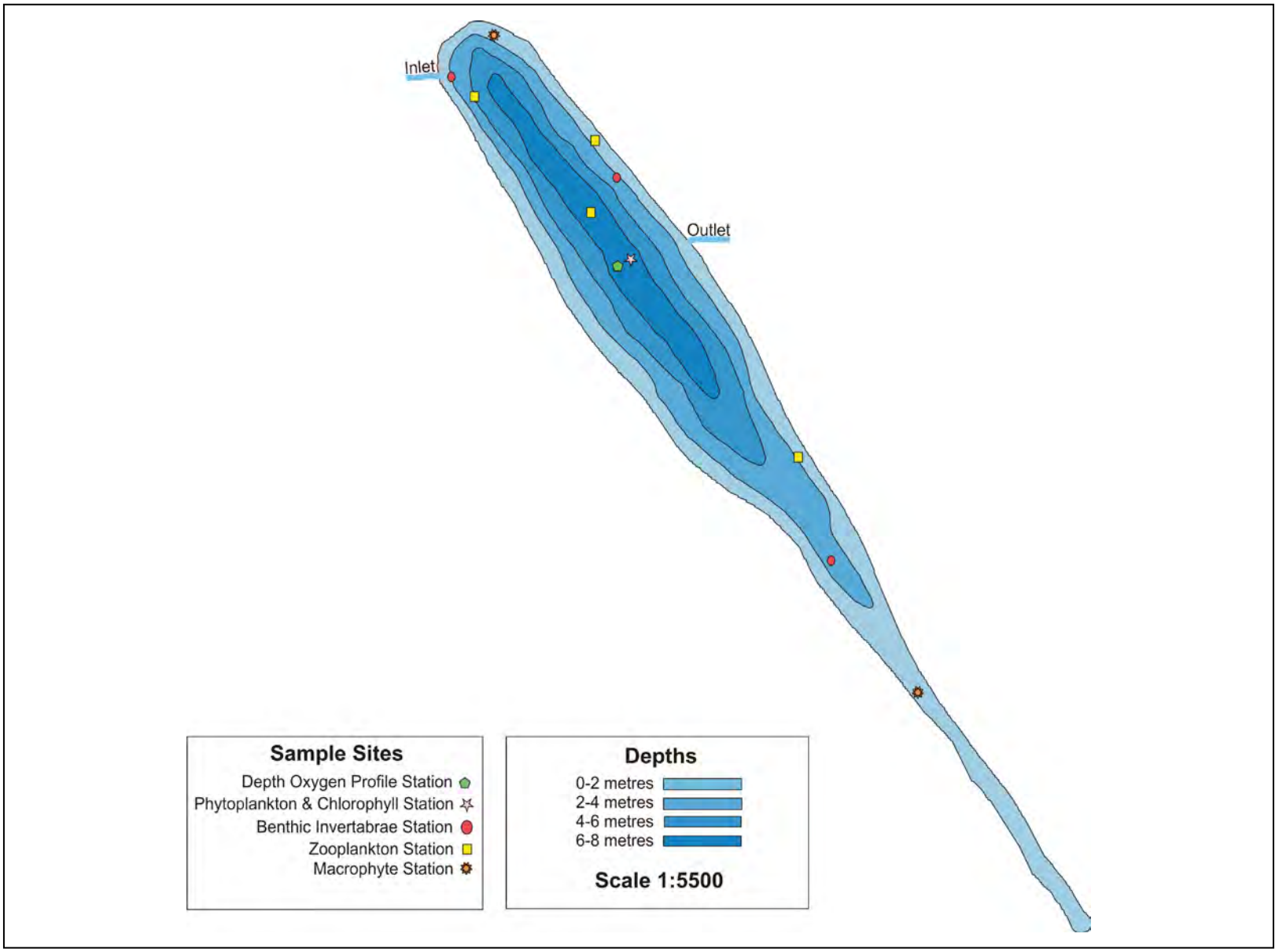


Figure 4.7. Bathymetry and Sample Locations on Upper Embarras Lake.

4.3.2. Physical and Chemical Conditions

The Secchi disc transparency in Upper Embarras Lake varied over the course of the sampling period (Table 4.10).

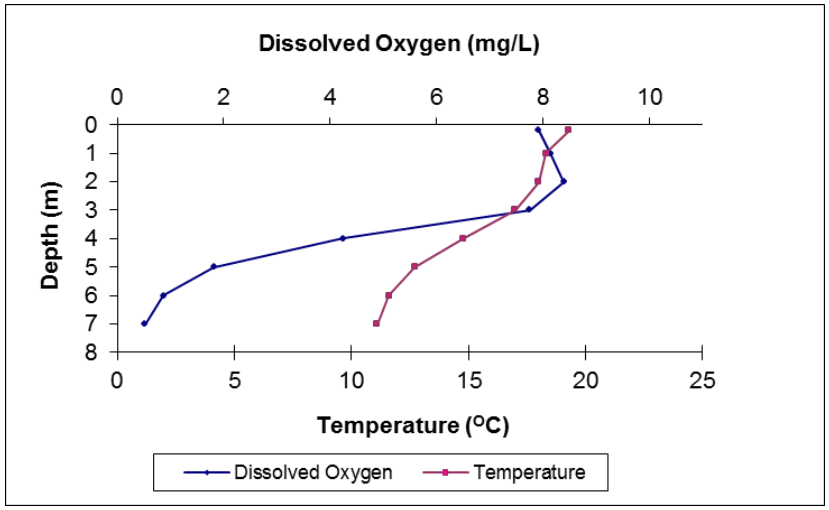
Table 4.10. Secchi disc transparency for Upper Embarras Lake.

Date/ Season	Secchi Depth (m)	Climatic Conditions
16-Aug-11 (Summer)	2.8	Partly overcast.
05-Oct-11 (Fall)	3.0	Partly sunny.
26-May-12 (Spring)	1.9	Sunny, moderate wind

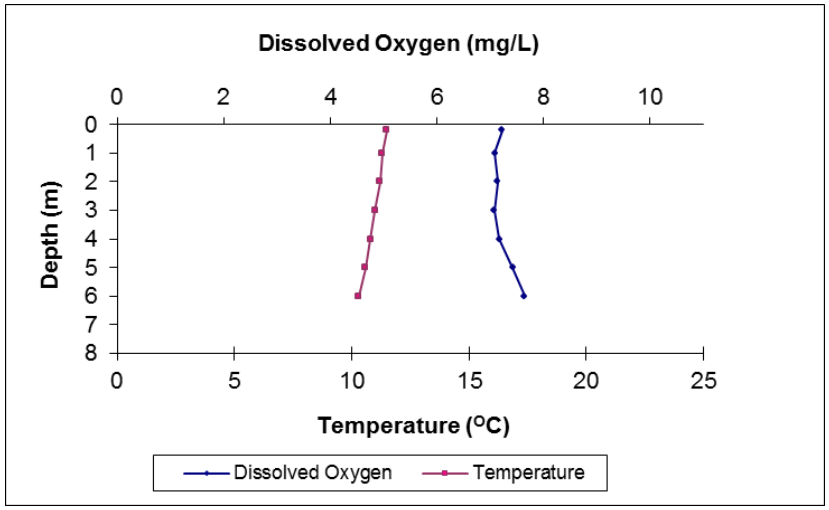
The lake was thermally stratified during the summer with temperatures ranging from about 19^{O}C near the surface of the lake to 11^{O}C at 7 m depth (Figure 4.8). Isothermal conditions persisted in the fall with temperatures near 11^{O}C throughout the water column. The lake was covered by approximately 0.67 m of ice and 0.06 m of snow when assessed in February 2012; water temperatures increased with depth from 1.0 ^{O}C at the ice surface to 4.2 ^{O}C near the lake bottom. Thermal stratification was evident in the spring with the thermocline present between 3 and 5 metres.

The Upper Embarras Lake exhibited a clinograde oxygen profile in general (Figure 4.8). Dissolved oxygen concentrations were lower in the hypolimnion than the epilimnion during the summer and winter and it appeared that the lake had already stratified when sampled in the spring. Oxygen concentrations were relatively constant within the water column in the fall.

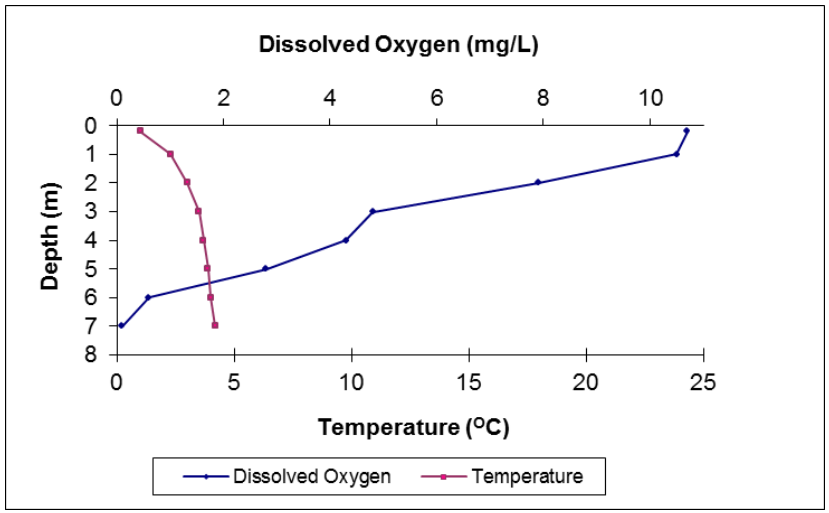
The specific conductivity of the lake water increased with depth in all seasons (Figure 4.9). In general, conductivity within the lake increased from the spring season to winter season.



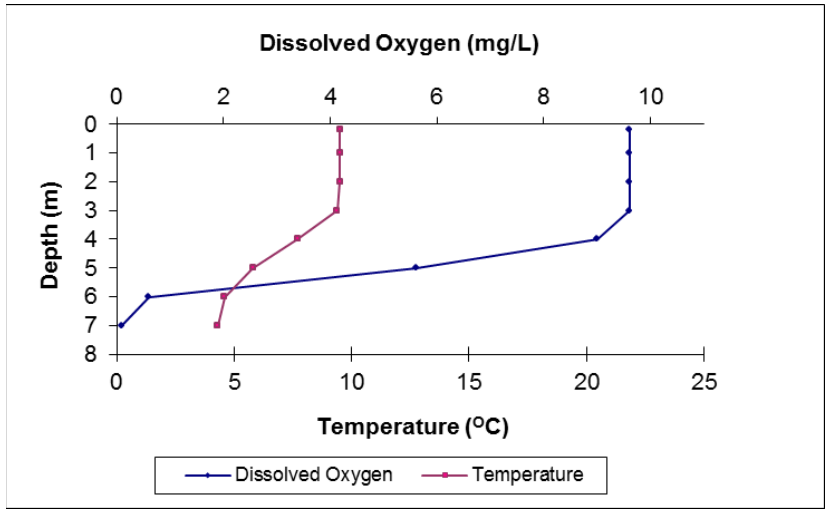
Summer



Fall



Winter



Spring

Figure 4.8. Oxygen and Temperature Profiles for Upper Embarras Lake.

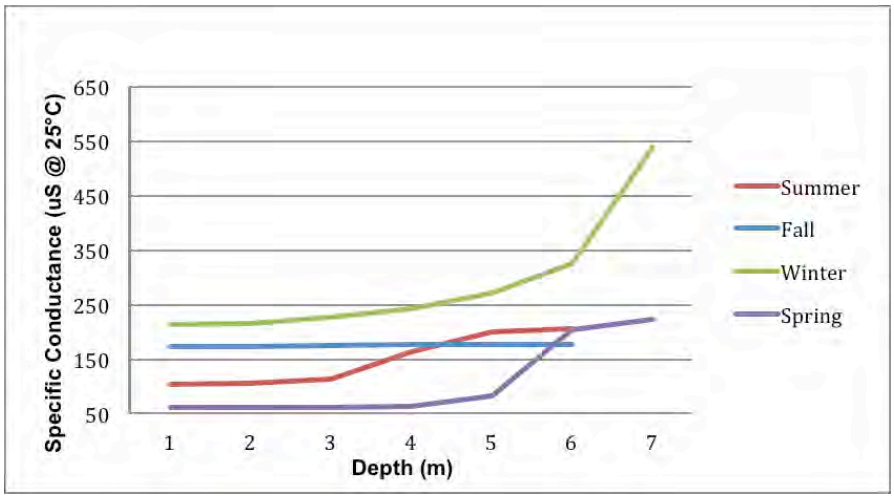


Figure 4.9. Conductivity Profiles for Upper Embarrass.

Alkalinity and pH values indicate that the lake was well buffered and non-acidic (Table 4.11). Water in the lake was of a bicarbonate-sodium type with an ionic dominance of $Ca^{+} > Na^{+} > Mg^{+} > K^{+}$ (cations) and $HCO_3^{-} > SO_4^{-} > Cl^{-}$. (anions). With the exception of iron (epilimnion only), and manganese (hypolimnion only), all parameters were within the water quality guidelines specified by CCME and the Province of Alberta (Table 4.11).

Table 4.11. Water Quality Data for Upper Embarras Lake.

Parameter	Units	Epilimnion	Hypolimnion
Kjeldahl Nitrogen	mg/L	0.27	0.24
Phosphorus	mg/L	<0.05	<0.05
Organic Carbon	mg/L	7.5	7.6
Calcium	mg/L	13.5	24.1
Iron	mg/L	0.39	0.23
Magnesium	mg/L	2.6	4.9
Manganese	mg/L	0.036	0.197
Potassium	mg/L	0.4	0.9
Silicon	mg/L	3.73	3.82
Sodium	mg/L	5.7	9.5
Sulfur	mg/L	1.9	4.7
Mercury	mg/L	<0.0001	<0.0001
Aluminum	mg/L	0.05	0.07
Antimony	mg/L	<0.0002	<0.0002
Arsenic	mg/L	0.0006	0.0010
Barium	mg/L	0.040	0.092
Beryllium	mg/L	<0.0001	<0.0001
Bismuth	mg/L	<0.0005	<0.0005
Boron	mg/L	0.01	0.017
Cadmium	mg/L	0.00001	<0.00001
Chromium	mg/L	<0.0005	0.0008
Cobalt	mg/L	<0.0001	0.0003
Copper	mg/L	0.001	<0.001
Lead	mg/L	0.0001	<0.0001
Lithium	mg/L	0.003	0.006
Molybdenum	mg/L	<0.001	0.003
Nickel	mg/L	0.0010	0.0015
Selenium	mg/L	<0.0002	0.0003
Silver	mg/L	<0.00001	<0.00001
Strontium	mg/L	0.108	0.232
Thallium	mg/L	<0.00005	<0.00005
Tin	mg/L	0.002	0.006
Titanium	mg/L	0.0008	0.0010
Uranium	mg/L	<0.0005	0.0007
Vanadium	mg/L	0.003	0.002
Zinc	mg/L	0.003	0.002
Solids	mg/L	<1	<1
pH		7.76	7.57
Electrical Conductivity	µS/cm at 25 C	111	201
Chloride	mg/L	0.5	<0.4
Nitrate - N	mg/L	<0.01	0.03
Nitrite - N	mg/L	<0.005	<0.005
Nitrate and Nitrite - N	mg/L	<0.01	0.03
Sulfate (SO4)	mg/L	6.0	15.0
Hydroxide	mg/L	<5	<5
Carbonate	mg/L	<6	<6
Bicarbonate	mg/L	64	107
P-Alkalinity	mg/L	<5	<5
T-Alkalinity	mg/L	53	88
Total Dissolved Solids	mg/L	62	110
Hardness	mg/L	45	83
Ionic Balance	%	100	104

* composite samples
- exceedences are shaded

4.3.3. Benthic Invertebrates

Sampling for benthic invertebrates was conducted in littoral habitat (Figure 4.7). Diptera were numerically dominant and accounted for four of the seven taxa sampled (Table 4.12). Other groups were present in very low numbers.

Table 4.12. Benthic Macroinvertebrate Composition for Upper Embarras Lake.

Taxon	Density (per 0.023 m^2) Replicate			Mean #Organisms/Sample
	1	2	3	
Dipters				
Ceratopogonidae				
Ceratopogoninae			4	1.3
Chironomidae				
Orthocladiinae	22	4	10	12
Tanytarsini	43	4	82	43
Empididae				
Simuliidae		4		1.3
Crustacea				
Ostracoda				
Cyprididae	4			1.3
Cladocera				
Daphnia sp.	5		4	3
Pelecypoda				
Sphaeriidae				
Pisidium sp.	1			0.3
Total	75	12	100	62.3
Total taxa	5	3	4	7

4.3.4. Zooplankton

Eleven taxa were found in the Upper Embarras Lake; Rotifera were numerically dominant while Cyclopoida, Cladocerans, and Calanoida comprised the remainder of the zooplankton community (Table 4.13).

Table 4.13. Zooplankton Abundance for Upper Embarrass Lake.

Taxa	Density per m^3					
	Replicate #					Mean
	1	2	3	4	5	#Organisms
Calanoida						
Leptodiaptomus sicilis	30	0	0	0	0	6
Calanoid copepodid	0	0	0	34	0	7
Cladocera						
Daphnia pulex	1091	2614	3546	2481	1026	2152
Bosmina longirostris	0	0	0	0	89	18
Cyclopoid						
Dicyclops bicuspidatus	1970	1352	1696	1937	2365	1864
Cyclopoid copepodid	3636	2073	2813	5335	3034	3378
Cyclopoid *(nauplii)*	23368	0	7282	18195	0	9769
Rotifera						
Ascomorpha sp	0	0	0	18195	22724	8183
Polyathra dolicoptera Idelson	0	10517	0	0	0	2103
Polyathra euryptera Wierzejski	7790	0	0	0	7140	2986
Synchaeta	15579	0	0	0	11362	5388
Total	53464	16556	15337	46177	47740	35854
Total Taxa	7	4	4	6	7	5.6

4.3.5. Phytoplankton

Phytoplankton collections in Upper Embarras Lake revealed a total of 18 taxa (Table 4.14). Chrysophyta were dominant while other types were less common. The chlorophyll *a* concentration for the lake was 0.518 mg/m^3.

Table 4.14. Phytoplankton Abundance for Upper Embarras Lake.

Genus/Species	Cell/Colony Density (cells/mL)
Bacillariophyta	
Diatoma sp.	0.67
Cryptophyta	
Cryptomonas reflexa	15.89
Katablepharis ovalis	35.63
Rhodomonas	26.10
Chrysophyta	
Chrysochromulina parva	1.00
Dinobryon divergens	224.49
D. divergens statospore	10.96
Kephyrion sp	1.34
Mallomonas sp.	0.34
Pyrrophyta	
Peridinium sp	0.34
Chlorophyta	
Ankistrodesmus setigera	2.01
Characium sp.	1.00
Monoraphidium	0.34
Sphaerocystis schroeteri	2.34
Unidentified colonial	0.67
Cyanophyta	
Lyngbya limnetica	9.03
Oscillatoria sp.	3.01
Phormidium	2.34
Total	337.49
Total Taxa	18

4.3.6. Aquatic Macrophytes

Aquatic macrophytes were present in Upper Embarras Lake in the summer of 2011; Narrow leaf pondweed (*Potamogeton strictifolius*), and broad leaf pondweed *(Potamogeton natans*) were sparsely distributed within the lake. The majority of macrophyte development had occurred along the north and south shores of Upper Embarras Lake in water less than two metres deep.

4.4. LOTIC HABITAT

4.4.1. Spawning Surveys

Spawning surveys conducted during the fall indicated that Brook Trout spawning had commenced by October 5th. Four redds and four possible redds were identified downstream of the fish exclusion weir (Table 4.15). No evidence of fall spawning was observed upstream of the weir.

Spawning surveys conducted in late May found two possible Rainbow Trout redds downstream of the fish exclusion weir and one possible redd upstream of the exclusion structure in the connecting channel between the Middle and Upper Lake (Table 5.15). No spawning was observed during subsequent spawning surveys conducted in June (Table 4.15).

Table 4.15. Summary of Spawning Survey Results.

Survey Date	Downstream of Fish Exclusion Structure	Upstream of Fish Exclusion Structure
October 5th-6th 2011	4 BKTR redds, 4 possible	No activity observed
May 26th, 2012	2 possible RNTR redds	1 possible redd upstream of middle lake
June 1st, 2012	No spawning observed, 3 large RNTR attempting to move upstream at weir	No spawning observed
June 21st, 2012	No spawning observed.	No spawning observed.

4.4.2. Fish Capture

Electrofishing surveys of the constructed channel upstream of the fish exclusion structure resulted in the capture of Rainbow Trout in both August and October (Table 4.16). In addition, fish were observed rising in the Upper Embarras Lake during summer field investigations.

Electrofishing surveys of the Embarras River downstream of the exclusion structure captured both Brook Trout and Rainbow Trout (Table 4.16). Brook Trout were

more common than Rainbow Trout in August while Rainbow Trout outnumbered Brook Trout during the fall sampling. A record of sampling effort and individual fish capture data is presented in Appendix D.

Table 4.16. Summary of Fish Capture Results for the Embarras Lake System in 2011.

Sample Section	Date	Species	n	Fork Length (mm)			Weight (g)		
				Mean	Min	Max	Mean	Min	Max
u/s of exclusion structure	18-Aug-11	RNTR	25	66.0	53	78	3.0	1	6
	5-Oct-11	RNTR	1	106	-	-	18	-	-
d/s of exclusion structure	18-Aug-11	RNTR	21	133.3	56	247	39.8	3	176
		BKTR	50	171.3	71	226	64.8	4	145
	5-Oct-11	RNTR	20	140.8	83	262	40.9	4	223
		BKTR	10	161.0	82	208	50.1	5	88

4.4.3. Benthic Invertebrates

The number of taxa present was highest at ER-B4 and lowest at ER-B2 (table 4.17). Total abundance of invertebrates ranged considerably between sites, with the highest numbers at ER-B1 and the lowest at ER-B2. Chironomidae were numerically dominant at all sites but were particularly common at ER-B1 where they comprised almost 90% of the total sample. Generally, ER-B1, B2, and B3 all had a relatively low proportion of EPT (Ephemeroptera, Plecoptera, Trichoptera) counts compared to ER-B4. Oligochaeata were highest at ER-B3 and lowest at ER-B1 and Nematodes were only present at ER-B1 and B2.

Table 4.17. Summary of Benthic Invertebrate Sampling Results from Lotic Sites.

Taxon	Mean Count from 3 Replicates (per 0.1m^2)			
	ER-B1	ER-B2	ER-B3	ER-B4
Ephemeroptera				
Baetidae				
Baetis sp.	12.0	23.0	57.7	457.7
Callibaetis sp.			43.0	
Ephemerellidae				
Serratella sp.	6.5	1.0		132.3
Heptageniidae				
Cinygmula sp.	10.0			49.0
Leptophebiidae				
Paraleptophlebia sp.			15.5	11.0
Siphlonuridae				
Parameletus.sp.	8.0	1.0		20.5
Plecoptera				
Chloroperlidae				21.0
Nemouridae				
Zapada sp.	2.0	1.0		106.0
Visoka sp.				23.7
Perlodidae				50.7
Megarcys sp.				6.5
Isoperla sp.			1.0	1.0
Isogenoides sp.				12.0
Capniidae	1.0		5.0	30.0
Trichoptera				
Brachycentridae				

Table 4.17. Continued

Brachycentrus sp.	2.0			11.0
Glossosomatidae				
Glossosoma sp.			1.0	9.5
Limnephilidae				
Dicosmoecus sp.	1.5	1.7		
Hydroptilidae				
Hydroptila sp.			1.0	10.5
Phryganeidae				
Phryganea sp.			1.0	
Rhyacophilidae				
Rhyacophila sp			4.0	14.0
Hydropsychidae				
Cheumatopsyche sp.			1.0	
Diptera				
Ceratopogonidae				
Ceratopogoninae	16.0			10.0
Chironomidae				
Orthocladiinae	215.3	454.3	524.3	142.7
Tanypodinae	18.5			11.0
Tanytarsini	3279.0	477.7	96.7	19.5
Chironomini	1.0		26.7	1102.0
Pupae	4.0	8.0		10.0
Empididae			1.0	2.0
Simuliidae	98.3	305.7	399.3	20.5
Pupae	2.0	32.5	3.0	
Tipulidae				
Limoniinae				
Dicranota sp.	4.3		7.3	32.0
Hexatoma sp.			1.0	8.0
Tipulinae				
Tipula sp.				5.0
Anthomyiidae	1.5	1.0	5.3	2.0
Psychodidae				
Pericoma/Telmatoscopus				5.5
Coleoptera				
Elmidae				55.3
adult				5.0
Dytiscidae			25.7	
adult			34.0	
Hemiptera				
Corixidae (adult)			4.0	
Nematoda	9.0	1.0		
Oligochaeta				
Naididae				
Specaria sp.	18.3	37.0	174.7	30.0
Arachnida				
Acari				
Hydrarachnidia	23.0		18.3	39.5
Crustacea				
Copepoda				
Cyclopoida	110.0	7.0	21.0	120.0
Calanoida		20.0	115.3	
Ostracoda				
Cyprididae	4.0	4.0		14.5
Cladocera				
Daphnia sp.	151.7	153.0	446.3	
Pelecypoda				
Sphaeriidae				
Sphaerium sp.		1.0		
Pisidium sp.				
Gastropoda				
Limnaeidae			1.5	
Hirudinea				
Erpobdellidae	7.0	5.7		4.0
Glossiphoniidae	29.0	2.7	1.0	18.0
Hydrozoa		267.7	30.7	
Total (average of 3 replicates)	4035.0	1805.8	2067.3	2622.8
Total Taxa	26	21	30	38

4.4.4. Temperature Regime

Temperature data collected in the Embarras Lake System in 2011 is presented in Figure 4.10. Overall, water temperatures in the Embarras River downstream of the lakes averaged approximately 2^{0}C warmer than upstream of the lakes.

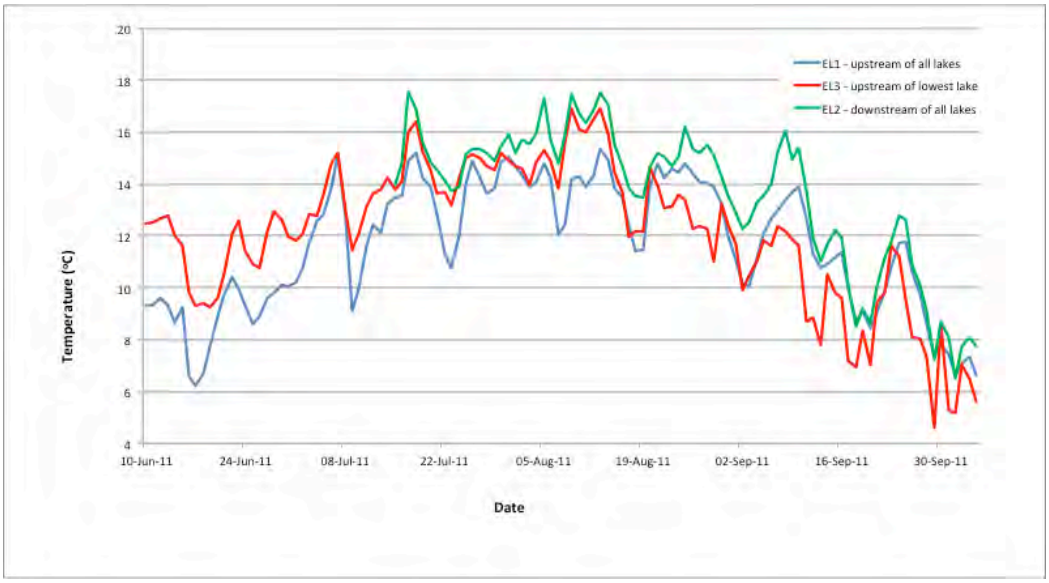


Figure 4.10. Mean Daily Temperatures in the Embarras River in 2011.

5.0 DISCUSSION

Results from monitoring conducted during the 2011-12 program represent the initial stages of lake development post reclamation and were undertaken to provide baseline information on the existing physical, chemical, and biological conditions in the lakes and connecting channels.

5.1. LENTIC HABITAT

5.1.1. Summary of 2011-12 Monitoring

The inlet and outlets of the lakes were stable (Table 5.1). Side slopes were generally stable and riparian vegetation was beginning to become established but areas of sparse vegetation, particularly on the slopes close to the haulroad, were fairly common.

Table 5.1. Characteristics of Embarras End Pit Lakes in 2011-12.

Parameter		Indicator	Lower Embarras	Middle Embarras	Upper Embarras
Physical		Inlet/Outlet Stability	Stable	Stable	Stable
		Shoreline Erosion	Some Erosion		Stable
Chemical		Circulation	Dimictic	Dimictic	Dimictic
		Water Quality[1] Exceedances	E (Fe, Al) H (Mn)	n/m	E (Fe) H (Mn)
Biological	Benthic Invertebrates	Average Density/Sample	34.7	n/m	62.3
		Total Taxa	6	n/m	8
	Zooplankton	Average Density/m^3	30253	n/m	35854
		Total Taxa	9	n/m	11
	Phytoplankton	Average Density (cells/ml)	389.1	n/m	337.5
		Total Taxa	18	n/m	18
	Aquatic Macrophytes	Present/Absent	Absent	Absent	Present
	Fish	Present/Absent	Present	Present	Present

1. E – epilimnion, H – hypolimnion

Results of the limnological investigations indicate that all three of the Embarras Lakes were dimictic with complete mixing occurring in the spring and fall (Table 5.1). Water in the lakes was of bicarbonate type and did not demonstrate a sodium ion dominance, which may indicate groundwater sources have less impact on these lakes than other end-pit lakes in the area (Brinker 1991, Hatfield, 2008, 2011, Stemo 2005, Pisces 2011). The majority of measured water quality variables did not exceed thresholds for the protection of aquatic life. Iron and aluminum concentrations exceeded CCME water quality guidelines in the Lower Embarras Lake while iron concentrations in the epilimnion of the Upper Embarras Lake also exceeded guideline levels. Both of the sampled lakes had nutrient concentrations corresponding to oligotrophic trophic status as defined in Wetzel (2001).

The benthic invertebrate assemblage within the lakes was typical of the early colonization stage in lake development. Densities were relatively low, there was limited diversity, and populations were dominated by Chironomids.

Zooplankton taxa collected from the Upper and Lower Lakes were common components of zooplankton communities in Alberta. Total taxa counts from each lake ranged from 9 to 11 and average densities ranged from 30,253 to 35,854 individuals per cubic metre (Table 5.1). Rotifers were numerically dominant in the Upper Lake while Cyclopoids were the most abundant group in the Lower Lake.

Chlorophyll *a* concentrations were quite low in both the Upper and Lower Lakes; however, the phytoplankton diversity was quite high. Phytoplankton composition in the Upper Embarras Lake was dominated by Chrysophyta while Chrysophyta, Chlorophyta and Cyanophyta were all dominant in the Lower Lake.

5.1.2. Comparision to Fairfax Lake

Draft guidelines for end pit lake development at coal mine operations were prepared in 2003 by the End Pit Lake Working Group to assist government and industry in designing, managing, monitoring, and evaluating end pit lakes (EPLWG 2003). Evaluation and performance criteria provided in the guideline document are used to assess whether a lake has met or is meeting its intended objective. While the targets/goals used to measure success in terms of physical and chemical parameters are based on specific indicators, the measure of success for biological targets/goals are typically based on comparison to “local lakes”.

There is one local natural lake in the general vicinity of the Coal Valley Mine. Fairfax Lake is a shallow (<5m mean depth) foothills lake (Radford 1979, Luscar 1992), which is generally comparable to the Embarras Lakes (Table 5.2). Overall, the biotic communities of the Embarras Lakes were similar to Fairfax Lake (Table 5.2). Zooplankton and benthic invertebrate diversity was lower in the Embarras Lakes compared to Fairfax Lake but Phytoplankton diversity was higher. Zooplankton and phytoplankton densities were lower but relatively comparable between the lakes while benthic invertebrate densities were notably lower in the Embarras Lakes compared to Fairfax Lake. Aquatic macrophyte communities have only become established in the Lower Embarras Lake

Table 5.2. Characteristics of Embarras Lakes and Fairfax Lake.

Lake	Area (Ha)	Max Depth (m)	Mean Depth (m)	Littoral (% <3 m deep)	Crustacean Zooplankton		Benthos		Phytoplankton		Macrophytes	Fish
					Density (n/l)[1]	# of taxa	Density (n/m$^{2)}$	# of taxa	Density (n/ml)	# of taxa	# of taxa	Species
Lower Embarras	6.6	18	7.34	30	30.3	9	1509	6	389.1	18	0	RNTR
Middle Embarras	3.0	10	3.4	55	-	-	-	-	-	-	0	RNTR
Upper Embarras	5.0	8	3.2	56	35.9	11	2709	8	337.5	18	2	RNTR
Fairfax Lake[1]	28.4	7.6	3.2	60[2]	41.3	22	6450	11	522.9	12	-	RNTR/ BKTR

1. Hatfield 2008
2. Derrived from Hatfield 2011

5.2. LOTIC HABITAT

The inlet and outlets of the lakes and the connecting channel were all stable (Table 5.1). Proposed habitat enhancements (i.e. spawning gravel, large woody debris) for the connecting and outlet channels had not yet been constructed but are expected to be installed in 2012 or 2013. Riparian vegetation along the connecting channels was somewhat limited and was not fully established. Habitat within the connecting channels was comprised mainly of shallow run and riffle habitat. However, in October 2011, the channel between the Middle and Lower Lake was dry and the outlet channel downstream of the Lower Lake was dry for approximately 150 m.

During the later stages of construction of the end pit lake system (early 2011) approximately 80 to 100 Rainbow Trout were found to have colonized the Lower Embarras Lake (Dean Woods *Personal Communication*). In September 2011, Alberta Environment and Sustainable Resource Development stocked 208 native Athabasca Rainbow Trout into the Upper Embarras Lake (Ryan Cox *Personal Communication*). The stocked fish ranged in size from 29 mm to 119 mm with a mean length of 80 mm (Ryan Cox *Personal Communication*). Spawning surveys conducted during spring 2011 confirmed Rainbow Trout spawning downstream of the fish exclusion structure and found some evidence to indicate that spawning may be occurring in the connecting channels of the end pit lake system. Fish sampling within the connecting channels during the summer of 2011 (prior to AESRD stocking) resulted in the capture of several Rainbow Trout that ranged in size from 53 mm to 78 mm long. Sonnenberg (2011) noted that growth rates for stream resident Rainbow Trout downstream of end pit lakes were significantly greater that growth rates for Rainbow Trout observed upstream of pit lakes. Considering this information and given the thermal regime of the lake system, it seems possible that egg and fry

development was accelerated (due to the slight warming effect of the lakes) such that some of the captured fish represent young of the year (yoy) age class resulting from successful spawning in the spring of 2011.

The fish exclusion structure appears to be effectively precluding the movement of Brook Trout into the Embarras Lake System since Brook Trout were found downstream of the barrier but not upstream.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Monitoring and assessing the progress of young waterbodies towards target values can be complicated by the inherent inability of an immature lake to exhibit functional equivalency to an older system (EPLWG 2003). Over time, young waterbodies typically progress from low nutrient, chemically imbalanced waters to a more fertile, chemically balanced state. The timeline and extent of this transition is variable between lakes. At present the Embarras Lakes appear to be developing towards being productive lakes that are similar to local waterbodies. Initial results indicate that certain parameters have not yet reached target goals while other parameters have (Table 6.1). Continued monitoring will document the development of the lakes and should help identify potential limiting factors. The following observations and recommendations have been made in the interest of maximizing the potential success of the Embarras End Pit Lake system. Additional reclamation and/or enhancement work may be required depending on future monitoring results.

- Unvegetated areas (including the haul road slopes) along the Middle and Lower Embarras Lakes appear to be resulting in sediment inputs into the Lake during the open water season.
- Cover within the Embarras River constructed connecting channels is limited. It is recommended that dense plantings of larger woody species (willows, deciduous trees, and coniferous trees) be installed along reconstructed channels.
- Appropriate sized Gravel (5m to 15mm) should be strategically placed within the constructed channels to create spawning and rearing habitat.
- Large woody debris (conifers with intact limbs) should be anchored at select locations within the constructed channel to provide cover for spawning fish.

Table 6.1. Pit lake evaluation/performance assessment for select chemical and biological parameters for the Embarras Lakes based on End Pit Lake Working Group (2003) guidelines.

Design Factor	Indicator	Parameters	Targets/Goals	Lake	Target/Goal Met?	Rationale
Chemical	Overturn	Summer stratification Fall mixing	Presence of annual summer stratification and fall overturn	All	Yes (dimictic)	• Table 5.1
	Water quality	Water chemistry in lake and discharge	Meet Surface Water Quality Guidelines used in Alberta Chemical end points fall within regional range	Upper Lower	Uncertain	• Table 5.1 • Most parameters are under guidelines. Only manganese and iron exceed Provincial Guideline. • Aluminum and Iron exceeded Federal Guidelines in Lower Lake, only Iron in Upper Lake.
Biological	Biodiversity Biomass Productivity	Benthic Invertebrates	Comparable to local lakes and/or regional fisheries management objectives (not applicable, no comparable local lakes). Comparable to similar natural mountain lakes.	Upper Lower	No	• Table 5.1 • Number of taxa lower than Fairfax Lake • Average densities lower than Fairfax Lake
		Zooplankton		Upper Lower	No Uncertain	• Table 5.1 • Number of taxa present fewer than Fairfax Lake • Average densities lower but comparable to Fairfax Lake
		Phytoplankton		Upper Lower	Yes	• Table 5.1 • Number of taxa present exceeds mean for Fairfax Lake • Average densities exceed mean for Fairfax Lake
		Macrophytes		All Lakes	No	• Table 5.1 • Number of taxa and distribution limited compared to Fairfax Lake.
		Fish (including non-game fish)		Uncertain		• Not applicable, Fairfax requires annual stocking. End goal self-sustaining Rainbow Trout population.

7.0 LITERATURE CITED

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8.0 PERSONNEL COMMUNICATIONS

Cox, Ryan. December 2012. Fisheries Biologist Foothills Area. Edson, Alberta.

Woods, Dean. December 2012. Reclamation Specialist D&T Woods. Edson, Alberta.

APPENDIX A:

Photos

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Lower Embarras Lake August 2011

Middle Embarras Lake August 2011

Upper Embarras Lake August 2012

Embarras Channel Upstream of Lakes in Summer 2011

Upper Embarras Lake Outlet (looking d/s) Spring 2012

Middle Embarras Lake Outlet (looking u/s) Spring 2012

Embarras Fish Exclusion Weir Spring 2012

Looking upstream from Embarrass Exclusion Weir

APPENDIX B:

Benthic invertebrate sample processing methodology

DRAFT

Method Used for Picking Animals and Taxonomy

The picking of animals was performed in accordance with the process developed by Wrona et al. (1982), with slight modifications. This procedure has been used for many years. It provides a good estimate of animal population in aquatic systems based on samples.

The Picking and Sub Sampling Process

The whole sample is washed through double stacked 2 mm and 106 µm meshes. All the animals that remain on the 2 mm mesh (coarse fraction) are picked. The fine fraction from the 106 µm mesh is put into an aeration apparatus and diluted with water until the total sample plus water volume is 1 litre. The sample is aerated, and when well mixed, five 50 mL sub samples are taken out of the aeration apparatus. The entire sub samples are picked using a compound microscope at 10 times magnification for the course fraction and 40 times magnification for the fine fraction. Once picking has been completed, the course and fine fraction are saved for quality assurance. The total of animals in each sub sample is determined for all taxa. After the samples are picked, quality assurance is performed to confirm that no visible animals are left in the sample.

All the animals are classified using the keys: '*Aquatic Invertebrates'* of Alberta by Hugh F. Clifford (1991), '*Ecology and Classification of North American Freshwater Invertebrates'* by James H. Thorp and Alan P. Covich (1991), and '*Fresh Water Invertebrates of the United States'* by Robert W. Pennak (1978).

The complete hierarchical classification through Phylum, Class, Order, Family, Genus, and Species is attempted for all taxa. However, in some cases when parts of the animals are missing, complete classification cannot be performed. In that case, classification was performed to the level recognizable to the taxonomer.

Reference:

Wrona, F.J., Culp, J.M. and Davies, R.W. 1982. *Macroinvertebrate subsampling: a simplified apparatus and approach*. Can. J. Fish. Aquat. Sci. 39:1051-1054

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APPENDIX C:

Zooplankton sample processing methodology

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Zooplankton were enumerated from three 1-15 ml sub-samples using a dissecting microscope at magnifications 10-50x for macro-zooplankton, and at magnification 100-400x for rotifers and copepod nauplii using Nikon compound microscope.

Macro-Zooplankton were identified using keys from Brooks (1957), Edmondson (1959), Chengalath (1971), Grothe and Grothe (1977), Pennak (1978), and Clifford (1991), The micro-zooplankton were identified using keys from Chengalath (1971), Grothe & Grothe (1977), Stemberger (1979), Clifford (1991) and Thorp & Covich (1991).

Lengths were determined directly on the microscope with a micrometer in the ocular. Generally, lengths were measured for the first 50 individuals of each species or genus observed. Where less than 30 individuals occur, the number measured equaled the average number counted over all sub-samples.

Zooplankton biomass was calculated for each sample. Weights were calculated from published length-weight regressions; general equations for taxa were used where length-weight equations are not available for specific species (Table 1). For each sample, mean individual weights for each species were calculated by averaging estimated weights. Total biomass for each group (species or developmental stage) was calculated as the product of its density and estimated mean individual weight.

Table 1. Length-weight regressions used in calculating zooplankton weights.

Organism	Equation (ug=microgram)	Reference
Copepods (N I-adults)	lnW(ug) = 1.9526 + 2.399 lnL(mm)	Bottrell et al. 1976
Daphnia spp.	lnW(ug) = 1.6 + 2.84' lnL(mm)	Bottrell et al. 1976
Ceriodaphnia spp.	lnW(ug) = 2.8713 + 3.079 lnL(mm)	Bottrell et al. 1976
Scapholeberis spp.	lnW(ug) = 2.5623 +3.338 lnL(mm)	Downing & Rigler 1984
Chydorus sphaericus	lnW(ug) = 4.543 + 3.6360 lnL(mm)	Downing & Rigler 1984
Other Cladocerans	lnW(ug) = 1.7512 + 2.653lnL(mm)	Bottrell et al. 1976
Rotifers	lnW(ug) = -10.3815 + 1.574llnL(mm)	Sternberger & Gilbert. 1987

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APPENDIX D:

Fish Capture Record

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Electrofishing Record				
Date:		18-Aug-11		
Stream Name:		Embarrass River		
UTM reference:		503436E, 5882209N, NAD 83, ZN11		
Sample Site:		Upstream of exclusion barrier		
Section length (m):		360m		
Duration (seconds):		2384		
Sample	Species	Fork Length	Weight	Comments
#		(mm)	(g)	
1	RNTR	78	6	
2	RNTR	53	1	
3	RNTR	65	3	
4	RNTR	69	3	
5	RNTR	71	3	
6	RNTR	69	3	
7	RNTR	58	2	
8	RNTR	75	4	
9	RNTR	65	2	
10	RNTR	71	4	
11	RNTR	60	2	
12	RNTR	63	3	
13	RNTR	64	2	
14	RNTR	58	2	
15	RNTR	63	2	
16	RNTR	64	3	
17	RNTR	74	4	
18	RNTR	62	2	
19	RNTR	63	2	
20	RNTR	72	4	
21	RNTR	67	4	
22	RNTR	69	4	
23	RNTR	64	4	
24	RNTR	65	3	
25	RNTR	68	3	

Electrofishing Record				
Date:		18-Aug-11		
Stream Name:		Embarrass River		
UTM reference:		503434E, 5882384N, NAD 83, ZN11		
Sample Site:		Downstream of fish exclusion barrier		
Section length (m):		300		
Duration (seconds):		1902		
Sample	Species	Fork Length	Weight	Comments
#		(mm)	(g)	
1	RNTR	154	34	
2	RNTR	147	33	

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3	RNTR	62	3	
4	RNTR	165	59	
5	RNTR	104	10	
6	RNTR	73	4	
7	RNTR	56	3	
8	RNTR	66	3	
9	RNTR	160	43	
10	RNTR	179	75	
11	RNTR	148	34	
12	RNTR	216	136	
13	RNTR	247	176	
14	RNTR	184	79	
15	RNTR	102	12	
16	RNTR	70	4	
17	RNTR	110	14	
18	RNTR	97	8	
19	RNTR	156	36	
20	RNTR	164	50	
21	RNTR	140	20	
22	BKTR	187	76	
23	BKTR	176	62	
24	BKTR	74	4	
25	BKTR	158	46	
26	BKTR	174	57	
27	BKTR	201	85	
28	BKTR	179	70	
29	BKTR	179	62	
30	BKTR	166	58	
31	BKTR	222	129	
32	BKTR	71	4	
33	BKTR	75	4	
34	BKTR	191	76	
35	BKTR	173	61	
36	BKTR	190	73	
37	BKTR	165	60	
38	BKTR	226	130	
39	BKTR	220	145	
40	BKTR	74	4	
41	BKTR	163	47	
42	BKTR	166	61	
43	BKTR	138	30	
44	BKTR	180	64	
45	BKTR	175	60	
46	BKTR	156	47	
47	BKTR	145	37	
48	BKTR	159	74	

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49	BKTR	215	117	
50	BKTR	157	45	
51	BKTR	188	79	
52	BKTR	170	57	
53	BKTR	177	64	
54	BKTR	225	131	
55	BKTR	195	85	
56	BKTR	192	81	
57	BKTR	186	74	
58	BKTR	175	62	
59	BKTR	194	83	
60	BKTR	178	57	
61	BKTR	185	72	
62	BKTR	180	69	
63	BKTR	175	50	
64	BKTR	164	49	
65	BKTR	163	45	
66	BKTR	164	51	
67	BKTR	197	95	
68	BKTR	195	92	
69	BKTR	171	58	
70	BKTR	178	56	
71	BKTR	160	44	

Electrofishing Record				
Date:		5-Oct-11		
Stream Name:		Embarrass Creek		
UTM reference:		503573E, 5882051N, NAD83, ZN11		
Sample Site:		Upstream of fish exclusion barrier.		
Section length (m):		300		
Duration (seconds):		1240		
Sample	Species	Fork Length	Weight	Comments
#		(mm)	(g)	
1	RNTR	106	18	

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Electrofishing Record				
Date:		5-Oct-11		
Stream Name:		Embarrass River		
UTM reference:		503434E, 5882384N, NAD 83, ZN11		
Sample Site:		D/S of outfall Structure		
Section length (m):		300		
Duration (seconds):		367		
Sample	Species	Fork Length	Weight	Comments
#		(mm)	(g)	
1	RNTR	262	223	
2	RNTR	170	52	
3	RNTR	163	42	
4	RNTR	124	21	
5	RNTR	98	9	
6	RNTR	218	102	
7	RNTR	171	54	
8	RNTR	133	25	
9	RNTR	88	8	
10	RNTR	140	31	
11	RNTR	172	57	
12	RNTR	148	32	
13	RNTR	146	30	
14	RNTR	97	7	
15	RNTR	181	66	
16	RNTR	154	36	
17	RNTR	93	8	
18	RNTR	88	4	
19	RNTR	83	5	
20	RNTR	86	6	
21	BKTR	196	81	
22	BKTR	208	88	
23	BKTR	185	62	
24	BKTR	181	64	
25	BKTR	180	62	
26	BKTR	183	61	
27	BKTR	145	26	
28	BKTR	163	46	
29	BKTR	90	6	
30	BKTR	82	5	

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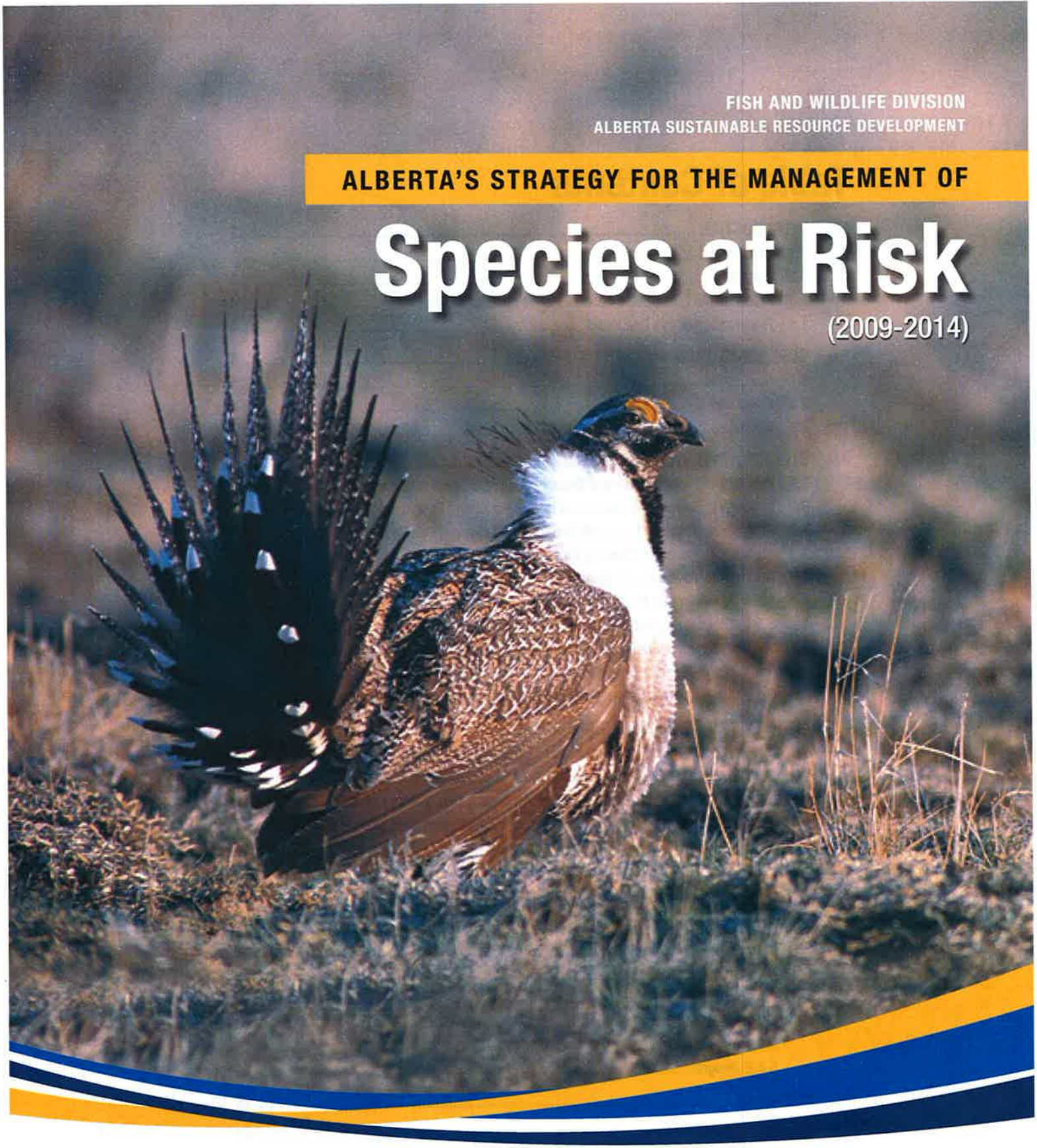
Appendix 3: Alberta Strategy for Management of Species at Risk

FISH AND WILDLIFE DIVISION
ALBERTA SUSTAINABLE RESOURCE DEVELOPMENT

ALBERTA'S STRATEGY FOR THE MANAGEMENT OF

Species at Risk

(2009-2014)



Alberta

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mountain plover
gordon court

1.0 INTRODUCTION

1.1 Background

A Strategy for the Management of Species at Risk in Alberta was drafted in 1997. That original document provided guidance for 10 years of species at risk management in the province. It provided strong process direction for species' status evaluation, species' listing and recovery planning.

Since 1997 general and detailed status evaluation and recovery planning have been completed for many species. The 1997 strategy has been acted upon and many of the original objectives have been achieved or are ongoing. This revised document incorporates the strong process direction provided by that strategy and supplements it with increased emphasis on implementation of recovery actions, strategies to prevent species from becoming endangered, and conservation and stewardship programs for species at risk. Whereas the 1997 document was used to establish provincial processes, the current document describes the program that developed from that strategy and provides specific program guidance for the future. This document has been prepared to guide Alberta's species at risk program for the five fiscal years from 2009/2010 to 2013/2014.

Alberta's species at risk program is an integral component of a national process of working together to conserve and recover species at risk in all jurisdictions of Canada. Alberta is represented on the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), for assessing and classifying the national status of species. Alberta also takes an active role in

"RENEW", the Committee for the Recovery of Nationally Endangered Wildlife. When Canada signed the United Nations *Convention on Biological Diversity* in 1992, both the federal and provincial governments took steps to ensure that species assessment criteria would be built upon those developed by the International Union for the Conservation of Nature (IUCN). In 1996 Alberta signed the national *Accord for the Protection of Species at Risk*, an agreement to work together with other provinces/territories and the federal government to develop laws and programs for protection of species at risk and their habitats. In 2002 the *Species at Risk Act* (*SARA*) was passed by Canada's parliament. *SARA* applies on federal lands (e.g., national parks), but Alberta's *Wildlife Act* is still the dominant legislation for management of species at risk on private lands and public lands under provincial jurisdiction. There are several federal/provincial committees in place to ensure a cooperative approach for the management of species at risk. At the time of preparation of this strategy, a Canada-Alberta bilateral agreement was being drafted to ensure ongoing inter-jurisdictional cooperation on species at risk conservation.

A *National Framework for Species at Risk Conservation* facilitates coordination and cooperation among jurisdictions, consistency in policies and procedures, and provides a base for the development of bilateral agreements. It explains the international context for Canada's species at risk and provides an overview and direction for species at risk conservation at the national level. The national framework identifies six "foundational elements" including:

- **Conservation** - emphasizing preventative approaches and conservation of biodiversity;
- **Governance and Legal Framework** - recognizing provincial and federal government roles, plus those of aboriginal treaties and encouraging federal-provincial bilateral agreements;
- **Knowledge** - considering science, aboriginal traditional knowledge and community knowledge;
- **Consultation** - consulting with affected parties on species at risk matters;
- **Socio-economic** - incorporating socio-economic factors into decision-making;
- **Stewardship** - adopting a range of stewardship and voluntary actions including education, incentives, and technical assistance to participants.

This document, *Alberta's Strategy for the Management of Species at Risk (2009-2014)* incorporates these six foundational elements into Alberta's species at risk program. It interprets Alberta's role within the national context. The strategy represents a bridge between conceptualization and action for the conservation of species at risk in this province by directing activities that provide Alberta-specific delivery of the national framework. Alberta's strategy provides direction for provincially-led initiatives and guides projects specifically suited to Alberta's unique circumstances, the landscape and our people.

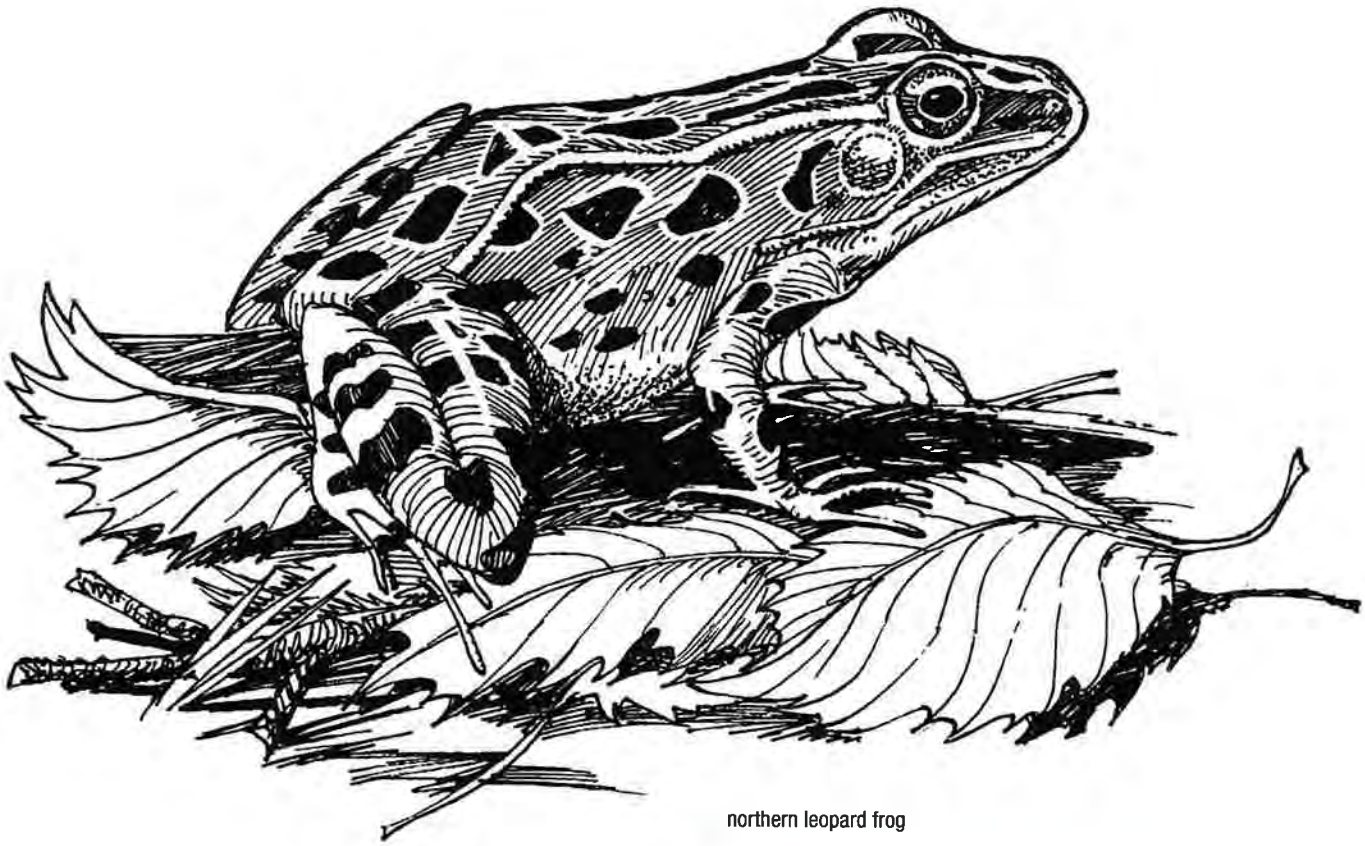
1.2 Purpose

Species at risk are the most vulnerable components of Alberta's biodiversity. The integrity of Alberta's ecosystems is dependent on their continued presence. An effective strategy is needed to sustain these rare and threatened species.

Wild species are a keystone to healthy ecological processes providing environmental stability, with a subsequent benefit to the economic stability of our province and the social and economic well-being of Albertans. This keystone role is reflected in the high value that the large majority of citizens place on conservation of species at risk.

In plain language, Albertans want to know Endangered species are being protected using our own laws and programs, without a need to turn to federal legislation.

Alberta's Strategy for the Management of Species at Risk (2009-2014) provides the framework for species at risk management in this province. It provides direction for Alberta government staff involved in species at risk management. The document will also be useful to Alberta citizens particularly those involved with recovery teams, advisory committees and project partnerships, by helping them understand species at risk program processes, priorities and activities.



northern leopard frog

Implementation of this strategy will deliver many of the *Ministerial* commitments made for species at risk. In addition to conservation benefits, it will demonstrate effective management of species at risk by the Alberta government. Under *SARA*, the province is given the first opportunity to protect listed species, but if this obligation to protect is perceived as not being done effectively, then a "safety net" clause in the Act may lead to negotiation enabling the federal government to assume management responsibility for the species. By following *Alberta's Strategy for the Management of Species at Risk (2009-2014)*, Alberta will in effect, be insuring itself against loss of provincial jurisdiction to the federal government.

1.3 Relevance to Sustainable Resource Development Business Plan

Alberta's Strategy for the Management of Species at Risk (2009-2014) is an important delivery component of the Sustainable Resource Development *Business Plan (2008-2011)*. The business plan identifies Ministry priorities, and provides Vision, Mission, Goals and Strategies. *Alberta's Strategy for the Management of Species at Risk (2009-2014)* is consistent with the SRD Vision and Mission by encouraging responsible use of resources through application of leading practices in management, science and stewardship, for the long-term benefit of Albertans.

Alberta's Strategy for the Management of Species at Risk (2009-2014) contributes in some way to all the goals in the SRD Business Plan. It is relevant to Goals 1 and 3 (Lands and Forests) to help sustain economic, environmental and social values, and encouraging actions to protect watersheds and biodiversity. *Alberta's Strategy for the Management of Species at Risk (2009-2014)* is central to Goal 4 (Fish and Wildlife), with particular application to Strategy 4.3 (Develop and implement management plans for species at risk), Strategy 4.9 (Actions to support biodiversity), Strategy 4.10 (Promote stewardship through information, education and outreach programs), and Strategy 4.11 (Programs and policies to encourage private landowners to practise stewardship to maintain and improve habitat).

Alberta's Strategy for the Management of Species at Risk (2009-2014) is the primary delivery mechanism for achievement of the SRD Business Plan Performance Measure of sustaining Alberta wildlife with less than five per cent of provincial species being listed as species at risk.

1.4 Organization of the Document

Alberta's Strategy for the Management of Species at Risk (2009-2014) is organized into seven sections. The first is this introduction, followed by a chapter describing the program goal, objectives, and six strategies for conservation and recovery of wild species. Chapter 3 provides an overview of processes relating to each of the six strategies. The fourth section describes specific activities needed to achieve conservation and recovery of Alberta's species at risk, categorized within each of the six strategies. Chapter 5 describes the resource needs of Alberta's species at risk program, the process for allocation of Departmental funds to species at risk projects and a provincial staffing strategy. Chapters 6 and 7 provide a summary and suggested readings.


short-horned lizard
gordon court

2.0 GOAL, OBJECTIVES AND STRATEGIES

2.1 Goal

To ensure that populations of all wild species are protected from severe decline and that viable populations are maintained, and where possible, restored.

2.2 Objectives

1. To identify species that are, or may be at risk and those for which management will help to prevent them from becoming at risk.
2. To identify and implement actions designed to restore species at risk to viable, self-sustaining levels.
3. To identify and implement actions designed to prevent species from becoming at risk.

2.3 Strategies

STRATEGY #1: **General Status:** Rank the relative security (General Status) of all wild species to prioritize risk assessment, data collection and conservation initiatives.

STRATEGY #2: **Detailed Status:** Assess and document the risk of becoming endangered for those species having a general status that suggests serious concern regarding current or future population viability.

STRATEGY #3: ***Wildlife Act* Listing:** Formally designate species that are *Endangered* or *Threatened*, as well as Species of Special Concern.

STRATEGY #4: **Recovery Planning:** Develop Alberta Recovery Plans for all *Threatened* and *Endangered* species.

STRATEGY #5: **Preventing Species from Becoming at Risk:** Develop management plans for Species of Special Concern, to prevent them from becoming *Endangered* or *Threatened*.

STRATEGY #6: **Implementing Recovery and Management Actions:** Coordinate and facilitate the implementing of recovery plans and management plans, with actions being carried out by government, non-government organizations, and private individuals.

Cape May warbler

3.0 STRATEGY OVERVIEWS

3.1 Strategy 1 Rank the Relative Security of all Wild Species (General Status)

Alberta supports more than 500 distinct species of vertebrates and thousands of plant and invertebrate species. The first task in managing species at risk is to determine the relative security of all species and sort them into categories based on risk of becoming endangered. This is a coarse-filter assessment to prioritize those species that may need a more detailed assessment.

The Alberta General Status process fulfils four key needs:

1. Identification of species which are or may be at risk and require more detailed assessment to determine the scope, scale, and urgency of that risk.
2. Identification of species for which current information is inadequate to assess status and for which additional data/information needs to be collected.
3. Identification of species that are sensitive to human activities and require special management to prevent them from becoming at risk.
4. Contribution of provincial General Status ranks to the National General Status of Wild Species Process.

Alberta's General Status process delivers Alberta's commitment to monitor, assess and report on the status of wildlife, as identified in the national *Accord for the Protection of Species at Risk*.

3.2 Strategy 2 — Assess and Document Risk of Becoming Endangered (Detailed Status)

Amendments to Alberta's *Wildlife Act* made in 1996 (Bill 42, *Wildlife Amendment Act*) created the process and structure for assessment of the risk of becoming endangered. Section 1(1) expanded the Minister's authority to designate *Endangered* species to include all vertebrates, plants and invertebrates. Section 9.1(1) indicated that the Minister shall establish and maintain a committee to be known as the Endangered Species Conservation Committee (ESCC), to function as an advisory committee to the Minister on matters related to the legal listing of species, the preparation and adoption of recovery plans, and any other species at risk matters on which the Minister requests its advice. Section 9.1(2) indicated that the ESCC shall establish, appoint, and maintain an independent scientific sub committee (SSC) to study and assess *Endangered* species and to recommend to the ESCC organisms that should be designated *Endangered* species.

Detailed status evaluations must be carried out in a manner that is both transparent and consistent. These characteristics are achieved by use of standard criteria that can be applied equally to a wide variety of species and by anyone seeking to examine the status of a particular species, with much the same result each time. A status evaluation must also be limited to the biological status of the species in question. Consideration of potential socio-economic issues around listing and/or recovery actions should be reserved for the formal designation and/or recovery planning stages.

Alberta's SSC and ESCC operate under these principles and using these processes. The Fish and Wildlife Division provides an ESCC/SSC Secretariat.

The SSC is composed of independent Alberta scientists who have expertise on a variety of species and/or aspects of conservation biology. During their evaluation, they rely on information compiled into a detailed status report, but they may also request additional information, which might require extra expenditure or other resources to acquire.

The ESCC is chaired by an MLA appointed by the Minister. The committee fulfils a consultative role demonstrating Alberta's commitment to consultation as a "foundational element" of the *National Framework for Species at Risk Conservation* (See Sec 1.1). The ESCC is composed of stakeholders representing industrial, agricultural, conservation, aboriginal and community interests. Its role is to provide balanced advice to the minister, with representation from a broad variety of interests. The ESCC considers the evaluation of the biological status of each species that the SSC assesses, and adds their own advice as to what actions to take regarding formal designation of that species and actions needed to address the species' status.

3.3 Strategy 3 Formally Designate Endangered or Threatened Species

After each meeting, the ESCC recommends to the Minister responsible for Alberta's wildlife on matters relating to those species for which legal designation would assist in management and conservation efforts. After considering the recommendations of the ESCC, the Minister may formally designate *Threatened* and *Endangered* species by regulation under Alberta's *Wildlife Act*.

A variety of regulations provide protection for these species, including the following: up to a $100,000 fine and/or six months in jail for killing or trafficking in an *Endangered* Animal, and year-round prohibitions against disturbing the nest or den of an *Endangered* Animal. The ultimate goal of formally designating a species as *Threatened* or *Endangered* is to facilitate management and recovery efforts necessary to restore viable populations.

3.4 Strategy 4 Recovery Planning for Endangered and Threatened Species

A recovery plan must be produced for *Endangered* and *Threatened* species. A recovery plan contains three elements:

1. A summary of current biological status of the species and an evaluation of the factors which have contributed to its decline.
2. A strategy indicating recovery goals and the strategies necessary to mitigate limiting factors and maintain or recover populations.
3. An action plan that lists the specific activities (including costs, schedules, and participating agencies) that will be completed to achieve the goals of the recovery program.

The recovery planning process, including the drafting of a recovery plan, is typically managed by a recovery team. These teams are established for each *Threatened* or *Endangered* species, with multi-species teams and recovery programs being established in some cases. Teams are initiated by the Minister of Sustainable Resource Development and facilitated and chaired by a designated department biologist. Teams include biologists, species' experts and stakeholders, including community and aboriginal representation. They compile the appropriate biological information from detailed status reports and other sources, identify limiting factors, and propose appropriate recovery goals, strategies and actions. Recovery plans include a chapter addressing socio-economic factors that may influence recovery success, plus consideration of any socio-economic implications of recommended recovery actions. This delivers upon the socio-economic "foundational element" of the *National Framework for Species at Risk Conservation* (See Section 1.1). Whenever possible, teams integrate Alberta recovery plans and programs with national and international efforts. Provincial plans should be compliant with the requirements of the federal *Species at Risk Act* (*SARA*).

Draft recovery plans are forwarded to the ESCC for review. The ESCC review process serves as an opportunity to gauge public support. Careful selection of team members and ESCC review provides opportunity for community and aboriginal influence in recovery planning; however, in some cases additional public comments may also be sought through open houses or other consultation approaches. Final plans are then forwarded to the Minister for approval and publication.

Recovery plans and programs will change over time as to reflect changes in the status of species. Progress in meeting recovery goals is tracked and reported on an annual basis. Plans are updated on a regular basis, generally every five years.

In many cases, species that are listed as *Threatened* or *Endangered* in Alberta will have similar designation at the national level. In these instances, national recovery plans may be drafted by federal agencies with input and review from the provincial government. Alberta's Fish and Wildlife staff may participate in the preparation of national recovery plans to ensure that they complement provincial recovery plans or management activities. National recovery plans are reviewed by the provincial Director of Wildlife Management or Director of Fisheries Management before they are finalized.

3.5 Strategy 5 Preventing Species from Becoming At Risk

It is more biologically sound and economically cost-effective to attempt to prevent species from becoming at risk than it is to recover them once they have become *Endangered* or *Threatened*. Managing ecosystems, protecting habitats and managing human land use should be done in ways that ensure healthy, viable long-term populations of wild species. Such preventative actions help to keep species from becoming *Threatened* or *Endangered*.

wolverine

3.5.1 Management Plans

One possible outcome of the General Status Process is the identification of Sensitive species that are not endangered but require active management or conservation to prevent them from becoming at risk. High-priority Sensitive species may be further assessed through the Detailed Status Process leading to designation as Species of Special Concern. In addition, species with a general status of May be at Risk that have been assessed by the ESCC for possible listing as *Threatened* or *Endangered* but were not considered to be at immediate risk may still require special management and these may also be listed as Species of Special Concern.

Management plans will be prepared for Species of Special Concern within three years of designation, unless a shorter time frame is recommended by the ESCC or directed by the Minister. These management plans are intended to be a resource tool for the Fish and Wildlife Division and for provincial and regional land and water management agencies. The plans are designed to provide guidance for species and habitat conservation and to be used in land, water and resource management decisions.

Management plans include goals, objectives and actions. They address the biological status of the species, potential limiting factors, possible land use conflicts, data gaps and needs, and appropriate management strategies necessary to maintain viable populations. The plans are more concise than recovery plans. In some cases it may be possible to group several species with similar needs into a single plan focused on a particular ecosystem or geographic area.

Management plans are generally prepared by Fish and Wildlife biologists, and may be reviewed by species' experts. In some cases experts may be consulted earlier in the process. If other government departments or non-government organizations are identified as being responsible for actions, they should also be given the opportunity to review the plan. Upon completion of this process, each plan will be provided to the Director of Wildlife Management or Director of Fisheries Management for approval.

3.5.2 Other Prevention Initiatives

Sensitive species and Data Deficient species may also need special management to prevent them from becoming *Endangered* or *Threatened*. Although formal management plans may not be required, it is incumbent on the Fish and Wildlife Division to conserve these species. Actions needed may include inventory, monitoring, and specific management activities. In some areas it may be possible to integrate the needs of these species into biodiversity monitoring initiatives, landscape planning, and multi-species stewardship programs.

The national framework suggests conservation of biodiversity as a preventative measure. Application of biodiversity principles to land management has the potential to sustain a variety of habitat types and associated species. There are, however, shortcomings in the coarse-filter approach and simple random sampling protocols currently used in that they do not monitor the rarer habitats or smaller portions of the landscape that are important to species at risk. Given that any future reductions in Alberta's biodiversity would likely be due to losses of *Endangered* species,

changes in biodiversity monitoring methods should be encouraged. A suggested modification is the initiation of long-term stratified sampling of landscapes occupied by high-priority species at risk, through methods such as intense area searches in high-quality habitats. This monitoring could help in tracking success in conservation of biodiversity and effectiveness of biodiversity approaches as a protective measure against species' endangerment.

3.6 Strategy 6 Implementing Recovery and Management Actions

Successfully implementing approved recovery and management plans is the true measure of how well the Alberta program provides for the needs of species at risk. Success can only be achieved if appropriate changes are made in the way we manage a species and its habitat. Implementing recovery actions is guided by a recovery team, relies on cooperative efforts of stakeholders and may be carried out by existing agencies, non-government organizations and concerned individuals.

In some cases, implementing recovery may include the need for regulatory changes. This may require ministerial involvement in seeking the support and participation of other departments and levels of government.

Actions identified in Species of Special Concern Management Plans are coordinated by the provincial species lead, but like those in recovery plans, may be implemented by a variety of government and non-government organizations. Implementation of management plan actions will usually rely on existing structures and organizations and on the development of new and creative partnerships with government, industry, landowners and land managers. Recovery and management plan actions should lead to direct improvement in conditions of a species' population and/or habitat. Actions may include inventory and monitoring, habitat management and conservation, public education initiatives and other activities. In some cases, plans may provide recommendations to revise existing, or develop new, policies and guidelines to assist in the long-term maintenance of the species and its habitat.

Among the most important aspects of implementation of both recovery and management actions are the transfer of information and encouraging awareness of the needs of these species. This sharing and communicating can enable land and resource managers to incorporate appropriate conservation considerations into their land-use decisions. In this context, publication of recovery plans and management plans and interpretation of appropriate information into educational and communications materials is important. Stronger working relationships with universities and other research and management agencies is also needed to fill data gaps.

Upon receiving ministerial approval, a recovery plan will be used as a resource for program development within Sustainable Resource Development, and should be integrated into the programs of other departments, as needed.

3.6.1 Single-Species Conservation and Stewardship Projects

In many cases, recovery and management can be effectively accomplished using recovery efforts specifically focused toward an individual species. These single-species efforts comprise the historical approach of the species at risk program, and continue to be the primary methods of recovery implementation. Successful examples include the peregrine falcon recovery program, the piping plover conservation program and the swift fox reintroduction program.

One advantage of single-species recovery implementation is the provision of a clear focus for activities specifically designed to recover that target species. Single-species approaches are necessary for species that require a strong emphasis on intervention (e.g., controlled breeding, reintroduction of populations, habitat development).

Single-species projects are easiest to implement in geographic areas that have only a few *Endangered* and *Threatened* species, because people in rural communities tend to respond with reduced tolerance to numerous single-species projects occurring on the same landscape. Even where a multi-species approach may be guiding conservation activities on a particular landscape, this generally involves a landscape prioritization that leads to priority single-species recovery initiatives being pursued in certain areas.

western blue flag

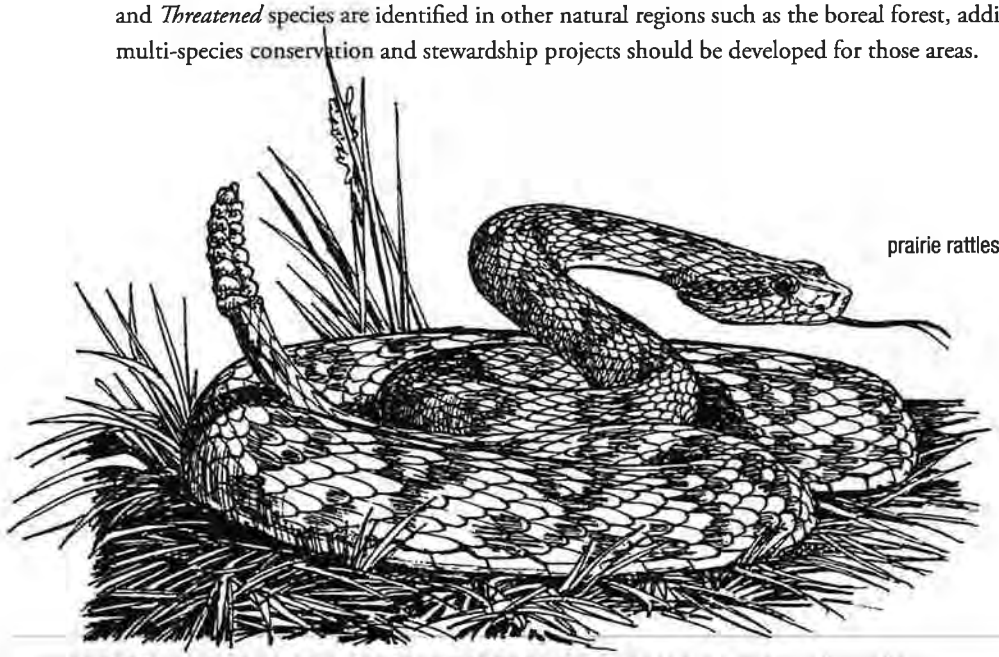
3.6.2 Multi-Species Conservation and Stewardship Projects

Multi-species initiatives are suited to landscapes where numerous species at risk occur or where there is reduced tolerance toward additional single-species activities. One example is the Grassland Natural Region where numerous species at risk are associated with remaining native prairie habitats. On such landscapes, there are efficiencies to be gained through addressing recovery needs of several species through multi-species conservation and stewardship projects.

On landscapes with several *Endangered* and *Threatened* species, single-species recovery efforts may be confounded by conflicting or competing actions being encouraged in their recovery plans. For example, it may be desirable to remove woody vegetation to benefit burrowing owl and sage grouse, whereas in the same area, the same woody vegetation may provide habitat for ferruginous hawk and loggerhead shrike. Similarly, prescribed recovery actions may conflict with other ecological needs such as range health. Under these circumstances, it may be necessary to consider the implications of such recovery actions on other species, and on habitat and ecological processes.

To be successful, multi-species conservation and stewardship projects need to include a landscape analysis to delineate appropriate geographic areas for the recovery actions of multiple *Endangered* and *Threatened* species. Detailed assessments serve to integrate single-species recovery actions with other species' objectives and to avoid conflicts with ecological processes and function. Such an assessment may include identifying areas of appropriate scale and distribution where single-species recovery actions may still be preferred. The end product of multi-species conservation and stewardship projects should be the implementation of appropriate recovery actions for priority *Endangered* and *Threatened* species on the parts of the landscape that hold the greatest potential for recovery.

Currently about 75 per cent of Alberta's species at risk reside in the native habitats of the Grassland Natural Region. Many of these are being addressed through a large multi-species conservation and stewardship program known as MULTISAR, which is a multi-partnered initiative managed by Sustainable Resource Development and the Alberta Conservation Association. As more *Endangered* and *Threatened* species are identified in other natural regions such as the boreal forest, additional multi-species conservation and stewardship projects should be developed for those areas.



prairie rattlesnake

4.0 ACTIVITIES TO CONSERVE AND RECOVER SPECIES AT RISK IN ALBERTA

4.1 Strategy 1 Activities — General Status

a) Carry out an Alberta General Status exercise to evaluate the relative security of wild populations of all species, in a manner consistent with other Canadian jurisdictions using the national *Guidelines for Assessing the General Status of Wild Species in Canada.*

b) Work toward including all known vertebrate, invertebrate, and plant species, plus some selected subspecies, in the Alberta General Status process. Incorporate new taxonomic groups into the general status process according to or ahead of national timelines.

c) Report on the Alberta General Status of wild species every five years, including provision of a searchable online database and a downloadable report and communication materials.

d) Participate in the national roll-up of General Status ranks for all assessed species to facilitate preparation of National General Status ranks.

e) Develop and implement data collection strategies for species for which current data/information/knowledge is inadequate to determine status. These species may include those assessed as Undetermined by the General Status evaluation and Data Deficient by the Detailed Status evaluation, new groups of taxa for which there is little information (e.g., invertebrate and plant groups), and species assessed as May be at Risk and Sensitive.

f) Continue to build functional linkages to Fish and Wildlife databases and other data sources, including the Alberta Natural Heritage Information Centre (ANHIC). Where data and information are limited, provide opportunity for broad input and use expert knowledge and opinion. Coordinate reviews of General Status evaluations with ANHIC's review of NatureServe S-ranks.

4.2 Strategy 2 Activities Detailed Status

a) Prioritize and select among candidates for detailed status evaluation each year. High-priority candidates may include species assessed as May be at Risk or Sensitive by the general status process, species that underwent detailed status evaluation more than five years previously (or less if directed by the Minister), and species occurring in Alberta that have been assessed, or are candidates for assessment, at the national level.

b) Collect, compile and report on the detailed information necessary to evaluate the current status and predict future risks to species selected for status assessment.

c) Prepare and publish detailed status reports for several high-priority May be at Risk and other species of concern each year. These reports will be achieved through commissioning of species' experts to compile Alberta Wildlife Status Reports summarizing all available information on the population size, trend and distribution, habitat needs and limiting factors in Alberta. These reports will continue to be directed and published jointly by the Alberta Conservation Association and the Fish and Wildlife Division. New data collection may be needed for some species.

d) Continue the SSC assessments of relative risk of extinction by measuring the current and predicted status against the guidelines of the IUCN (World Conservation Union) using information in prepared Wildlife Status Reports, plus any additional data or knowledge about the species.

e) Forward SSC recommendations to the ESCC for the development of Initial Conservation Action Statements for species. The ESCC will then make recommendations on status and conservation measures to the Minister of Sustainable Resource Development.

f) Report regularly on this process on the Species at Risk Program website and in biennial reports of Alberta's Endangered Species Conservation Committee.

g) Manage species that do not meet the criteria for *Threatened* or *Endangered* but that qualify as Species of Special Concern, and which require focused conservation effort to prevent them from becoming at risk in the future, through development and implementation of management plans, within three years of designation as Species of Special Concern. Conservation steps needed for both Species of Special Concern and those designated as Data Deficient will be recommended by the ESCC, and implemented by Sustainable Resource Development and partners.

h) Designate species for which information is considered inadequate to determine listing as Data Deficient species; develop and implement appropriate data collection strategies for these species.

4.3 Strategy 3 Activities — Formally Designate Endangered or Threatened Species

a) Upon the advice of the ESCC, and direction of the Minister, amend regulations under Alberta's *Wildlife Act* to designate species as *Threatened* or *Endangered* in Alberta.

b) Develop protective regulations under the *Wildlife Act* for fish, invertebrates, and plants, to complement those already in place for *Endangered* and *Threatened* mammals, birds, reptiles and amphibians. Develop additional regulatory amendments to extend protections to other taxa.

c) Amend Alberta's *Wildlife Act* and *Wildlife Regulation* to allow formal designation of Species of Special Concern.

d) Designate a staff biologist, at time of listing of each species, to be the provincial species coordinator to lead recovery planning and implementation.

e) Examine whether a provincial Species at Risk Act would enhance the current legal measures provided under Alberta's *Wildlife Act* to accommodate species at risk in the province.

4.4 Strategy 4 Activities — Recovery Planning for Endangered and Threatened Species

a) Establish recovery teams to develop provincial recovery plans within one year for *Endangered* species and two years for *Threatened* species.

b) Include representation from the department, appropriate technical specialists, and stakeholders on recovery teams.

c) Provide draft recovery plans to the ESCC for their review.

d) Gauge the level of public interest, through the ESCC review, and consider additional public input for some plans.

e) Submit final Alberta tecovery plans to the Minister along with any regulatory and policy requirements.

f) Initiate specific legal, regulatory, and policy authorities needed to facilitate recovery programs.

g) Where significant regulatory amendments and/or policy changes are needed, seek approval of the relevant Cabinet Policy Committee.

h) Adopt approved recovery plans as the Alberta government's policy for that species, with identified actions becoming priorities for staff and divisions of the Ministry of Sustainable Resource Development.

i) Request involvement of other departments or other levels of government when a recovery plan identifies them as having a direct role in implementation of the identified actions, or if they may be affected by implementation of the plan.

j) Integrate Alberta recovery teams and plans with national recovery plans and processes, wherever possible.

4.5 Strategy 5 Activities — Programs to Prevent Species from Becoming Endangered or Threatened

a) Identify species for which management plans are needed (primarily Species of Special Concern and some Sensitive species).

b) Prepare and publish the management plans within the prescribed time period.

c) Identify populations, limiting factors, habitat requirements, data needs, and appropriate management strategies necessary to maintain viable populations.

d) Encourage and facilitate research needed to fill data gaps for Data Deficient species and species of undetermined status.

e) Designate a department biologist species lead for each Species of Special Concern, Data Deficient and high-priority Sensitive species to coordinate management planning and other initiatives.

f) Work collaboratively to incorporate management of these species into government and non-government conservation and stewardship programs.

4.6 Strategy 6 Activities — Implementing of Recovery and Management Actions

a) Coordinate and facilitate the implementation of recovery plans for *Endangered* and *Threatened* species, with actions being carried out by government, non-government organizations, and private individuals.

b) Coordinate and facilitate the implementation of management plan actions for Species of Special Concern.

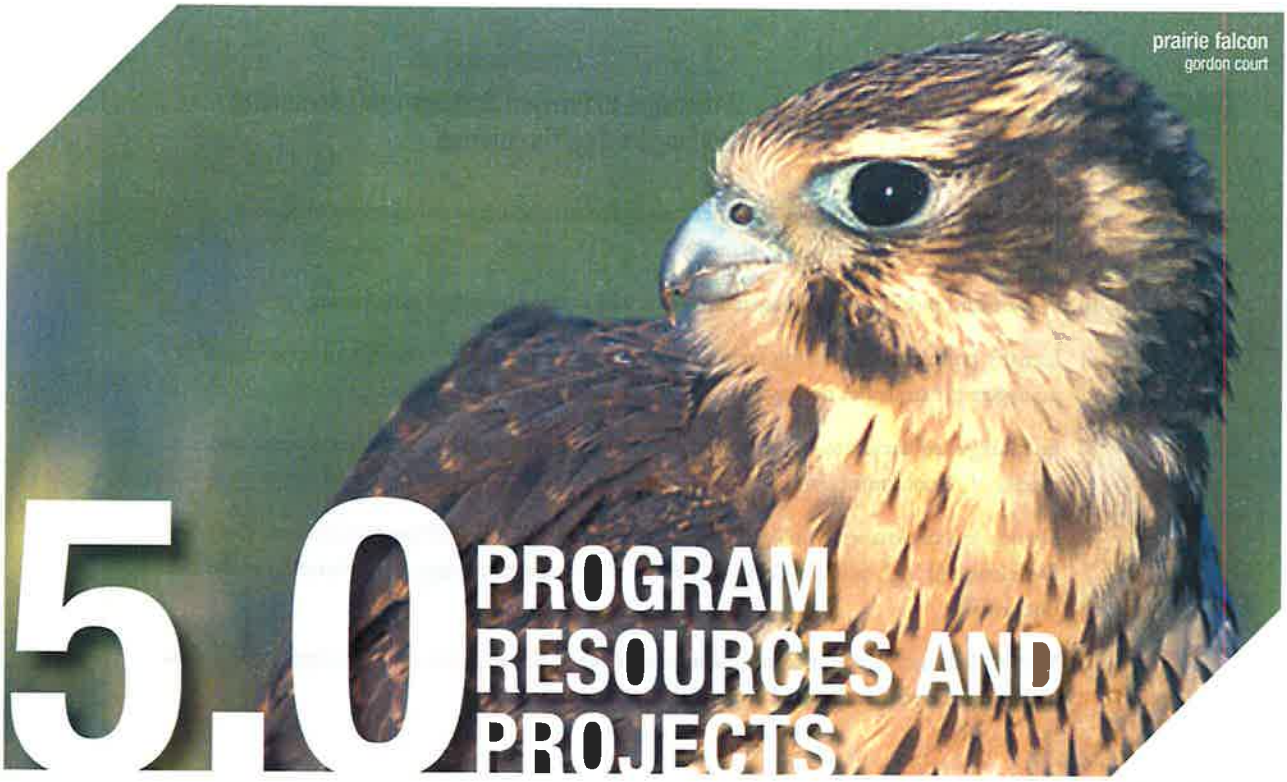
c) Implement recovery and management actions through conservation and stewardship projects with single- or multi-species' focus.

d) Encourage the development of standards, guidelines, beneficial management practices and industrial review processes to assist individuals, corporations and government in planning development activities in a manner compatible with species' recovery or management.

e) Encourage the review and revision (as needed) to land and water resource management policies and regulations to provide the needs of species at risk and to reduce likelihood of species becoming at risk.

f) Review the implementation tables in recovery plans annually to track progress in implementation of recovery actions.

g) Create new partnerships with universities, government, and non-government institutions to implement research-related recovery and management actions


prairie falcon
gordon court

5.0 PROGRAM RESOURCES AND PROJECTS

5.1 Balance Between Program Areas

Six program areas are described, based upon the strategies in the preceding chapter. They are General Status, Detailed Status, Legal Listing, Recovery Planning, Prevention Programs, and Recovery and Management Implementation. Alberta's species at risk program will strive toward a degree of balance by making progress in each of the six program areas annually. This progress will be provided by projects and activities at the provincial level and within priority landscapes.

5.2 Program Resource Needs

Continued progress in delivering Alberta's Species at Risk Program will require additional resources. Estimated needs are based upon a review of ministerial commitments, implementation tables in approved recovery plans, committee costs, and species at risk monitoring programs. The priorities identified in this strategy do not represent approved business plans or funding allocations by the Alberta government. These priorities are meant to provide suggested future direction, which may be used for planning purposes.

The following priorities are identified for the five-year period of this strategy:

- General status assessments, detailed status report contracts and publishing, operational costs of the ESCC and SSC, and Data-Deficient species surveys.
- Progressive implementation of action items identified in ministerial-approved Initial Conservation Action Statements.
- Recovery planning for all Alberta *Endangered* and *Threatened* species.
- Management planning for selected Species of Special Concern.
- Progressive implementation of action items in ministerial-approved provincial recovery plans.
- Implementation of action items in additional recovery plans that will be approved within the five-year period of this strategy.
- Emphasis on staffing program areas and geographic areas where high-priority species at risk activities are needed.

5.3 Project Prioritization

Annual projects are an important component of the species at risk program. They provide capability for the program to respond to changing priorities resulting from general and detailed status reviews, species listings, and recovery planning. The projects also allow for the development of recovery implementation strategies through funding of new single- and multi-species conservation and stewardship initiatives or through partnering in existing ones. The Species at Risk project allocations are matched, on average, by outside partner funds of three to four times the amount provided by the Department. This results in annual species at risk projects being an excellent conservation expenditure for the Alberta government.

Annual project funding prioritization is done using a process based upon the following criteria:

- Higher ranking for more highly endangered species.
- Higher ranking for projects delivering upon ministerial commitments identified in provincial recovery plans, or ministerial-approved ESCC/SSC conservation action statements.
- Higher ranking for projects providing direct and immediate benefits for species or their habitats.
- Higher ranking for projects delivering actions identified in national recovery plans.
- Consideration of levels of partnership contributions, as a secondary criterion.

Project funding is made by departmental allocation on an annual basis. The Species at Risk Section Head guides individual project decisions, based upon a prioritization table and considering input from other program and area managers, and is accountable to the Director of Wildlife Management for final decisions on project approvals.

5.4 Recommended Future Direction

5.4.1 Program Delivery and Structure

The Species at Risk Program is coordinated through a work unit within the Wildlife Management Branch. Area species at risk biologists operate within Area work units. In addition, several Area Wildlife and Fisheries Biologists spend part of their time on non-game/species at risk projects.

Work plans are determined by the managers of individual work units, but are strongly driven by the general and detailed status processes, *Wildlife Act* jurisdictional requirements, and ministerial commitments related to recovery planning and implementation of conservation and stewardship actions. The broad scope of the program requires that work plans be developed through a cooperative process involving branch and area managers and staff. Increasing demands for recovery/management planning and implementation, combined with increasing threats and emerging issues, creates the need for additional provincial species at risk staff in Alberta. Perceptions of a less than adequate provincial government resourcing could stimulate potential involvement of the federal government in management of Alberta's species at risk. This involvement could lead to increased federal staff presence in Alberta communities, delivering species at risk programs for Alberta's wildlife.

5.4.2 Program Staff

In early 2008 there were four positions in the Wildlife Management Branch's Non-game and Species at Risk unit, with species status and provincial program responsibilities. There were also four regional species at risk biologists, all working within the Prairie Area of the province. The following subsections identify several program areas and geographic areas where increased emphasis is recommended.

NORTHERN ALBERTA

- Northeastern Alberta: concentrating on management and recovery of whooping crane, peregrine falcon, shortjaw cisco, several sensitive species, and planning and approvals related to the high levels of industrial developments (e.g., oil sands).
- North-central Alberta: working closely with Provincial Parks (Boreal Centre for Bird Conservation), industry and academic institutions on development of non-game multi-species and landscape approaches for the boreal forest ecosystem.
- Northwestern Alberta: addressing recovery planning and implementation for species such as trumpeter swan, wood bison, and a large number of sensitive species.

FISH SPECIES AT RISK

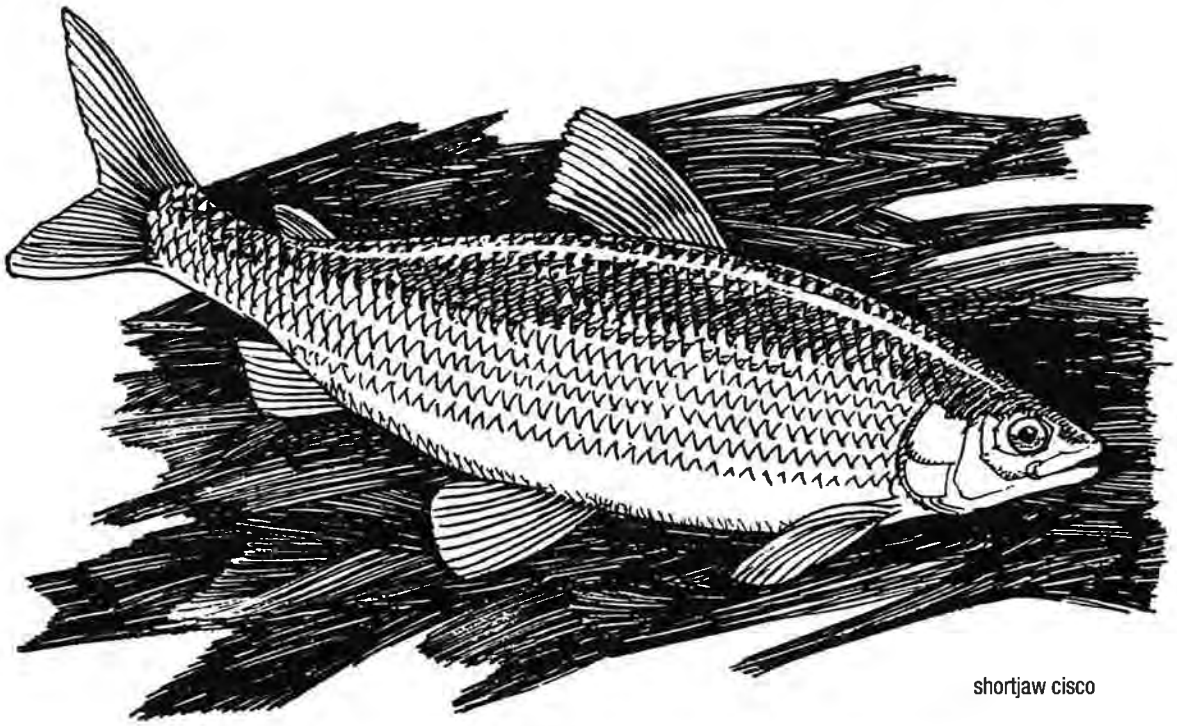
The Species at Risk Program includes responsibilities for fish listed or proposed for provincial and federal listing as *Endangered* or *Threatened* species. There are several recent ministerial commitments related to fish. There is an increased need for communication and progress on these commitments, as well as for increased recovery planning and implementation capability for lake sturgeon, western silvery minnow, east-slope sculpin, stonecat, and westslope cutthroat trout.

PLANT SPECIES AT RISK

SARA listings of Alberta plant species and third party legal challenges to Alberta's jurisdiction for *Endangered* and *Threatened* plants create the need for increased emphasis on rare plants. In addition, four plant species were recently listed in Alberta's *Wildlife Act*, and there may be more species of plants listed over the next several years. Plant regulations, in development at time of preparation of this document, will further strengthen provincial management in this area. Areas of focus would include recovery planning and implementation for listed plants, development of survey protocols, and participation in industrial mitigation measures to conserve rare plants.

MOUNTAIN/FOOTHILLS FORESTRY

Tree species in mountain and foothills ecosystems being threatened by disease and insect pests require special management. Listing and subsequent recovery planning and implementation are needed for some tree and forest plant species.



shortjaw cisco

MULTI-SPECIES CONSERVATION INITIATIVES

The MULTISAR project has demonstrated success of a multi-species stewardship initiative for species at risk on the Alberta prairie landscape. That project was initially developed for the small landscape of the Milk River Basin, and was subsequently expanded to all of prairie Alberta, largely facilitated through a temporary allocation of funds from the Innovation Program of Ministry of Advanced Education and Technology. MULTISAR would be an appropriate long-term program for management within Sustainable Resource Development.

RECOVERY PLANNING AND IMPLEMENTATION

The preparation of recovery plans is a time-sensitive, concentrated effort requiring coordination of a diverse team and access to appropriate technical and scientific experts. Some areas have several recovery planning exercises active at the same time. This situation is likely to increase over the period of this strategy, with additional emphasis needed to facilitate recovery implementation.

PRIORITY SPECIES

Focused efforts are needed for the conservation and recovery of the three currently identified priority species: caribou (*Threatened*), bison (*Endangered*) and grizzly bear (pending status designation). A provincial coordinator for priority species plus several area wildlife staff spend portions of their time on conservation and recovery of these three species. Recovery plans provide recommendations for these species. Areas of emphasis will need to include caribou range planning, grizzly conflict prevention, communication and education programs, development of industrial guidelines, and direct species' management.


woodland caribou

6.0 SUMMARY

This document outlines Alberta's strategy for conservation and recovery of species at risk. It describes general and detailed status processes, legal listing, recovery planning, measures to prevent endangerment, and recovery/management implementation.

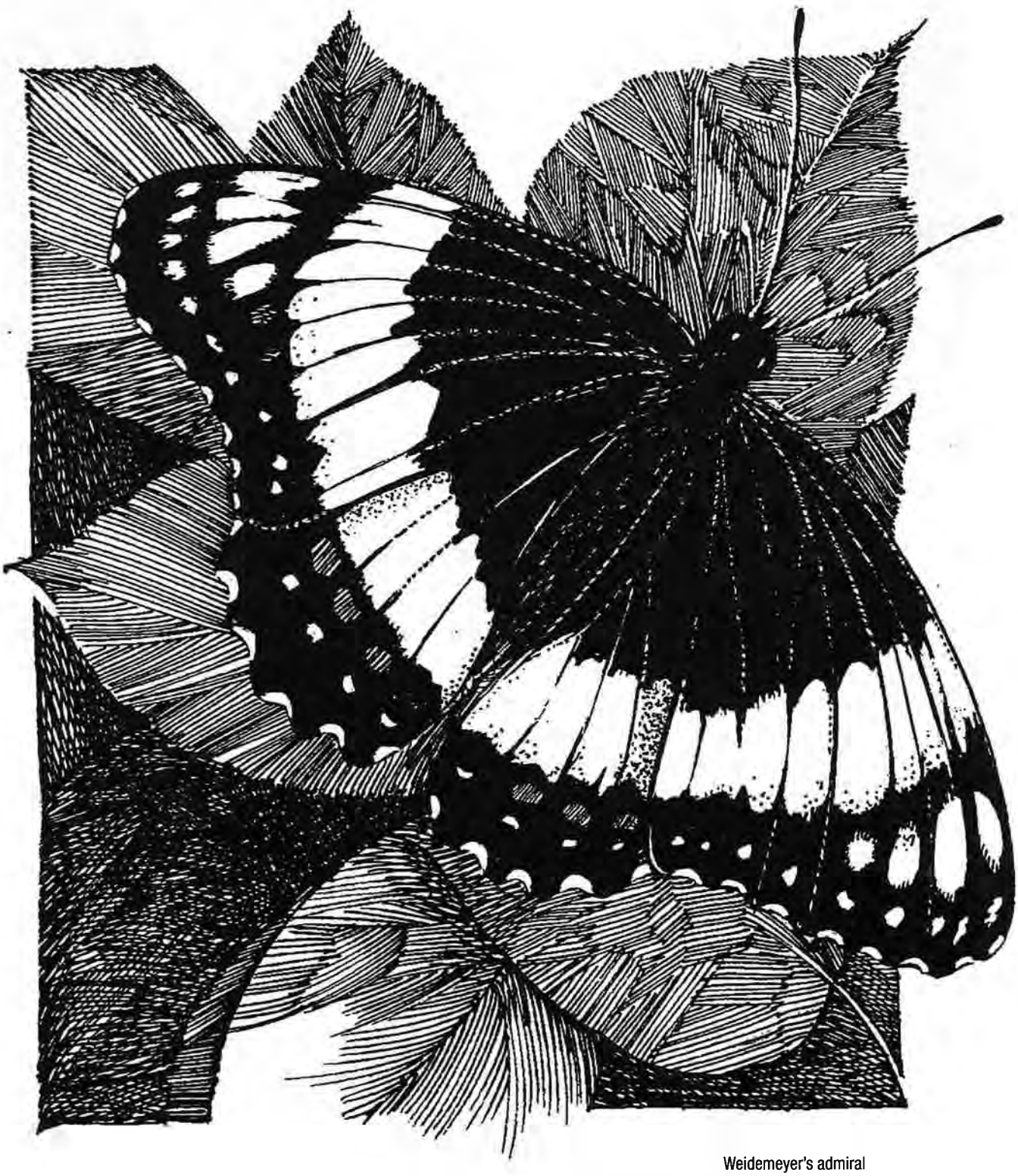
Alberta's Strategy for the Management of Species at Risk (2009-2014) provides information on the planning processes and actions needed for the management of Alberta's species at risk within a national context. Enhancement of Alberta's species at risk program will be key to maintaining Alberta's biodiversity. It will help to ensure environmental and economic health of the province and the social well-being of Albertans.

The process of managing species at risk in Alberta will be sustained by a focused and ongoing program commitment. As we gain more information, knowledge and experience, our ability to recognize problems and implement appropriate management for species at risk will improve. However, as human use of our natural environment changes, new challenges will present themselves. *Alberta's Strategy for the Management of Species at Risk (2009-2014)* will help to organize and focus Albertans' efforts to meet these demands. The strategy will need to be revisited in the 2013/2014 fiscal year, to revise it for the subsequent five years.

tiny cryptanthe

7.0 SUGGESTED READING

- The General Status of Alberta Wild Species reports, detailed status reports, and species at risk project reports may be viewed on the provincial species at risk web page http://srd.alberta.ca/fishwildlife/speciesatrisk/
- The *Wildlife Act* and *Wildlife Regulation* may be viewed on the Alberta Queens Printer web page http://www.qp.gov.ab.ca/catalogue/
- Information on the ESCC and SSC may be viewed on the Endangered Species Conservation Committee web page http://srd.alberta.ca/fishwildlife/escc/
- Information on the federal *Species at Risk Act* and national programs and processes may be viewed on the national species at risk web page http://www.sararegistry.gc.ca/
- Sustainable Resource Development Business Plan 2008-2011 may be viewed on the Sustainable Resource Development web page http://srd.alberta.ca/



Weidemeyer's admiral


yucca moth
gordon court

8.0 APPENDIX 1

Endangered, Threatened and Special Concern Species

This list summarizes the *Endangered* and *Threatened* species in Alberta, as designated in Schedule 6 of the *Wildlife Regulation* in early 2008. It also includes species recommended by the Minister for Species of Special Concern status.

Endangered Species: swift fox, bison[1], whooping crane, sage grouse, piping plover, Ord's kangaroo rat, burrowing owl, ferruginous hawk, mountain plover, short-horned lizard, tiny cryptanthe, western spiderwort, soapweed,

Threatened Species: woodland caribou, barren ground caribou, northern leopard frog, trumpeter swan, peregrine falcon, small flowered sand verbena, lake sturgeon, shortjaw cisco, St. Mary sculpin, western silvery minnow, stonecat.

Species of Special Concern: Sprague's pipit, long-toed salamander, long-billed curlew, loggerhead shrike, black-throated green warbler, harlequin duck, bull trout, white-winged scoter, prairie falcon, barred owl, western blue flag.

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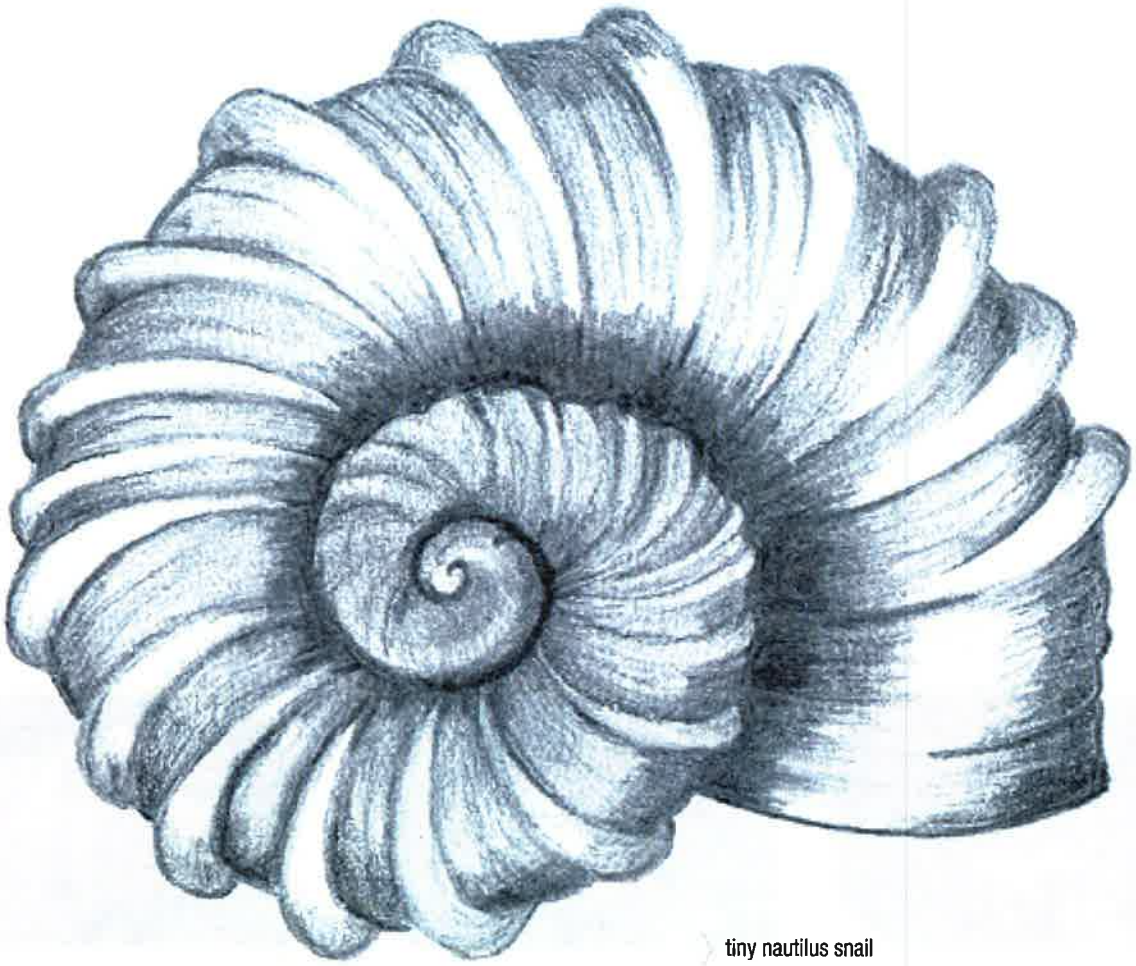
[1]Only Bison bison (Bison) that are found or killed on or captured from the lands within the following boundaries are Endangered animals: Commencing at the intersection of the Alberta Northwest Territories boundary and primary Highway 35; thence southerly along primary Highway 35 to the north boundary of the Paddle Prairie Metis Settlement; thence westerly along the north boundary of the Paddle Prairie Metis Settlement to the sixth meridian; thence southerly along the west boundary of the Paddle Prairie Metis Settlement (the sixth meridian) to the right bank of the Chinchaga River in Township 102; thence upstream along the right bank of the Chinchaga River to the Alberta British Columbia boundary; thence northerly along the Alberta British Columbia boundary to its intersection with the Northwest Territories boundary; thence easterly along the Alberta Northwest Territories boundary to the point of commencement.



tiny nautilus snail

ALBERTA'S STRATEGY FOR THE MANAGEMENT OF

SPECIES AT RISK

(2009-2014)

Alberta

A2.5 PLANT SPECIES INDICATOR VALUES FOR 2005, 2006, 2007 AND 2009

Table A2.25 Plant Species Indicator Values for 2005, 2006, 2007 & 2009, Long Lake Wetlands Monitoring Program

Species	2005			2006			2007			2009		
	Wetland Type	IV	p-value	Wetland Type	IV	p-value	Wetland Type	IV	p-value	Wetland Type	IV	p-value
Tree Species												
Larix laricina	**Wooded Fen**	**93.7**	**0.028**	Wooded Fen	36.2	0.819	Wooded Fen	36.2	0.972	Shrubby Fen	31.0	1.000
Picea mariana	Wooded Fen	61.4	0.373	**Wooded Fen**	**95.1**	**0.022**	**Wooded Fen**	**96.9**	**0.004**	**Wooded Fen**	**82.9**	**0.008**
Shrub Species												
Alnus crispa	Shrubby Fen	75.0	0.127	-	-	-	-	-	-	-	-	-
Betula glandulosa	-	-	-	-	-	-	-	-	-	Shrubby Fen	20.0	1.000
Betula neoalaskana	-	-	-	-	-	-	-	-	-	Shrubby Fen	20.0	1.000
Betula occidentalis	-	-	-	-	-	-	-	-	-	Shrubby Fen	20.0	1.000
Betula papyrifera	-	-	-	Wooded Fen	20.0	1.000	Wooded Fen	12.1	1.000	-	-	-
Betula pumila	**Shrubby Fen**	**96.2**	**0.092**	**Shrubby Fen**	**89.1**	**0.092**	**Shrubby Fen**	**92.2**	**0.019**	**Shrubby Fen**	**99.0**	**0.009**
Ledum groenlandicum	**Wooded Fen**	**74.8**	**0.053**	**Wooded Fen**	**98.0**	**0.022**	**Wooded Fen**	**98.3**	**0.004**	**Wooded Fen**	**77.9**	**0.052**
Lonicera caerulea	-	-	-	-	-	-	-	-	-	Shrubby Fen	20.0	1.000
Oxycoccus microcarpus	**Wooded Fen**	**79.4**	**0.028**	Wooded Fen	46.3	0.659	Wooded Fen	51.6	0.503	Wooded Fen	42.4	0.875
Ribes glandulosum	Wooded Fen	25.0	1.000	-	-	-	-	-	-	-	-	-
Ribes hudsonianum	-	-	-	Wooded Fen	20.0	1.000	Wooded Fen	16.7	1.000	Wooded Fen	20.0	1.000
Rosa acicularis	Wooded Fen	25.0	1.000	-	-	-	-	-	-	-	-	-
Rubus arcticus	-	-	-	-	-	-	Shrubby Fen	36.5	0.393	Shrubby Fen	18.5	1.000
Rubus chamaemorus	Wooded Fen	50.0	0.431	Wooded Fen	40.0	0.501	**Wooded Fen**	**66.7**	**0.093**	**Wooded Fen**	**79.4**	**0.063**
Salix bebbiana	-	-	-	Wooded Fen	20.0	1.000	Wooded Fen	16.7	1.000	Wooded Fen	60.0	0.173
Salix candida	-	-	-	Shrubby Fen	33.3	1.000	Shrubby Fen	25.0	0.374	Shrubby Fen	20.0	1.000
Salix lasiocarpa	-	-	-	-	-	-	-	-	-	Shrubby Fen	20.0	1.000
Salix lucida	Shrubby Fen	68.4	0.151	-	-	-	-	-	-	-	-	-
Salix macalliana	-	-	-	-	-	-	Shrubby Fen	25.0	0.415	Shrubby Fen	12.7	1.000
Salix myrtillifolia	**Shrubby Fen**	**100.0**	**0.028**	Wooded Fen	20.0	1.000	Wooded Fen	66.7	0.137	Wooded Fen	60.0	0.173
Salix pedicellaris	-	-	-	Shrubby Fen	33.3	0.396	Shrubby Fen	44.7	0.308	**Shrubby Fen**	**80.0**	**0.033**
Salix planifolia	Wooded Fen	50.0	0.402	Shrubby Fen	53.5	0.646	Shrubby Fen	67.8	0.363	Wooded Fen	45.3	0.760
Salix pyrifolia	Wooded Fen	75.0	0.128	Shrubby Fen	33.3	0.396	Shrubby Fen	25.0	0.422	Shrubby Fen	20.0	1.000
Vaccinium vitis-idaea	**Wooded Fen**	**82.6**	**0.053**	**Wooded Fen**	**100.0**	**0.022**	**Wooded Fen**	**99.3**	**0.004**	Wooded Fen	92.1	0.004
Forb Species												
Achillea millefolium	-	-	-	-	-	-	Wooded Fen	16.7	1.000	Wooded Fen	20.0	1.000

Bold type indicates a significant indicator species for that wetland types and year

Species Assessed by Alberta's Endangered Species Conservation Committee: Short List

Alberta Species at Risk

List of Endangered and Threatened species currently listed under Alberta's *Wildlife Act* and other species assessed by the Endangered Species Conservation Committee (ESCC) and its Scientific Subcommittee (SSC)

Endangered Species

1. Swift fox (*Vulpes velox*)
2. Bison (*Bison bison athabascae*)[1]
3. Sage grouse (*Centrocercus urophasianus*)
4. Piping plover (*Charadrius melodus*)
5. Ord's kangaroo rat (*Dipodomys ordii*)
6. Whooping crane (*Grus americana*)
7. Mountain plover (*Charadrius montanus*)
8. Short-horned lizard (*Phrynosoma douglassi*)
9. Burrowing owl (*Athene cunicularia*)
10. Ferruginous hawk (*Buteo regalis*)
11. Tiny cryptanthe (*Cryptantha minima*)
12. Soapweed (*Yucca glauca*)
13. Western spiderwort (*Tradescantia occidentalis*)
14. Porsild's bryum (*Bryum porsildii*)
15. Limber pine (*Pinus flexilis*)
16. Whitebark pine (*Pinus albicaulis*)
17. Slender mouse-ear-cress (*Halimolobos virgata*)

Threatened Species

1. Peregrine falcon (*Falco peregrinus*)
2. Woodland caribou (*Rangifer tarandus caribou*)
3. Barren ground caribou (*Rangifer tarandusgroenlandicus*)
4. Trumpeter swan (*Cygnus buccinator*)
5. Northern leopard frog (*Rana pipiens*)
6. St. Mary sculpin (*Cottus bairdi punctulatus*)
7. Stonecat (*Noturus flavus*)
8. Shortjaw cisco (*Coregonus zenithicus*)
9. Western silvery minnow (*Hybognathus argyritis*)
10. Lake sturgeon (*Acipenser fulvescens*)
11. Small-flowered sand verbena (*Trypterocalyx micranthus*)
12. Westslope cutthroat trout (*Oncorhynchus clarkii lewisi*) [2]
13. Grizzly bear (*Ursus arctos*)

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Species of Special Concern

1. Sprague's pipit (*Anthus spragueii*)
2. Long-toed salamander (*Ambystoma macrodactylum*)
3. Long-billed curlew (*Numenius americanus*)
4. Loggerhead shrike (*Lanius ludovicianus*)
5. Black-throated green warbler (*Dendroica virens*)
6. Harlequin duck (*Histrionicus histrionicus*)
7. Bull trout (*Salvelinus confluentus*)
8. White-winged scoter (*Melanitta fusca*)
9. Prairie falcon (*Falco mexicanus*)
10. Barred owl (*Strix varia*)
11. Western blue flag (*Iris missouriensis*)
12. Arctic grayling (*Thymallus arcticus*)
13. Weidemeyer's admiral (*Limenitis weidemeyerii*)
14. Western grebe (*Aechmophorus occidentalis*)
15. Western small-footed bat (*Myotis ciliolabrum*)

Data Deficient Species

1. Prairie rattlesnake (*Crotalus viridis*)
2. Wolverine (*Gulo gulo*)
3. Pygmy whitefish (*Prosopium coulteri*)
4. Great Plains toad (*Bufo cognatus*)
5. Canadian toad (*Bufo hemiophrys*)
6. American badger (*Taxidea taxus*)
7. Verna's Flower Moth (*Schinia verna*)
8. Northern myotis (*Myotis septentrionalis*)

In Process

1. Yucca moth (*Tegeticula yuccasella*)
2. Cape May warbler (*Dendroica tigrina*)
3. Bay-breasted warbler (*Dendroica castanea*)
4. Banff Springs snail (*Physella johnsoni*)
5. Athabasca rainbow trout (*Oncorhynchus mykiss*)

1 The only endangered bison are those found, killed or captured on land in northwestern Alberta, extending from around the Hay-Zama lakes and north and west to the N.W.T. and B.C. borders.

2 The only threatened stocks of Westslope cutthroat trout are genetically pure native stocks that are found, killed or captured from flowing waters in parts of the Oldman River and Bow River watersheds and Picklejar Lakes.

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Appendix 5

Aboriginal Consultation Summary Table

Bi-Monthly Consultation Report

Project Name:	CVRI Robb Trend Project	**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	Alexis Nakota Sioux First Nation, Aseniwuche Winewak Nation, O'Chiese First Nation, Paul First Nation, Samson Cree First Nation, Ermineskin Cree First Nation, Mountain Cree (Smallboy) Camp, Sunchild First Nation, Foothills Ojibway Society, Metis Nation of Alberta Region IV, Nakcowinewak Nation of Canada, Whitefish Lake First Nation	**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**

SUMMARY

The Aboriginal Consultation Plan for CVRI's Robb Trend Project represents a continuation of consultation efforts initiated in 2006 when aboriginal groups were first informed of the project and subsequently undertook Traditional Use Studies where necessary (in conjunction with CVM's Mercoal West and Yellowhead Tower extension projects). The Aboriginal Consultation Plan and Project Description for the Robb Trend Project were approved by Alberta Environment on February 14, 2011. On February 23, 2011, Margaret Fairbairn, Acting Regional Director of the Canadian Environmental Assessment Agency, mailed early notification letters to potentially affected First Nations and Metis groups, noting that the project was subject to a provincial EA, consideration of an EA under CEAA, and participation by the MPMO. A notification regarding the project and Proposed Terms of Reference appeared in the May 2011 (Volume 18, No. 6) edition of Alberta Sweetgrass. This document represents the sixteenth bi-monthly report of consultation activities as requested by Alberta Environment in their approval of the plan. At the request of the SREM Aboriginal Affairs Branch, the Aboriginal Consultation Plan was revised in January, 2013 to include consultation with the Samson Cree Nation, and to clearly reflect that consultation is voluntary with the Mountain Cree Camp and mandatory with the Ermineskin Cree Nation. In the time since approval of the consultation plan, all 11 aboriginal communities detailed in the plan have been contacted to provide copies of the Consultation Plan, Project Description, Detailed Maps, Proposed Terms of Reference, Terms of Reference, and the federal Project Agreement for the project. Meetings to discuss the Robb Trend project and need, if any, for further consultation and traditional use studies have been undertaken, and six groups have partially or totally completed additional field traditional use studies or tours of the area (beyond those completed in previous years). The status of on-going consultations varies between groups. The Alexis Nakota Sioux Nation, Mountain Cree (Smallboy) Camp, Nakcowinewak Nation of Canada, O'Chiese First Nation, Paul First Nation, and Sunchild First Nation have completed additional field studies or tours where necessary from May through October, 2011. Meaningful meetings have occured with the Foothills Ojibway Society with the scope of additional field studies and consultation to be determined. CVRI is still awaiting details from the Metis Nation of Alberta Zone IV regarding a proposed traditional use study. The Aseniwuche Winewak Nation have indicated that the project area falls outside of their traditional area. Meetings to determine steps in an on-going consultation process with Ermineskin and Samson have been planned. Consultation activities are on-going and have and will be updated bi-monthly during review of the Project application. All groups have been provided copies of the *Robb Trend Project Environmental Impact Assessment and Mine Permit Application* (April 2012) and encouraged to provide comment. The Ermineskin Cree Nation and Samson Cree Nation have filed Statements of Concern regarding the Project Application with the ERCB. Following submission of statements of concern with regulatory agencies, CVRI has also engaged with the Whitefish Lake First Nation. On October 15, 2012 CEAA contacted Aboriginal groups with preliminary assessments of potential adverse impacts on their potential or established Treaty or Aboriginal rights. CVRI's responses to Supplemental Information Requests were provided to each Aboriginal group in January 2013. CVRI's responses to the second round of Supplemental Information Requests were provided to each Aboriginal group in July 2013. A corrected version of the same was provided in August 2013.

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	D		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
24-Feb-11	phone	Called to speak with Aboriginal Group D representative (CVRI liaison), was told that person did not work there, was told another representative from Aboriginal Group D would likely be the CVRI liaison.		need to confirm CVRI liaison
03-Mar-11	phone	Left voicemail asking to speak with CVRI liaison	Representative from Aboriginal Group D returned call, said he was not liaison, it probably was another Aboriginal Group D representative, he would provide Dan's contact info and ask her to contact him	need to confirm CVRI liaison
09-Mar-11	phone	Aboriginal Group D representative returned call, said he was not liaison, it probably was nother Aboriginal Group D representative, he would provide my contact info and ask her to contact Dan Meyer		need to confirm CVRI liaison
04-Apr-11	email	inquiry about the current status of Coal Valley liaison, request for meeting to discuss Robb Trend specifically		need to confirm CVRI liaison, set up meeting to discuss Robb Trend

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20-Apr-11	email/phone	Aboriginal Group D representative and Dan arranged to meet in Calgary on April 26 to discuss project. Aboriginal Group D representative followed up with a phone call to confirm her status as liason and will attempt to be at meeting	meeting arranged, liason confirmed	
26-Apr-11	meeting, Calgary, Pengrowth building	Two aboriginal Group D representatives were unable to attend as expected. Dan provided hard copies of Aboriginal Consultation Plan (1), PTOR (1), and Project Description (25) with offer of as many copies of each as requested by community. Discussed history of CVRI-Aboriginal Group D relationship specific to project. Discussed previous TLU work. Dan will send copies of previous Aboriginal Group D reports back to Aboriginal Group D representatives. Discussed contracting, job opportunities, environmental monitoring. Need to assess scope and scale any additional TUS studies, Aboriginal Group D representative to arrange meeting to discuss other issues.	PTOR delivered	Dan to send previous Aboriginal Group D reports to Aboriginal Group D representative. Scope and scale any additional TUS studies to be determined. Aboriginal Group D representative to arrange meeting between CVRI and Aboriginal Group D leadership to continue discussion.
28-Apr-11	email	Dan emailed PDF copy of Aboriginal Group D Sept. 2007 report on TLU of Robb Trend, Mercoal West, and Yellowhead Tower, requested possible dates for meeting to continue discussions	Previous Aboriginal Group D TLU report delivered back to Aboriginal Group D	Aboriginal Group D representative to arrange meeting between CVRI and Aboriginal Group D leadership to continue discussion. Scope and scale any additional TUS studies to be determined.
12-May-11	voice mail	Dan called Aboriginal Group D, left voicemail asking her to arrange the previously discussed meeting		Aboriginal Group D representative to arrange meeting between CVRI and Aboriginal Group D leadership to continue discussion. Scope and scale any additional TUS studies to be determined.

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18-May-11	email	Dan emailed Aboriginal Group D representatives, asking to arrange the previously discussed meeting. Aboriginal Group D representative replied that he would get another Aboriginal Group D represetnative to contact Dan		Aboriginal Group D representative to arrange meeting between CVRI and Aboriginal Group D leadership to continue discussion. Scope and scale any additional TUS studies to be determined.
29-May-11	email	Dan emailed Aboriginal Group D representatives noted he had had no contact from the other Aboriginal Group D representative to arrange the previously discussed meeting		Aboriginal Group D representative to arrange meeting between CVRI and Aboriginal Group D leadership to continue discussion. Scope and scale any additional TUS studies to be determined.
03-Jun-11	email	Dan emailed additional copy of PTOR with a reminder of comment deadline of June 17.		
03-Jun-11	email	In response to a request from Aboriginal Group D representative, Dan provided a review of contact between CVRI and Aboriginal Group D to date along with a list of materials sent		additional meetings regarding project to be scheduled
07-Jun-11	email	Aboriginal Group D representative followed up with Dan to ensure Aboriginal Group D staff had been in contact regarding project, Dan indicated that Aboriginal Group D representative and he were trying to schedule a meeting		additional meetings regarding project to be scheduled
09-Jun-11	email	Series of emails between Aboriginal Group D representative and Dan set a meeting for lunch in Edmonton on June 10		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
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10-Jun-11	meeting, Edmonton, Outback Steakhouse	Aboriginal Group D representative clarified Aboriginal Group D staff responsibilities regarding consultation with CVRI regarding project. Indicated he would work to schedule additional TUS studies. Dan provided additional copies of PTOR and consultation plan. Aboriginal Group D representative indicated that he was in possession of maps, would begin working on details of field studies	clarification of roles and moving ahead on planning of TUS field studies	scope and scale of TUS studies to be determined
04-Jul-11	phone	Dan telephoned to ask for an update on proposed budgets for field studies, Aboriginal Group D representative indicated in the works		scope and scale of TUS studies to be determined
13-Jul-11	phone	Dan telephoned to ask for an update on proposed budgets for field studies, Aboriginal Group D representative indicated in the works		scope and scale of TUS studies to be determined

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20-Jul-11	email	Aboriginal Group D representative emailed a potential budget on behalf of another Aboriginal Group D representative. Subsequent emails in the following days sought to clarify the intent of the budget and help establish scope and scale of work		scope and scale of TUS studies to be determined
28-Jul-11	phone, email	Aboriginal Group D representative asked Dan to set up a meeting		
06-Aug-11	meeting, Hinton and areas	Items discussed included contracting opportunities, potential Robb Trend traditional studies, status of the liaison		scope and scale of TUS studies to be determined; Les to investigate potential smaller contracts to be awarded in the near future
17-Aug-11	mail (priority)	Dan sent additional copies of large-scale Robb Trend maps and two copies of final TOR		scope and scale of TUS studies to be determined
24-Aug-11	email	Les requested information regarding Aboriginal Group D's contracting partner		
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		scope and scale of TUS studies to be determined
28-Sep-11	email	Dan requested a meeting to continue Robb Trend discussions, traditional studies, liaison position, Aboriginal Group D representative indicated we could discuss at Sharing Circle		scope and scale of TUS studies to be determined
01-Oct-11	meeting, Aboriginal Group D Sharing Circle	Meeting arranged for October 5; items to be discussed include scheduling field studies, status of liaison, on-going consultation; copies of final TOR and Federal project agreement provided		scope and scale of TUS studies to be determined

Project Name:		Date of Report Submission:	04-Oct-13
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05-Oct-11	meeting, Aboriginal Group D Reserve	Discussion of effectiveness of liaison position and outcome, employment and contracting opportunities involving reclamation, written agreement with emphasis on education (ie.scholarships). Concern over impact on bears in the area. Arrangement of Bridget to meet with CVRI biologist to see area. Logistics of field studies and budget finalized.	Field studies to commence within next week. Les to arrange Aboriginal Group D representative to meet with CVRI biologist.	Further consultation once TLU report submitted
12-Oct-11	meeting, Aboriginal Group D Reserve	Map of Robb Trend area provided, with discussion of upcoming TLU, annual agreement including liasion and education scholarship funding. Further talk of long-term consultation, educational opportunities,and traditional use funding.		Further consultation once TLU report submitted, long-term consultation
13-Oct-11	field studies	Aboriginal Group D field studies begin with assistance from Dan and Mary.	Field studies initatied.	

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FN or Aboriginal Group Consulted	D	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

18-Oct-11	meeting, Obed Mine	Discussion of the importance to hold a meeting with Chief and Council to discuss economic opportunities, allocation of jobs to nation and aboriginal policies.		Dwayne to provide Aboriginal Group D resumes to HR personnel at CVM
19-Oct-11	field studies	Aboriginal Group D finish field studies.	Field studies completed.	Production of TLU report, further consultation
21-Oct-11	tour of reclaimed CVM mine areas	Aboriginal Group D representative showed different ecological areas, including a reclaimed area and an unreclaimed pit. Questions raised regarding reclamation of plants, berries, trees, and mushrooms. Aboriginal Group D would like to be kept informed on berry plot reclamation.		Keep Aboriginal Group D informed and updated of berry plot reclamation and environmental concerns raised.
31-Oct-11	meeting, Sherritt offices, Edmonton	Items of discussion included on-going communication and long term consultation, annual report, allocation of job/economic opportunities, community involvement and funding.		Production of TLU report; production of annual report, further consultation
07-Nov-11	email	Dan inquired about status of preparation of traditional use report, Aboriginal Group D representative indicated may be prepared in the forthcoming week		Production of TLU report; production of annual report, further consultation
08-Nov-11	mail	Dan sent a copy of bi-monthly consultation report		
09-Nov-11	email	Aboriginal Group D representative inquired about a meeting on Nov. 14. Dan indicated no meeting had been scheduled, but CVRI had indicated annual report may be ready by this date		production of annual report
14-Nov-11	email	Aboriginal Group D representative emailed Dan the report on Aboriginal Group D traditional studies of the Robb Trend area	Report on traditional studies of Robb Trend provided	production of annual report

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28-Nov-11	email	Aboriginal Group D representative emailed to inquire about status of annual report on consultation between Aboriginal Group D and CVRI		submission of annual report
01-Dec-11	email	Dan inquired if Aboriginal Group D representative had ever responded with comment on the draft annual report on consultation between Aboriginal Group D and CVRI		submission of annual report, further consultation
02-Dec-11	phone	Aboriginal Group D representative indicated he would like some time to comment on the draft annual report on consultation between Aboriginal Group D and CVRI		submission of annual report, further consultation
02-Dec-11	email	CVRI legal counsel indicated that a draft was sent to Aboriginal Group D representative for review		submission of annual report, further consultation
14-Dec-11	mail	Dan sent a copy of bi-monthly consultation report		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	D	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

07-Feb-12	phone	Aboriginal Group D representative called to introduce himself as new Aboriginal Group D liaison to CVRI, would like to set up meeting with an Aboriginal Group D representative, Aboriginal Group D representative indicated the previously noted Aboriginal Group D representative was away, would forward contact information to		meeting to discuss on-going agreement and activities
10-Feb-12	email	Barry sent a note clarifying issues he felt needed to be addressed in his new liaison role including monthly meetings, environmental monitoring of new developments, tours for elders and students, summer students, full-time employment, funding for Aboriginal Group D sports multiplex, joint venture agreements and contracting opportunities, clear communication, primarily working towards enhancing sustainability of socio-economics for Aboriginal Group D community. Indicated his belief that he is to work through Les LaFleur and would like to set up meeting. Subsequent emails clarified some issues regarding employment, and set a February 28 meeting date		meeting to discuss on-going agreement and activities
14-Feb-12	mail	Dan sent a copy of bi-monthly consultation report		
17-Feb-12	meeting, Sherritt offices, Edmonton	Aboriginal Group D representative stopped by to discuss his new liaison position to CVRI, meet some people, the Robb Trend EA process was discussed		

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FN or Aboriginal Group Consulted	D	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

21-Feb-12	phone	Aboriginal Group D representative phoned Les to discuss upcoming meeting including personnel to be present and agenda items		
28-Feb-12	meeting, Coal Valley Mine	Discussed general role of liaison position. Dan delivered document on previous consultation, project description, offered hard copies of past traditional reports. Les provided background on Robb Trend project. Discussed economic opportunities, current agreement, specific contracting opportunities, need for on-going traditional/environmental inspections, proposed Plan of Action, GIS capacity funding, summer students, long-term employment, monthly meetings.	initial meeting with new liaison	Potential meeting in two weeks time
01-Mar-12	email	Aboriginal Group D representative emailed Les discussing concept of an Action Plan to incorporate ideas discussed regarding full-time employment, summer students, and contracting opportunities, the latter also discussed with another Aboriginal Group D representative, request for a secretary. Les responded March 2 asking for a draft of the proposed Action Plan, indicating information about employment and contracting forwarded to Aboriginal Group D		

Project Name:		Date of Report Submission:	04-Oct-13
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02-Mar-12	phone	Aboriginal Group D representative phoned Dan to follow-up on previous meeting and some of items discussed including annual budgets for additional field work, GIS capacity funding, etc. Dan explained that Aboriginal Group D representative was CVM contact for liaison between Aboriginal Group D and CVRI under written agreement, and		
06-Mar-12	email	Les sent the minutes from the last meeting, a job poster, and a request for a mailing address to send some additional project documents. Aboriginal Group D representative indicated that he would like to meet on the 15th as discussed and to pick up any documents in hard copy then.		
08-Mar-12	email	representative forwarded and email originally to Aboriginal Group D representative indicating firm need for CVM and its Aboriginal Group D liaison to meet twice a month, and date of March 15 crucial in this regard to discuss upcoming economic initiatives.		meeting on March 15 at CVM
09-Mar-12	email	Dan inquired if Aboriginal Group D would like a hard copy or CD of project application for review		

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12-Mar-12	text and email	Aboriginal Group D represetative texted and then emailed Dan to inquire about how CVRI could be submitting a project application prior to full mitigation of Aboriginal Group D concerns. Also indicated that Aboriginal Group D representative was having issues with Coal Valley. Dan responded to text inquiring when Aboriginal Group D representative would like to meet to discuss this and who should be present for the discussion.		
12-Mar-12	phone	Aboriginal Group D representative phoned to indicate that Aboriginal Group D request to see project application prior to filing to ensure Aboriginal Group D interests fully addressed. Dan indicated Aboriginal Group D would be provided final project application and opportunity to review and comment. His request would be passed on to Les LaFleur.		meeting on March 15 at CVM

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15-Mar-12	meeting Coal Valley Mine	Discussion of contract work and requirements, continuation of TLU aspects in reclamation process including a summer program and mapping capacities, CVRI booth in the upcoming job fair, CVRI involvement in the upcoming Aboriginal Group D trade fair, job posters and deadline for summer job resumes. Dave noted Aboriginal Group D main contact regarding Robb Trend is Les, contact regarding CVRI is Aboriginal Group D representative. Aboriginal Group D representative noted he will soon complete a detailed plan of action for CVRI addressing water/watersheds, economic opportunities and TEK assessments. Les provided Aboriginal Group D representative with additional documentation on the Robb Trend Project, explained Aboriginal Group D would be provided with copy of EIA report at time of government submittal, Aboriginal Group D will then have		meeting April 2 at CVM
15-Mar-12	email	Aboriginal Group D representative emailed Les to let him know that he thought the days meeting was successful and he would produce a summary of the objectives discussed and would pass on to Chief and Council for their input. He would also contact Aboriginal Group D representative to discuss full-time and summer employment opportunities.		meeting April 2 at CVM

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18-Mar-12	email	Letter forwarded from Ron Khrulak to Les LaFleur. The letter sent to Ron from John A. Kosolowski (Duncan & Craig LLP), addresses the request from Aboriginal Group D Chief that the CVRI proposed application be reviewed by Aboriginal Group D before submittal to ERCB to ensure proper feedback. The letter also addresses concern on the response of the TLU report and recommendations.		meeting April 2 at CVM
20-Mar-12	email	Aboriginal Group D representative emailed Les to see if he could identify a date for the Public Forum at the Aboriginal Group D community hall. Aboriginal Group D representative indicated he would like to start planning and ensure concerns of community members will be addressed.		meeting April 2 at CVM
11-Apr-12	email	Aboriginal Group D representative provided a copy of an Action Plan regarding the agreement between CVRI and Aboriginal Group D for review. Emphasis to be on TEK research, economic development, and community		
12-Apr-12	mail	Dan sent a copy of bi-monthly consultation report		
17-Apr-12	email	Les indicated that the proposed Action Plan provided excess emphasis on additional TEK studies considering the substantial past efforts in this area and agreement on mitigation efforts in this regard. The plan should focus on additional contract and employment initiatives and anticipated in the agreement.		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	D	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

27-Apr-12	email	Aboriginal Group D representative email a revised Action Plan for the CVRI-Aboriginal Group D relationship for review, Les indicated the document could not be read as password protected		
01-May-12	meeting, Coal Valley Mine	Les provided a hard copy and CDs of the Robb Trend Project application.		
04-May-12	meeting, Best Western, Stony Plain	Items discussed included summer students, employment, slashing contract, review of Robb Trend application and funding, pow wow funding request		
09-May-12	mail	Chief sent an invitation to annual pow-wow.		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
15-May-12	email	In response to CVRI newsletter, Aboriginal Group D representative indicated information on Robb Trend was formative, would be need to discuss reclamation plans		
13-Jun-12	mail	Dan sent a copy of bi-monthly consultation report		
22-Jun-12	email	Aboriginal Group D representative indicated an invite had been sent to the pow-wow but she was still awaiting a response on attendance		
03-Jul-12	email	Les indicated that representative unable to make it to the Aboriginal Group D pow-wow, but capacity funding has been provided for the event		
20-Aug-12	email	Aboriginal Group D representative indicated Chief and Council on recess, but on their return he wished to discuss additional capacity funding for further TEK studies of the Robb Trend area.		

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24-Aug-12	mail	Dan sent a copy of bi-monthly consultation report		
11-Oct-12	mail	Dan sent a copy of bi-monthly consultation report		
15-Oct-12	mail	Aboriginal Group D representative sent Aboriginal Group D representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and the Aboriginal Group D regarding the Robb Trend Project, and information available on Aboriginal Group D traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group D representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
30-Oct-12	email	Aboriginal Group D representative emailed a letter from another Aboriginal Group D representative confirming that effective as of October 19, a certain Aboriginal Group D representative would be acting Lands Consultation Manager for Aboriginal Group D and all matters are to be directed to her.		
13-Dec-12	mail	Dan sent a copy of bi-monthly consultation report		

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08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
30-Jan-13	meeting	Routine meeting for Aboriginal Group D - Coal Valley consultation. Les provided Aboriginal Group D representative with CD of Robb Trend SIR responses. Coal Valley approved funding for Aboriginal Group D technical review of EIA, Les to pass on Project Application to Dillon Consulting. Aboriginal Group D representative noted that he is listed as the contact with CEAA (Lori Crozier).		Review of EA, on-going consultation
31-Jan-13	email	Les emailed Aboriginal Group D representative a response in regards to proposal from Dillon Consulting Limited Dec. 12, 2012 that CVRI has agreed to fund a "high level review" of the Robb Trend Project EA and Application, which have been supplied to the consultant. CVRI outlined shared expectations regarding reporting. Email responses from John Kosolowski and Ron Kruhlak clarified and confirmed these expectations.		Review of EA, on-going consultation

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13-Feb-13	email	Aboriginal Group D representative email to Les a table of outline of concerns touched upon at meeting with CEAA regarding consultation with CVRI. The concerns discussed included concerns of inadequate TLU/TEK baseline studies, need for environmental monitoring, use of TEK in reclamation, assessing correlation to accomodation through compensation, contracting opportunities, economic development, cumulative impacts to water, selenium dust, medicinal plants, wash plant, reclamation, worker retention and IBA agreement.		Review of EA, on-going consultation
20-Feb-13	email	Aboriginal Group D representative emailed Les asking to move forward on a meeting with community elders in order for Dillion consulting to conduct a community assessment to move forward on the technical review. Aboriginal Group D representative requested funding for the event and for the following of traditional protocol for the elders. Aboriginal Group D representative indicated that following the event, it would be 6 weeks for completion of review.		Community meeting to be scheduled regarding the Robb Trend Project. Review of EA, on-going consultation.

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19-Feb-13	mail	Dan povided a copy of the bi-monthly consultation report		
21-Feb-13	email	Les replied to Aboriginal Group D representative's email with funding proposal and inquiring proposed date for event.		Community meeting to be scheduled regarding the Robb Trend Project. Review of EA, on-going consultation.
17-Apr-13	mail	Dan povided a copy of the bi-monthly consultation report		
12-Mar-13	mail	Les provided a response to Lori based on Aboriginal Group D representative's email to Lori dated February 13, 2013. Les gave responses to the concerns raised regarding TLU studies, annual agreements, mapping standards, reclamation, agreement, impacts, water, plants (TEK species), wash plant, and social impacts.		Community meeting to be scheduled regarding the Robb Trend Project. Review of EA, on-going consultation.

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10-Jul-13	email	Aboriginal Group D representative emailed Les a PDF copy of a report entitled Robb Trend Environmental Impact Assessment High-Level Technical Review, produced by Dillon and dating May 31, 2013. He did so at the direction of Aboriginal Group D representative. Email contains a request for balance of funding. The report provides a review by Dillon of Air Quality, Aquatic Resources (Fish), Historical Resources, Socio-Economic, Water Resources, Traditional Knowledge (Aboriginal Consultation), Vegetation, and Wildlife. The primary concerns summarized include the lack of Aboriginal Group D involvement in determining VECs, the lack of documentation related to Aboriginal consultation, the lack of specific documentation of Aboriginal concerns and how these were addressed, the lack of clarity on future communication, mitigation, and monitoring, the lack of specific on socio-economic impacts on		
11-Jul-13	email	Les indicated that he had just received from Dillon Consulting a copy of the May, 2013 report: Robb Trend Environmental Impact Assessment High-Level Technical Review. Les indicated that he understood that Aboriginal Group D Chief and Council have reviewed an earlier draft of this report and have accepted it as a 'final report'.		

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18-Jul-13	mail	Aboriginal Group D representative sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Aboriginal Group D representative also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	email	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19-Aug-13	email & mail	Jim emailed and mailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	K		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
24-Feb-11	mail	Mailed copy of Consultation Plan and 3 copies of Project Description for review to determine if project area still outside of Aboriginal Group K traditional area based on previous project review		determination if consultation and traditional use studies required for project
08-Mar-11	email	Aboriginal Group K representative confirmed that the Robb Trend project was outside Aboriginal Group K traditional area; Dan Meyer requested a written letter	Aboriginal Group K review found Robb Trend project to be outside of traditional area	written letter confirming the outcome
08-Mar-11	mail	Aboriginal Group K representative sent a letter and copy of map review indicating that Robb Trend project outside of Aboriginal Group K traditional area	Aboriginal Group K review found Robb Trend project to be outside of traditional area	none
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
28-Sep-11	mail	Dan mailed copies of final TOR and federal project agreement with reminder of open houses		
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
02-May-12	mail	Copy of the Project Application on CD sent		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	K	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
19-Feb-13	mail	Dan provided a copy of the bi-monthly consultation update		

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17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		
18-Jul-13	mail	Aboriginal Group K representative sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Aboriginal Group K representative also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	email	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19-Aug-13	email & mail	Jim emailed and mailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	F	**Reporting Period (From m/d/y to**	**02/14/2011 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
31-May-11	email	In response to an email requesting information, Dan indicated that he was just finishing field studies with the Aboriginal Group F and would provide Aboriginal Group K representative with further information requested on the project including the consultation plan and project description.		Consultation Plan and Project Description to be sent to Aboriginal Group F
06-Jun-11	mail	Dan mailed copies of the Aboriginal Consultation Plan, Project Description, and proposed Terms of Reference to Aboriginal Group F representative	Consultation Plan, Project Description, PTOR sent to Aboriginal Group F	
16-Aug-11	meeting, Aboriginal Group F Tribal Offices	Dan provided copies of final TOR and consultation plan (sent previously by mail June 6, 2011). Aboriginal Group F representative indicated that for protocol reasons, all consultation with Aboriginal Group L was to go through her. Dan indicated that it was not his decision to make, and portion of Aboriginal Group F most affected is being consulted. Aboriginal Group F representative agreed but indicated other Aboriginal Group F members utilize the area also. Parties agreed a meeting with AENV, CVRI, her, and another Aboriginal Group F representative to discuss would be appropriate. Dan indicated that CVRI had a strong existing relationship and would continue to speak directly with the Aboriginal Group L pending resolution.		continued consultation activities; final TLU reporting
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
15-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		

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02-May-12	mail	Copies of Project Application sent on CD		
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
28-Sep-12	email	On behalf of an Aboriginal Group F representative, Karan Jones submitted official Statements of Concern to the ERCB regarding the Robb Trend application on behalf of the Aboriginal Group F and Aboriginal Group A. These letters assert that the Project has the potential to affect Aboriginal Group F and Aboriginal Group A Aboriginal and Treaty rights to hunt, fish, gather, and trap. The letters include affidavits from "harvesters" indicating general use of the region including the project area. The letters specifically cite impacts to grizzly bear, marten, fisher, lynx, wolf, water quality, environment, and fish habitat. They request intervenor status at hearings, and request that the application be denied. The Aboriginal Group F letter cites CVRI's "failure" to consult Aboriginal Group F elected leadership about Aboriginal Group L.		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
15-Oct-12	mail	outlining CEAA's current understanding of her community and the status of consultation efforts between CVRI and the Aboriginal Group F regarding the Robb Trend Project, and information available on Aboriginal Group F traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group F representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		

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08-Jan-13	mail, email	Dan mailed and emailed a re-notification letter to Aboriginal Group F representative on behalf of CVRI indicating that SAAB has directed continuing consultation with the Aboriginal Group F regarding the Robb Trend Project. Dan noted that he has enclosed a CD with responses to SIR regarding the project application and has asked Aboriginal Group F to review the information and notify if there are any site specific concerns regarding the project by February 1, 2013. CVRI has requested a meeting with Aboriginal Group F to discuss the Robb Trend project with the support of SAAB and CEAA representatives at the meetings. Further, CVRI has requested from Aboriginal Group F that if there are potential impacts regarding the project to prepare site-specific concerns and locations at the meeting.		Response to letter and meeting to be scheduled to discuss the Robb Trend project.
22-Jan-13	mail, email	Dan mailed and emailed a notification letter to Aboriginal Group F representative indicating that on January 8, 2013 the project description, application documents and CD with responses to SIR was sent regarding the Robb Trend Project as well as a request to meet with Aboriginal Group F representatives and Chief and Council. The letter reminded that if the Aboriginal Group F had specific concerns regarding the Robb Trend Project to notify Dan or Les by February 1st, 2013.		Meeting to be scheduled to discuss Robb Trend Project
25-Jan-13	email	Lori confirmed receipt of the correspondence and indicated a willingness and desire for CEAA representatives to attend any meetings scheduled.		

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28-Jan-13	email	behalf of Aboriginal Group F Chief his letter response, dated January 21, to the letter sent January 8, 2013 to Aboriginal Group F representative regarding the Robb Trend Project. The response letter outlined that there are Aboriginal Group F members in the Aboriginal Group L and there is concern that there has been no formal delegation from the Aboriginal Group F. Since the Aboriginal Group L do no represent the Nation, the Aboriginal Group F hold that an agreement between CVRI and Aboriginal Group L is not valid. The letter addresses concern that the Government of Alberta has given improper advice on the duty to consult and CVRI, Alberta & Canada have engaged a small group of Aboriginal Group F members to circumvent consultation with the Aboriginal Group F. The letter outlines concerns that Alberta's First Nations Consultation Policy is not being followed in regards to consultation with First Nations and that aspects of *The Declaration on the Rights of Indigenous People* is not being followed in terms of consultation with cooperation and in good faith for informed consent prior to approval of any development affecting the lands or territories of First Nations. The letter addresses concern over the January 8, 2013 letter sent stating "continued consultation" as they have had one meeting with Coal Valley and felt concerns of lack of consultation were not addressed. CVRI's letter has asked the Aboriginal Group F to review the project information and outline concerns, but an SOC has been filed outlining their concerns about impact to treaty rights; the Aboriginal Group F are concerned that CVRI has not reviewed this document.		
[continued from above]	[continued from above]	[continued from above] The letter outlines that TLU/TEK studies would need to be performed with the nation, reject any previous TLU studies or reports with the Aboriginal Group L and reject the notion that their people do not often use this area. They are also concerned that the project is taking up crown land which impacts their Treaty rights. The Aboriginal Group F state they would invite a meeting on February 13th and request that CVRI carefully review Aboriginal Group F's Letter of Objection and Statement of Concern.		
28-Jan-13	email	Aboriginal Group F representative emailed to Dan the above mentioned letter addressed from Aboriginal Group F Chief to Les LaFleur in response to the January 8th, 2013 letter.		

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30-Jan-13	email	Dan emailed two Aboriginal Group F representatives notifying that they had received Aboriginal Group F Chief's response letter. Dan noted that there was a typo in Les' email and he has forwarded the letter on to him and that Les and other representatives would be happy to meet with Aboriginal Group F Chief and Council Feburary 13th to discuss the project and Aboriginal Group F concerns as the Chief's January 21st, 2013 letter suggests. Dan asked about preferred venue, and CVRI to provide venue if wanted. Dan inquired if legal counsel will be present and that members of SAAB and CEAA have also been invited to attend.		Meeting tentatively scheduled February 13, 2013 to discuss Robb Trend Project
30-Jan-13	email	Lori confirmed the availability of CEAA representatives for a meeting and indicated that she hopes to have representatives from Transport Canada, Natural Resources Canada, and the Department of Fisheries and Oceans also attend.		Meeting tentatively scheduled February 13, 2013 to discuss Robb Trend Project
05-Feb-13	email	Dan emailed two Aboriginal Group F representatives asking for confirmation of the proposed meeting date by Coal Valey for February 13, 2013 and if the date was still suitable.		Meeting tentatively scheduled February 13, 2013 to discuss Robb Trend Project
06-Feb-13	email	Aboriginal Group F representative replied to Dan that Aboriginal Group F had sent a letter to Coal Valley confirming a meeting date of February 13, 2013.		Meeting tentatively scheduled February 13, 2013 to discuss Robb Trend Project

Project Name:			Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	F		Reporting Period (From m/d/y to	02/14/2011 to 04/10/2013
13-Feb-13	meeting, Aboriginal Group F Tribal Offices	Meeting with Chief and Council to discuss Robb Trend project. Les provided copies of project description and map of area and gave a presentation on the project outlining history and information on project, reclamation efforts, water restoration, regulatory process, end-pits etc. Aboriginal Group F raised some questions regarding water quality. Further discussion of improper consultation with Aboriginal Group F and moving forward on consultation. Aboriginal Group F would like a presentation on the project to the community members and the elders in order for them to identify any concerns with the project. Les provided responses to listed concerns, Aboriginal Group F stated that having not reviewed this beforehand they would not discuss. Meeting to be scheduled mid-March for follow up discussions and Aboriginal Group F to provide proposal for CVRI.		Meeting to be scheduled to continue discussions of Robb Trend Project.
19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
21-Feb-13	email/mail	Aboriginal Group F representative sent a letter to Les as a follow-up to their discussions from their meeting February 13, 2013, stated that Aboriginal Group F was pleased with Coal Valleys willingness to work with Aboriginal Group F to resolve concerns. Aboriginal Group F representative requested that another meeting be set up second week or March absent of government or regulatory officials. Aboriginal Group F representative requested Les' availability and that if helpful Aboriginal Group F could provide a budget, scope and scale of TLU studies and a list of items for possible agreement regarding the project.		Meeting to be scheduled to continue discussions of Robb Trend Project.
27-Feb-13	email/mail	Les emailed to Aboriginal Group F representative a letter thanking for the meeting February 13, 2012 and follow-up to her letter February 21, 2013. Les indicated in response to her questions, CVRI would be available to meet and discuss (Les outlined dates of availability) and in response would request the scope and scale of TLU studies in advance of meeting and a list of "agreement" terms.		Meeting to be scheduled to continue discussions of Robb Trend Project.
17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		

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25-Apr-13	email	Aboriginal Group F representative emailed to Les a proposed Terms of Reference Scope and Budget for TLUO for the Robb Trend. Aboriginal Group F representative would like to set up a meeting with Aboriginal Group F and CVRI between May 6-8th.		Meeting to be scheduled to continue discussions of Robb Trend Project
04-Jun-13	email	Les emailed questions to Aboriginal Group F representative regarding the proposed traditional use study documents. Les indicated that the costs were high and inquired about economizing; Les indicated that he was in agreement to fulfill consultation, and requested that Aboriginal Group F withdraw its currently filed objections to the Project; some questions regarding the field logistics of the proposed traditional studies; Les asked for background about Watertight Solutions, the proposed consultant for traditional studies.		Meeting to be scheduled to continue discussions of Robb Trend Project
06-Jun-13	email	Aboriginal Group F representative emailed a response to Les' June 4 email indicating that some measures can be looked at to reduce costs, but that this is a core region for Aboriginal Group F who have been pushed further and further from their Reserve to the fringes of Treaty 6 to continue lifeways; the Statement of Concern will not be withdrawn until an agreement was in place addressing Aboriginal Group F concerns with impacts to Treaty Rights and Traditional Uses, the first step in the process is coming to agreement on a traditional use study; field work to start in late June or early July if agreements, including data sharing, could be reached; Aboriginal Group F representative indicated confidence in Watertight to undertake the work		Meeting to be scheduled to continue discussions of Robb Trend Project
24-Jun-13	email	Les emailed Aboriginal Group F representative a list of questions regarding the Aboriginal Group F traditional use study proposal to be answered by Watertight Solutions. Les indicated that efforts needed to be made to economize the budget, wondered to what extent Aboriginal Group A and Aboriginal Group J might be involved with Watertight in similar studies.		Meeting to be scheduled to continue discussions of Robb Trend Project

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27-Jun-13	phone	Clayton indicated that Aboriginal Group F, Aboriginal Group A and Aboriginal Group J are considering a joint traditional use study to economize, suggested a meeting the following Friday to discuss, with a follow-up meeting after between the two to discuss a benefits agreement.		Meeting to be scheduled to continue discussions of Robb Trend Project
02-Jul-13	email	Aboriginal Group F representative requested a meeting July 5 at MLT in Edmonton, suggested representatives from Aboriginal Group A and Aboriginal Group J could also be lined up. Indicated that Les' questions had been forwarded to Watertight Solutions for response by meeting date.		Meeting to be scheduled to continue discussions of Robb Trend Project
03-Jul-13	email	Responding to an earlier request, Clayton indicated that he had lined up representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J for a meeting on July 5 at MLT's offices, and a suggestion that he and Les meet alone later.		Meeting to be scheduled to continue discussions of Robb Trend Project
05-Jul-13	meeting, MLT offices, Edmonton	Meeting with Clayton and representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J.		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19-Aug-13	email & mail	Jim emailed and mailed an invitation to the Robb Trend Information Session, Tour and Open House.		

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21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		
26-Aug-13	email	Aboriginal Group F representative confirmed her attendance to Jim at the Open House in Robb and for the tour of the water management facility.		
05-Sep-13	email	Aboriginal Group F representative emailed Les to inquire about his response to the terms of reference for Aboriginal Group F TLU studies of Robb Trend. Les responded back to Aboriginal Group F represtative that he was waiting on a draft TLU proposal from Aboriginal Group F.		
05-Sep-13	email	Aboriginal Group F representative notified Les that she believed the proposal was sent in July and would ensure it was sent to him right away.		
05-Sep-13	email	Clayton sent to Les an attached budget for a joint Aboriginal Group F and Aboriginal Group J TLU study of the Robb Trend.		
07-Sep-13	Open House, Robb	Discussion of openness of Sheritt discussions and relationship building, and TLU proposal for Robb Trend. Aboriginal Group F representative stated that the impacts of larger projects are everyone's concern with emphasis on clean water, environment and traditional way of life.		Meeting to be scheduled to continue discussions of Robb Trend Project
30-Sep-13	email	Aboriginal Group F representative emailed Les inquiring if a meeting could be set up October 4, 2013 with Aboriginal Group A and MLT to discuss propsed Terms of Reference for joint TLU study.		Meeting to be scheduled to continue discussions of Robb Trend Project
03-Oct-12	email	Les replied to Aboriginal Group F representative's previous email with some comments towards TLU proposal and would like discuss budget further. He indicated he was available to meet on Friday.		Meeting tentatively scheduled to continue discussions of Robb Trend Project

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Project Name:		**Date of Report Submission:**	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	B		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
20-Jan-11	phone	Dan and Aboriginal Group B representative discussed on-going consultation, set up meeting to discuss Robb Trend	meeting planned for January 25 in Hinton	meeting to discuss Robb Trend
25-Jan-11	meeting, Hinton	Dan and Aboriginal Group B representative met, Dan explained the changes to the Robb Trend area, provided copies of the draft Project Description, asked him to review area with his community and assess any needs for additional TLU work; he and Les LaFleur need to meet again to work on finalizing the agreement between CVRI and Aboriginal Group B.		assessment of need for additional TLU field work; finalization of community agreement
28-Apr-11	phone	Dan left voicemail requesting meeting between Aboriginal Group B representative and Les LaFleur to discuss Robb Trend project further		meeting to discuss Robb Trend

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12-May-11	phone	Dan and Aboriginal Group B representative set meeting date of May 16 in Edmonton	meeting arranged	meeting to discuss Robb Trend
16-May-11	meeting, River Cree Casino, Edmonton	Discussed aspects of Aboriginal Group B beliefs, aboriginal education, etc. Aboriginal Group B representative provided with 25 new copies of Project Description (those given in January were draft), 2 copies Consultation Plan, 2 copies of PTOR, 2 copies of large-scale project area maps. Aboriginal Group B representative received emergency phone call, departed before further discussions possible	delivery of project related documents	meeting to discuss Robb Trend; assessment of need for additional TLU field work; finalization of community agreement
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
22-Jun-11	phone	Dan and Aboriginal Group B representative discussed setting up a meeting the following week in Hinton, Aboriginal Group B representative to consult schedule and call back		meeting to discuss Robb Trend; assessment of need for additional TLU field work; finalization of community agreement
26-Jun-11	phone	Dan left voicemail requesting follow-up on June 22 discussion regarding a meeting		meeting to discuss Robb Trend; assessment of need for additional TLU field work; finalization of community agreement
04-Jul-11	phone	Dan left voicemail requesting meeting between Aboriginal Group B representative and Les LaFleur to discuss Robb Trend project further		meeting to discuss Robb Trend; assessment of need for additional TLU field work; finalization of community agreement
07-Jul-11	email	Dan and Rita exchanged emails confirming meeting with Aboriginal Group B representative for July 13 in Hinton	meeting scheduled	scope and scale of additional TUS field studies to be determined
13-Jul-11	meeting, Smitty's, Hinton	Discussed aspects of Aboriginal Group B land claim etc.; scheduling of Robb Trend field studies, Aboriginal Group B representative indicates should be able to schedule this summer		scope, scale, timing of additional TUS field studies to be determined

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28-Jul-11	meeting	During consultation on another matter, Dan asked Aboriginal Group B representative to consider the timing etc. of additional Robb Trend field studies		scope, scale, timing of additional TUS field studies to be determined
01-Sep-11	phone	Dan left voicemail asking Aboriginal Group B representative to call him about Coal Valley		scope, scale, timing of additional TUS field studies to be determined
13-Sep-11	email	Dan asked Rita to have Aboriginal Group B representative call him or Les about Robb Trend as Aboriginal Group B representative's cell phone seemed to be out of service		scope, scale, timing of additional TUS field studies to be determined
17-Sep-11	mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
20-Sep-11	phone	Dan left voicemail indicating need to discuss Robb Trend, field studies		scope, scale, timing of additional TUS field studies to be determined
28-Sep-11	mail	Dan sent two copies of final TOR and Federal project agreement to Aboriginal Group B representative, along with invitation to open houses on October 25 and 26, and request to set up meeting.		scope, scale, timing of additional TUS field studies to be determined
03-Oct-11	phone	Dan and Aboriginal Group B representative discussed the need to set up a meeting to discuss Robb Trend. CVRI reps will return call in a few days once Aboriginal Group B representative has a chance to review his schedule for dates		scope, scale, timing of additional TUS field studies to be determined
14-Oct-11	phone	Meeting schedule for Oct. 19		
19-Oct-11	meeting, Smitty's, Hinton	Discussed issues remaining regarding Robb Trend, additional field studies, interim community agreement, long-term MOU agreement for protection of sites and conflict resolution, employment and long term environmental monitor, reclamation	Next meeting date set for early November. Field studies likely to commence next spring	draft MOU agreement outlining issues

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03-Nov-11	email	Les emailed a draft outline of an MOU agreement for consideration prior to meeting		discussion of draft MOU agreement
09-Nov-11	meeting, Ernie O's, Edson	Dan delivered copy of bi-monthly consultation report w/cover letter, Les presented outline of MOU agreement with long term goals, mitigation impacts, protection of sites. Jimmy discussed needing long term employement opportunities, job training, and possibly a community liaison.	discussion of draft MOU agreement outlining issues discussed	Keith to prepare map with all Aboriginal Group B historic/cultural sites in area.
20-Nov-11	email	Keith emailed a copy of a transcript of the Nov. 9 meeting		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
22-Nov-11	meeting, Ernie O's, Edson	Keith provided map with Aboriginal Group B cultural sites in CVRI area. Dan to send shapefiles to Keith. Discussion of database management of sites, job opportunities, critieria and expectations, and community event funding. Resumes of potential job candidates supplied by Aboriginal Group B		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
23-Nov-11	email	Rita asked for the human resources contact information for Coal Valley Mine, sent.		
28-Nov-11	email	Keith inquired about the timing on additional shapefiles and mapping information, Dan indicated additional time required to compile materials		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
09-Dec-11	phone	Dan and Aboriginal Group B representative discussed the presence of Aboriginal Group B traditional sites possibly in Robb Trend West, perhaps visiting them soon, Aboriginal Group B representative noted in Hinton area the past, apparently intentional, disturbance of Aboriginal Group B sites by unknown parties		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.

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13-Dec-11	email	Dan provided a shapefile of existing, planned, or potential CVRI operations in Hinton area		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
14-Dec-11	email	Dan provided a shapefile of old, known-to-CVRI Aboriginal Group B site location information based on map information provided by Les LaFleur.		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
03-Jan-12	email	Dan inquired about status of draft MOU and next meeting date		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
06-Jan-12	email	Keith indicated a draft MOU for discussion prepared, Aboriginal Group B legal counsel still reviewing, suggests meeting January 13, map of CVRI project areas attached. Subsequent emails over next week suggested meeting January 30, Keith requested update on project scheduling		Further consultation regarding protection of Aboriginal Group B sites provided on map and MOU agreement.
23-Jan-12	email	Keith confirmed January 30 meeting, MOU to be attached		meeting January 30 to discuss MOU

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26-Jan-12	email	Keith provided a draft of an MOU between the parties for review and discussion at next meeting January 30		meeting January 30 to discuss MOU
30-Jan-12	meeting, Hinton, Entrance Ranch	Discussion of draft MOU provided to CVRI by Keith, including language, terms, reclamation, employment opportunities, contracting, avoidance of important sites, community support, traditional territory		Les to provide written response regarding the language and terms of agreement for use in preparing further drafts
04-Feb-12	email	Les sent a draft simplified framework for an agreement as discussed detailing some of the items discussed in past	delivery of written response regarding terms of agreement	meeting to continue discussions regarding Robb Trend agreement
07-Feb-12	meeting, area of Yellowhead Tower and Robb Trend	Meeting to inspect an Aboriginal Group B traditional site in vicinity of existing operations, discussed the location of a traditional site in Robb Trend West and its location relative to potential impact zones		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
22-Feb-12	email	Dan asked if Aboriginal Group B had had an opportunity to review the document sent by Les LaFleur on February 4		meeting to continue discussions regarding Robb Trend agreement
03-Mar-12	email	Les inquired about a response to his proposed agreement format and a meeting date to continue discussions		meeting to continue discussions regarding Robb Trend agreement

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07-Mar-12	mail	Letter of concern sent regarding Mercoal West, Yellowhead Tower, Obed Mountain Mine and lack of adequate Crown consultation with the Aboriginal Group B community, concerns with how consultation has and will proceed with Robb Trend and Coalspur Mines, and future protection of Aboriginal Group B lands, sacred sites, burials, social, cultural, and economic well-being. Intent to be fully engaged in project regulatory process.		
08-Mar-12	email	Keith emailed a letter to Les indicating no date set for next meeting, letters to regulatory agencies about to be sent indicating expectations for consultation, points included in Les' last document to be addressed, but agreement will not be simplistic, he would get back by March 14 with a meeting date		meeting to continue discussions regarding Robb Trend agreement
09-Mar-12	email	Dan inquired if Aboriginal Group B would like a hard copy or CD of project application for review		

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16-Mar-12	email	Keith emailed a letter to Les indicating that Aboriginal Group B representative would be able to meet Friday, March 30 and that a letter signed by Aboriginal Group B representative would be sent to the CVRI board of directors indicating Aboriginal Group B current position on negotiations. Keith identified that once the Environmental Impact Statement was received due to the twelve week period to comment on it, there would be an urgent need to advance discussions on a substantive agreement between the parties. Keith also indicated the community would like 5 DVD's and 1 hard copy of the Environment Impact Statement.		meeting Friday, March 30 to continue discussions regarding Robb Trend agreements
21-Mar-12	email	Keith emailed to Les the letter that was sent to CVRI confirming the current position of the Aboriginal Group B with respect to negotiation needs and their difficulty in responding to the Environmental Assessment until there is a new longer term Agreement in place with Coal Valley Resources.		meeting Friday, March 30 to continue discussions regarding Robb Trend agreements
26-Mar-12	email	Keith emailed Les to reconfirm the meeting on Friday, March 30 and to provide time and location. Keith advised that Peter Hutchins (Hutchins Legal Inc.) will be attending the meeting to answer any legal questions regarding consultation, and Les could also bring corporate legal counsel if desired.		meeting Friday, March 30 to continue discussions regarding Robb Trend agreements
26-Mar-12	email	Keith emailed Les to inform him that Peter Hutchins would be unable to attend the meeting on Friday.		meeting Friday, March 30 to continue discussions regarding Robb Trend agreements

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30-Mar-12	meeting, Edmonton, Yellowhead Tribal Council Office	Les explained the AEW process for the environmental assessment, the review length and process and Aboriginal Group B to receive a copy for review and funding if needed. Discussion of protection and compensation of Aboriginal Group B sites, assistance for a meeting place for Aboriginal Group B members, job involvement in reclamation, employment at the mine including monitors for mining activities and for the environment. CVRI to consider discussion items for next meeting.		Les to follow up with EA application when ready, meeting to be scheduled to continue discussions regarding Robb Trend agreements
03-Apr-12	email	Les emailed draft notes from the March 30 meeting and indicated CVRI management would be discussing some of the items raised prior to discussion at the next meeting.		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
29-Apr-12	mail	Aboriginal Group B representative mailed Al regarding the March 30 meeting, indicating that it was open and cordial, will facilitate long-term agreement. Items for inclusion in agreement discussed including joint planning prior to mining to address Aboriginal Group B concerns, monitoring, reclamation, capacity funding, employment and contracting opportunities, compensation for past impacts. Aboriginal Group B representative reiterated position that Aboriginal Group B requires additional capacity funding for staff and legal fees to continue consultation. Meeting dates suggested.		meeting to be scheduled to continue discussions regarding Robb Trend agreements

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02-May-12	mail and email	In response to the letters of March 7, Sean indicated that CVRI has and will continue to consult with Aboriginal Group B, including on Robb Trend Project. He noted an item of concern on the AEW website has been revised. He noted that Aboriginal Group B and other aboriginal groups have approximately 9 months to provide input on the project application. On-going consultation matters should be directed to Al Brown		
02-May-12	mail and email	In response to the letter of March 19 and meeting of March 30, Al confirmed in writing CVRI committment to open and meaningful consultation and to provide resources as in past for Aboriginal Group B participation; Aboriginal communities have approximately 9 months to comment on the Robb Trend Project application; further communication on consultation efforts must not be "without prejudice"; as consultation does not require or contemplate benefit agreements, those discussions will be held separately from consultation efforts		
02-May-12	meeting, Hinton	Dan delivered hard and CD copies of Robb Trend project application for the Aboriginal Group B to the Entrance Ranch at the direction of Aboriginal Group B representative		
02-May-12	mail	Copy of Project Application of CD sent		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		

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28-May-12	email	Keith emailed a draft copy of his notes from the March 30 meeting between Aboriginal Group B representative and Al and Les, and two chapters from a book on consultation, and a letter version of his comments in the email. The letter presents a formal request for additional capacity funding. Keith indicates that without additional funding Aboriginal Group B feels that consultation and accommodation may be inadequate. Aboriginal Group B will continue to provide its correspondance as "without prejudice" based on advice from legal counsel. continued below		meeting to be scheduled to continue discussions regarding Robb Trend agreements
cont. from above	cont. from above	(cont. from above): The draft meeting notes include commentary that interim measures are required to ensure Aboriginal Group B teachings can be passed to the next generation, additional funding needed for EIA review and to keep Aboriginal Group B office open, the Supreme Court has upheld differences in aboriginal view of the environment, value of aboriginal education upheld in Cree School Board case, only a signed agreement proves that reasonable accommodation met and this cannot be secondary to EIA review.		

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29-May-12	email	Al thanked Keith for the recent documentation of the last meeting. He also attached a letter from Aboriginal Group B representative dated April 29 that he had received much later than that daten not allowing a timely response for a request for a mid-May meeting. He indicated he would review the materials and respond with potential meeting dates.		meeting to be scheduled to continue discussions regarding Robb Trend agreements
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
15-Oct-12	mail	Tracy sent Aboriginal Group B representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and the Aboriginal Group B regarding the Robb Trend Project, and information available on Aboriginal Group B traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group B representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
22-Oct-12	phone	Les and Aboriginal Group B representative talked about setting up a meeting October 28 to discuss the existing agreement, the Mercoal West project, the Robb Trend Project, CVRI support for a Aboriginal Group B community hall.		Meeting to discuss terms of a finalized agreement

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28-Oct-12	meeting, Smitty's, Hinton	Les and Aboriginal Group B representative discussed the existing agreement, the Mercoal West project, and the Robb Trend. Aboriginal Group B representative indicated that he is not objecting to the Project, but requires terms of greater benefit to the community in a final agreement. Aboriginal Group B representative is interested in CVRI support of a land claim. Discussion of meeting in a few weeks with Keith Shephard to continue discussions. Discussion of CVRI support for a Aboriginal Group B community hall, also to be discussed again at next meeting.		Meeting to discuss terms of a finalized agreement
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
28-Jan-13	phone	Aboriginal Group B representative called Les for availability of next meeting, meeting arranged for February 6, 2013.		Meeting to discuss terms of a finalized agreement; now recheduled for February 8.

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19-Feb-13	meeting, Smitty's, Hinton	Discussion of Aboriginal Group B sites in the Robb Trend, GIS map data, concern of confidentiality in site information, long term MOU agreement, capacity funding, invovlement in reclamation and pre-mining meetings, contracting opportunities for reclamation. Aboriginal Group B representative raised concerns of restoriation of land, animal communities, bears dens, protection of sites and rehabilitiation.		FOFN to provide proposals for mitigation to sites, Les to determine if GIS map data available, CVRI to provide draft MOU proposal based on concerns
19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
21-Feb-13	meeting, Smitty's, Hinton	Discussion of Aboriginal Group B sites in the Robb Trend, GIS map data, concern of confidentiality in site information, long term MOU agreement, capacity funding, invovlement in reclamation and pre-mining meetings, contracting opportunities for reclamation. Aboriginal Group B representative raised concerns of restoration of land, animal communities, bears dens, protection of sites and rehabilitiation. Les would like to incorporate Aboriginal Group B concerns and move forward on an agreement for the Robb Trend.		Aboriginal Group B to provide proposals for mitigation to sites, Les to determine if GIS map data available, CVRI to provide draft MOU proposal based on concerns
17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		
04-Jun-13	email	Les inquired about a meeting to continue discussions about the Robb Trend and responses to his suggested terms for an agreement presented at the last meeting.		Meeting to discuss the terms of a potential agreement.
24-Jun-13	email	Les inquired about a meeting to continue discussions about the Robb Trend, and about a map of identified Aboriginal Group B traditional use sites.		Meeting to discuss the terms of a potential agreement.

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03-Jul-13	email	Keith emailed Les a letter from Aboriginal Group B representative, and indicated that hopefully a meeting could be set up in early August to discuss a Mutual Benefits Agreement. The letter from Aboriginal Group B representative, dated June 18, 2013, presents a series of responses to Les' earlier suggestion of terms for an agreement. Terms included mapping of traditional sites, capacity funding for consultation, ceremonial support, and the indexing of any terms to the price of coal.		Meeting to discuss the terms of a potential agreement.
16-Jul-13	email	Rita indicated would like to set up a meeting with Aboriginal Group B representative in Edmonton on July 24 or 25. Les replied that the 24th would work.		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
25-Jul-13	email	Rita indicated that due to personal issues a suggested meeting never occurred, she would follow-up soon with new dates.		

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29-Jul-13	email	Rita confirmed that Aboriginal Group B representative would like to meet 10 AM, Wednesday the 31st at Smitty's		
31-Jul-13	meeting, Smitty's, Hinton	Meeting to discuss terms of a long-term agreement. Aboriginal Group B will not supply site locational information, will provide printed map after receiving base map of project. Discussion of site avoidance. Discussion of other benefits for life of the mine. Keith to provide minutes of the meeting. Aboriginal Group B to provide draft of the agreement within a couple of weeks.		Aboriginal Group B to provide minutes of meeting and a draft agreement with the terms discussed.
02-Aug-13	email	Keith emailed Les with attached meeting minutes and information requested for mapping.		
06-Aug-13	email	Les emailed Keith with comments towards interpretation of discussions regarding Keiths meeting minutes towards data point coordinates, capacity funding, signed areas, rehabilitation and mitgiation, and funding agreements.		CVRI to provide draft agreement
19-Aug-13	email & mail	Aboriginal Group B representative emailed and mailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	H	**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
17-Feb-11	phone	Dan called Melanie to arrange a meeting between Aboriginal Group H and CVRI to discuss Robb Trend	meeting set for February 23 in Edmonton	meeting to discuss Robb Trend
23-Feb-11	meeting, Edmonton	Dan provided 1 copy of Consultation Plan and 50 copies of Project description, introduction to revisions to Robb Trend since last discussion, discussed possibility of TLU studies, dissemination of information to membership in area, confirmed that Aboriginal Group H would be leading consultation, joint open house with Aboriginal Group H reps in attendance, benefits and contracting for local Aboriginal Group H, keeping Aboriginal Group H updated on regulatory milestones	Metis will participate in next Open Houses for project in Edson, mail out to membership in area to occur prior to that once a date is scheduled, CVRI contractor criteria to be provided to Aboriginal Group H	contact Aboriginal Group H when next Open House date scheduled, coordinate on mail out materials
21-Apr-11	phone	Dan explained PTOR just issued, will email when confirmed latest version available. Dan indicated CVRI would like to set up specific Aboriginal Group H open house, preceeded by mailout of latest project newsletter and comment card to Aboriginal Group H members to guage project interest. Because of FOIP issues, Aboriginal Group H to deliver materials and receive input. Jim Gendron to coordinate with Melanie on this process	agreement on information input process	coordinate mail out of materials; schedule open house based on Aboriginal Group H membership input

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26-Apr-11	email	Dan emailed Melanie a PDF copy of the project PTOR		mail out to Aboriginal Group H membership; schedule open house based on Aboriginal Group H membership input
02-May-11	phone	Jim and Melanie discussed the scope and content of the mailout to Aboriginal Group H membership		mail out to Aboriginal Group H membership; schedule open house based on Aboriginal Group H membership input
13-May-11	phone	Melanie and Jim agreed on the content of the response card to be included in the mailout to Aboriginal Group H membership. Melanie requested 500 copies of all materials to send to approximately 470 persons on mailing list	agreement on content of mailout and amount of material required	mail out to Aboriginal Group H membership; schedule open house based on Aboriginal Group H membership input
16-May-11	email	Jim informed Melanie that the newsletter and response card were being duplicated and would likely be delivered in the next day or two		mail out to Aboriginal Group H membership; schedule open house based on Aboriginal Group H membership input
23-May-11	email	Melanie acknowledged receipt of the materials to be sent in the mailout to Aboriginal Group H membership	mailout materials received by Aboriginal Group H	mail out to Aboriginal Group H membership; schedule open house based on Aboriginal Group H membership input
01-Jun-11	email	Jim sent Melanie an email requesting an update on number newsletters/cards sent, and any input from Aboriginal Group H membership to date		schedule open house based on Aboriginal Group H membership input
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
27-Jun-11	phone	Dan left a message with Aboriginal Group H reception requesting that Melanie call he or Jim to provide an update onthe Aboriginal Group H mailout regarding CVRI		progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input

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30-Jun-11	phone	Sharon and Jim discussed CVRI engagment with the Aboriginal Group H and plans for the Aboriginal Group H mailout, which does not appear to have occurred. Sharon indicated a desire to be kept up-to-date regarding consultations		progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input
05-Jul-11	phone	Sharon and Jim discussed a meeting with Les LaFleur	Sharon's contact information provided to Les LaFleur	progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input
13-Jul-11	phone	Dan phoned Aboriginal Group H representative to discuss progress on Robb Trend mailout, message left with reception		progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input
14-Jul-11	phone	Aboriginal Group H representative returned Dan's call, provided cell phone number, indicated busy due to Aboriginal Group H elections		progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input
19-Jul-11	phone	Dan phoned the Aboriginal Group H and left a message with reception asking that Aboriginal Group H representative phone regarding CVRI, Aboriginal Group H representative to return to office on July 21		progress report on Aboriginal Group H mailout, schedule open house based on Aboriginal Group H membership input
03-Aug-11	phone	Aboriginal Group H representative indicated that the mailout had been delayed by staff illness and now the impending elections. Dan stressed need for this component to be undertaken, Aboriginal Group H representative pledges that it would occur soon. Dan offered whatever help CVRI could to make it happen soon.	progress report on Aboriginal Group H mailout	schedule open house based on Aboriginal Group H membership input once mailout completed
04-Aug-11	email	Jim offered Melanie any assistance needed to help the Aboriginal Group H mailout to membership be undertaken		schedule open house based on Aboriginal Group H membership input once mailout completed

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01-Sep-11	email	In response to an email inquiry based on CVM newsletter about the project, employment opportunities, open houses etc., Dan emailed this Edson-area Aboriginal Group H member an offer to mail materials out should an address be sent		
02-Sep-11	phone	Aboriginal Group H representative informed Dan that approximately 500 mailout packages sent to membership about two weeks prior. Roughly 100 returned with incorrect addresses, 1 response. Both agreed more time required for additional input		schedule open house based on Aboriginal Group H membership input once mailout completed
13-Sep-11	email	Dan emailed Aboriginal Group H representative to inquire about status and results of mailout		schedule open house based on Aboriginal Group H membership input once mailout completed
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
20-Sep-11	phone	Dan phoned to see status of mailout, Aboriginal Group H representative indicated 4 returned questionaires, many return to sender, Aboriginal Group H representative will send out specific invite to membership for Edson open house, Jim Gendron will help arrange, Aboriginal Group H representative and Melanie will attend	progress report on Aboriginal Group H mailout	further consultation once membership input from mailout finalized
23-Sep-11	phone	Scheduled a meeting for October 4 to discuss on-going consultation matters and open house		further consultation once membership input from mailout finalized

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04-Oct-11	meeting, MNA, Edmonton	Two copies of final TOR and Federal project agreement provided. Melanie provided a verbal update on the mailout. Additional discussion of EIA and regulatory process, contracting and employment opportunities, involvement in reclamation activities.	progress report on Aboriginal Group H mailout	Melanie to provide written summary of mailout results and invoice; Melanie to contact community members to investigate specific traditional use concerns; Jim to provide open house materials to Aboriginal Group H for distribution to members; additional discussion Metis concerns at open houses in Edson and Robb
20-Oct-11	phone	Jim confirmed that Aboriginal Group H representatives would be attending CVRI open houses		
25-Oct-11	CVRI Open House, Robb	Aboriginal Group H representative attended the Robb Trend Open House, further information provided on environmental assessment studies		
26-Oct-11	CVRI Open House, Edson	Melanie attended the Robb Trend Open House, further information provided on environmental assessment studies		
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
02-Dec-11	email	Dan inquired about report on Aboriginal Group H mailout and invoice, Melanie replied would be forthcoming soon.		further consultation once community members near CVRI area contacted and input from mailout finalized
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
09-Mar-12	email	Dan inquired if the Aboriginal Group H would like a hard copy or CD of project application for review		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
02-May-12	mail	Copy of Project Application on CD sent		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		

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24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
15-Oct-12	mail	Tracy sent Aboriginal Group H representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and Aboriginal Group H regarding the Robb Trend Project, and information available on Aboriginal Group H traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group H representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
30-Oct-12	email	Melanie emailed a response to the October 9 letter from CEAA on behalf of Aboriginal Group H representative. Melanie agreed with the outline of issues and discussions posed in the letter, and indicated that one outstanding item was a verbal committment from Coal Valley to undertake a traditional use study which has not occurred.		
03-Nov-12	email	Dan emailed to set up a meeting to discuss the results of the Fall, 2011 mailout regarding the Robb Trend and to discuss the Robb Trend further. Dan noted an invoice for the mailout and report of results has been outstanding since December 2011.		meeting to discuss Robb Trend

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05-Nov-12	email	Tracy acknowledged Aboriginal Group H's response to the October 9 letter from CEAA, including the stated need that a Traditional Use Study was still required. She would follow-up with Les LaFleur and Aboriginal Group H following review of the upcoming SIR responses.		
21-Nov-12	email	Dan emailed to set up a meeting to discuss the results of the Fall, 2011 mailout regarding the Robb Trend and to discuss the Robb Trend further. Melanie responded with a request for dates which were provided		meeting to discuss Robb Trend
23-Nov-12	email	Melanie emailed the invoice for the mailout from Fall, 2011, and confirmed the Dec 6 meeting date		meeting to discuss Robb Trend
06-Dec-12	meeting, Aboriginal Group H office, Edmonton	Discussion of mailout responses, community members and Aboriginal Group H history and settlements. Detailed discussion of TEK studies and scope and scale for Robb Trend Project. Dan to provide plain-language document and maps of project area for Aboriginal Group H review.		further consultation once input from mailout is finalized, budget proposal for TEK studies to be provided by Aboriginal Group H
07-Dec-12	email	Dan emailed Melanie attached two maps of the Robb Trend area for review for traditional studies. Dan indicated that if Melanie needed other maps to let him know.		budget proposal for TEK studies to be provided by Aboriginal Group H
07-Dec-12	email	Melanie responded to Dan's previous email requested a historically detailed map and the plain-language document.		budget proposal for TEK studies to be provided by Aboriginal Group H

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07-Dec-12	email	Based on Melanie's request Dan sent her the Robb Trend plain-language document and a more detailed and historical map of the area. Dan indicated however that the even more detailed NTS maps would take longer to produce and could be provided if needed once scope of traditional studies is established.		budget proposal for TEK studies to be provided by Aboriginal Group H
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
29-Jan-13	phone	Dan left a messsage with Aboriginal Group H reception asking Melanie to follow-up regarding a budget proposal for Robb Trend traditional studies.		budget proposal for TEK studies to be provided by Aboriginal Group H
19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
07-Mar-13	email	Dan inquired if Melanie had a chance to review with their TLU consultant scope and scale of studies to be joint with another project. Melanie responded and asked for a cost sharing proposal.		budget proposal for TEK studies to be provided by Aboriginal Group H

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07-Mar-13	email	Dan responded to Melanies previous email indicating that the Robb Trend would need to see a seperate budget proposal and report for the TLU studies.		budget proposal for TEK studies to be provided by Aboriginal Group H
07-Mar-13	email	Les confirmed with Melanie that there should be a seperate cost estimate for the Aboriginal Group H TLU studies of the Robb Trend.		budget proposal for TEK studies to be provided by Aboriginal Group H
17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		
17-Jul-13	email	Melanie requested information regarding engagement opportunities be sent to her so that she might share it with the Aboriginal Group H leaders and members directly. Jim emailed a copy of the latest project newsletter containing this requested information.		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	email	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19/Aug/13	email & mail	Jim emailed and mailed an invitation to the Robb Trend Information Session, Tour and Open House.		

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21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

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		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	L		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
24-Feb-11	email	Dan emailed Aboriginal Group L representative at the Aboriginal Group L to see if a meeting could be scheduled to discuss changes to the Robb Trend		meeting to discuss Robb Trend
03-Apr-11	email	Aboriginal Group L representative responded to Dan's earlier email, indicated she no longer worked for the Aboriginal Group L recommended calling two other Aboriginal Group L representativesdirectly to discuss Robb Trend		meeting to discuss Robb Trend
19-Apr-11	phone	Dan spoke with Aboriginal Group L representative on the phone, explained need to discuss changes to Robb Trend versus past footprint inspected, determine if additional field studies needed, provide project information. Agreed to meet April 26.	meeting arranged for April 26	meeting to discuss Robb Trend

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27-Apr-11	meeting, Aboriginal Group L	[note: meeting date changed from original April 26]. Dan presented Aboriginal Group L representative with copies of Consultation Plan (1), Proposed Terms of Reference (1), and 25 copies of Project Description. Dan explained comment process for PTOR, and offered as many copies of all documents as required by community. Aboriginal Group L representative indicated Project Description would be left at school (presumably so community members could pick up). Dan explained Robb Trend project moving towards application, explained differences between original footprint and latest. Need for additional TLU studies discussed, agreed to schedule for before Chicken Dance in spring. Will append new info to existing Robb Trend TLU report. Aboriginal Group L representative noted community recevied a letter from mine about employment opportunities.	project changes presented; additional TLU studies provisionally scheduled	TLU field studies
17-May-11	meeting, Aboriginal Group L	Dan provided copies of large-scale maps of project areas for review. Discussed scope and scale of additional TLU field studies.	scope of TLU field studies determined, precise timing TBD	TLU field studies
25-May-11	meeting, Aboriginal Group L	Parties confirmed dates of May 28-May 31 for TLU field studies as discussed briefly previously by phone	TLU field studies scheduled	TLU field studies
28-May-11	field studies	Aboriginal Group L begin field studies with assistance of Dan	field studies initiated	

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FN or Aboriginal Group Consulted	L	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

31-May-11	field studies	Aboriginal Group L finish field studies	field studies completed	final TLU reporting; continued consultation activities
31-May-11	email	In response to an email requesting information, Dan indicated that he was just finishing field studies with the Aboriginal Group L and would provide Aboriginal Group L representative with further information requested on the project including the consultation plan and project description.		Consultation Plan and Project Description to be sent to Aboriginal Group F
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
06-Jun-11	mail	Dan mailed copies of the Aboriginal Consultation Plan, Project Description, and proposed Terms of Reference to Aboriginal Group L representative	Consultation Plan, Project Description, PTOR sent to Aboriginal Group F	
06-Jun-11	phone	Aboriginal Group L representative asked that the Chief receive an honorarium for having reviewed the findings of the TUS studies and plant identifications, Dan indicated that he had passed on the camp's request regarding firewood		final TLU reporting; continued consultation activities

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

16-Aug-11	meeting, Aboriginal Group F Offices	Dan provided copies of final TOR and consultation plan (sent previously by mail June 6, 2011). Aboriginal Group L representative indicated that for protocol reasons, all consultation with Aboriginal Group L was to go through her. Dan indicated that it was not his decision to make, and portion of Aboriginal Group F community most affected is being consulted. Aboriginal Group L representative suggested a meeting with AENV, CVRI, her, and another Aboriginal Group L representative to discuss. Dan indicated that CVRI would continue to speak directly with the Aboriginal Group L pending resolution.		continued consultation activities; final TLU reporting
22-Aug-11	meeting, Aboriginal Group L	Dan provided copies of the final TOR and federal Project Agreement. Dan reported the results of the meeting on August 16 with Aboriginal Group L representative. Aboriginal Group L representative expressed the Aboriginal Group L position that consultation with them should not be administered by Aboriginal Group F and there rep. He would ask Aboriginal Group L representative to look into this issue. Dan indicated that CVRI would continue to speak directly with the Aboriginal Group L pending resolution.		continued consultation activities; final TLU reporting
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
15-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

29-Nov-11	meeting, Aboriginal Group L	Dan provided draft copies of traditional use report for additional input, verification, approval		finalization of traditional use report
30-Jan-12	meeting, Aboriginal Group L	Input on traditional use report has not been prepared. Discussed the need for a resolution from Aboriginal Group F Council if Aboriginal Group L to be authorized to consult on their own behalf, Aboriginal Group L representative to look into this soon with contacts at Aboriginal Group F		finalization of traditional use report, resolution of delegation of authority issue
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
28-Feb-12	meeting, Aboriginal Group L	Discussed review of Robb Trend traditional report, indicated still working on additions to finalize. Discussed the issue of delegation of authority from Aboriginal Group F		
09-Mar-12	text message	Dan inquired if theAboriginal Group L would like a hard copy or CD of project application for review, Aboriginal Group L representative indicated that a CD would be good.		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
02-May-12	meeting, Aboriginal Group L	Dan provided Aboriginal Group L representative with 2 copies of EIA on CD and a cover letter. Aboriginal Group L representative reiterated Aboriginal Group L position that they will consult on their own behalf, not through Aboriginal Group F		
02-May-12	mail	Copies of Project Application sent on CD		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
28-Sep-12	email	On behald of Sean, Karan Jones submitted official Statements of Concern to the ERCB regarding the Robb Trend application on behalf of the Aboriginal Group F and the Aboriginal Group A. These letters assert that the Project has the potential to affect Aboriginal Group F and Aboriginal Group A Aboriginal and Treaty rights to hunt, fish, gather, and trap. The letters include affidavits from "harvesters" indicating general use of the region including the project area. The letters specifically cite impacts to grizzly bear, marten, fisher, lynx, wolf, water quality, environment, and fish habitat. They request intervenor status at hearings, and request that the application be denied. The Aboriginal Group F letter cites CVRI's "failure" to consult Aboriginal Group F elected leadership about the Aboriginal Group L.		
04-Oct-12	meeting, Aboriginal Group L	Dan indicated he would like to bring Les LaFleur by soon to discuss the existing relationship and Robb Trend Project. Brief discussion of additional community support and Aboriginal Group A and F. Dan would be in contact soon with potential meeting dates.		Meeting to continue discussions regarding Robb Trend and on-going Coal Valley consultation
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	L	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

15-Oct-12	mail	Tracy sent Aboriginal Group L representative a letter outlining CEAA's current understanding of her community and the status of consultation efforts between CVRI and the Aboriginal Group F regarding the Robb Trend Project, and information available on Aboriginal Group F traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group L representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
23-Nov-12	phone	Dan and Aboriginal Group L representative confirmed the meeting date and time on Nov. 27		Meeting to continue discussions regarding Robb Trend and on-going Coal Valley consultation
27-Nov-12	meeting, Aboriginal Group L	Items discussed including completion of Traditional Use report with syllabics, history of school, drilling of water well for school (as supported by other developers), Christmas pageant funding, other capacity items, training or job fair in community. Additional meeting in Wetaskiwin to discuss items further with Chief.		January meeting to continue discussions regarding Robb Trend and on-going Coal Valley consultation
30-Nov-12	email	Aboriginal Group L representative emailed with potential future dates for meetings, Les LaFleur provided some information on dispositions around the Aboriginal Group L as discussed, Dan indicated he would need to touch base with Aboriginal Group L representative regarding potential meeting dates and places.		Future meeting to continue discussions regarding Robb Trend and on-going Coal Valley consultation

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
16-Jan-13	email	Dan emailed Aboriginal Group L representative requesting Aboriginal Group L representative email to send him information regarding the Aboriginal Group L TLU report.		
23-Jan-13	email	Aboriginal Group L representative emailed Dan regarding his supplementary info in the Aboriginal Group L TLU report and asked if Dan received this information okay.		finalization of TLU report

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

23-Jan-13	email	Dan notified Aboriginal Group L representative he had not received it and supplied Elmer with the draft table of contents of the report.		finalization of TLU report
23-Jan-13	email	Aboriginal Group L representative emailed to Dan, Aboriginal Group L representative's supplementary info to be added to the Aboriginal Group L TLU report.		finalization of TLU report
19-Feb-13	mail	Dan mailed a copy of the bi-monthly consultation update		
19-Feb-13	mail	Dan mailed a copy of the bi-monthly consultation update		
17-Apr-13	mail	Dan mailed a copy of the bi-monthly consultation update		
17-Apr-13	mail	Dan mailed a copy of the bi-monthly consultation update		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19/Aug/13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	L		

21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	G		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
03-Mar-11	mail	Dan mailed 1 copy of Consultation Plan and 50 copies of Project Description with cover letter requesting meeting to discuss Robb Trend		meeting to discuss Robb Trend
09-Mar-11	phone	Aboriginal Group G representative phoned in response to mailing, Dan introduced the changes to Robb Trend area, discussed need to review to determine if additional TLU work required	subsequent calls resulted in meeting scheduled for March 17 in Hinton	meeting to discuss Robb Trend
17-Mar-11	meeting, Hinton	Dan introduced Robb Trend changes, Aboriginal Group G representative provided translation, discussed how large new areas were relative to old, protection of sites previously located, field studies likely required, large-scale maps needed for Elder review	Elder review to help determine scope and scale of additional TLU studies	Dan to provide large-scale maps for Elder review, planning of field studies; Aboriginal Group G representatives to provide estimate of costs for review
04-Apr-11	email	Dan emailed to confirm address, inquired about estimate for Elder review, hoped to supply large-scale maps soon		Dan to provide large-scale maps for Elder review, planning of field studies;Aboriginal Group G representatives to provide estimate of costs for review
06-May-11	fax	Aboriginal Group G representative faxed invoice for map review, indicated that a field visit was requested by the elders		Dan to provide large-scale maps for Elder review, planning of field studies; Darryl and Jean to provide estimate of costs for review
13-May-11	phone	Arranged to meet next week for delivery of additional project materials	meeting arranged	Dan to provide large-scale maps for Elder review, planning of field studies;Aboriginal Group G representatives to provide estimate of costs for review

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FN or Aboriginal Group Consulted	G		

17-May-11	meeting, Hinton	Dan provided 2 copies of PTOR and explained comment process. Dan provided 2 copies of large-scale maps of project area. Discussed a preliminary field tour of areas, first week of June suggested	project documents provided	field tour; planning of field studies
26-May-11	phone	set date of June 1 for field tour	field tour arranged	field tour; planning of field studies
02-Jun-11	project area tour	Dan guided Aboriginal Group G party to the additional Robb Trend project areas not previously inspected. Aboriginal Group G representative indicated that no burials in Robb Trend West, but many plants used by community. Issue of burials previously recorded discussed.	field tour completed	planning of additional TLU field studies
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
29-Jun-11	fax	Aboriginal Group G representative faxed a letter to Dan for Les LaFleur acknowledging map review of the project by the Elders on March 17, field visits on June 2 and 9, and appreciation of the consultation efforts		planning of additional TLU field studies
13-Jul-11	phone	Dan and Aboriginal Group G representative discussed additional field studies for Robb Trend, Dan to check back once Aboriginal Group G representative has discussed issue with Aboriginal Group G representative		planning of additional TLU field studies
25-Jul-11	phone	Dan left voicemail at Aboriginal Group G representative office requesting that Aboriginal Group G representative phone him regarding CVRI Robb Trend		planning of additional TLU field studies

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28-Jul-11	phone	Aboriginal Group G representative returned Dan's call, left a voicemail asking him to call		planning of additional TLU field studies
17-Aug-11	phone	Dan and Aboriginal Group G representative discussed remaining field studies, budget, and date, likely to constitute the extent of field studies for the project		undertaking final field studies
23-Aug-11	meeting, Hinton, Halpenny Corridor	Dan provided copies of final TOR and Federal project agreement. Proceeded to do final field visit of Halpenny corridor area. No specific concerns noted for the area.	field visitation/studies completed	on-going project consultation
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
09-Mar-12	phone	Dan inquired if Aboriginal Group G would like a hard copy or CD of project application for review, Darryl indicated that a CD would be good.		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
04-May-12	mail	Copy of Project Application on CD sent		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	G	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

15-Oct-12	mail	Tracy sent Aboriginal Group G representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and the Aboriginal Group G regarding the Robb Trend Project, and information available on Aboriginal Group G traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group G representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
04-Dec-12	phone	Dan telephoned Aboriginal Group G representative to set up the anticipated meeting with Les LaFleur to discuss the Robb Trend and on-going Coal Valley consultation. Meeting set for Dec. 10 at 1:00 PM		meeting to discuss Robb Trend and on-going Coal Valley consultation
10-Dec-12	meeting, Hinton	Discussion of donations for ceremonies, exsisting agreement of review of annual maps, liaison position, Christmas donations and scheduling of field visit.		planning of additional field visit
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	G		

08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
19-Feb-13	mail	Dan mailed a copy of the bi-monthly consultation update		
17-Apr-13	mail	Dan mailed a copy of the bi-monthly consultation update		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19/Aug/13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	G		

21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	C	**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
02-Mar-11	meeting, Aboriginal Group C	Dan Meyer provided 1 copy of Consultation Plan and 50 copies of Project Description, discussed history of previous TLU studies done by Aboriginal Group C and relationship to revised project area, discussed possible scope and scale of additional TLU studies	Aboriginal Group C will need to supplement TLU studies of revisions to Robb Trend area	Aboriginal Group C to provide proposed budget and scope of work; meeting with Les LaFleur and Aboriginal Group C representatives/Chief
14-Mar-11	email	Aboriginal Group C representative emailed preliminary budget to Dan Meyer, confirmed meeting with Council on March 21; Dan responded that he would pass the budget on to Les LaFleur for review	meeting with Council confirmed	meeting with Council; agreement on scope and scale of TLU work
21-Mar-11	meeting, Aboriginal Group C	Aboriginal Group C representative, Les, and Dan discussed proposed scope and budget for TUS work, agreed on; brief discussion with Aboriginal Group C Chief; meeting with Council cancelled; met with Aboriginal Group C representative (band manager), scope and scale of work approved	scope and scale of Traditional Use Studies agreed upon	additional Aboriginal Group C TLU studies planned for early summer 2011

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	C		

16-May-11	meeting, Aboriginal Group C	Dan provided first capacity funding installement, 4 copies of each map required for field work, and 2 copies of PTOR (explained comments can go directly to AENV or CVRI until end of June). Aboriginal Group C representative provided detailed agenda for the TLU field program.	PTOR delivered; final arrangements for TLU field program completed	implementation of TLU field program
23-May-11	field studies	Aboriginal Group C begins implementation of TLU field program with direct assistance Dan Meyer starting May 25		completion of field program
27-May-11	field studies	Aboriginal Group C completes TLU field program	TLU field program of additional Robb Trend areas completed	Written communication of results of TLU field program. Aboriginal Group C representative indicated verbally that no specific concerns (other than previous discussed environmental stewardship issues) had been noted and she expected the Aboriginal Group C to issue letters of authorization soon
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
06-Jun-11	phone	Aboriginal Group C representative and Dan discussed progress of Aboriginal Group C reporting, names to be used in letters of authorization, invoice from Yellowhead Vac, Aboriginal Group C representative indicates report forthcoming soon		written communication of results of TLU field program
06-Jun-11	fax	Aboriginal Group C representative faxed a report on the results of the TLU field program and findings with a letter of authorization indicating that the Aboriginal Group C has no concerns with the additions to the Robb Trend project	written communication of results of TLU field program and letter of authorization provided	
07-Jun-11	email	Dan asked Aboriginal Group C representative for hard copies of the faxed materials		
04-Jul-11	email	Dan indicated that he had received the mailed hard copy of the report and authorization letter, indicating invoice from Yellowhead Vac still outstanding		

Project Name:		Date of Report Submission:	04-Oct-13
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FN or Aboriginal Group Consulted	C		

17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
28-Sep-11	mail	Dan sent two copies of final TOR and Federal project agreement to Aboriginal Group C representative, along with invitation to open houses on October 25 and 26.		
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
09-Mar-12	email	Dan inquired if Aboriginal Group C would like a hard copy or CD of project application for review		
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
02-May-12	meeting, Aboriginal Group C	After brief discussion with Aboriginal Group C representative, Dan left a hard copy and CD with EIA and a cover letter for Aboriginal Group C representative with another Aboriginal Group C representative at Lands Department		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
25-Jun-12	meeting, Aboriginal Group C	Dan and Les met to discuss an important Aboriginal Group C site in the Coal Valley area and its relationship to Coal Valley developments		Field meeting needed
13-Jul-12	email	Dan confirmed meeting near Coal Valley on August 7 to discuss important sites in area.		Meeting
31-Jul-12	email	Dan emailed to confirm meeting next week at site near Coal Valley. Capacity funding for cultural programs is ready.		Meeting
10-Aug-12	meeting	Meeting to discuss some traditional sites outside of the Robb Trend Project area. Overall discussion of Aboriginal Group C concerns with development in the region.		Meeting to further discuss any issues

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	C		

24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Oct-12	email	Dan emailed Aboriginal Group C representative to request a meeting to follow-up on some of the continuing Coal Valley consultation items previously discussed		
15-Oct-12	mail	Aboriginal Group C representative sent another Aboriginal Group C representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and the Aboriginal Group C regarding the Robb Trend Project, and information available on Aboriginal Group C traditional studies and stated concerns regarding the Project. The letter invites Darren to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	C		

13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		
19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
17-Apr-13	mail	Dan mailed copy of bi-monthly consultation update		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19-Aug-13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	I	**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
24-Feb-11	email	Dan emailed Aboriginal Group I representative requesting a meeting to discuss the Robb Trend project		meeting to discuss Robb Trend
28-Mar-11	email	Aboriginal Group I representative indicated meeting in Calgary would work, meeting set for March 9 in Calgary	meeting arranged	meeting to discuss Robb Trend
09-Mar-11	text message	Aboriginal Group I representative indicated that due to an emergency at home, the Aboriginal Group I had to return home and cancel meeting	meeting cancelled	meeting to discuss Robb Trend
04-Apr-11	email	Dan emailed Aboriginal Group I representative to see if another meeting could be arranged		meeting to discuss Robb Trend
12-Apr-11	email	meeting arranged for April 14th	meeting arranged	meeting to discuss Robb Trend
14-Apr-11	meeting, Continental Inn West, Edmonton	Dan provided copies of the consultation plan (1) and project description (25) with offer to provide as many as required by the community. History of CVRI - Aboriginal Group I consultations reviewed. Additional Robb Trend areas presented, need to re-engage in consultation. Issues discussed include need, if any, for additional TLU field studies, funding for youth programs, funding for film, contracting and jobs, CEAA letter.	Agreed to set up meeting with Chief and Council again to determine process for site visits, discussion impacts, begin discussing a formal MOU	Chief/Council Meeting; Request for Funding; MOU discussion
09-May-11	phone	Dan and Aboriginal Group I representative confirmed a meeting date between Aboriginal Group I and CVRI in Edmonton for May 16.	meeting arranged	Chief/Council Meeting; Request for Funding; MOU discussion

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

16-May-11	meeting, Aboriginal Group I	A brief meeting was held with Chief and Council where Dan and Les reviewed CVRI extension history. Council was not prepared for meeting, so suggested setting another date. Following this Dan and Les met with Dennis. Dan provided 2 copies of the PTOR, Les reviewed the comment process. Dan provided 2 copies of large-scale maps of project area for field studies. Discussed setting up another meeting in the near future.	PTOR and maps delivered	Chief/Council Meeting; Request for Funding; MOU discussion
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
07-Jun-11	fax/email	Aboriginal Group I representative faxed and emailed Dan a budget for field work in 2011, Dan emailed a response seeking clarification	proposed budget for TUS studies provided	scope and scale of additional TUS field studies to be finalized
23-Jun-11	email	Dan asked Aboriginal Group I representative to confirm if budget proposal forwarded was for Robb 2011 field program		scope and scale of additional TUS field studies to be finalized
13-Jul-11	email	Dan asked Aboriginal Group I representative to confirm if budget proposal forwarded was for Robb 2011 field program		scope and scale of additional TUS field studies to be determined
25-Jul-11	email	Dan asked Aboriginal Group I representative to confirm if budget proposal forwarded was for Robb 2011 field program, would like to move field studies and consultation forward soon		scope and scale of additional TUS field studies to be determined
28-Jul-11	email	Aboriginal Group I representative confirmed some information regarding capacity funding		continuing dialogue regading consultation on the project
01-Aug-11	email	Dan confirmed that traditional use capacity funding had been approved, inquired about additional field studies versus interviews		continuing dialogue regading consultation on the project
12-Aug-11	mail	Traditional use capacity funding sent to Aboriginal Group I	traditional use capacity funding provided	continuing dialogue regading consultation on the project

Project Name:			Date of Report Submission:	04-Oct-13
			Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	I			
12-Sep-11	phone	Dan left a message with reception at Aboriginal Group I Admin. requesting that Aboriginal Group I representative phone regarding project		continuing dialogue regading consultation on the project
13-Sep-11	email	Dan emailed Aboriginal Group I representative with request to discuss Robb Trend, additional consultation, elders meeting, meeting with Chief and Council		continuing dialogue regading consultation on the project
17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
19-Sep-11	email	In response to newsletter and invitation to open houses, Aboriginal Group I representative emailed to set up meeting between Chief and Council and CVRI		continuing dialogue regading consultation on the project
20-Sep-11	email	Dan and Aboriginal Group I representative confirmed a meeting date of September 30 between CVRI and Chief and Council	meeting set between Aboriginal Group I Chief and Council and CVRI	continuing dialogue regading consultation on the project
30-Sep-11	meeting, Aboriginal Group I	Copies of final TOR and Federal project agreement provided. Les, Dan, and Aboriginal Group I representative described some of the background of CVRI- Aboriginal Group I relationship and consultation on Robb Trend. Aboriginal Group I indicated need to send Elders/Crew out one additional time to record salt licks/hunting areas in vicinity. Potential items for an MOU/community agreement discussed, as were employment, cultural awareness camp, round dance.	Aboriginal Group I Chief and Council reiterated support for direction of consultation led by Aboriginal Group I representative for project	scheduling of additional field visit; continuing dialogue regarding consultation and community agreement
03-Oct-11	email	Dan asked Aboriginal Group I representative to let him know when a field visit is planned		additional field visit; continuing dialogue regarding consultation and community agreement
14-Oct-11	mail	Emailed to see about getting Aboriginal Group I crew to look at important salt-licks near Robb Trend mentioned by Aboriginal Group I Chief at last meeting	Aboriginal Group I representative made contact in response.	scheduling of additional field visit

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

14-Oct-11	phone	Aboriginal Group I representative texted Dan twice in regards to make contact and discuss the project. Dan called Aboriginal Group I representative and discussed recording of the salt-licks, Aboriginal Group I representative suggested to meet and would call back regarding a day that would work for him.		scheduling of additional field visit
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
14-Feb-12	email	Aboriginal Group I representative emailed to inquire about a meeting to discuss employment and contracting opportunities associated with the project, info about a career fair on February 29. Les responded indicating he had forwarded his request to HR personnel at CVM to coordinate discussion on these matters		
05-Mar-12	email	Aboriginal Group I representative asked Les to follow up with staff at CVM for a request to schedule a meeting with the procurement department. Dan followed up with phone call to Aboriginal Group I representative, left a message		scheduling of meeting to discuss Aboriginal Group I representative interests in contracting opportunities
06-Mar-12	email	Dan inquired about scheduling a meeting soon including Les LaFleur to discuss the Robb Trend, an agreement, and Aboriginal Group I interests in contracting opportunities.		scheduling of meeting to discuss project
09-Mar-12	email	Dan inquired if Aboriginal Group I would like a hard copy or CD of project application for review, Aboriginal Group I representative indicated that a CD would be sufficient.		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

12-Mar-12	email	Dan thanked Aboriginal Group I representative for previous response, inquired again about scheduling a meeting to discuss project		scheduling of meeting to discuss project
13-Mar-12	phone	Bill called Dan about meeting with Aboriginal Group I representative, Grizzco partnering with Aboriginal Group I. Dan indicated waiting to hear from Aboriginal Group I representative about possible meeting times. Bill to speak with Aboriginal Group I representative about meeting, Dan to pass Bill's info to Les LaFleur		scheduling of meeting to discuss project
26-Mar-12	email	Aboriginal Group I representative emailed Dan to ask if a meeting could be set to discuss MOU agreement regarding the Robb Trend. Email forwarded to Les and Bill to schedule a date.		meeting set April 9 in Edmonton to discuss MOU
30-Mar-12	email	Aboriginal Group I representative emailed Dan to see if meeting could be moved to April 10th at Aboriginal Group I.		meeting set April 10 at Aboriginal Group I to discuss MOU
10-Apr-12	meeting, Aboriginal Group I	Discussed project background, draft MOU, employment and training programs, sponsorship for campouts, corporate aboriginal policy, subsequent meeting and mine tour, contracting opportunities for supplies and reclamation.		meeting/mine tour for early May
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Apr-12	email	As per discussion at last meeting, Dan inquired if a meeting/tour could be arranged for May 1-4.		
02-May-12	mail	Copy of Project Application on CD sent		
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		

Project Name:			Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
27-May-12	email	Aboriginal Group I representative sent an email regarding scheduling a round table meeting to discuss employment opportunities & "training to employment" options for short, medium and long term job prospects that qualified Aboriginal Group I representative members could apply or strive towards. Les responded requesting additional information about participants.		scheduling of meeting to discuss employment opportunities
31-May-12	email	Aboriginal Group I representative sent additional emails regarding scheduling a round table meeting to discuss employment opportunities & "training to employment" options for short, medium and long term job prospects that qualified Aboriginal Group I members could apply or strive towards.		scheduling of meeting to discuss employment opportunities
12-Jun-12	email	Aboriginal Group I representative provided a scheduling link to help set up a proposed meeting date.		scheduling of meeting to discuss employment opportunities
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
05-Jul-12	email	Catherine indicated scheduling difficulties, would get back once issues settled.		scheduling of meeting to discuss employment opportunities
16-Jul-12	phone	Andy called to indicate working for Aboriginal Group I on consultation, wanted to set up meetin to get up to speed on Project.		Meeting to continue consultations

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

17-Jul-12	email	Andy requested update on regulatory process so lawyers could draft a meeting agenda. Les summarized that meetings on Project since 2006, traditional studies undertaken, community presentations, community contributions, Project application submitted, provided to Aboriginal Group I for review, CVRI is seeking letter of support from Aboriginal Group I. Confirmed a meeting date of July 23 in Edmonton		Meeting to continue consultations
23-Jul-12	meeting, Aboriginal Group I Resources Inc., Edmonton	Grizzco has been given a BCR to negotiate on behalf of the Aboriginal Group I. Discussion included present status Robb Trend regulatory process, MOU for opportunities including joint venture partners, other CVRI and Sherrit operations and opportunities, corporate aboriginal policy, additional letter of support from Aboriginal Group I, employment, reclamation, compensation, contracting, benefit agreement.	Further discussions about corporate relationship/benefit agreement required	Additional copies of Robb Trend, Mercoal West, and Yellowhead Tower applications directly to Grizzco. Meeting with Sherritt to discuss benefit agreement/MOU. Les to identify a corporate contact to discuss Aboriginal Group I business park.
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Sep-12	mail	Andy sent a letter requesting additional consultation with Sherrit regarding mining operations and requested a meeting in mid-October		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		

Project Name:			Date of Report Submission:	04-Oct-13
			Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	I			

15-Oct-12	mail	Tracy sent Aboriginal Group I representative a letter outlining CEAA's current understanding of his community and the status of consultation efforts between CVRI and Aboriginal Group I regarding the Robb Trend Project, and information available on Paul traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group I representative to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
19-Oct-12	email	Les emailed Andy indicating had just seen the Sept. 12 letter to Mike Peck, suggested mid-October meeting clearly not likely, suggested mid-November, requested package of materials alluded to and an agenda. Andy responded that the Robb Trend and Highvale mine should be dealt with under a single corporate Sherritt agreement as per earlier discussion, indicated an agenda would be forthcoming in early November.		Meeting to discuss Robb Trend
03-Nov-12	email	Les emailed Andy regarding the previously discussed potential mid-November meeting dates and a request for issues to be discussed		Meeting to discuss Robb Trend
21-Nov-12	email	Andy sent a revised agenda for the upcoming meeting as requested		Meeting to discuss Robb Trend
23-Nov-12	email	Series of email confirming a meeting on Dec. 3 in Edmonton		Meeting to discuss Robb Trend

Project Name:		Date of Report Submission:	04-Oct-13
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FN or Aboriginal Group Consulted	I		

03-Dec-12	meeting, Grizzco offices, Edmonton	Andy presented a package outlining the nature of Grizzco and relationship with Aboriginal Group I. Information on Aboriginal Group I "traditional territory," Rights, Treaty 6, way of life presented. Information on Joint Venture Partners, development Aboriginal Group I Consultation Policy and Guidelines, economic development consultation. Indication that Coal Valley Mine has not positively impacted Aboriginal Group I in past 35 years. Land tenure sales not previously consulted on. Aboriginal Group I representative concerned that to date no adequate project review for Robb Trend, no proper assessment of loss of use for existing mine, lack of investment in education, employment, contracting, capacity building, loss of land use, [continued below]		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

[continued from above]	[continued from above]	[conintued from above] ...failure to adequately engage Aboriginal Group I since 2007, Aboriginal Group I never supplied environmental reports for review, watercourses will be destroyed, billions of dollars to be made by mine, loss of hunting, fishing, trapping, Coal Valley has said no job or economic opportunities, water pollution, water consumption, waste coal pollution, transportation, thermal pollution, sulfur dioxide, radioactivity, particulates, scarring of land, toxic emissions, resources companies have a contingent liability. A draft benefit agreement was presented. A draft loss of use model was presented. Terms of a potential MOU were discussed. Les to respond by mid-December regarding other Sherrit operations, terms acceptable for CVRI in an agreement. Next meeting likely January 2013.		CVRI response to terms, meeting in January
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		

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FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

22-Jan-13	email	Andy emailed Les to follow up with the proposed items of last meeting and CVRI's review of the presented draft benefit agreement by Grizzco on behalf of Aboriginal Group I.		CVRI response to terms, meeting in January
22-Jan-13	email	Les responded to Andy's email indicating that CVRI has rejected Grizzco's proposed draft benefit agreement and indicated that there is an existing agreement between Aboriginal Group I and CVRI regarding the Robb Trend. Les would agree to meet to discuss the existing agreement.		Meeting to discuss Robb Trend agreements
28-Jan-13	mail	Letter sent to Lori outlining concern of Coal Valleys lack of consultation and cooperation towards an agreement with Aboriginal Group I regarding the Robb Trend.		Meeting to discuss Robb Trend agreements

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

13-Feb-13	mail	Letter sent to Lori outlining specific concerns with Robb Trend project SIR. Points include elders dissatisfaction with reclamation, lack of adequate consultation and addressing of potentially infringed treaty rights. Specific concerns that they feel have been not fully addressed or accomodated include: impact to water, air quality, traditional food source loss, loss of traditional territory, need for detailed report and map of project, accomodation, social development funding, ongoing monitoring, training and employement. The letter states further that Aboriginal Group I's treaty rights will be infringed by the proposed project and the duty to consult and accomodate includes the obligation of sufficient capacity funding for identifying interest/concerns with the project. The project should be put on hold until these concerns are addressed and meaningful consultation has occurred.		Meeting to discuss Robb Trend agreements
19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
11-Mar-13	mail	Les sent a letter to Andy acknowledging and thanking for receipt of a copy of the January 28, 2013 and February 13, 2013 letters to Lori Crozier. Les identified the previous agreement reached by Aboriginal Group I, pipe ceremony and funding provided by CVRI. Les acknowledged that Aboriginal Group I is desiring an additional "benefit agreement" and "infrastructure agreement" to focus on contracting, and employement. Les would welcome further discussions and to point out mitigation efforts in the EIA that may have potential environmental or land use impacts.		Meeting to discuss Robb Trend agreements

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

07-May-13	meeting, River Cree Resort	General discussion of an agreement regarding the project. Aboriginal Group I representative & Andy requested tour of project area.		Tour of Robb Trend to be arranged, meeting to discuss Robb Trend agreements
17-Apr-13	mail	Dan mailed copy of bi-monthly consultation update		
07-Jun-13	meeting, Coal Valley Mine	Meeting for a tour of Robb Trend area and the CVM minesite. Aboriginal Group I representative unable to attend. Discussions of environmental impacts, impacts benefits agreement, follow-up meeting to discuss a potential agreement.		Meeting to discuss a potential agreement
10-Jun-13	email	Andy thanked Les for the mine tour, a discussion of potential meeting dates and a draft agreement discussed.		
12-Jun-13	email	Andy suggested a meeting on June 21.		Meeting to discuss a potential agreement
18-Jun-13	email	Les confirmed that a meeting on June 21 would work.		Meeting to discuss a potential agreement
21-Jun-13	meeting, Grizzco offices, Edmonton	Discussion of Aboriginal Group I business plans/structure and a potential benefits agreement. Discussion of terms including capacity funding, employment opportunities, proposed Aboriginal Group I Industrial Park, Canadian Matting, accountability committee, social responsibility, education and scholarships.		Meeting to discuss a potential agreement
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		

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FN or Aboriginal Group Consulted	I	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

22-Jul-13	mail	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
25-Jul-13	email	In response to an email from Andy suggesting a meeting sometime after August 12 to continue discussions on an agreement, Les suggested August 13.		meeting to discuss agreement
13-Aug-13	meeting	Discussion of moving towards possible agreement, contracting and training, Aboriginal Group I "co-management", industry funding of Aboriginal Group I "public works" project and funding for community events.		CVRI to provide Robb Trend draft agreement
19-Aug-13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		
September 2013	discussions	discussions of terms of an agreement		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	A	**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
28-Sep-12	email	On behalf of Aboriginal Group A representative, Karan Jones submitted official Statements of Concern to the ERCB regarding the Robb Trend application on behalf of the Aboriginal Group F and Aboriginal Group A. These letters assert that the Project has the potential to affect Aboriginal Group F and Aboriginal Group A Aboriginal and Treaty rights to hunt, fish, gather, and trap. The letters include affidavits from "harvesters" indicating general use of the region including the project area. The letters specifically cite impacts to grizzly bear, marten, fisher, lynx, wolf, water quality, environment, and fish habitat. They request intervenor status at hearings, and request that the application be denied. The Aboriginal Group F letter cites CVRI's "failure" to consult Aboriginal Group F elected leadership about the Aboriginal Group L.		

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	A	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

08-Jan-13	mail, email	Dan mailed and emailed a notification letter and information package on behalf of CVRI indicating that SAAB has directed consultation with the Aboriginal Group A regarding the Robb Trend Project. Dan noted that the information package included the Plain-language project description, Project Application on CD, and SIR responses on CD regarding the project application and has asked Aboriginal Group A to review the information and notify if there are any specific concerns regarding the project by February 1st, 2013. CVRI has requested a meeting with Aboriginal Group A to discuss the project with the support of SAAB and CEAA representatives at the meetings. Further, CVRI has requested from Aboriginal Group A that if there are potential impacts regarding the project to prepare site-specific concerns and locations at the meeting.		Response to letter and meeting to be scheduled to discuss the Robb Trend project.
11-Jan-13	email	Carcey emailed to Aboriginal Group A representative a notification letter regarding the Coal Valley Robb Trend Project.		Response to letter and meeting to be scheduled to discuss the Robb Trend project.
22-Jan-13	phone	Aboriginal Group A representative called Les to set up a meeting to discuss the Robb Trend project.		Meeting to be scheduled to discuss Robb Trend Project
22-Jan-13	mail, email	Dan mailed and emailed a notification letter to Aboriginal Group A representative indicating that on January 8, 2013 an information package was sent regarding the Robb Trend Project as well as a request to meet with Aboriginal Group A representatives and Chief and Council. The letter reminded that if the Aboriginal Group A had specific concerns regarding the Robb Trend Project to notify Dan or Les by February 1st, 2013. In the email Dan apologized that this was sent before he was notified by Les that she had called to arrange a meeting.		Meeting to be scheduled to discuss Robb Trend Project

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	A	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

23-Jan-13	email	Les emailed Aboriginal Group A representative notifying of availability to meet and discuss the Robb Trend project with possible dates.		Meeting to be scheduled to discuss Robb Trend Project
25-Jan-13	email	Lori confirmed receipt of the correspondence and indicated a willingness and desire for CEAA representatives to attend any meetings scheduled.		
04-Feb-13	phone	Discussion of cancelled meeting with Aboriginal Group A representative. Meeting to be rescheduled in mid-to-late February, likely at Aboriginal Group A		Meeting to be scheduled to discuss Robb Trend Project.
09-Feb-13	email	Les emailed Aboriginal Group A representative to arrange another meeting date for introductory meetings.		Meeting to be scheduled to discuss Robb Trend Project.
19-Feb-13	mail	Dan provided a copy of the bi-monthly consultation update		
27-Feb-13	email	Les emailed to Aboriginal Group A representative a letter indicating CVRI's interest in setting up a meeting to discuss the Robb Trend and concerns with the project. Les indicated his availability from March 12-22, 2013.		Meeting to be scheduled to discuss Robb Trend Project.
27-Feb-13	email	Aboriginal Group A representative emailed Les to inquire if he was able to attend a meeting with Chief and Council on March 1st, 2013. Due to short notice, Aboriginal Group A representative would provide other available dates for a meeting. Les replied that he unfortunately was not able to attend the meeting March 1st, 2013.		Meeting to be scheduled to discuss Robb Trend Project.
13-Mar-13	email	Les emailed Aboriginal Group A representative to confirm meeting date. Norine replied and confirmed meeting date, time and location scheduled for March 15, 2013.		Meeting scheduled March 15, 2013 to discuss Robb Trend project.

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FN or Aboriginal Group Consulted	A	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

15-Mar-13	meeting	Discussion of consultation coordinator, Aboriginal Group A independent site visits in project area, concern of project in traditional use territory, Aboriginal Group A consultation strategy, procurement opportunities, promoting employmenet and business opportunities for Aboriginal Group A and emphasis on youth employment. Aboriginal Group A representative said she would like a presentation to Chief and Council for next meeting and outlined items to be addressed. Aboriginal Group A representative also suggested Coal Valleys attendance at their Career Fair.		Meeting to be scheduled with Chief and Council to provide presentation and discuss project concerns.
17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		
04-Jun-13	email	Les inquired about the development of the proposed work plan for a Aboriginal Group A traditional use study and a meeting to discuss the Robb Trend.		
24-Jun-13	email	Les inquired about a meeting to discuss the Robb Trend, and asked about the development of the proposed work plan for a Aboriginal Group A traditional use study.		
27-Jun-13	phone	Aboriginal Group A representative indicated that Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J are considering a joint traditional use study to economize, suggested a meeting the following Friday to discuss, with a follow-up meeting after between the two to discuss a benefits agreement.		Meeting to be scheduled to continue discussions of Robb Trend Project
03-Jul-13	email	Responding to an earlier request, Aboriginal Group A representative indicated that he had lined up representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J for a meeting on July 5 at MLT's offices, and a suggestion that he and Les meet alone later.		Meeting to be scheduled to continue discussions of Robb Trend Project

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	A	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

05-Jul-13	meeting, MLT offices, Edmonton	Meeting with Aboriginal Group A representative and representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J.		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
19-Aug-13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		
19-Aug-13	phone message	Aboriginal Group A representative left a message to Jim in response to email invitation to Open House in Robb September 7th, 2013 confirming her attendance and desire for agreement regarding hiring a consultant for parts of Aboriginal Group A representative TLU studies of Robb Trend.		Meeting to be scheduled to continue discussions of Robb Trend Project
19-Aug-13	email	Aboriginal Group A representative sent an email to Les and Jim indicating her thanks for invite to the Open House in Robb and that her and her assitant would be attending. Aboriginal Group A representative also noted her desire to move quickly on a TLU study approval and budget.		Meeting to be scheduled to continue discussions of Robb Trend Project
19-Aug-13	email	Les responded to Aboriginal Group A representatives email indicating that he had not yet received a TLU budget proposal from MLT regarding joint study with Aboriginal Group J and Aboriginal Group F of the Robb Trend.		Meeting to be scheduled to continue discussions of Robb Trend Project
20-Aug-13	email	Aboriginal Group A representative responsed to Les' email saying that the TLU budget would be sent right away and they would like to meet soon to discuss.		Meeting to be scheduled to continue discussions of Robb Trend Project

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	A	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		
22-Aug-13	email	Jim emailed Aboriginal Group A representative thanking her for her response to the invite to the Robb Trend Information Session and Open House, September 7th in Robb and that he had passed on her voicemail correspondance to Les who would be best to contact regarding TLU proposals regarding the Robb Trend and further discussions could continue at the open house.		
23-Aug-13	email	Les emailed Aboriginal Group A representative indicating that he received her message from Jim and had not yet seen a budget proposal for a TLU study of the Robb Trend, and would hope to see her at the open house in Robb.		Meeting to be scheduled to continue discussions of Robb Trend Project
05-Sep-13	email	Aboriginal Group A representative responded to Les' previous email indicating that she would provide him with a TLU budget proposal either today or tomorrow morning and after waiting for joint efforts with Aboriginal Group J and Aboriginal Group F, Aboriginal Group A has decided to move forward. Aboriginal Group A representative confirmed her attendance at the open house to discuss further.		
07-Sep-13	Open House, Robb	Discussion of TLU studies and finalization, relation building and discussions of project, training programs to implement employment, visit to council & portfolio holders and Aboriginal Group A's lack of continuation with Aboriginal Group F and Aboriginal Group J.		Finalization of TLU studies propoal, meeting to discuss Robb Trend Project

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FN or Aboriginal Group Consulted	A		**Reporting Period (From m/d/y to m/d/y)**	**02/14/2011 to 04/10/2013**
10-Sep-13	email	Aboriginal Group A representative sent an email message to Jim Gendron requesting a meeting to discuss some of the requirements that were identified in the meeting with Brian McKinnon and Les LaFleur on September 6. Jim notified them of the message and sent Aboriginal Group A representative an email indicating that McKinnon and LaFleur should be contacted directly.		Meeting to discuss Robb Trend Project
13-Sep-13	phone	In a voicemail, Aboriginal Group A representative identified the following potential dates for a meeting: September 16th, 20th, October 1st, 2nd, after the 21st (she mentioned that she and her "negotiating team" have commitments between the 2nd and 21st She said that the agenda would have two parts - 1) Business, contracting opportunities 2) TLU study • There is a 6 person negotiating team from the Aboriginal Group A representative on these items. This information was passed to Les LaFleur and Brian McKinnon.		Meeting to discuss Robb Trend Project

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	**02/14/2011 to 04/10/2013**
FN or Aboriginal Group Consulted	E		

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
01-Mar-11	phone	several attempts made to call Aboriginal Group E representative at Aboriginal Group E Admin office, resulted in busy signals and no voicemail available		meeting to discuss Robb Trend
03-Mar-11	mail	Dan mailed Aboriginal Group E representative 1 copy of Consultation Plan and 50 copies of Project Description with cover letter requesting meeting to discuss Robb Trend		meeting to discuss Robb Trend
19-Apr-11	phone	Dan called Aboriginal Group E, was informed Aboriginal Group E representative no longer worked there. Spoke with another Aboriginal Group E representative, asked if he could help arrange necessary meetings with Chief and Council to discuss Robb Trend Project. Aboriginal Group E representative had not seen the materials sent previously to Aboriginal Group E representative.	Aboriginal Group E representative to arrange meeting with Chief and Council; Dan to send project info again	meeting to discuss Robb Trend
19-Apr-11	mail	Dan mailed copies of Consultation Plan (1) and Project Description (3) directly to Aboriginal Group E representative as discussed	Aboriginal Group E representative to arrange meeting with Chief and Council	meeting to discuss Robb Trend

Project Name:		Date of Report Submission:	04-Oct-13
FN or Aboriginal Group Consulted	E	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

17-May-11	meeting, Aboriginal Group E	After several unsuccesful attempts to communicate by phone, Dan stopped by Aboriginal Group E to see Aboriginal Group E representative. He was out, Dan left an envelope with 2 copies of PTOR and 2 copies of large-scale maps to Aboriginal Group E representative for delivery to the other Aboriginal Group E representative.	Aboriginal Group E representative to arrange meeting with Chief and Council	meeting to discuss Robb Trend
24-May-11	phone	Dan and Aboriginal Group E representative arranged to meet May 25 at Aboriginal Group E	meeting scheduled	meeting to discuss Robb Trend
25-May-11	meeting, Aboriginal Group E	Aboriginal Group E representative confirmed receipt of the package of Consultation Plan, Project Description, and PTOR and Maps. Dan offered as many copies as requested by Aboriginal Group E. Dan indicated CVRI wants to re-engage regarding Robb Trend. History of past consultation reviewed. Discussed working on estimates of scope for new TLU field studies, info to be incorporated into previous studies (which had not been provided to CVRI). Dan explained maps, and process for comment on PTOR. Aboriginal Group E representative asked about animal tissue testing, Dan suggested that might be an issue to provide comment on for PTOR.	initial project discussions and go ahead plans achieved	determine scope and scale additional TLU field studies; meeting with Chief and Council
03-Jun-11	email	Dan emailed copy of PTOR with a reminder of comment deadline of June 17.		
06-Jun-11	fax	Aboriginal Group E representative faxed a proposed budget for Aboriginal Group E TUS studies of additional Robb Trend areas	proposed scope and scale of field studies provided	approval of scope and scale of TUS field studies

Project Name:		Date of Report Submission:	04-Oct-13
		Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013
FN or Aboriginal Group Consulted	E		

23-Jun-11	email	Dan requested an update on field studies progress		
24-Jun-11	phone/email	Aboriginal Group E representative indicated that Chief and Council requested a revised budget, Dan informed Aboriginal Group E representative of approval of new budget for field studies, first half to be provided as soon as possible	agreement on scope and scale of TUS field studies of additional Robb Trend areas	provision of capacity funding to undertake field studies
30-Jun-11	meeting, Rocky Mountain House	Dan provided Aboriginal Group E representative with first half of capacity funding to implement TUS field studies	capacity funding provided	implementation of TUS field studies of additional Robb Trend areas
13-Jul-11	phone	Dan left Aboriginal Group E representative voice mail requesting update of TUS field studies, if complete a meeting for results presentation		
18-Jul-11	phone	Aboriginal Group E representative called to confirm that Aboriginal Group E had completed the majority of new TUS fieldwork, no concerns observed to date; Chief has requested rest of funding to do campout; Aboriginal Group E representative will request that 2008 report be released		request release of funds to finalize field program; request release of 2008 TUS report
15-Aug-11	phone	Based on Aboriginal Group E representative's inquiry, Dan indicated that capacity funding had been sent on July 29	capacity funding provided	release of 2008 and 2011 TUS reports; meeting with Chief and Council
25-Aug-11	phone	Aboriginal Group E representative called to ask for confirmation that capacity funding had been sent to Aboriginal Group E		release of 2008 and 2011 TUS reports; meeting with Chief and Council
30-Aug-11	phone	Dan confirmed that capacity use funds have been delivered to Aboriginal Group E. Aboriginal Group E representative indicated finalization of field studies likely to occur following week, would call to confirm.	capacity funding provided	release of 2008 and 2011 TUS reports; meeting with Chief and Council
13-Sep-11	phone	Dan left voice mail inquiring about completion of field studies, need to set up meeting with Chief and Council		release of 2008 and 2011 TUS reports; meeting with Chief and Council

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17-Sep-11	email or mail	Official CVRI Robb Trend Project update and invitation to open houses sent		
20-Sep-11	phone	Dan left voice mail inquiring about completion of field studies, need to set up meeting with Chief and Council		release of 2008 and 2011 TUS reports; meeting with Chief and Council
22-Sep-11	phone	Dan left voice mail asking Aboriginal Group E representative to call regarding the Robb Trend		release of 2008 and 2011 TUS reports; meeting with Chief and Council
27-Sep-11	phone	Dan left voice mail asking Aboriginal Group E representative to call regarding the Robb Trend		release of 2008 and 2011 TUS reports; meeting with Chief and Council
27-Sep-11	email	Dan emailed Aboriginal Group E representative inquiring about completion of field studies, need to set up meeting with Chief and Council		release of 2008 and 2011 TUS reports; meeting with Chief and Council
28-Sep-11	mail	Dan sent two copies of final TOR and Federal project agreement to Aboriginal Group E representative, along with invitation to open houses on October 25 and 26, and request to set up meeting.		release of 2008 and 2011 TUS reports; meeting with Chief and Council
03-Oct-11	phone	Dan left voice mail asking Aboriginal Group E representative to call regarding the Robb Trend, and physical message at Aboriginal Group E for Aboriginal Group E representatives requesting the same		release of 2008 and 2011 TUS reports; meeting with Chief and Council
08-Nov-11	mail	Dan mailed copy of bi-monthly consultation update		
15-Nov-11	phone	Called to speak with Aboriginal Group E representative, no answer and no voicemail option		release of 2008 and 2011 TUS reports; meeting with Chief and Council
15-Nov-11	phone	Spoke to Aboriginal Group E representative about arrangement of meeting with Chief and Council and Les LaFleur, arranged for Nov. 22		release of 2008 and 2011 TUS reports; meeting with Chief and Council

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21-Nov-11	phone	Called Aboriginal Group E representative to confirm meeting with Chief and Council, no answer, left voicemail		release of 2008 and 2011 TUS reports; rescheduling of meeting with Chief and Council
14-Dec-11	mail	Dan mailed copy of bi-monthly consultation update		
10-Jan-12	phone/email	Meeting tentatively arranged for January 13, 11 AM, location TBA. Dan sent follow-up email to Aboriginal Group E representative. Details confirmed in subsequent emails		release of 2008 and 2011 TUS reports; meeting with Chief and Council
13-Jan-12	meeting, Edmonton, River Cree Casino	Topics discussed included employment opportunities and summer students, transmission of traditiona use report, concerns regarding animal health, economic benefits, sponsorship of community events, traditional territory and studies, community support of project		release of 2008 and 2011 TUS reports; letter of support from community
16-Jan-12	email	Dan inquired about traditional use report status. Aboriginal Group E representative indicated that information would be provided soon		release of 2008 and 2011 TUS reports; letter of support from community
19-Jan-12	email	Dan inquired about traditional use report status. Aboriginal Group E representative indicated that final revisions being made to reports, would be available soon		release of 2008 and 2011 TUS reports; letter of support from community
26-Jan-12	email	Dan inquired about the current status of traditional use reports		release of 2008 and 2011 TUS reports; letter of support from community
07-Feb-12	email	Dan inquired about the current status of traditional use reports		release of 2008 and 2011 TUS reports; letter of support from community
14-Feb-12	mail	Dan mailed copy of bi-monthly consultation update		
22-Feb-12	email	Series of emails discussing potential meeting dates and delivery of outstanding traditional use reports		meeting to discuss Robb Trend
29-Feb-12	email	Series of emails confirming at meeting at the Westin, Calgary, 1:00, March 1		meeting to discuss Robb Trend

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01-Mar-12	meeting	Meeting never occurred, Aboriginal Group E representative explained in March 6 email issues with attendance, discussed next potential meeting dates		meeting to discuss Robb Trend
07-Mar-12	email	Meeting for March 8 in Edmonton confirmed		meeting to discuss Robb Trend
08-Mar-12	meeting, Courtyard Inn, Edmonton	Aboriginal Group E representative delivered hard copy of 2008 traditional report, will fax latest report soon. Discussed delivery of outstanding capacity funding, additional meeting with Chief to discuss project impacts and Aboriginal Group E concerns, compensation for impacts. Dan delivered a letter from Les LaFleur confirming pow-wow funding, thanking for reports, requesting letter of authorization for project.	2008 traditional report delivered	meeting to discuss Robb Trend and the mitigation of Aboriginal Group E concerns
09-Mar-12	email	Through several emails, Dan indicated a March 19 meeting would work, requested the outstanding traditional use report, Aboriginal Group E representative indicated she would fax the report on Monday		meeting to discuss Robb Trend and the mitigation of Aboriginal Group E concerns
13-Mar-12	fax	Aboriginal Group E representative faxed Dan a copy of the 2012 Aboriginal Group E traditional use report, follow up text messages confirmed Monday, March 19 meeting at Aboriginal Group E and coordinates provided as NAD83	2012 traditional use report shared	meeting to discuss Robb Trend and the mitigation of Aboriginal Group E concerns
14-Mar-12	email	Dan thanked Aboriginal Group E representative for the reports (it had been confirmed the previous day by text that UTM coordinates were NAD 83), requesting confirmation of address for outstanding capacity funding.		meeting to discuss Robb Trend and the mitigation of Sunchild concerns

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20-Mar-12	email	Dan emailed Aboriginal Group E representative to see if meeting could be set with Chief and Council in Edmonton with Les at Coal Valley offices.		meeting tentatively set March 22, 2012 to discuss Robb Trend and the mitigation of Aboriginal Group E concerns
22-Mar-12	meeting, River Cree Resort & Casino	Discussion of additional capacity funding for TLU studies, support and funding for a multi-cultural center, contribution to the Robb Trend, and educational scholarships for youth.	Les to provide proposal based on items discussed	meeting to discuss agreements regarding the Robb Trend
27-Mar-12	email	Through a few emails, Aboriginal Group E representative contacted Les to inquire about outstanding capacity funding. Les confirmed date and location for pickup.		meeting to discuss agreements regarding the Robb Trend
12-Apr-12	mail	Dan mailed copy of bi-monthly consultation update		
30-Apr-12	phone	Barry indicated he was working with Aboriginal Group E on consultation matters, requested some of the information provided previously to Aboriginal Group E, and a copy of the EA, Dan indicated he would provide. Some discussion of history of project and consultation with Aboriginal Group E. Barry indicated Aboriginal Group E may have concerns with some nearby sites, Dan indicated that Les LaFleur has been in discussions with Aboriginal Group E chief regarding the mitigation of Aboriginal Group E concerns		

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30-Apr-12	phone	Barry indicated he was working with Aboriginal Group E on consultation matters, requested some of the information provided previously to Aboriginal Group E, and a copy of the EA, Dan indicated he would provide. Some discussion of history of project and consultation with Aboriginal Group E. Barry indicated Aboriginal Group E may have concerns with some nearby sites, Dan indicated that Les LaFleur has been in discussions with Aboriginal Group E chief regarding the mitigation of Aboriginal Group E concerns		
02-May-12	meeting, Aboriginal Group E	Dan left a hard copy and CD with the EIA Report and a cover letter for Aboriginal Group E representative with Aboriginal Group E reception. Texts between Aboriginal Group E representative and Dan confirmed this, and Aboriginal Group E representative inquired about next meeting date.		meeting to discuss agreements regarding the Robb Trend
14-May-12	mail or email	Sent copies of the CVRI newsletter including an update on the Robb Trend project		
24-May-12	phone	Stan left a voicemail for Les, who tried to return call, unable to leave voicemail		meeting to discuss agreements regarding the Robb Trend
07-Jun-12	phone	Chief called to inquire about a meeting to discuss the Project further and to request capacity funding for pow-wow		meeting to discuss agreements regarding the Robb Trend
13-Jun-12	mail	Dan mailed copy of bi-monthly consultation update		
04-Jul-12	email	Dan indicated capacity funding for pow-wow available, requested details on delivery.		
11-Jul-12	phone	Aboriginal Group E representative left message indicating would like to meet soon to discuss Project.		
11-Jul-12	phone	Discussed details of capacity funding pick-up.		

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27-Jul-12	phone	Aboriginal Group E representative had earlier picked up capacity funding for pow-wow. Called to confirm amount, Dan indicated would investigate.		
31-Jul-12	phone	Aboriginal Group E representative left a voicemail for Les.		
31-Jul-12	phone	Aboriginal Group E representative called to ask about visits to Coal Valley. Dan indicated the field visits completed last year, Aboriginal Group E representative agreed but said elders wanted to revisit some sites. Meeting to be arranged soon to discuss this and additional aspects of consultation.		meeting to discuss agreements regarding the Robb Trend
17-Aug-12	meeting, Courtyard Inn, Edmonton	Meeting to specifically discuss traditional sites located outside of the Robb Trend Project area. Brief discussion of need to meet again regarding the Robb Trend Project		meeting to discuss agreements regarding the Robb Trend
24-Aug-12	mail	Dan mailed copy of bi-monthly consultation update		
11-Oct-12	mail	Dan mailed copy of bi-monthly consultation update		
12-Oct-12	email	Dan sent a request for a meeting to continue discussions regarding the Robb Trend Project		meeting to discuss agreement regarding Robb Trend
15-Oct-12	email	Meeting of October 25 confirmed through series of emails on this date and following		meeting to discuss agreement regarding Robb Trend

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15-Oct-12	mail	Tracy sent Aboriginal Group E representative a letter outlining CEAA's current understanding of her community and the status of consultation efforts between CVRI and the Aboriginal Group E regarding the Robb Trend Project, and information available on Aboriginal Group E traditional studies and stated concerns regarding the Project. The letter invites Aboriginal Group E to confirm those details and/or provide additional information. SIR responses would be provided soon, and a follow-up phone call would discuss the need for a follow-up meeting.		
23-Oct-12	email	Meeting of October 25 re-confirmed through series of emails on this date and following		meeting to discuss agreement regarding Robb Trend
25-Oct-12	meeting, Aboriginal Group E	Discussion of Robb Trend project and community benefits to Aboriginal Group E. Discussed history of traditional studies, training opportunities, funding of multi-cultural complex, scholarship programs, impact on hunting and gathering, duration of agreement, other capacity and support issues.		CVRI to provide a draft of potential terms
13-Nov-12	email	Les emailed a letter outlining some draft terms to be included in an agreement between Aboriginal Group E and CVRI, and requested a discussion of the terms at a follow-up meeting.		meeting to discuss agreement regarding Robb Trend

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FN or Aboriginal Group Consulted	E	Reporting Period (From m/d/y to m/d/y)	02/14/2011 to 04/10/2013

15-Nov-12	email	Aboriginal Group E representative indicated a rejection of the "offer" from CVRI citing corporate profits, lack of compensation for infringement of Treaty Rights protected by the Constitution, Aboriginal Group E sites and Rights in this traditional territory. A later email indicated that a copy of "this letter" had also been sent to the ERCB. An attachment was not included, nor a clear reference to which letter.		
22-Nov-12	email	Dan sent an email request for a meeting to discuss agreement and feedback regarding the potential terms		meeting to discuss agreement regarding the Robb Trend
28-Nov-12	email	Dan sent another email request for a meeting to discuss agreement and feedback regarding the potential terms		meeting to discuss agreement regarding the Robb Trend
30-Nov-12	email	Series of emails confiming Dec. 5th as meeting date, details of location and time still to be worked out		meeting to discuss agreement regarding the Robb Trend
03-Dec-12	email	Aboriginal Group E representative confirmed details of Dec. 5 meeting		meeting to discuss agreement regarding the Robb Trend
05-Dec-12	meeting, Sunchild First Nation	Discussion of terms of agreement, annual funding for community, cultural, and youth events as well as Christmas donations.		CVRI to provide a revised draft of potential terms
13-Dec-12	mail	Dan mailed copy of bi-monthly consultation update		
08-Jan-13	mail	Dan sent as PDF on DVD the CVRI, Robb Trend Project Supplementary Information Request Responses. Dan notified that the government review process of the project application has been initiated and after reviewing this document if their are any specific outstanding concerns regarding the Robb Trend Project they can be directed to Les LaFleur, Fares Haddad (ERCB), Margot Trembath (ESRD) or Sean Carriere (CEAA).		

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19-Feb-13	mail	Dan mailed copy of bi-monthly consultation update		
17-Apr-13	mail	Dan provided a copy of the bi-monthly consultation update		
06-Jun-13	email	Dan emailed Aboriginal Group E representative noting that he had heard he was back with Sunchild TLU department, requesting a meeting with he, Chief and council to discuss the Robb Trend Project and the terms of a potential agreement. This exchange culminated in emails of June 11 suggesting a meeting on June 18 (never confirmed),		Meeting to discuss a potential agreement
17-Jun-13	email	Series of emails setting a date of June 21 for a meeting.		Meeting to discuss a potential agreement
21-Jun-13	meeting, Sherritt Offices, Edmonton	Les indicated a desire to resume talks towards finalizing an agreement. After a brief discussion of history of discussions with Aboriginal Group E representative and past Chief, Les agreed to send Aboriginal Group E representative the last draft discussed, and Aboriginal Group E representative would set up a meeting with Chief and Council. Other questions which arose during the discussions include impact to big game and fish, moose, mercury, animal health, visits to reclaimed areas.		Meeting to discuss a potential agreement
24-Jun-13	email	Les emailed Aboriginal Group E representative the November 13, 2012 letter to Aboriginal Group E Chief with potential terms for an agreement.		
04-Jul-13	phone	A meeting was set for July 8 at Aboriginal Group E with Chief to discuss the project and agreement. Confirmed with follow-up email.		

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08-Jul-13	meeting, Aboriginal Group E	At a meeting prior to Chief and Council, Aboriginal Group E representative and Les discussed the history of the agreement and its terms. At meeting with Chief, Les provided tobacco, and handed out project maps. Les provided project background. Discussion of the agreement resulted in council indicating it needed more time to think about the Project before discussing. Questions that arose during discussions included extent areas have been logged, history of Sunchild TUS studies with Project, employment opportunities, training and safety "tickets," contracting opportunities.		Additional meeting to discuss a potential agreement
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns. Mary also povided a copy of the June bi-monthly consultation report.		
22-Jul-13	email	Sent CVRI Newsletter and Robb Trend Project update including information about Open Houses and Information Sessions in August and September		
19-Aug-13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		

Bi-Monthly Consultation Report

Project Name:		**Date of Report Submission:**	04-Oct-13
FN or Aboriginal Group Consulted	J	**Reporting Period (From m/d/y to m/d/y)**	**01/23/2013 to 04/10/2013**

COMMUNICATIONS/ACTIVITY LOG				
Date of First Nation Contact	Method of Contact and/or activity (Direct mail, Phone call, Email, Meeting, Other)	Summary of Issues Discussed	Outcomes	Follow-up/Outstanding Issues (these should link back to previous reports)
23-Jan-13	email	Letter discusses general Aboriginal Group J uses of the region and indicates that the Project will impact Aboriginal Group J Treaty rights to hunt, fish, and trap in the region. The letter details concerns about impacts to several species of animals, hydrology, and fish habitat. The letter requests formal inclusion in the consultation process.		
21-Feb-13	email	Aboriginal Group J representative indicated that he had heard from legal counsel of CVRI's willing to meet. However, given that the Provincial and Federal governments have overlooked their concerns, they would be filing regulatory objections. Nonetheless, suggested meeting dates in March		
27-Feb-13	email	Les LaFleur indicated a willingness to meet in March to discuss Aboriginal Group J concerns regarding the project.		
01-Mar-13	email	CEAA indicated that Aboriginal Group J is not recognized as a separate band. If confirmed by another FN, CEAA will continue to consult on potential impacts to established Aboriginal and Treaty rights.		

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01-Mar-13	email	CEAA indicated that Aboriginal Group J is not recognized as a separate band. If confirmed by another FN, CEAA will continue to consult on potential impacts to established Aboriginal and Treaty rights.		
13-Mar-13	email	Carcey confirmed to Les that Alberta does not require CVRI to consult with Aboriginal Group J on the project and has informed Aboriginal Group J of this decision		
02-Apr-13	MLT office, Edmonton	Discussion of hunting & fishing in project area, Aboriginal Group J industry businesses, "compensation agreement" for use of land, and Aboriginal Group J process of TLU report, EIA review and community agreement.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements
04-Apr-13	email	Aboriginal Group J representative emailed to Les an attached Information Sharing Agreement and Scope of Work for Traditional Land Use Study for the Robb Trend, for his review.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements
10-Apr-13	email	Aboriginal Group J representative emailed to Les a sample Aboriginal Group J TLU study report example for his review.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements
04-Jun-13	email	Les emailed Aboriginal Group J representative in response to the Aboriginal Group J Information Sharing Agreement and TLU proposal of the Robb Trend with some follow-up questions.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements

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07-Jun-13	email	Aboriginal Group J representative emailed Les in response to previous email indicating TLU budget costs and possible collaborations to reduce costs, Aboriginal Group J legal counsel review of Information Sharing Agreement and confidentiality, SOC letter, consultation efforts and working towards agreement of TLU study.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements
24-Jun-13	email	Les emailed Aboriginal Group J representative with some follow-up questions and comments regarding the proposed Whitefish TLU study of the Robb Trend.		Scope and Scale of TLU studies to be determined, continued discussions regarding Robb Trend agreements
27-Jun-13	phone	Aboriginal Group J representative indicated that Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J are considering a joint traditional use study to economize, suggested a meeting the following Friday to discuss, with a follow-up meeting after between the two to discuss a benefits agreement.		Meeting to be scheduled to continue discussions of Robb Trend Project
03-Jul-13	email	Responding to an earlier request, Aboriginal Group J representative indicated that he had lined up representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J for a meeting on July 5 at MLT's offices, and a suggestion that he and Les meet alone later.		Meeting to be scheduled to continue discussions of Robb Trend Project

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05-Jul-13	meeting, MLT offices, Edmonton	Meeting with Aboriginal Group J representative and representatives from Aboriginal Group F, Aboriginal Group A, and Aboriginal Group J.		Meeting to be scheduled to continue discussions of Robb Trend Project
11-Jul-13	email	On behalf of Aboriginal Group J, Meaghan M. Conroy submitted an official Statements of Concern to the ERCB and AESRD regarding the Robb Trend application. This letter asserts that the Project has the potential to affect Aboriginal Group J Treaty rights to hunt, fish, gather, and trap. The letters include affidavits from "harvesters" indicating general use of the region including the project area. The letter cites cocern of impact to traditional activities, wildlife, aquatic resources, air quality, noise, human heaht risks, habitat fragmentation and reclamation. The letter sites that the application should be denied because the Crown has not properly consulted regarding their treaty rights impacted by the project. They request intervenor status at hearings, and request that the application be denied.		
18-Jul-13	mail	Mary sent as PDF on DVD the second round of CVRI Robb Trend Project Supplementary Information Request Responses, with similar names and addresses of contacts at Coal Valley and regulatory agencies to communicate any concerns.		

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19-Aug-13	email & mail	Jim emailed and emailed an invitation to the Robb Trend Information Session, Tour and Open House.		
21-Aug-13	mail	Kendra sent as PDF on DVD a corrected version of the second round of CVRI Robb Trend Project Supplementary Information Request Responses.		
05-Sep-13	email	Aboriginal Group J representative sent to Les an attached budget for a joint Aboriginal Group F and Aboriginal Group J TLU study of the Robb Trend.		Meeting to be scheduled to continue discussions of Robb Trend Project
20-Sep-13	mail	MLT sent affadavits supporting their statement of concern of July 10, 2013. The letter also indicated that Aboriginal Group J has decided not to make an application for confidentiaility under the AER rules of practice in relation to these affidavits.		

Appendix 6

AER Supplemental Document to SIR #3
Mine Plan Update

AER Supplemental Document to SIR #3
Mine Plan Update

Introduction

Coal Valley Resources Inc. (CVRI) submitted a Mine Permit Amendment application (Environmental Impact Assessment – EIA) for the Robb Trend Project (Project) in April, 2012.

Since then the application has been under review by public, stakeholders and government agencies (federal and provincial) including the Alberta Energy Regulator (AER). The regulatory review has raised numerous questions, provided commentary on the proposed plans, and requested consideration of various alternatives.

Three Supplemental Information Requests (SIRs) have been made by government agencies with responses filed by CVRI for each round:

a. Response to SIR #1 was submitted December, 2012;
b. Response to SIR #2 was submitted June, 2013; and
c. This report forms part of the SIR #3 response material.

This review process has resulted in the determination that several minor 'revisions' to the original Project plan concept should be incorporated into the Project plan where a lesser degree of environmental impact or a greater degree of mitigation would result thus reducing potential risk of impact.

Mine Plan Revisions

CVRI is now including several 'revisions' to the conceptual mine plan. Figure 1 and Table 1 illustrate the general location of several revised areas while other changes are incorporated throughout the Project area. The following discussion will present:

1. What is the proposed revision?
2. Who requested the change or why is the revision proposed?
3. What is the justification?
4. What is the impact on the conceptual mine plan?

Table 1 Robb Trend Project – Revised Mine Permit Area[1]						
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
	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	12	LSD 10; SE; SW; NW
48-19-W5M	3	LSD 4			16	LSD 4, 5, 14; NE
	4	SW; SE; LSD 11, 12, 13			17	LSD 1, 7, 8; NE
	5	NW; NE; SE, LSD 6			19	LSD 15, 16
	6	SW; NE; NW			20	LSD 11, 13, 14; SE; NE
	7	All			21	LSD 9, 10, 15; SE; SW; NW
	8	LSD 1, 2, 7, 11, 12; SW			28	LSD 3, 4, 5
	18	LSD 1, 2, 12; SW			29	LSD 9, 10; SE; SW; NW

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

Table 1 Robb Trend Project – Revised Mine Permit Area[1]						
TWP-RGE	**Sec**	**LSD/QTR**		**TWP-RGE**	**Sec**	**LSD/QTR**
48-20-W5M	1	LSD 1, 8, 9, 16			30	LSD 3, 5, 6; SE; NE; NW
	8	LSD 10, 15		49-22-W5M	31	SE; S and NW portion of LSD 3, LSD 4
	12	NE; SE			32	LSD 4
	13	LSD 3, 5, 6; NE; NW; SE			25	LSD 9, 16
	14	LSD 9, 15, 16				
	17	LSD 2, 7, 12; SW				
	18	NE				
	19	LSD 3, 6, 9, 10; SE				
	20	LSD 4, 5, 6, 7, 8, 11, 12, 14; NE				

CVRI is integrating the following mine plan changes into the Project in order to accommodate stakeholder concerns and attain improvements within the overall development plan. Minor loss in coal reserves will result in return for significant reductions in risk of environmental impact. The resulting development plan will remain as guidance for detailed mine development plans to be submitted in subsequent approval stages.

1. **West Limit**
   a. CVRI is proposing realignment of the proposed Mine Permit with the permit currently assigned to Mancal. Such a revision would avoid any overlap by making the boundaries congruent. Figure 2 illustrates the proposed revised boundary in this area.
   b. AER raised questions regarding this boundary area (See SIR #2, Question 2).
   c. As indicated in SIR #2 (Question 2) it is the intent of CVRI to work jointly with Mancal when appropriate to establish a suitable mutual boundary for mining that would evenly share the coal reserves within the adjoining coal leases.
   d. The revision will allow for future negotiation of the 'property' boundary to enable recovery from the adjacent coal leases.
2. **Robb West, Mynheer Pit**
   a. A change in the sequence of mining in Robb West will be incorporated into the revised mine plan in order to lessen the risk of impact on Bryan Creek.

      Figure 3 illustrates the revised channel route for Bryan Creek. Instead of routing the creek through Lake 2 the creek is routed through the reclaimed Mynheer Pit. This accommodates restoration of stream habitat for fish.
   b. Environment and Sustainable Resource Development (ESRD) and the Department of Fisheries and Oceans (DFO) had questioned levels of impact in the Bryan Creek area with requests to consider options to increase stream habitat in the reclaimed profile.

c. By mining the eastern limb of the Mynheer Seam first a reclaimed stream channel can be accommodated within the reclaimed pit for the final placement of Bryon Creek as a stream channel instead of flowing through a lake. This scheme keeps Bryan Creek as stream habitat. This lowers the risk of decreased long term fish habitat loss (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

d. The revision does not affect any change to coal recovery quantities.

3. Robb West, Mine Limit

a. The 'buffer zone' between Robb West and the Hamlet of Robb will be increased to lessen the risk of potential impact within the community. A buffer zone of 800 m is recommended between the proposed mining limit and the Hamlet boundary.

Figure 4 illustrates the proposed 800 m buffer surrounding the Robb Hamlet boundary. On the western side of the community this increased buffer would result in mining activity being moved westward. Additional forest area could be retained between the mine area and the community to aid in dust and noise control in addition to serving as additional visual barrier. Commonly used walking and quad trails utilized by the community would also be retained.

Figure 3 illustrates the revised reclamation plan resulting from this mine plan revision. The eastern end of Lake 2 will be shortened thus reducing the lake size. Additional changes to the reclamation plan could result from further changes in mining sequence which would increase in-pit backfill (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

b. Public comments during consultation favored a greater separation between mining activity and residential areas in order to lessen possible noise, dust and visual impacts. ESRD and AER raised concerns regarding possible groundwater impacts from mining activity within abandoned underground workings and private water wells.

Robb Hamlet Preservation Association (RHPA) has specifically focused on an increased buffer distance. The concept of an 800 m buffer has been presented to RHPA and has been generally accepted.

c. By increasing the 'buffer distance' between mine activity and residential areas the risk and frequency of possible dust and noise impacts can be lessened. Added separation also accommodates greater retention of forest cover which aids impact reduction and adds further visual barriers.

This revision also accommodates reduction of impact on Bryan Creek, particularly fish habitat. The revised plan also accommodates improvements in diversion and reclamation plans for Bryan Creek.

d. The additional buffer zone moves the proposed mining limit approximately 350 m westward. CVRI estimates a potential loss of 975,000 RMT of reserves[2] as a result.

CVRI notes that the Val d'Or Seam within this area has been subject to underground mining which has reduced the available reserve.

The Mine Permit Boundary requires adjustment for the increased buffer. Figure 4 illustrates the boundary proposed for this area.

[2] Estimate = Strike Length 350 m x Seam thickness 14 m x Dip Slope 140 m x 1.42 = 974,120 RMT (rounded to 975,000 RMT)

4. Robb Main, Mine Limit

a. The 'buffer zone' between Robb Main and the Hamlet of Robb will be increased to lessen the risk of potential impact within the community. A buffer zone of 800 m is recommended between the proposed mining limit and the Hamlet boundary.

Figure 5 illustrates the proposed 800 m buffer surrounding the Robb Hamlet boundary. On the eastern side of the community this increased buffer would result in mining activity being moved eastward. Additional forest area could be retained between the mine area and the community to aid in dust and noise control in addition to serving as additional visual barrier. Commonly used walking and quad trails utilized by the community would also be retained. Please note that the proposed Mine Permit Boundary would also be revised to accommodate this revision.

Figure 3 illustrates the revised reclamation plan which would result from the proposed mine plan change. The western end of Lake 3 would be shortened leaving portions of Hay Creek undisturbed.

b. Public comments during consultation favored a greater separation between mining activity and residential areas in order to lessen possible noise, dust and visual impacts. ESRD and AER raised concerns regarding possible groundwater impacts from mining activity within abandoned underground workings and private water wells. Robb residents raised concerns for retaining the 'tank' site found along Hay Creek.

Robb Hamlet Preservation Association (RHPA) has specifically focused on an increased buffer distance. The concept of an 800 m buffer has been presented to RHPA and has been generally accepted.

c. By increasing the 'buffer distance' between mine activity and residential areas the risk and frequency of possible dust and noise impacts can be lessened. Added separation also accommodates greater retention of forest cover which aids impact reduction and adds further visual barriers.

In the case of Robb Main the added buffer moves the mine limit eastward of the Lakeside Mine abandoned workings. This aids in removing potential 'intersection' with flooded underground workings and resulting possible direct impact to private water wells within the hamlet.

The revised boundary would retain the 'tank' site on Hay Creek which has been identified by local residents as an important landmark.

Portions of upper Hay Creek would be retained (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

d. The additional buffer zone moves the proposed mining limit approximately 400 m eastward. CVRI estimates a potential loss of 995,000 RMT of reserves[3] as a result.

The Mine Permit Boundary requires adjustments for the increased buffer. Figure 5 illustrates the boundary proposed for this area.

5. Increased In-Pit Backfill

a. Subsequent mine planning will consider increased proportion of in-pit backfilling in order to achieve improved end pit lake configurations including littoral zones and 'land bridges' to accommodate stream connectivity.

[3] Estimate = 400 m x 14 m x 125 m x 1.42 = 994,000 RMT (rounded to 995,000 RMT)

b. ESRD and DFO had raised questions regarding alternatives to decrease fish habitat loss and improved end pit lake design to enhance fish habitat capability. These concerns included reduction of lake habitat in favour of increased stream habitat, increased littoral zones within end pit lakes, and greater stream connectivity.

c. CVRI believes that adjustments to the mining sequence, dumping plans and backfill sequences can be accommodated to provide requested improvements in the reclaimed terrain profile.

d. The changes can be expected to be accommodated without any reduction in the mined reserves.

6. Erith River Diversion – Mynheer Pit

a. A change in the reclamation sequence of mining in Robb Main/Center will be incorporated into the revised Project plan in order to lessen the risk of impact on the Erith River.

Figure 3 illustrates the revised routing for Erith River through the reclaimed Mynheer Pit. Previously this pit was left as a narrow end pit lake. In the interest of restoring stream fish habitat, the lake has been replaced with a stream channel (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

b. ESRD and DFO had questioned the levels of impact in the Erith River area with requests to consider options to increase stream habitat in the reclaimed profile.

c. Changes in the mine sequence within McPherson and Mynheer Pits in the Erith River valley are recommended so that stream habitat may be maintained throughout the diversion periods of the river. Once mining in the McPherson Pit is complete the floor of the pit should be reclaimed as a stream channel to carry the Erith River. This would accommodate the river flow while the Mynheer Pit is mined. Upon completion of mining of the Mynheer Pit it should be reclaimed to accommodate a stream channel in the pit floor, the length of the pit. This would then accommodate the final Erith River flow route. This revision replaces Lake 4 with a stream channel.

d. The revision does not affect any change to coal recovery quantities.

7. Drop Mining in ERT1

a. It is proposed to delete mining of approximately 600 m of Mynheer Pit in the Erith River Tributary 1 (ERT1).

Figure 3 illustrates the area which would be excluded from mining. A segment of ERT1 would be retained and remain connected to lower reaches of Erith River.

b. ESRD and DFO had questioned levels of impact in the ERT1 area with requests to consider options to retain fish spawning area and lessen the risk of fish impact.

c. Elimination of approximately 600 m of Mynheer Pit would permit retention of an important reach of ERT1 which has been identified as a favourable fish spawning location. This feature could be an important contribution to maintaining fish populations in the Erith River channels (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

d. Elimination of this portion of the Mynheer Pit would result in a reduction of approximately 540,000 RMT of reserve[4].

8. Drop Mining in Portions of Bacon, Halpenny and Lendrum Creeks

a. It is proposed to delete mining of 1,000 m of Mynheer Pit in the Bacon & Halpenny Creek area.

Figure 7, 8, and 9 illustrates the locations of these revised mine areas. Portions of the Mynheer Seam would be left in place in order to retain creek stream beds thus maintaining undisturbed flows and retaining fish habitat.

b. ESRD and DFO had questioned levels on impact in the Bacon Creek area with requests to consider options to retain stream habitat and lessen the risk of fish impacts.

c. Elimination of approximately 1,000 m of Mynheer Pit would permit retention of portions of Bacon, Halpenny and Lendrum Creek tributaries. These features are considered important connections for maintenance and recovery of fish populations in the parent channels (See *Summary of Fish Habitat Impacts, Mitigation and Habitat Compensation Strategies*).

d. Elimination of these portions of the Mynheer Pit would result in a reduction of approximately 895,000 RMT of reserve[5].

9. Pembina River Buffer

a. An increased buffer between the proposed mining limit and the Pembina River floodplain is proposed to provide wildlife movement and increased geotechnical stability in the pit end wall conditions including groundwater flows.

Figure 10 illustrates the reduced mining area. The eastern end of the Val d'Or Pit would be removed from the mine plan in order to provide a greater buffer between mining and the Pembina River.

b. ESRD and AER have raised concerns regarding limited separation between the proposed mining limit and the Pembina River floodplain.

ESRD has focused on possible wildlife movement around the end of the proposed development and the adequacy of space to accommodate such movements.

AER has raised concerns regarding end pit wall stability and possible groundwater influence between the end pit lake and the Pembina River flows.

ESRD and DFO have raised questions regarding diversion of the Pembina River Tributary (PET1) from the Pembina River system to the Lund Creek system. Alternatives to lost stream habitat have also been requested.

c. It is prudent to accommodate an increased buffer zone between proposed mining and the Pembina River floodplain until greater detail regarding geology, ground conditions and groundwater flows can be determined.

[4] Estimate = 600 m x 7 m x 90 m x 1.42 = 536,760 RMT (rounded to 540,000 RMT)
[5] Estimate = 1000 m x 7 m x 90 m x 1.42 = 894,600 RMT (rounded to 895,000 RMT)

d. Approximately 600 m strike length of the Val D'Or Pit has been temporarily removed from the mine plan. Exploration in this area has not been completed hence reserve estimates are preliminary. There is some indication that the over thickening of the Val d'Or Seam may not extend into this eastern extension. In this case mining would likely be reduced anyway.

   Future evaluations are proposed for consideration of this reserve area. The proposed buffer addition may contain approximately 1,705,000 RMT of reserve[6].

   The proposed Mine Permit in this area should not been revised so that this reserve may be considered in the future.

These Project mine plan alterations have been proposed to accommodate requested modifications focused at reductions in environmental impact, increased mitigation or reduction in the risk of impacts. Table 2 summarizes the estimated changes to the coal reserves resulting from these alterations.

A total of 3,405,000 RMT of coal will be excluded from the mine development plan in order to achieve the accommodations requested. Of this quantity approximately 60% of the reduction is associated with an increased buffer around the Robb Hamlet. The remainder of the reduction is associated with avoidance of sensitive fish habitat by retaining existing stream beds.

An additional 1,705,000 RMT may be excluded should future accommodations be necessary to accommodate an increased buffer to the Pembina River. Further exploration drilling is required to confirm the magnitude of the reduction in reserve.

Table 2 Reserve Reductions – Based on Mine Plan Revisions

Item	Change	Reason for Change	Predicted Reduction (RMT)	Possible Reduction (RMT)
1	West End of Robb West Mine Permit	Joint Boundary	-	-
2	Bryan Creek Mine Sequence	Improved fish habitat	-	-
3	Mine Plan Mine Permit	Robb Hamlet buffer	975,000	-
4	Mine Plan Mine Permit	Robb Hamlet buffer	995,000	-
5	In-Pit Backfill Mine Plan	Improved fish habitat	-	-
6	River Diversion Mine Plan	Improved fish habitat	-	-

[6] Estimate = 600 m x 20 m * 100 m x 1.42 = 1,704,000 RMT (rounded to 1,705,000 RMT)

Table 2 Reserve Reductions – Based on Mine Plan Revisions				
Item	**Change**	**Reason for Change**	**Predicted Reduction (RMT)**	**Possible Reduction (RMT)**
7	Delete Creek Bed Mine Plan	Improved fish habitat	540,000	-
8	Delete Creek Bed Mine Plan	Improved fish habitat	895,000	-
9	Uncertain End Wall Future Mine Plan	Pembina River buffer	-	1,705,000
Total			**3,405,000**	**1,705,000**

Reclamation Plan Revisions

CVRI is now including several 'revisions' to the conceptual reclamation plan. A number of alternatives have been presented during the SIR process and mine plan changes will result in additional revisions. The following revisions will now be incorporated into the Project plan.

End Pit Lakes

ESRD SIR #2 Appendix 20 provided discussion of possible revisions regarding development of end pit lakes.

Assessment of these proposed changes has indicated potential HADD reductions and retention of valued stream channel habitat. CVRI is proposing integration of these revisions into the mine plan.

Lake 1 & 2

Mining through multiple phases will be able to attain further backfill of Lake 1 and 2 areas and provide a greater 'land bridge' separating the two lakes.

Therefore lake volumes will be decreased, maximum depth decreased and littoral area increased.

Bryan Creek will also be returned to flow through the Mynheer Pit thus retaining a stream channel.

Lake 3

Mining sequence will be established to provide greater in pit backfill for the Lake 3 area. The increased buffer beside Robb Hamlet will also reduce the length and volume of the lake.

Therefore, lake volume will be decreased, maximum depth decreased and littoral area increased.

Upper segments of Hay Creek will now be avoided thus leaving stream channel habitat.

Lake 4

Reclamation plans will be changed to delete Lake 4. The Erith River will be accommodated by a reclaimed stream channel.

Lake 5

A revised mining sequence will be able to reduce the size and depth of Lake 5. Backfilled 'land bridges' will sub-divide the lake into segments. These 'land bridges' will be shallow submerged features which can accommodate wetlands or interconnecting stream channels.

Therefore, lake volume will be decreased, maximum depth decreased, and littoral area increased. Accommodation of wetlands and stream channels will be provided on the shallow 'land bridge' features.

Stream Channels Retained

Segments of Erith, Bacon, Halpenny and Lendrun Creeks will be conserved as valued stream channel habitat. Such segments will provide connections between lakes and lake inlet channel habitat.

Lake 5/6 Bridge

The 'land bridge' between Lake 5 and 6 will be modified to provide for a constructed stream channel for the routing of Bacon Creek.

Therefore, stream channel habitat will be provided for connection of the upper and lower segments of Bacon Creek.

Lake 7, 10 & 11

Reclamation planning will be focused on establishing wetlands in place of Lakes 7 , 10 and 11.

Lake 12

Changes to the mining sequence are expected to provide greater in pit backfill opportunity to decrease the lake volume and maximum lake depth. A probable increased buffer to the Pembina River will aid further lake size reduction.

Lake Design Elements

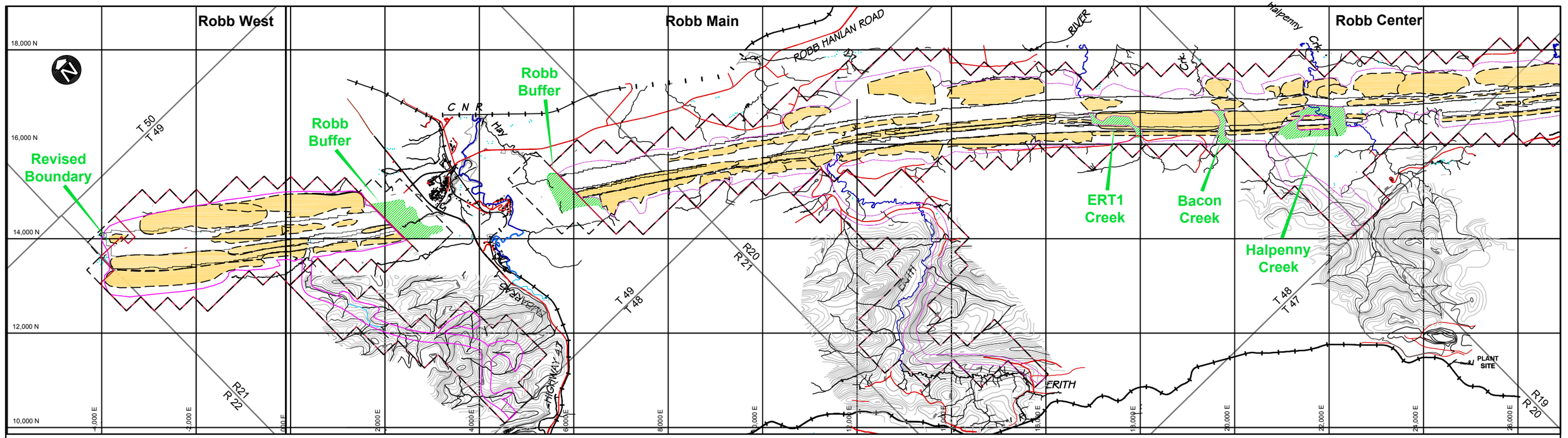
The revisions noted above reflect planning of lake designs that would better meet EPL Guidelines:

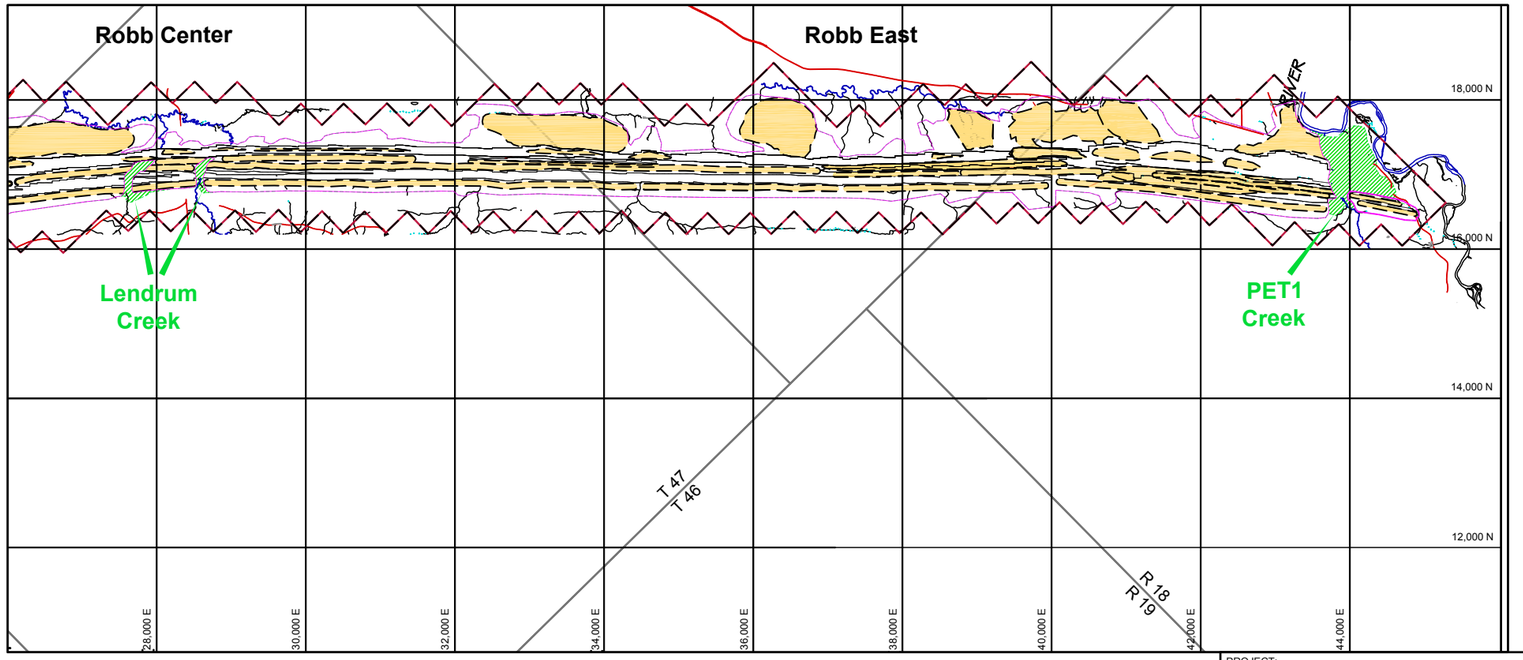
- Reduce maximum lake depth;
- Reduce lake fill time (reduced volume);
- Increase littoral area;
- Provide inlet and outlet channels;
- Provide 'flow through' water bodies; and
- Connect 'non-flow through' lakes with stream channels for possible 'control structures'.

Fish Habitat Net Loss/ Compensation Plan

CVRI has held several review discussions with DFO regarding fish habitat and corresponding compensation strategy. Through Project plan incorporation of the revisions addressed above will result in a 'no net loss' outcome. The details of these plans are provided as part of the SIR#3 response package.

Figures





Legend

- Rock Dump
- Area of Revision
- Revised Mine Permit

REF: CVRI, 2013.

0 1 2 3 4 km

SCALE 1 : 80 000

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

TITLE:

Mine Plan Revisions

...Final Docs\08-041b\2013\Fig 1 Mine Plan.dwg

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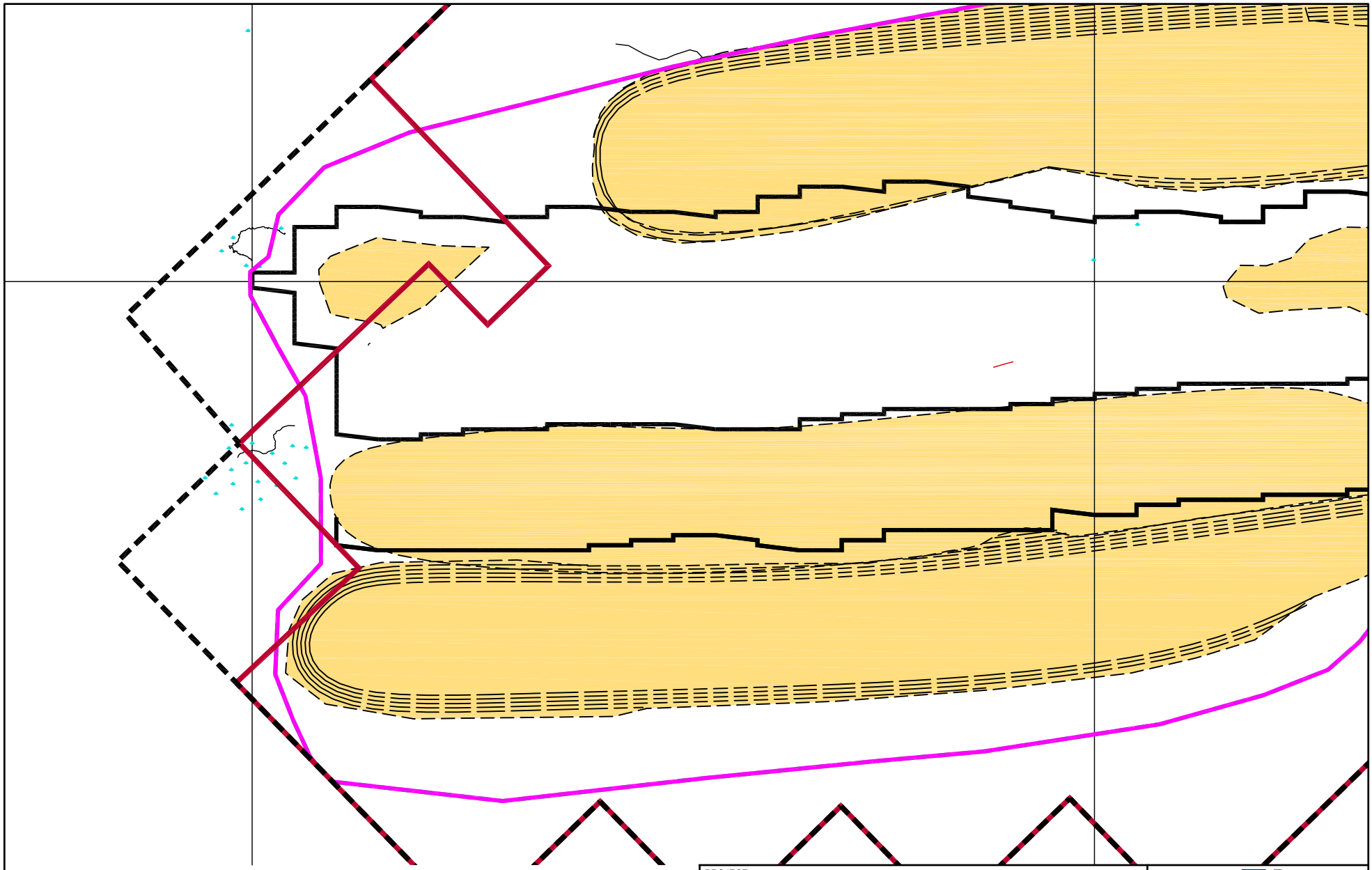
DATE: Mar 14/14	
PROJECT: 08-041b	



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

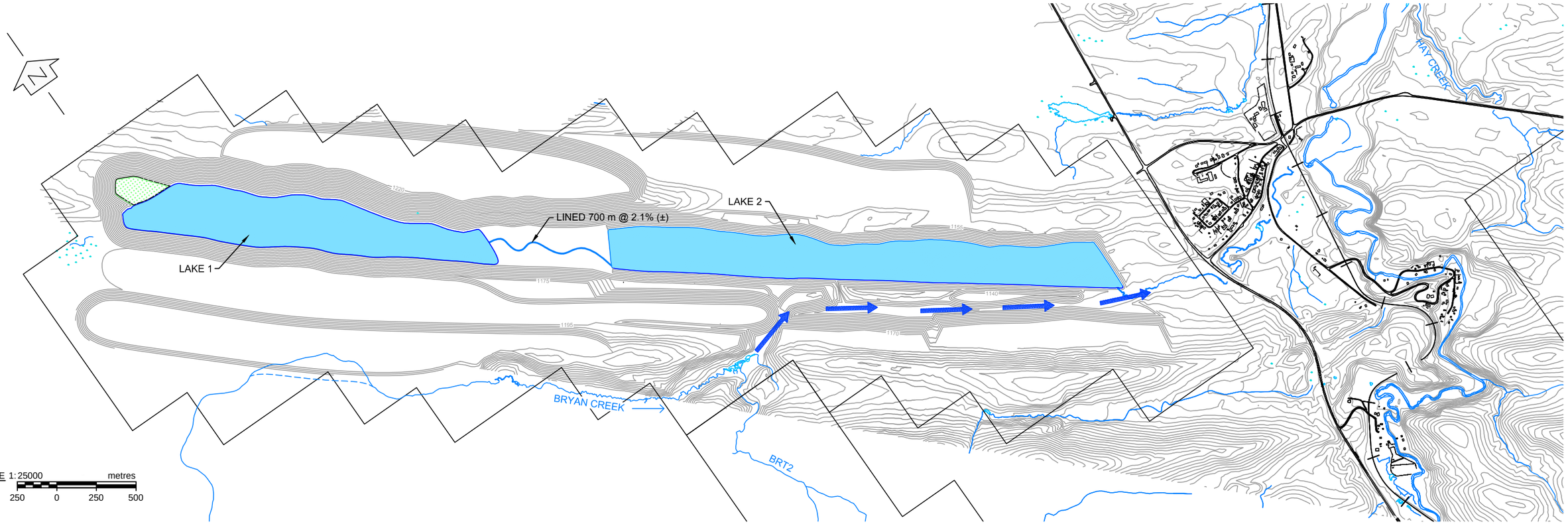
TITLE:

West End - Permit Change

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: **2**



LEGEND

- Lake
- Wetland
- Constructed Steams

REF: Matrix Solutions Inc., December 2011.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

TITLE:

Bryan Creek Channel

FILE: Final Docs\08-041b\DFO\Fig_Various.dwg

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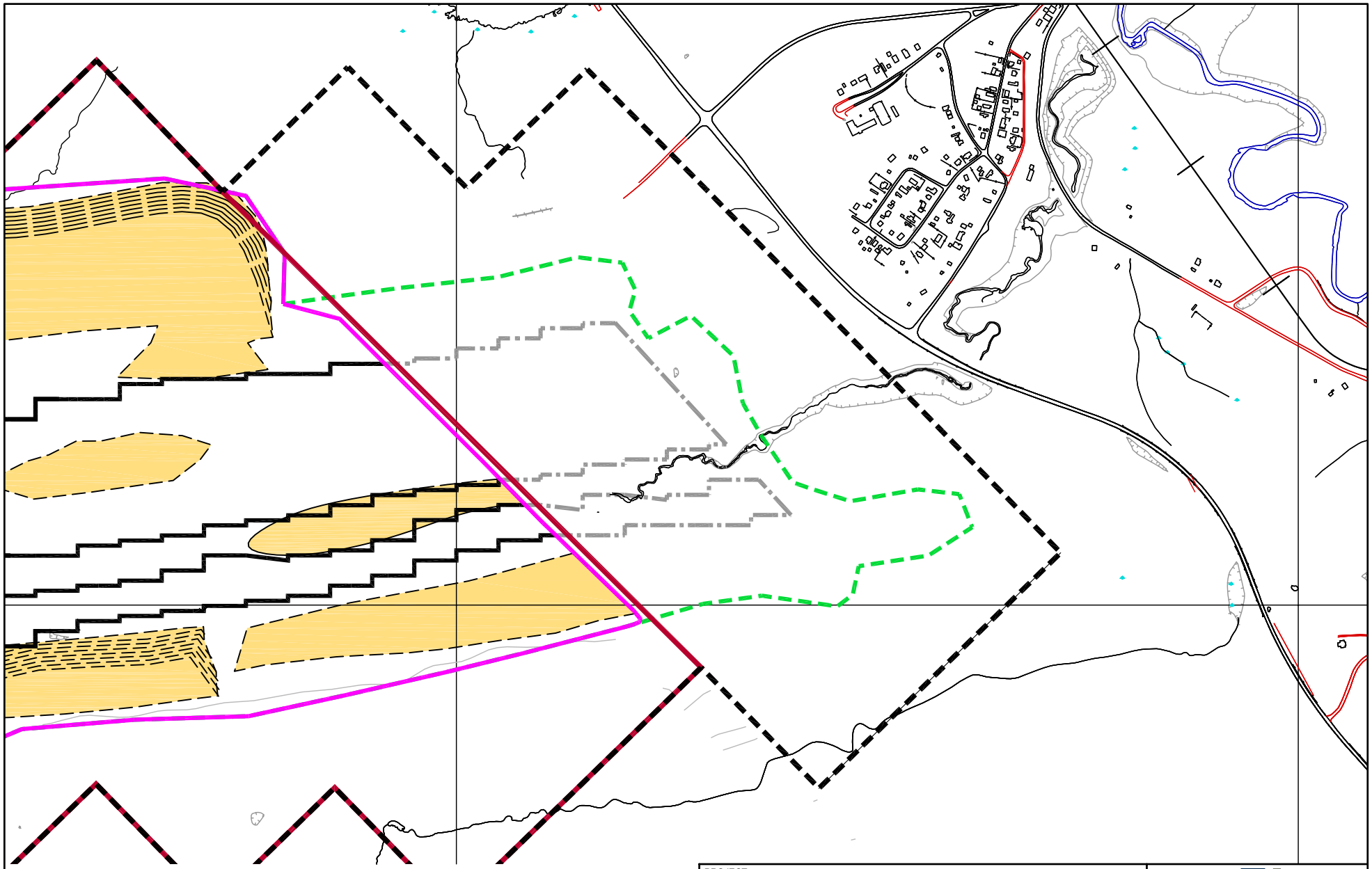
CHECKED: KP	
DATE: Mar 20/14	
PROJECT: 08-041b	



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

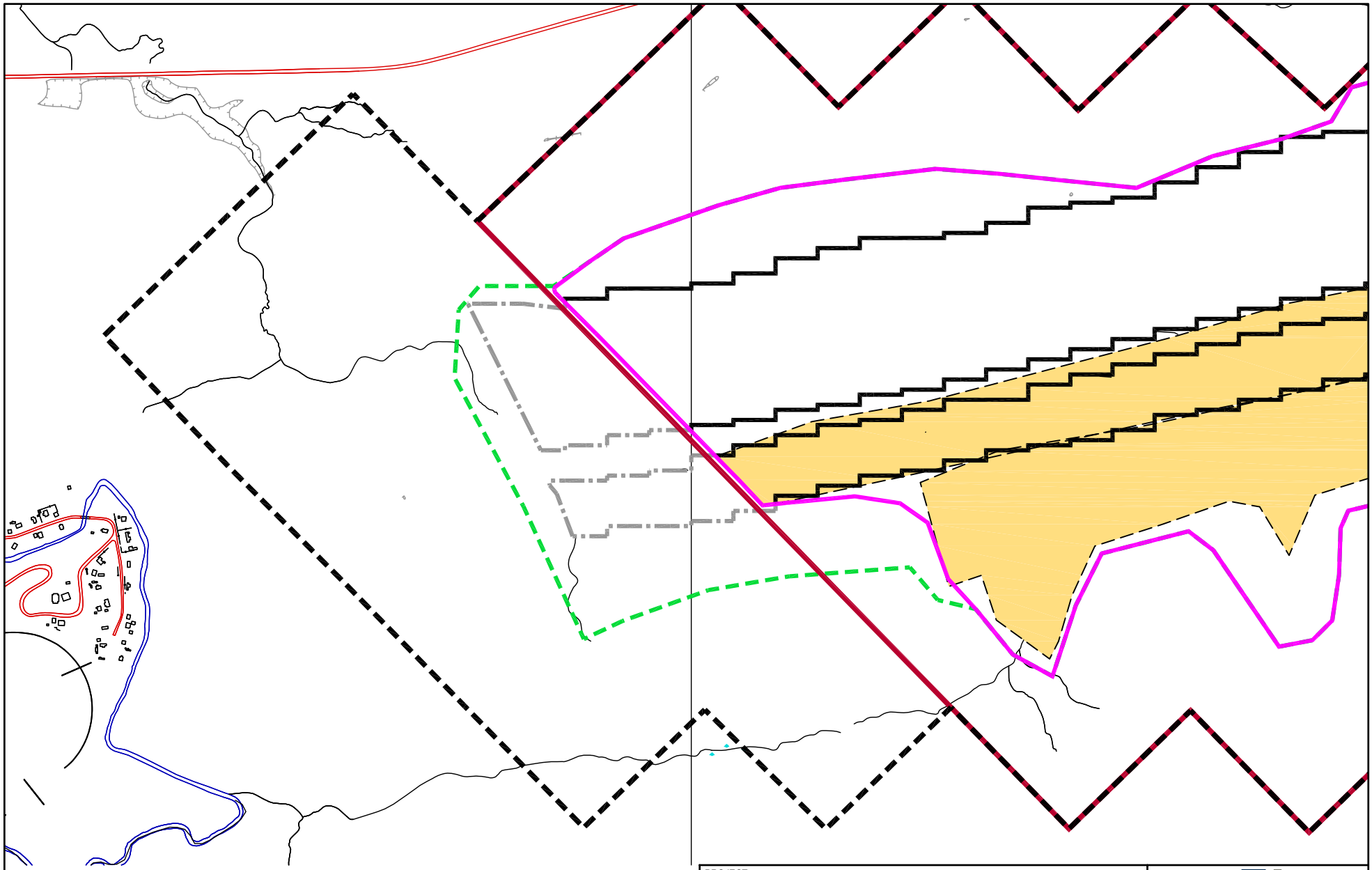
TITLE:

Robb Buffer

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: **4**



PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

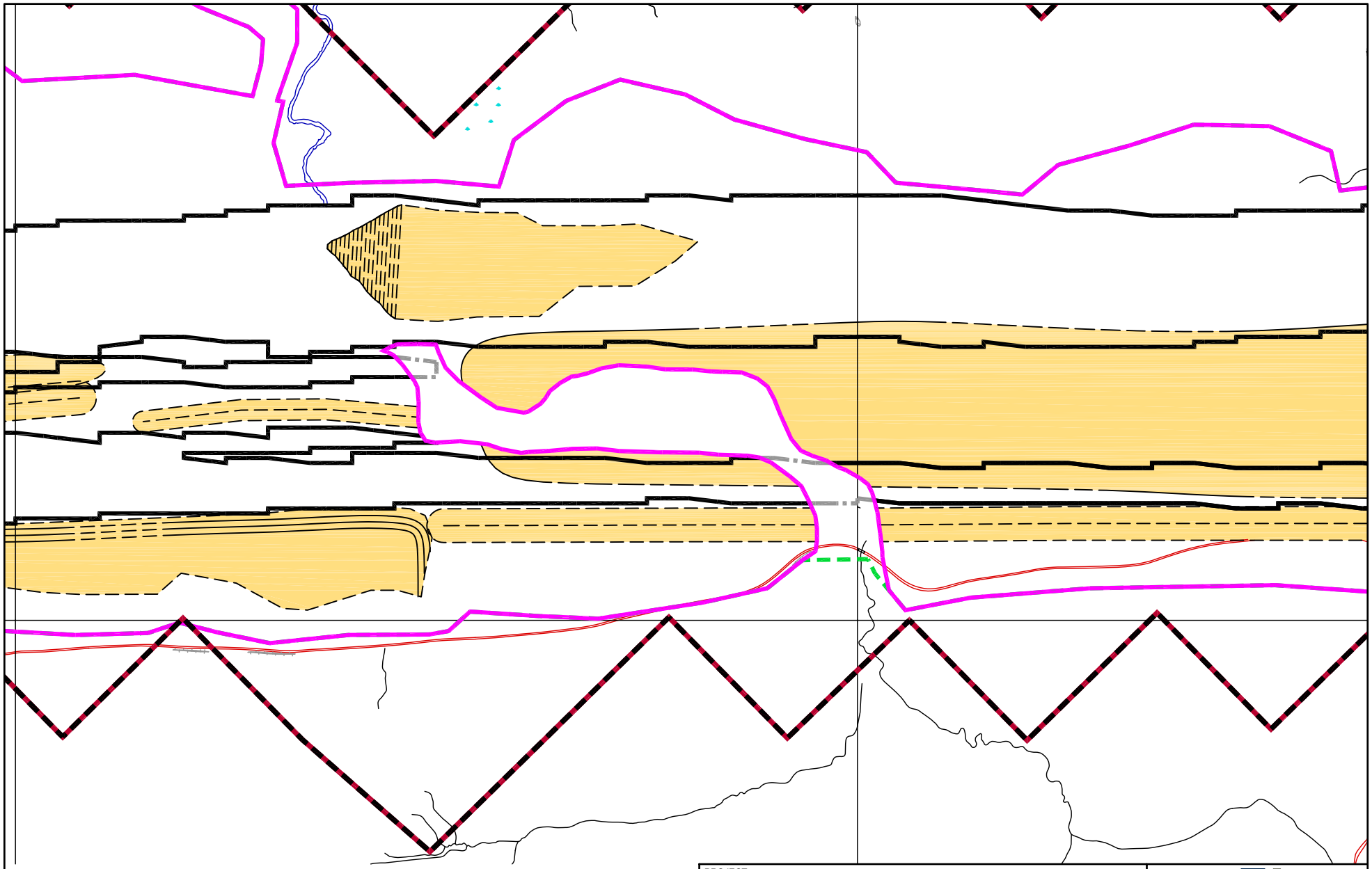
TITLE:

Robb Buffer

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: **5**



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

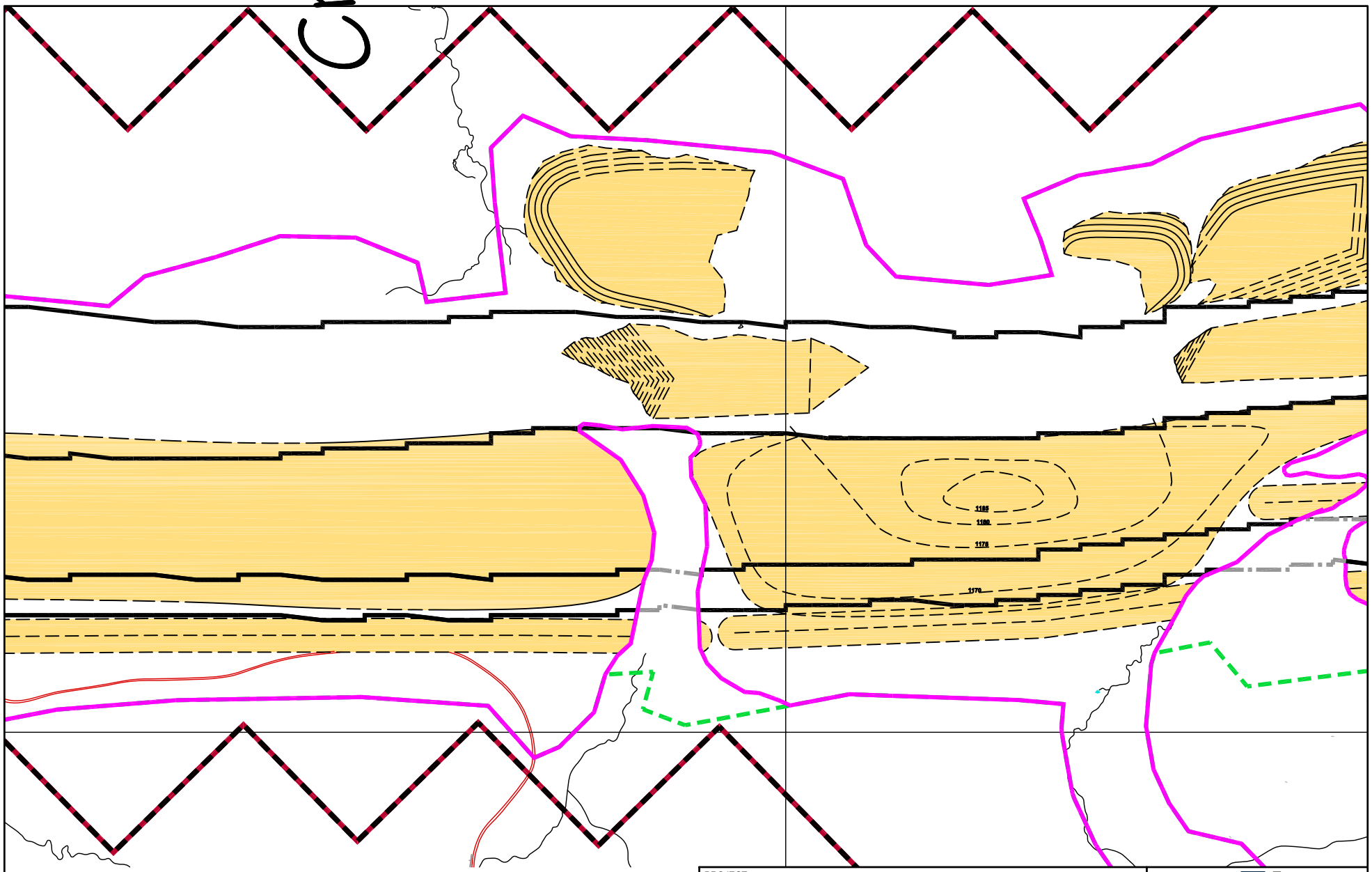
TITLE:

ERT1 Creek

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: **6**



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT: CVRI

Coal Valley Mine
Robb Trend Project

MILLENNIUM EMS Solutions Ltd.

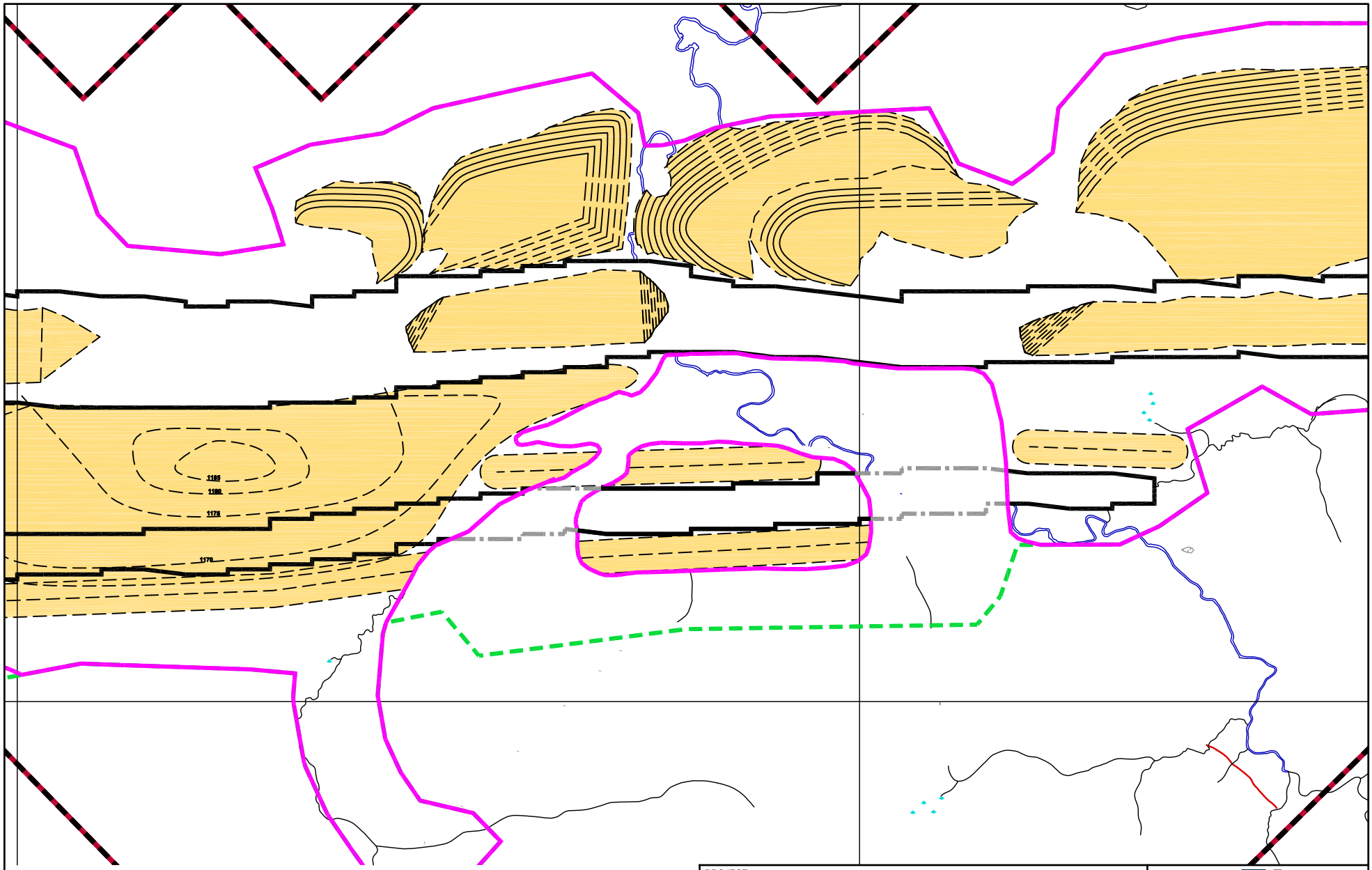
TITLE:

Bacon Creek

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: 7



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

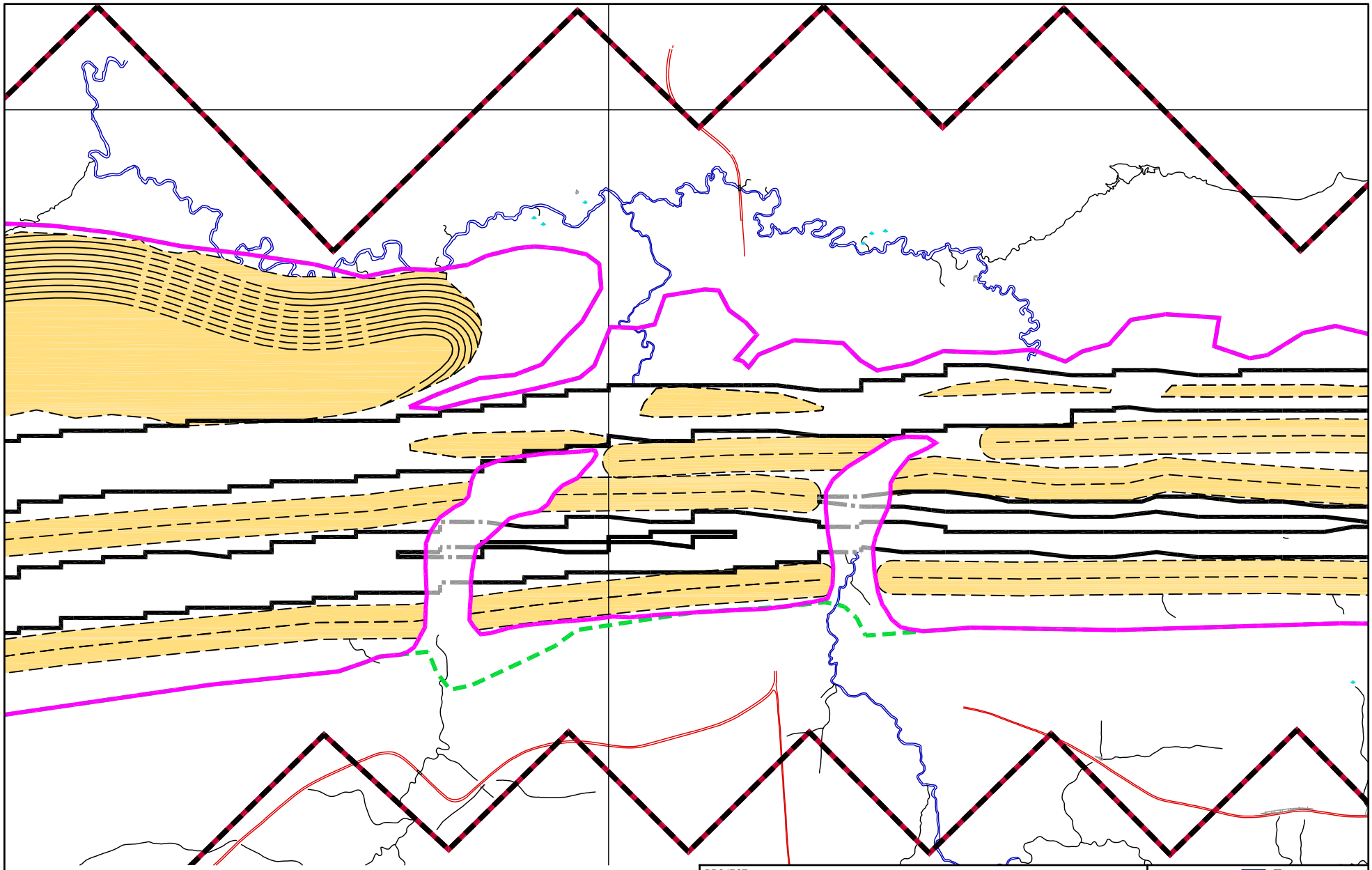
MILLENNIUM
EMS Solutions Ltd.

TITLE:

Halpenny Creek

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN: JG	FIGURE: 8
CHECKED: KP	
DATE: Mar 18/14	
PROJECT: 08-041b	



Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

TITLE:

Lendrum Creek

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN: JG	FIGURE:
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DATE: Mar 18/14	
PROJECT: 08-041b	

Legend

- Proposed Robb Trend Mine Permit Boundary
- Disturbance Limit - Modified
- Disturbance Limit - Not Being Mined
- Pit Limits
- Pit Deleted
- Revised Mine Permit Boundary
- Rock Dump

0 125 250 500m

Scale 1 : 12 500

REF: CVRI, 2013.

PROJECT:

cvri

Coal Valley Mine
Robb Trend Project

MILLENNIUM
EMS Solutions Ltd.

TITLE:

PET1 Creek

...Final Docs\08-041b\2013\Fig 2 thru 8 Details.dwg

DRAWN:	JG
CHECKED:	KP
DATE:	Mar 18/14
PROJECT:	08-041b

FIGURE: **10**

FIGURES

Robb West

Robb Main

Robb Center

Robb East

Revised Boundary

Robb Buffer

Robb Buffer

ERT1 Creek

Bacon Creek

Halpenny Creek

Lendrum Creek

PET1 Creek

PLANT SITE

ROBB HANLAN RUN

C N R

HIGHWAY 40

ERITH

RIVER

T 50
T 49
T 49
T 48
T 48
T 47
T 47
T 46
R 21
R 22
R 20
R 21
R 19
R 20
R 18
R 19

18,000 N
16,000 N
14,000 N
12,000 N
10,000 N

2,000 E
4,000 E
6,000 E
8,000 E
10,000 E
12,000 E
14,000 E
16,000 E
18,000 E
20,000 E
22,000 E
24,000 E
26,000 E
28,000 E
30,000 E
32,000 E
34,000 E
36,000 E
38,000 E
40,000 E
42,000 E
44,000 E

Legend

- Rock Dump
- Area of Revision
- Revised Mine Permit

REF: CVRI, 2013.

0 1 2 3 4 km

SCALE 1 : 80 000

PROJECT:

Coal Valley Mine
Robb Trend Project

TITLE:

Mine Plan Revisions

MILLENNIUM
EMS Solutions Ltd.

...Final Docs\08-041b\2013\Fig 1 Mine Plan.dwg

DRAWN: JG	FIGURE: 2-1
CHECKED: KP	
DATE: Apr 3/14	
PROJECT: 08-041b	