Appendix 26:
Rescan Environmental Serviced Ltd: Woodjam Gold-Copper Project Permitting Due Diligence Report

Cariboo Rose Resources Ltd.

Woodjam Gold-Copper Project Permitting Due Diligence

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Woodjam Gold-Copper Project
Permitting Due Diligence

May 2009
Project #1014-003

Prepared for:

GOLD FIELDS

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1. Introduction

Rescan Environmental Services Ltd. was retained by Gold Fields Ltd. to complete a permitting due diligence review for the potential development of the Woodjam property located near Williams Lake in the central interior of British Columbia.

The Woodjam claim area is located in the Horsefly River watershed which drains northwards into Quesnel Lake, leading through the Quesnel watershed northwest to the Fraser River watershed. Landforms in the area include rolling hills and forested areas of gentle sloping terrain, with few rock outcrop exposures. The land is generally covered by fir and pine forest with some old growth cedar.

The claim block is centred around the community of Horsefly, and 70 km east of Williams Lake, and covers a total area of approximately 480 km^2 (Cariboo Rose 2009). The elevation in the claim block area extends from approximately 850 m in marshy areas to approximately 1,240 m above sea level. See Project Location map (Figure 1-1) and Woodjam Claim Block (Figure 1-2).

The Project area experienced a climate typical of central interior of BC, with warm, wet summers averaging 24^oC in July, with an average of 400 mm of rain. Winters are cold (-18^oC in January) with November through March being the coldest months, and snow packs are typically 1 to 2 m by April. The period of mid-May to mid-August is generally frost-free.

The Woodjam claim area is highly mineralized, containing at least five documented copper-gold, copper only and gold only occurrences hosted by subvolcanic alkalic intrusives (Global Geological Services 2006). The Megabuck Zone has been most extensively studied. These mineralized zones are all situated approximately 10 km south of Horsefly, in the vicinity of upper reaches of Deerhorn Creek. Bedrock exposure is of limited extent, comprising some steeper hillsides, ridgetops and roadcuts. Lower areas are usually covered by extensive glacial till and alluvium, and numerous small lakes and marshes are found in the claims area.

Surface water quality in the Horsefly River just above Quesnel Lake is of slightly basic pH (7.2 to 8.2), with low to moderate alkalinity (25 to 70 mg/L as $CaCO_3$) and hardness (29 to 72 mg/L calculated as $CaCO_3$), based on a federal monitoring station (Environment Canada 2009). Water quality control and mitigation strategies will be important if a development were to proceed.

The Horsefly River and downstream Quesnel watershed and associated tributaries support a number of fish species including world-class rainbow trout, lake trout, Dolly Varden, bull trout (provincially blue-listed), several salmon species including chinook, coho, kokanee. and the Quesnel and Horsefly stock of Fraser River sockeye. Steelhead trout are also present in this system. Amphibian populations are also found in Horsefly Lake and surrounding small lakes. Whether the protected “Western Toad” is present or not is unknown at this time.

Wildlife in the area around Horsefly Park include moose, mule deer, coyotes, black bear, cougar and a number of small mammals including fisher, while wolves may be found in surrounding areas (BC Parks 2009). Some Mule deer conservation priorities are found in the Horsefly

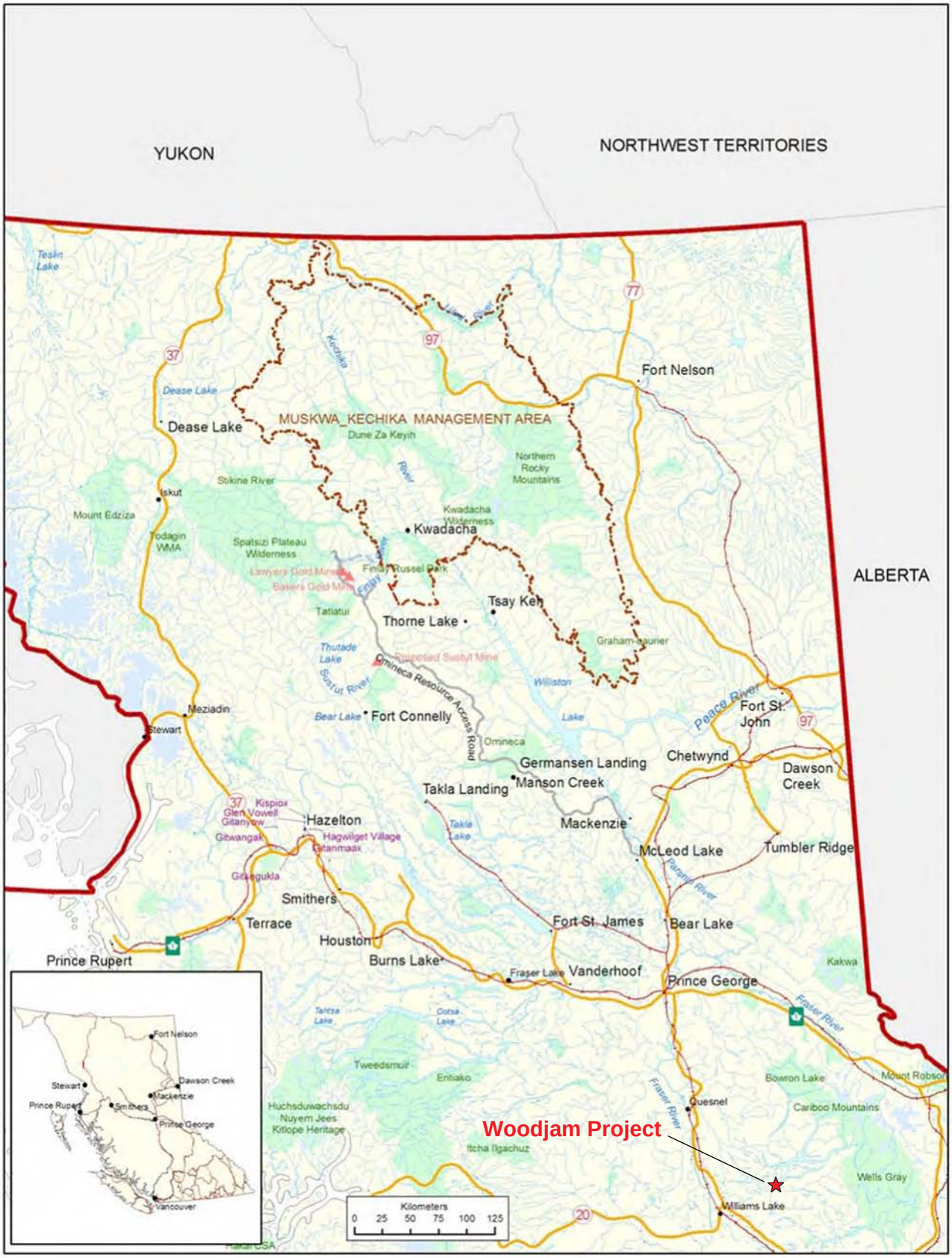
landscape unit among others. Project planning and management will incorporate requirements under the CCLUP Management Plan for winter ungulates. Habitat is ranked 'low capability' for grizzly bear usage (Integrated Land Management Bureau 2009b). Some waterfowl habitat is likely around wetlands, small lakes and creeks.

Under the CCLUP, the tenure land is classified mainly as Special Integrated Resource Development Zone land (most of the Horsefly River), with some Enhanced Resource Development Zone land near the deposit zones, and encompassing most of the downstream reaches and Quesnel drainage (Integrated Land Management Bureau 2009c).

The environmental assessment process in British Columbia is well defined. The regulatory framework for a project such as the Woodjam project will likely involve both the Canadian federal process under the *Canadian Environmental Assessment Act* as well as the *British Columbia Environmental Assessment Act* (BCEAA). Pursuant to the Canada-British Columbia Agreement for Environmental Cooperation (2004), the provincial and federal processes would likely be integrated into a harmonized review with the British Columbia Environmental Assessment Office (EAO) taking the lead.

This report includes the following sections:

- British Columbia Environmental Assessment Process
- Canadian Federal Environmental Assessment Process
- Canada-British Columbia Cooperation Agreement
- Regional Land Use Planning Process
- Woodjam environmental context
- Licences, Permits and Approvals
- Woodjam Permitting Timeline
- First Nations and Mining in British Columbia
- Woodjam First Nations context
- Proposed First Nations Engagement for Woodjam Project
- Summary of Strategy and Recommendations for Permitting Woodjam Project



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Woodjam Project Location

FIGURE 1-1

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PROJECT # 1014-003 GIS # WDF-15-001b May 20 2009

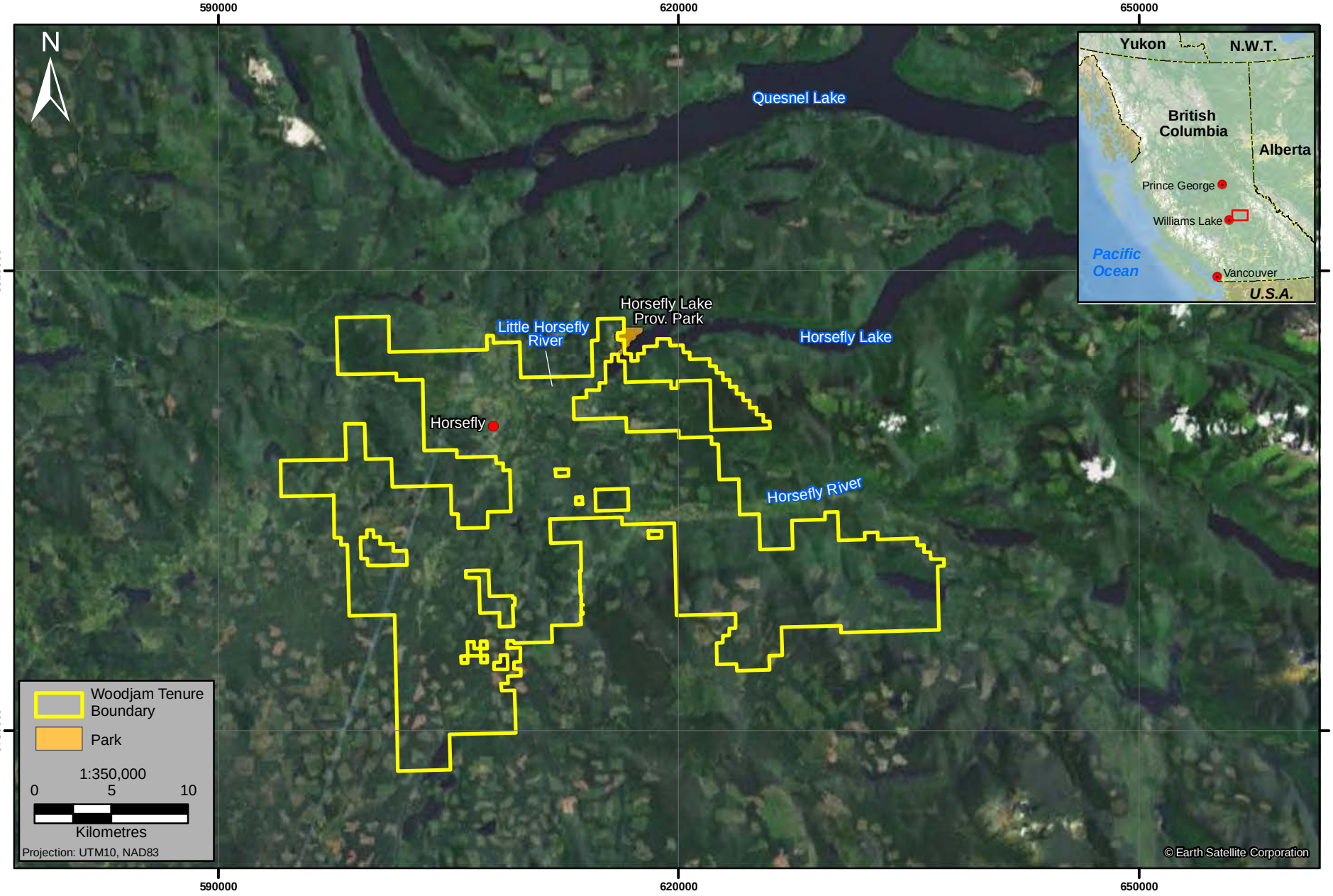

Figure 1-2

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Woodjam Claim Area

Figure 1-2

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2. ENVIRONMENTAL PERMITTING PROCESS

2. Environmental Permitting Process

2.1 British Columbia Environmental Assessment Process

2.1.1 British Columbia Environmental Assessment Act

The *British Columbia Environmental Assessment Act* (BCEAA) requires that certain large-scale project proposals undergo an environmental assessment and obtain an Environmental Assessment Certificate before they can proceed. The full text of the BCEAA can be found at http://www.qp.gov.bc.ca/statreg/stat/E/02043_01.htm.

The BCEAA process identifies and assesses the potential effects that may result from a proposed project and develops measures for managing those effects. In general, the BCEAA process includes the following four main elements:

- opportunities for all interested parties, including First Nations, to identify issues and provide input;
- technical studies of the relevant environmental, social, economic, heritage and/or health effects of the proposed project;
- identification of ways to prevent or minimize undesirable effects and enhance desirable effects; and
- consideration of the input of all interested parties in compiling the assessment findings and making decisions about project acceptability.

The BCEAA and accompanying regulations establish the framework for delivering environmental assessments. However, the scope, procedures and methods of each assessment are tailored specifically to the circumstances of the proposed project. This approach allows for each assessment to focus on the issues relevant to the project and whether or not the project should proceed.

Proposed mining developments that exceed the threshold criteria laid out in the *Reviewable Projects Regulation* are required to obtain an Environmental Assessment Certificate from the EAO under the Act before the issuance of a Mines Permit under the *Mines Act*. The full text of the *Reviewable Projects Regulation* can be viewed at http://www.qp.gov.bc.ca/statreg/reg/E /EnvAssess/370_2002.htm. Projects involving an open pit operation with tonnage exceeding the threshold limit of 75,000 tonnes per year require an Environmental Assessment Certificate.

The intent of the BCEAA process is to identify any foreseeable adverse impacts through the project's lifecycle, including: construction, start-up, operation and closure; and to determine ways to eliminate, minimize (mitigate) or compensate identified impacts. The process identifies the potential effects of the project on environmental and community values and provides information on the nature of public support for a project.

The BCEAA process moves through six stages:

1. determining how the assessment will be conducted, through preparation, review and approval of Terms of Reference for the EA Application;
2. preparation and submission of the EA Application;
3. review of the EA Application;
4. preparation of the Environmental Assessment report by the BCEAO;
5. referral to the appropriate provincial ministers for a certification decision; and
6. decision to either issue or not issue an Environmental Assessment Certificate.

The decision to approve or reject a mining project is made by the following provincial ministers:

- the Minister of Energy, Mines and Petroleum Resources; and
- the Minister of Environment.

The various stages of the environmental review process are presented in Figure 2-1. The process has timelines built in at several phases of the review. Figure 2-2 presents an outline of the project proponent's responsibilities during the environmental assessment review process. A recent presentation by the BCEAO and CEAA is attached as an appendix to this report outlining the process.

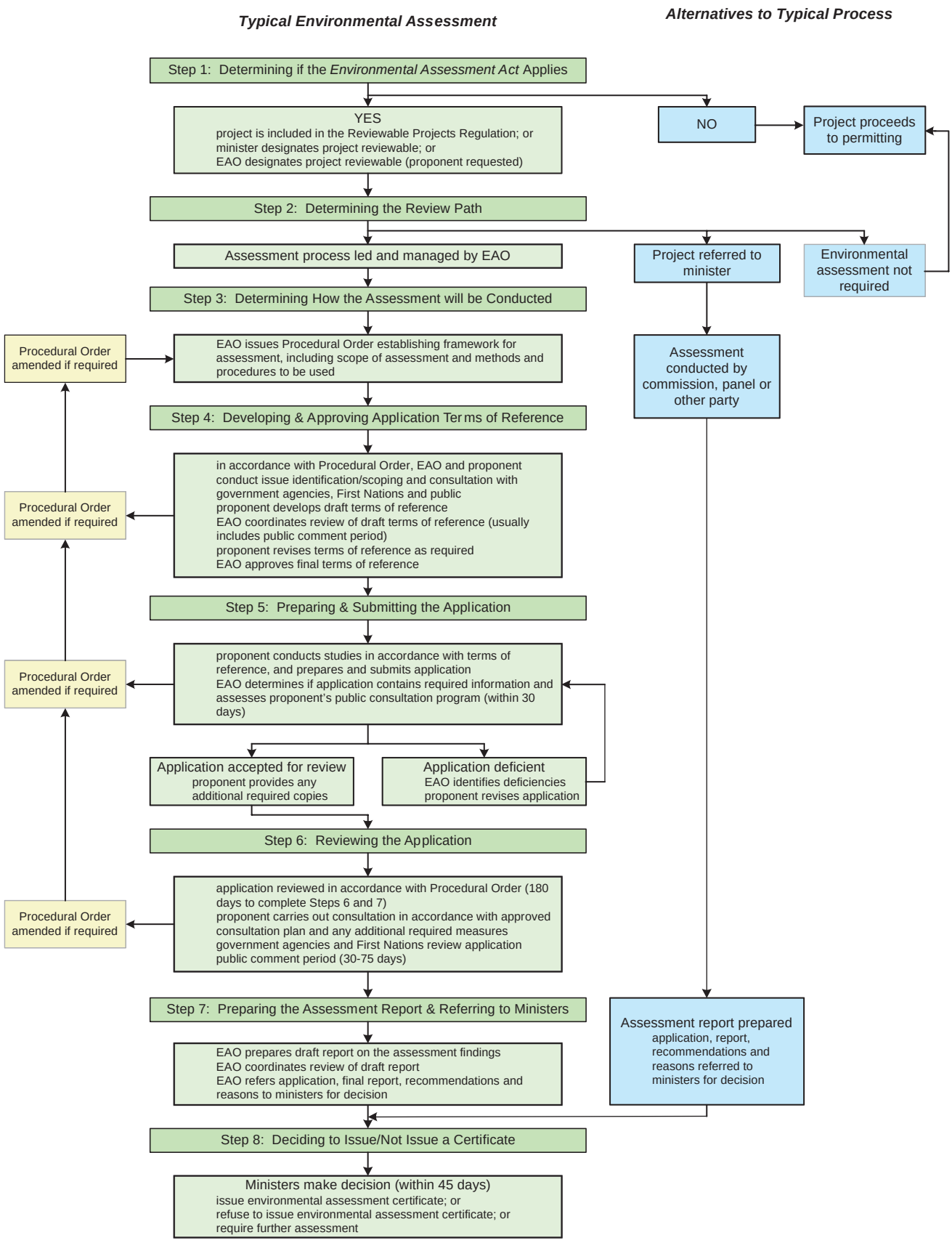
2.1.2 Project BCEAA History

The provincial regulatory process for the Woodjam Project will be initiated with the submission of a Project Description. A hypothetical environmental process development schedule is presented in Figure 2-5 in Section 2.6.

The EAO maintains a document registry available via their website at http://www.eao.gov.bc.ca/epic/output/html/deploy/epic_project_home_239.html. Details of many of the process activities, such as meeting minutes and correspondence, are usually found in the registry.

2.1.3 Project Technical Working Groups

Under the *BC Environmental Assessment Act*, the BCEAO has the authority to formulate the review process to best meet the requirements of each specific project. Although there is no longer a mandatory requirement to establish a project committee to review each project such as the Woodjam Project, the EAO usually recommends the formation of smaller technical committees to focus on specific issues. Accordingly, the EAO establishes one main working group for the Project, such as the Woodjam Project, and then organizes individual technical working groups to examine specific issues.



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Environmental Assessment Process Managed by the B.C. Environmental Assessment Office

FIGURE 2-1

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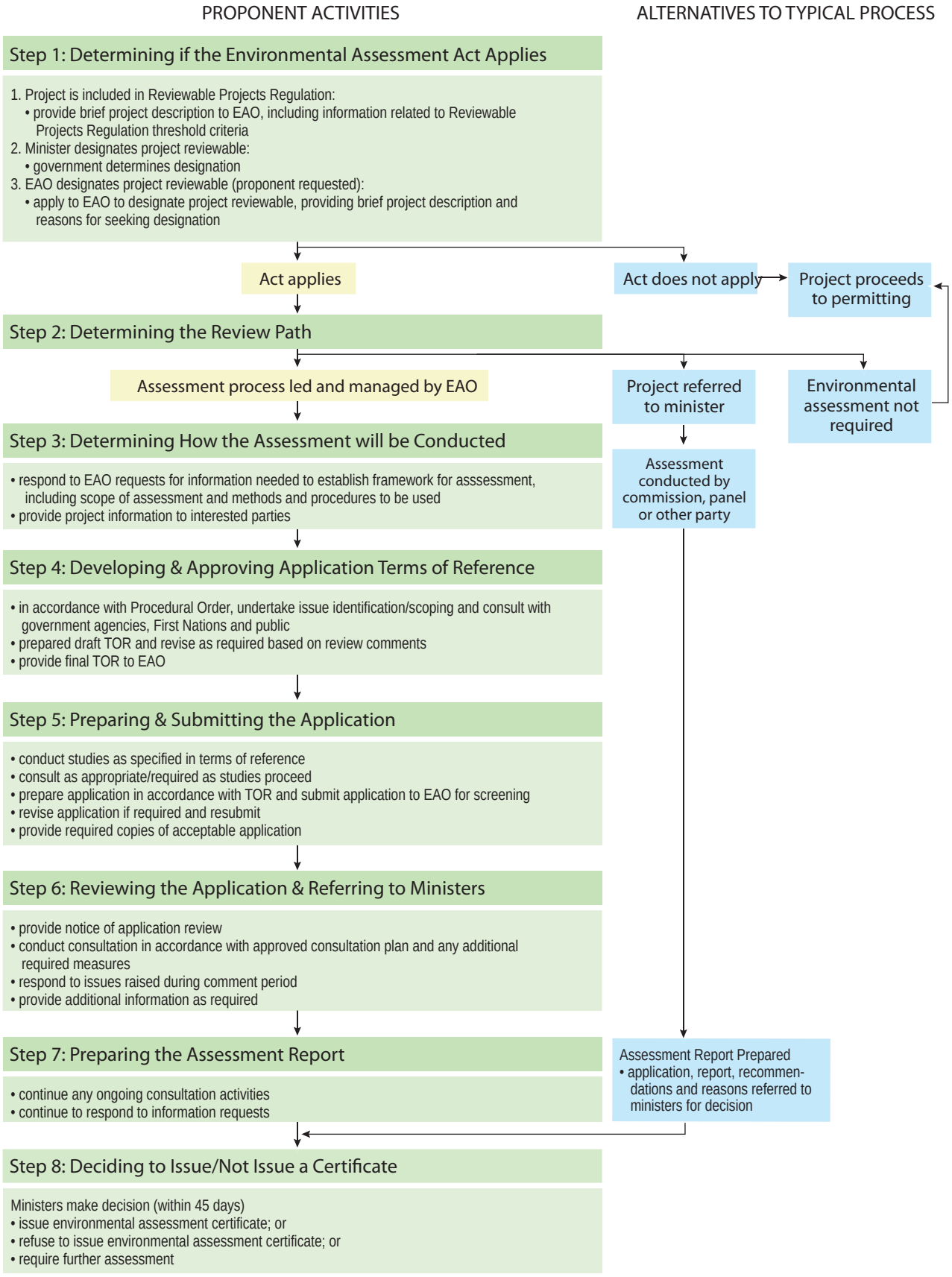
Source: EAO (2003)



Source: EAO (2003)

Proponent Activities in the B.C. Environmental Assessment Process Coordinated by the Environmental Assessment Office (EAO)

FIGURE 2-2

These groups are mandated to review and guide the project through field programs and on through submission of the Application. These working groups usually consist of provincial, federal regulators, EAO, CEAA, Proponent, local government and First Nations representatives. The technical working groups could include the following:

- Access Road Technical Working Group;
- ML/ARD Technical Working Group;
- Water Quality/Hydrology/Water Management Technical Working Group;
- Wildlife/Terrain Technical Working Group;
- Fisheries and Navigable Water Working Group;
- Socio-economic Technical Working Group; and
- Mine Planning, Development and Closure Technical Working Group.

The review process procedures are formalized in a Section 11 Order issued by the EAO. The Order outlines the scope, procedures and methods to be used for the BCEAA review of the Project. The EAO is intended to be a neutral agency with the responsibility to administer and mange the assessment process under the BCEAA.

2.1.4 Concurrent Permitting

Provincial permitting, licensing and approval processes (statutory permit processes) may proceed concurrently with the BCEAA review or may, at the proponent's option, be initiated following the receipt of the Environmental Assessment Certificate. The "Concurrent Approval Regulation" (http://www.qp.gov.bc.ca/statreg/reg/E/EnvAssess/371_2002.htm) sets out the provisions related to concurrent permit approvals. To be eligible for concurrent review, the approval must be required to construct, operate, modify, dismantle, abandon or otherwise undertake part or all of the "Reviewable Project" that is the subject of the environmental assessment. Any such authorization is eligible for concurrent review except a Certificate of Public Convenience and Necessity under the *Utilities Commission Act.*

Under the "Concurrent Approval Regulation" an applicant must apply in writing for concurrent permitting within seven days of notification of the acceptance by the EAO of an application for an Environmental Assessment Certificate. The provincial ministry responsible for the permit may within 75 days of the notification of acceptance of an application for Environmental Assessment Certificate request additional information from the applicant. The ministry responsible for the permit must make a decision to issue a permit, or explain why a permit will not be issued, within 60 days of an Environmental Assessment Certificate being issued.

Statutory permit approval processes are normally more specific than the environmental assessment level of review, and for example, will require detailed and possibly final engineering design information for certain permits such as the tailings impoundment structures and others.

Gold Fields might seek concurrent permits for the Woodjam Project for the essential authorizations required to start construction. The key authorizations might include the following:

- surface lease under the *Land Act* for the tailings and waste rock disposal area;
- all licences, permits and approvals related to the construction and use of the access road, including *Forest and Range Practices Act* Special Use and Road Use permits, *Forest Act* Occupant Licence to Cut, and *Highway Act* Highway Access Permit;
- all licences, permits and approvals related to operation of temporary construction camps for mine, plant site and road including permits required under the *Health Act*, *Drinking Water Protection Act* and *Environmental Management Act* (sewage, incinerator, and waste generation); and
- all water licences for diversion, management, use and storage under the *Water Act*, and approval for release of sediment under the *Environmental Management Act*, pertaining to the initial earth moving work in the Project area.

2.2 Federal Environmental Assessment Process

2.2.1 *Canadian Environmental Assessment Act*

The federal environmental assessment process is governed by the *Canadian Environmental Assessment Act* (CEAA). In June 1992, Bill C-13, CEAA received royal assent. CEAA, which provides a legal basis for federal environmental assessment, came into force on January 19, 1995. Following extensive cross-Canada public consultations the Minister of the Environment tabled a report to introduce amendments to CEAA in March 2001 to strengthen the process. Bill C-9, an act to amend CEAA, received royal assent on June 11, 2003, and came into force on October 30, 2003. CEAA ensures that the environmental effects of projects are carefully reviewed before federal authorities take action in connection with them so that projects do not cause significant adverse environmental effects.

CEAA is triggered by federal involvement in a project. CEAA applies when a federal department or agency is required to make a decision on a proposed project. Under CEAA's "triggering" provisions, an assessment is required if a federal authority exercises or performs one or more of the following powers, duties or functions relating to a project:

- proposing the project (known as the "proponent trigger");
- granting money or any other form of financial assistance to the proponent (the "funding trigger");
- granting an interest in land to enable a project to be carried out (e.g., sell, lease or otherwise transfer control of land) (the "land trigger); or
- exercising a regulatory duty in relation to a project, such as issuing a permit or license, that is included in the Law List prescribed in CEAA's regulations (the "Law List trigger"). This includes various federal licenses and authorizations, including Section 5(1) under the *Navigable Waters Protection Act* (NWPA) and the *Fisheries Act* authorization under sub-section 35(2).

Special provisions of CEAA provide the federal Minister of the Environment with discretionary powers to trigger an environmental assessment in exceptional circumstances if the Minister believes the project:

- has potential for significant environmental effects; or
- raises public concerns; or
- may cause significant adverse transboundary environmental effects and no other federal act or regulation applies.

Under CEAA, projects receive a level of environmental assessment tailored to their impact potential. There are four environmental assessment review options under CEAA – screening, comprehensive study, mediation and panel review. The Woodjam Project will likely trigger the CEAA process (pursuant to law list triggers) and a comprehensive study report will likely be required.

2.2.2 Project CEAA Process History

Experience with CEAA, Department of Fisheries and Oceans (DFO) and Department of Transport and Natural Resources Canada suggest that the Woodjam Project would require federal authorization under various "Law List triggers. According to the Comprehensive Study List Regulations (SOR/94-638), the Woodjam Project will likely proceed by way of a comprehensive study because, among other reasons, it will likely involve the proposed construction of a "metal mill with an ore capacity of 4,000 tonnes/day or more."

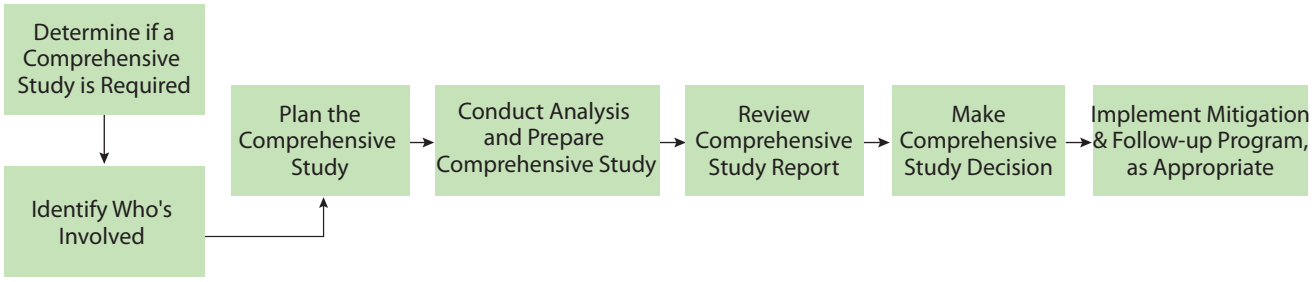
Gold Fields would submit an expanded project description outlining the scope of the project to the Agency. Based on this document, a number of regulatory authorities (RAs) will trigger the CEAA process.

2.2.3 Federal Review Process

The key steps in the CEAA process are similar to the provincial BCEAA process. A summary of the environmental process under CEAA is presented in Figure 2-3. The first step in the CEAA process is to determine whether any of the four triggering provisions described above require the project to be subject to a comprehensive review.

The second step is for Canadian Environmental Assessment Agency ("Agency") to identify all of the responsible authorities, expert federal authorities and other jurisdictions that should be involved in the environmental assessment. This requires that the proponent submit a project description which outlines the scope of the project.

The third step is to plan the environmental assessment. This step involves registering the project with the Agency, and establishing a work plan and time lines. The Agency coordinates these activities that include describing the project and conducting a public review. The Minister of



Summary of Each Phase

Phase	Action
1. Determine if a Comprehensive Study assessment is required	A federal authority determines whether it has a responsibility to ensure that an environmental assessment is conducted. Are there any triggers?
2. Identify who's involved	The responsible party, called a responsible authority (RA), notifies other federal parties to determine whether they may have: • responsibilities to ensure the conduct of an environmental assessment; or • expert information to contribute
3. Plan the Comprehensive Study	RA determines how the Comprehensive Study will be conducted. For example, they identify the: • scope of the proposed project (Section 21); • scope of the factors that must be considered in the Comprehensive Study • assessor; and • time lines.
4. Conduct the analysis and prepare the Comprehensive Study Report	One or more qualified environmental assessment practitioner(s) identifies the potential environmental effects and measures to mitigate those effects. The findings are presented in a written report.
5. Review the Comprehensive Study Report	The responsible authority(ies) reviews the report for adequacy and accuracy, and may have others review the report as well
6. Make the Comprehensive Study Report Decision	Bases on the findings of the report, the responsible authority(ies) decides whether adverse environmental effects are likely to be significant. This decision is taken into account when determining whether the proposed project should proceed.

Source: CEAA Website

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Environmental Assessment Process Under the Canadian Environmental Assessment Act

FIGURE 2-3

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Environment will decide on the type of process that the project will follow, i.e., screening, comprehensive study, mediation or panel review.

The fourth step is the preparation of the environmental assessment report, which requires conducting baseline studies and other analyses.

The fifth step is the review of the report. The proponent is largely responsible for report preparation, but the Agency coordinates the review, in cooperation with the BCEAO. At the conclusion of the review, the Agency makes recommendations concerning the project to the Minister of the Environment.

The sixth step is the federal decision, which ultimately requires approval by the federal Minister of the Environment. The seventh and last step involves mitigation and follow-up programs, as appropriate.

2.2.4 Metal Mining Effluent Regulations

The Metal Mining Effluent Regulations (MMER), under the *Fisheries Act*, came into law on June 6, 2002. These regulations apply to all metal mines in Canada and impose limits for cyanide as well as for arsenic, copper, lead, zinc, nickel, and radium-226 in discharge waters. They also prohibit the discharge of effluent that is acutely lethal to fish (rainbow trout). The maximum monthly mean concentration of total suspended solids has been set at 15 mg/L, and a pH range of 6.0 to 9.5 is required. Under the regulations, mines must conduct Environmental Effects Monitoring (EEM) programs to monitor and report on effluent quality, flow and the results of periodic effluent scans to identify adverse effects of their effluent on fish, fish habitat, and the use of fisheries resources. EEM studies will include effluent characterization, receiving water quality monitoring, sub-lethal effluent toxicity tests, site characterization, fish population surveys, fish tissue analysis and benthic invertebrate community surveys.

The MMER prohibits the discharge of deleterious substances in areas frequented by fish. If the tailings impoundment area selected for the Woodjam Project is located in an area where fish are present, an amendment to the MMER will be required. This is referred to as a Schedule 2 amendment. This process may take 6 to 12 months after the Project has been approved.

2.3 Canada-British Columbia Cooperation Agreement

In March 2004, the governments of Canada and British Columbia signed an agreement to cooperate in conducting environmental assessments (the "Agreement"). This agreement can be viewed at http://www.eao.gov.bc.ca/publicat/canada-bc-agreement/can-bc-agree-mar1104.pdf. Under this bilateral Agreement, projects that require a review under both federal and provincial environmental assessment legislation will undergo a single, cooperative assessment, meeting the legal requirements of both governments while maintaining their respective roles and responsibilities. This Agreement translates into a specific operating plan that incorporates the principles of the 1998 Canada-Wide Accord on Environmental Harmonization and the Sub-Agreement on Environmental Assessment.

The British Columbia responsible agency is the EAO and the Government of Canada responsible agency is the Canadian Environmental Assessment Agency.

Both the BCEAO and the Agency are required to notify each other about projects that require cooperative assessment and provide access to information. They must identify a lead party that will take primary responsibility for administering and coordinating the review. In general, the Agency will take the lead for projects on federal Crown land and the BCEAO will take the lead on projects within BC that are not on federal land. In all other cases, the lead party will be determined by mutual agreement between the Agency and the EAO.

Although this Agreement was designed to prevent duplication of effort and reduce the time required for completion of an environmental assessment, both the Agency and the EAO must also meet their own requirements for project registration and review and for dealing with First Nations issues and potential transboundary effects.

The BCEAO and the Agency would likely recommend that the environmental assessment process for the Woodjam Project undergo a single, cooperative assessment as provided for in the Canada-British Columbia Cooperation Agreement and that the BCEAO would likely take the lead in coordinating the assessment process. It should be Gold Field's intention that the "Project Application Report" meets the requirements of a Federal Comprehensive Study Report. The terms of reference for the Woodjam Project environmental assessment would incorporate the requirements of both processes. The BCEAO and the Agency will prepare individual reports on the results of the environmental assessment for their respective ministers. Project approval would come separately from the British Columbia Government and the Government of Canada.

2.4 Regional Land Use Planning Process

Environmental assessment is one component of British Columbia's overall land and resource management system. Other components include land use planning, land and resource tenuring, permitting and other review/approval mechanisms, and operations management. Each component, and its applicable laws, regulations, policies and technical guidelines is intended to support provincial goals for economic development, environmental protection and community stability.

Environmental assessment evaluates major projects within the context of the provincial government's regulatory and policy framework and technical expectations, so that a decision can be made on the overall acceptability of the project. The process results in a ministerial-level decision on whether to issue an Environmental Assessment Certificate.

Provincial land use plans provide the framework and context for setting environmental, land use and resource management goals over provincial Crown land. Environmental assessment is conducted within the context of existing land use plans. While environmental assessment examines the effects of a project on adjacent land uses, it is a project-specific review mechanism and has no authority to act as a land use planning mechanism or to re-open previously approved land use plans.

Tenure-granting processes dispense some form of use or ownership rights to both public and private parties with respect to land and resources. Tenure rights to Crown land and resources that are required for a project to proceed may be in place when a proponent applies for an Environmental Assessment Certificate (e.g., a mineral claim), or options to grant the necessary tenures may be reserved for the proponent subject to satisfactory completion of the environmental assessment (e.g., *Land Act* reserves). Where a project is located on private land, the proponent may own the land or have the right to exercise an option on the land.

2.4.1 Cariboo-Chilcotin Land Use Plan

The Woodjam Project is located within the Horsefly Sustainable Resource Management Plan (HSRMP) of British Columbia's Cariboo-Chilcotin Land Use Plan (CCLUP), with recognized values for forestry, guiding, trapping, mineral resource exploration and development, and recreation. Horsefly SRMP is one of the seven plans covering the Caribou-Chilcotin region – a spatial application of the CCLUP with sub-regional planning directions. It is an area within which activities are expected to be sensitive to park and protected area values in neighbouring zones.

2.4.1.1 Woodjam Project Adherence to Regional Land Use Plans

The CCLUP acknowledges the impressive mineral potential of the Quesnel region. Mineral exploration and mining and construction of access roads for mining are all permitted activities in the project area subject to the constraints of the General Management Directions and the specific management directions of the Resource Area-Specific Management Zones. The Plan suggests that the Woodjam Project area can be successfully developed, operated and reclaimed in a manner consistent with intentions of the CCLUP.

Section 2.2.3 of the CCLUP states: "The CCLUP provides for full access, outside of Protected Areas, for mining and placer exploration subject to regulations under applicable statutes" and "requires the mining industry to practice low impact forms of access (e.g., helicopter) in unroaded areas until there is sufficient evidence to warrant road construction." A report addendum adds "These activities are subject to provincial guidelines and standards and will be carried out in a manner which respects sensitive natural values." (Integrated Land Management Bureau 1996).

The Horsefly Sustainable Resource Management Plan (SRMP) covers the area of the Cariboo-Chilcotin Land Use Plan previously known as the Horsefly Forestry District. It encompasses the Woodjam Project, and is widely recognized for its fisheries values and productive forests. There are numerous Old Growth Management Areas (both permanent and transition status) situated throughout the tenure area (Integrated Land Management Bureau 2009d). These would also be included in management and permitting related to project development. The landscape units covered by the tenure area include: Moffat, Black Creek, and Horsefly (Integrated Land Management Bureau 2009e; Figure 2-4). Some small areas of key moose wetlands are also identified within the tenure area (Integrated Land Management Bureau 2009f).

Sustainable Resource Management Plans associated with the relevant area within the CCLUP (in this case the Horsefly SRMP) should be used to identify access requirements for mineral exploration and potential development areas while identify the potential impact of access development on other land uses including recreation, tourism, and fish and wildlife resources.

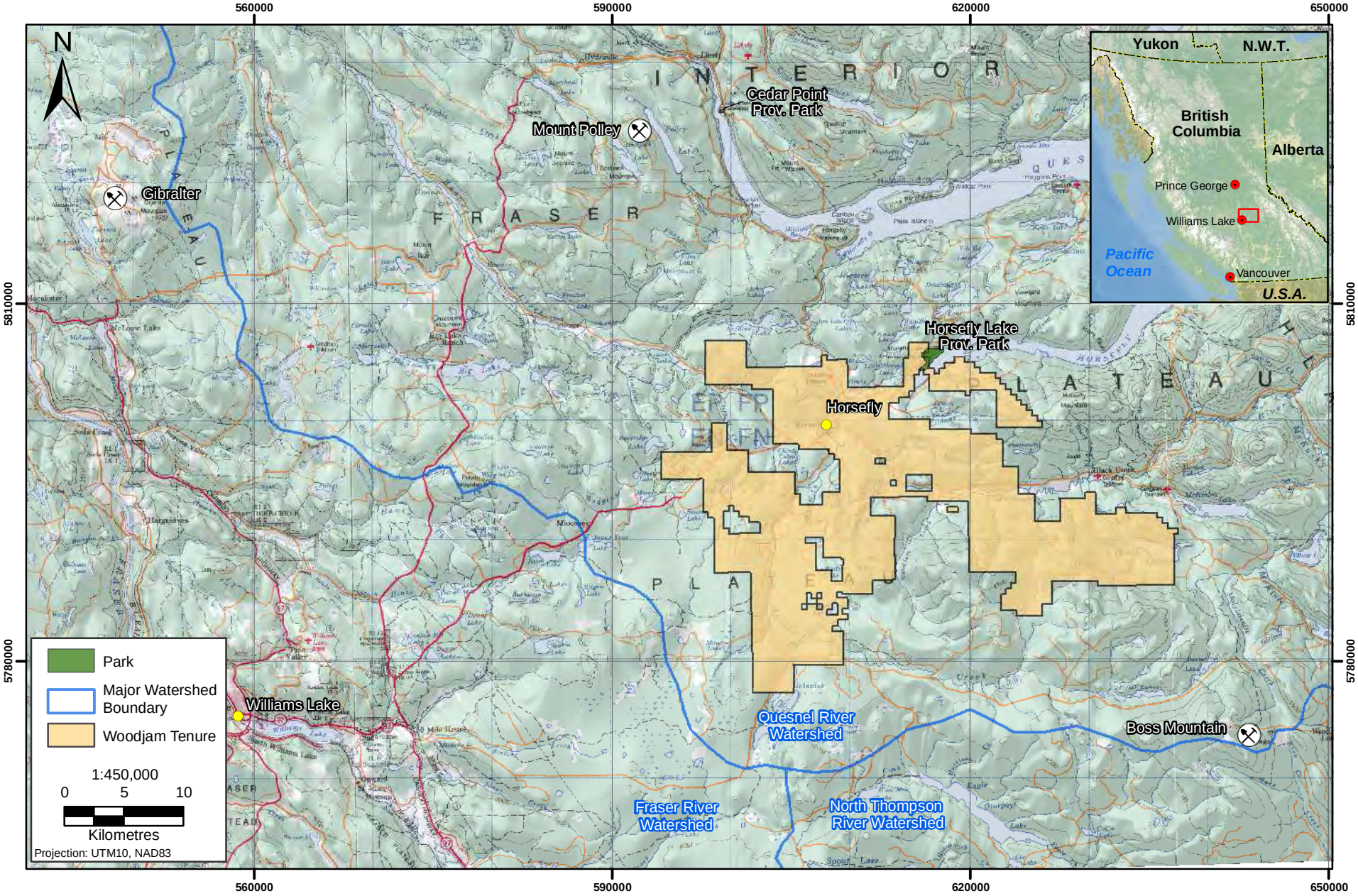


Figure 2-4

Woodjam Tenure Location

Figure 2-4

2.4.1.2 Parks and Protected Areas in Vicinity to the Woodjam Project

The Horsefly Lake Provincial Park lies on the northeast perimeter of the tenure lands, therefore objectives of this protected area, and that of Cedar Point Park downstream of the project area on Quesnel Lake also need to be considered. Both support various recreational activities including camping, swimming, canoeing and kayaking, and protect high quality fisheries resources, while supporting local populations of deer, black bear, moose, fox, and otter. Horsefly Lake Provincial Park includes a public-access sockeye salmon hatchery, and Cedar Point Park includes an old mining exhibit. The riparian area surrounding the mouth of Horsefly River as it enters Quesnel Lake is classified as a 'Goal 2' Protected Area (Integrated Land Management Bureau 2009c).

2.4.1.3 Fisheries

Fisheries values are high in the Woodjam claim area, with significant populations of rainbow trout, steelhead, Dolly Varden char in the Quesnel and Horsefly Lakes and Rivers. Several salmon species including sockeye/kokanee, coho and chinook are also present in various watersheds of the CCLUP area.

The Horsefly SRMP and in particular, the Woodjam claim area is host to sensitive salmon population and habitat. Other fish species include mountain whitefish, Northern pike, minnow, burbot, and several species of dace, chubs and shiners. The HSRMP includes management objectives designed to sustain fisheries resources in the Horsefly River and Quesnel Lake, related to protection of riparian areas and harvest control. While no BC red-listed fish species were noted, one blue-listed species (Dolly Varden/ bull trout) is present. (Genetic testing is the standard method to distinguish these groups; Bull trout are legally blue-listed). Critical fish habitat is identified along the majority of Horsefly River, Little Horsefly River, and Horsefly Bay in Quesnel Lake (Integrated Land Management Bureau 2009g). Deerhorn Creek which runs within the zone of the four identified deposits (Megabuck/ East Megabuck, Takom, Deerhorn, and Southeast) supports rainbow trout.

2.4.1.4 First Nations

There are no reserves within the Horsefly SRMP, however the plan area overlaps with seven Secwepemc and Carrier Nations' asserted traditional territories:

- Williams Lake Band[1]
- Soda Creek Band
- Canim Lake Band
- Lhtako First Nation

[1] The Woodjam property is located in the Secwepemc, or, the Northern Shuswap Tribal Council's traditional territory. Williams Lake Band is the closest member band to the property. Details are described in Section 3.3: The Woodjam Project and First Nations, including considerations and values specific to the Secwepemc, or, the Northern Shuswap First Nations.

- Esketemc First Nation
- North Thompson Band
- Lheidli T'enneh First Nation

First Nations in the area contributed to the development of the CCLUP and HSRMP. In general, the key land use issues for these First Nations are:

- protection of trapping areas;
- incorporation of traditional knowledge and use;
- awareness of existing First Nations land use plans and protected area;
- access management and planning;
- protection of trout and salmon; and
- cultural and heritage resources.

The general land use management objective concerning mining with regards to First Nations within the plan area states "manage industrial and commercial land development to prevent or mitigate physical damage to cultural and heritage features as identified by First Nations, consistent with the *Heritage Conservation Act"* (Integrated Land Management Bureau 2009a).

2.4.1.5 Relevant Resource Management Objectives

Table 2.4-1 summarizes the main environmental management objectives for the Horsefly SRMP.

Table 2.4-1
Key Horsefly SRMP Environmental Management Objectives Relevant to the Woodjam Project

Management Component	Objective
Water	Watershed to be managed for hydrologic stability through watershed assessment, restoration and monitoring
Fisheries	Manage one of the highest fisheries resources of the Fraser system, including world class sport fishing in Quesnel Lake based on rainbow trout spawning and rearing habitat in the Horsefly drainage. Important spawning grounds for Horsefly sockeye stock as well as Chinook, kokanee and coho salmon populations.
Agriculture	Enhance access to crown lands to support viable beef industry.
Wildlife and Wildlife Habitat	Manage land use and maintain habitat values for: for mule deer winter range; mountain caribou (e.g. Quesnel Lake); mountain goat habitat (including mitigation for aircraft disturbance); moose habitat; maintain security cover (vegetative and topographic) for grizzly bear habitat; minimize disturbance and maintain habitat necessary for Species at Risk in the CCLUP.
Trapping	Maintain viability of trapping industry by maintaining bio-diversity, riparian and woody fur-bearer habitats

(continued)

Table 2.4-1
Key Horsefly SRMP Environmental Management Objectives Relevant to the Woodjam Project (completed)

Management Component	Objective
Access	Maintain viability of key trail corridors including an integrated, year-round, world class, multi-use trails system, including development of Gold Rush Snowmobile Trail.
Mining	Ensure access to 100% of area for exploration and development, excluding Goal 2 protected areas.
Forest Resources	Maintain short-term needs of forest industry while providing appropriate management of other values
	In areas of high and moderate grizzly bear habitat capability, manage silvicultural activities on cutblocks so as to retain as much existing natural berry production as possible.
	Manage infectious outbreaks of forest diseases and pests in accord with objectives for other resource values identified in the SRMP.
	Maintain at least 40 percent of existing, mature birch within cutblocks in the areas of Beaver Valley, Polley, Lower Cariboo River, and Cariboo Lake Landscape Units
	Ensure high and medium value wildlife trees contributing to wildlife tree retention requirements are retained
Visual Quality	Manage visual quality in visually sensitive areas from identified viewpoints
Tourism and Recreation	Maintain and manage recreation and tourism opportunities
Heritage and Culture	Manage industrial and commercial land development to prevent or mitigate physical damage to cultural and heritage features as identified by First Nations, consistent with the Heritage Conservation Act
	Maintain First Nations' trails identified by government or First Nations, free of debris from industrial and commercial development

2.5 Summary Key Land Use and Environmental Considerations

The following section describes key land use and environmental elements surrounding the Woodjam property.

2.5.1 Land use plans

The Woodjam property is located within the Cariboo-Chilcotin Land Use Plan and specifically follows the management objectives of the Horsefly Sustainable Resource Management Plan (HSRMP) at a sub-regional planning level.

2.5.2 Mining

The Woodjam project is located within a well established mining district with closed and operating mines in the area. Mount Polley is an operating open pit copper/gold producing owned by Imperial Metal and located approximately 20 km northeast of the Woodjam property.

Gibraltar, a copper-molybdenum mine currently operating and undergoing expansion, is owned by Taseko Mines (Taseko Mines Ltd 2009) and is approximately 50 km to the west of the Woodjam property. The closed Boss Mountain molybdenum mine, formerly a Noranda property, is approximately 20 km southeast of the property.

2.5.3 Geology

The Woodjam claim area is highly mineralized, containing at least five documented copper-gold, copper only and gold only occurrences hosted by subvolcanic alkalic intrusives (Global Geological Services 2006). The Megabuck Zone has been most extensively studied. These mineralized zones are all situated approximately 10 km south of Horsefly, in the vicinity of upper reaches of Deerhorn Creek. Bedrock exposure is of limited extent, comprising some steeper hillsides, ridgetops and roadcuts. Lower areas are usually covered by extensive glacial till and alluvium, and numerous small lakes and marshes are found in the tenure area.

2.5.4 Water Quality

Surface water quality in the Horsefly River just upstream of Quesnel Lake is of slightly basic pH (7.2 to 8.2), with low to moderate alkalinity (25 to 70 mg/L as $CaCO_3$) and hardness (29 to 72 mg/L calculated as $CaCO_3$), based on a federal monitoring station (Environment Canada 2009).

The Woodjam area in general is exposed to ML/ARD issues as previously encountered at Mount Polley, Gibraltar and to a lesser extent at Boss Mountain. These potential water quality issues in the Horsefly River area are exacerbated by the high fisheries values. Water quality control and mitigation measures will be an important consideration if development were to proceed.

2.5.5 Fisheries and aquatic resources

The Quesnel and Horsefly River drainages are very important. The Horsefly River and downstream Quesnel watershed and associated tributaries support a number of fish species namely, large rainbow trout, sockeye salmon, and sensitive populations of kokanee salmon. Additionally, there are chinook and coho salmon, lake trout, Dolly Varden, and provincially blue-listed bull trout. Steelhead trout are also present in this system, while amphibian populations are also found in Horsefly Lake and surrounding small lakes. Whether the protected "Western Toad" is present or not is unknown at this time. The HSRMP includes management objectives designed to sustain fisheries resources in the Horsefly River and Quesnel Lake, related to protection of riparian areas and harvest control.

2.5.6 Wildlife

Wildlife in the area around Horsefly Park include moose, mule deer, coyotes, black bear, cougar and a number of small mammals including fisher, while wolves may be found in surrounding areas (BC Parks 2009). All are yellow-listed except fisher (blue-listed). Regarding ungulate management areas, no sheep, goat or caribou areas are contained within the claims area, as this area does not contain mountainous terrain (Integrated Land Management Bureau 2009a). However, some mule deer winter range is identified along some sections of the Horsefly River and Lake drainages.

The highest mule deer conservation priorities tend to be concentrated in the Interior Douglas Fir (IDF) zone with some additional areas including the Horsefly landscape unit among others. Project planning and management will incorporate requirements under the CCLUP Management Plan for winter ungulates. Habitat is ranked 'low capability' for grizzly bear usage (Integrated Land Management Bureau 2009b).

Key moose habitat and some waterfowl habitat are likely to exist around wetlands, small lakes and creeks within and adjacent to the Woodjam project.

2.5.7 Parks

The Horsefly Lake Provincial Park lies on the northeast perimeter of the claim area. Located 13 km northeast of the community of Horsefly, the Park includes Horsefly Lake, which is a highly popular destination for angling. Cedar Point Park is downstream of the project area on Quesnel Lake, six Km from the town of Likely. A popular area for hiking, swimming, boating and fishing, the Park is approximately eight hectares.

2.5.8 Forestry

Old growth management areas (both permanent and transition status) are situated throughout the Woodjam claim area.

2.6 Licences, Permits, and Approvals

2.6.1 British Columbia Authorizations, Licences, and Permits

Ministerial approvals of the project under the BCEAA and CEAA are authorizations in principle required to allow the project to proceed. Once approval in principle is obtained, many provincial and federal licences, permits, and approvals will be required to address the technical and administrative details to construct, operate, decommission and close the Woodjam Project. The following sections list and summarize the major permits, licences, approvals, consents and material authorizations which will be required to occupy, use, construct and operate the Woodjam Project. The lists cannot be considered comprehensive due to the complexity of government regulatory processes which evolve over time and the large number of minor permits, licences, approvals, consents and authorizations and potential amendments which would be required throughout the life of the mine.

Table 2.6-1 presents a list of British Columbia authorizations, licences and permits required to develop the Woodjam Project. Gold Fields might want to proceed with concurrent permitting for the Woodjam Project. The agency responsible for the approval of specific permits may be required to make a decision relating to issuing the approval within a specified timeframe. However, under no circumstance can an authorization to construct or operate the mine be issued until the environmental assessment has been completed and an Environmental Assessment Certificate has been granted and federal approval is granted.

Table 2.6-1
List of British Columbia Authorizations, Licences, and Permits Required to Develop Woodjam Project

BC Government Permits and Licences	Enabling Legislation
Environmental Assessment Certificate	*BC Environmental Assessment Act*
Permit Approving Work System & Reclamation (Minesite – Initial Development)	*Mines Act*
Amendment to Permit Approving Work System & Reclamation Program (Pre-production)	*Mines Act*
Amendment to Permit Approving Work System & Reclamation Program (Bonding)	*Mines Act*
Amendment to Permit Approving Work System & Reclamation Program (Mine Plan – Production)	*Mines Act*
Amendment to Permit Approving Work System & Reclamation Program (Construction & Operation of Tailings Impoundment Dam)	*Mines Act*
Permit Approving Work System & Reclamation Program (Gravel Pit/Wash Plant/Rock Borrow Pit)	*Mines Act*
Water Licence – Notice of Intention (Application)	*Water Act*
Water Licence – Storage & Diversion	*Water Act*
Water Licence – Use	*Water Act*
Occupant Licence to Cut – Minesite/Tailings Impoundment	*Forest Act*
Occupant Licence to Cut – Gravel Pits	*Forest Act*
Occupant Licence to Cut – Access Road	*Forest Act*
Occupant Licence to Cut – Borrow Areas	*Forest Act*
Occupant Licence to Cut– Power Transmission Line	*Forest Act*
Special Use Permit – Access Road	*Forest Act*
Licence of Occupation –Water Discharge Line	*Land Act*
Licence of Occupation – Borrow/Gravel Pits	*Land Act*
Licence of Occupation – Staging Areas	*Land Act*
Licence of Occupation / Statutory Right of Way – Power Transmission Line	*Land Act*
Surface Lease – Minesite Facilities	*Land Act*
Surface Lease – Concentrate Dewatering Facility (Filter Plant)	*Land Act*
Right of Way – Concentrate and Diesel Pipelines	*Land Act*
Pipeline Permit	*Pipeline Act*
Road Use Permit – Devil Creek Forest Service Road	*Forest Act*
Waste Management Permit – Effluent (Sediment, Tailings & Sewage)	*Environmental Management Act*
Waste Management Permit – Discharge from Filter Plant	*Environmental Management Act*
Waste Management Permit – Air (Crushers, Concentrator)	*Environmental Management Act*
Waste Management Permit – Refuse	*Environmental Management Act*
Camp Operation Permits (Drinking Water, Sewage Disposal, Sanitation and Food Handling)	*Environmental Management Act*
Special Waste Generator Permit (Waste Oil)	*Environmental Management Act (Special Waste Regulations)*
Firearm Restricted Area	*Wildlife Act*

2.6.2 Federal Licences and Approvals

Federal approvals required for the Woodjam Project (Table 2.6-2) include the authorization from the federal Minister of Environment approving the combined Application/Comprehensive Study Report. Major authorizations may be required from Fisheries and Oceans under the *Fisheries Act*. Approvals for water crossings will also be required from Transport Canada under the

Navigable Waters Protection Act. An explosive factory licence and explosives magazine licence will be required from Natural Resources Canada under the *Explosives Act*. The Metal Mining Effluent Regulation under the *Fisheries Act* and administered by Environment Canada might require a Schedule II authorization to permit discharge of deleterious substances to the tailings impoundment if the areas proposed for the tailings impoundment contain fish or fish habitat. Other federal requirements such as those for radio communication and aviation matters would need licences.

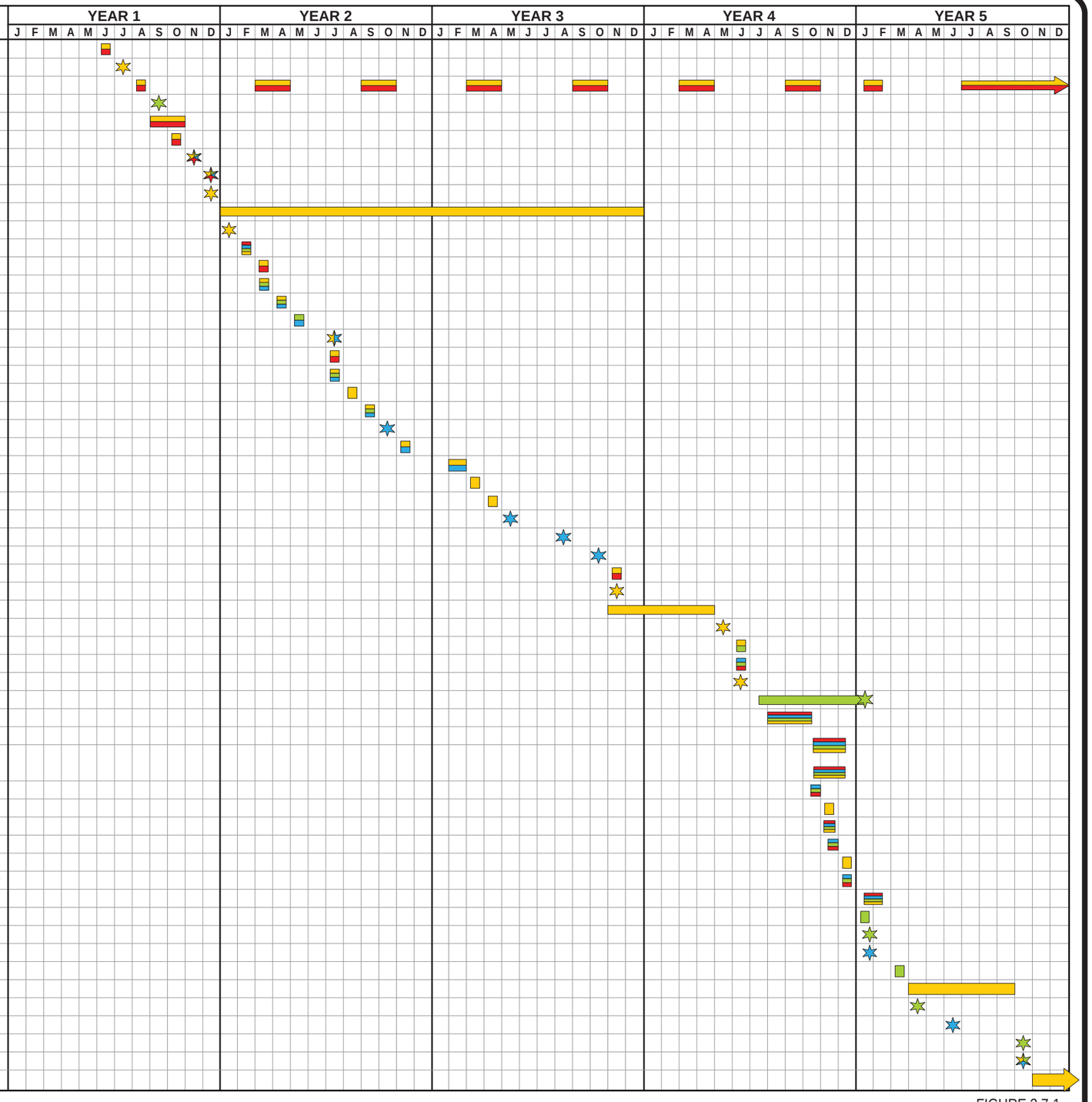
Table 2.6-2
List of Federal Approvals and Licences
Required to Develop Woodjam Project

Federal Government Approvals and Licences	Enabling Legislation
CEAA Approval	*Canadian Environmental Assessment Act*
Metal Mining Effluent Regulations (MMER)	*Fisheries Act*/Environment Canada
Schedule II Amendment to MMER for locating the TMA in fisheries habitat	*Fisheries Act*/Environment Canada
Fish Habitat Compensation Agreement	*Fisheries Act*
Section 35(2) Authorization for harmful alteration, disruption or destruction of fish habitat (HADD)	*Fisheries Act*
Navigable Water: Stream Crossings Authorization	*Navigable Waters Protection Act*
Explosives Factory Licence	*Explosives Act*
Explosives Magazine Licence	*Explosives Act*
Ammonium Nitrate Storage Facilities	*Canada Transportation Act*
Radio Licences	*Radio Communication Act*
Radioisotope Licence (Nuclear Density Gauges/X-ray analyzer)	*Atomic Energy Control Act*

2.7 Regulatory Schedule

A hypothetical environmental process schedule has been developed for the Woodjam Project based on our extensive experience in licensing and permitting major projects in British Columbia. The BC environmental process spans approximately four and a half years starting in the Summer of Year 1 and permitting being granted by Fall of Year 5. The timeline assumes advanced exploration and engineering pre-feasibility completed by mid-Year 4. The Woodjam Project Regulatory Review and Approval Schedule is presented in Figure 2.7-1.

Task	Task Responsibility: Gold Fields / EAO / CEAA / First Nations
1.	Meet with the Northern Shuswap Treaty Society/Tribal Council and the Williams Lake Indian Band to introduce Gold Fields and the Woodjam Project - June
2.	Submit Woodjam Project Description to BC Environmental Government Office to iniate BC EAO Process - July
3.	First Nations Leadership Consultation - August
4.	Section 10 Order issued under BC Environmental Assessment (EA) Act - September
5.	Initial support and process funding agreement negotiation for First Nations - September
6.	Develop environmental baseline study work plan and review with First Nations - October
7.	Submit baseline study work plan to provincial and federal agencies and First Nations - November
8.	Federal and provincial agencies, First Nations and Goldfield meeting to review work plan - December
9.	Finalize 2010 baseline study work plan and post final on EAO website - December
10.	Initiate 2 year baseline study program - January to December
11.	Prepare and submit initial draft Terms of Reference (TOR) for EA Application - January
12.	Distribute TOR for federal/provincial agencies, First Nations comments - February
13.	Open houses in Horsefly, Williams Lake, Quesnel and 100 Mile House - March
14.	Project Alternatives Working Group meeting in Williams Lake - March
15.	ML/ARD Working Group Meeting in Williams Lake - April
16.	Provincial and federal decision on harmonized process for project review - May
17.	Submit CEAA Project Description to CEAA and Major Projects office - July
18.	Site visit for First Nations - July
19.	Site visit for federal and provincial agencies - July
20.	Review draft TOR and incorporate comments - August
21.	Working group meeting in Williams Lake to review alternatives analysis - September
22.	DFO, NRCan and DOT triggered CEAA review - October
23.	Meet with Health Canada and Northern Health Unit to confirm requirement for health impact assessment - November
24.	CEAA Scoping Document for 30 day Public Review (Section 21) - February
25.	Complete BC-EAO/Federal CEAA Workplan - March
26.	Finalize TOR for Application and EAO issue Section 11 Order outlining review process - April
27.	Federal RAs recommendation to Environment Minister on level of review (Comprehensive Study or Panel) - May
28.	Federal Minister of Environment's decision on level of Review (Comprehensive Study or Panel) - August
29.	CEAA Section 21 order issued with decision likely Comprehensive Study harmonized with provincial process - October
30.	Open houses in Horsefly, Williams Lake, Quesnel and 100 Mile House - November
31.	Final TOR issued - November
32.	Environmental and Socio-Economic Impact Assessment - November - May
33.	Submit Application/Comprehensive Study EIA - May
34.	EAO office provide comments to Gold Fields on adequacy of public consultation program as outlined in the Application - June
35.	Screening of Application (to be completed within 30 days of receiving the Application) - June
36.	Submit concurrent provincial permit applications (timing of submission coincides with the acceptance of the Application for review) - June
37.	EAO accept Application and initiate 180 day review - mid July to January
38.	Start Public comment period (60 - 75 days) - August to mid October
39.	Agency, First Nations meeting with Gold Fields to review Application and provide preliminary verbal comments on the Application (meeting to be held within 21 days of initiating Application review) - late October to early December
40.	Public meetings on Application: Horsefly, Williams Lake, Quesnel and 100 Mile House - October to December
41.	Agencies and First Nations submit written comments on the EA Application to the EAO (deadline coincides with last day of public comment period) - late October
42.	Summarize agency and public comments, identify responses (within 14 days of receiving written comments) and distribute to agencies and First Nations - November
43.	Meeting and Conference calls as required to resolve issues raised by agencies and First Nations during the review of the EA Application - mid November
44.	EAO distribute 1st draft of Assessment Report to agencies and First Nations for Comment (14 to 21 day comment period) - late November
45.	Submit remaining permit applications during EA Application review - December
46.	EAO incorporate comments where possible & distribute 2nd draft of Assessment Report to agencies & First Nations for comment (7 day comment period) - December
47.	Public comment period (30 day) on Comprehensive Study Report prepared by CEAA - mid January to mid February
48.	BC EAO finalize Assessment Report, EA Certificate and Application referral package - January
49.	EAO refer Application to Provincial Ministers (within 180 days of acceptance and receipt of Application) - late January
50.	CEAA/RAs decisions on Comprehensive Study Report - late January
51.	Decision on Application for EA Certificate (up to 45 days to make a decision) - March
52.	Apply for Schedule II Amendment of MMER for Tailings Management Area (TMA) - April to October (may be required if TMA is in fish habitat)
53.	EA Certificate of Approval from EAO - April
54.	CEAA approval from Federal Minister of Environment - June
55.	Schedule II Amendment of MMER completed - October
56.	All permits and licences in hand to start construction - October
57.	Start construction - November



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Hypothetical Timeline: Woodjam Project - Regulatory Review and Approval Schedule

FIGURE 2.7-1

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3. FIRST NATIONS AND MINING IN BC

3. First Nations and Mining in BC

To understand the social and political context of mining in BC, it is necessary to understand the history and status of federal and provincial Aboriginal issues. The following section provides background information on the history, legal landscape and socio-political climate of the mining industry in relation to Aboriginal interests and issues in British Columbia.

3.1 Canadian Aboriginal History and Legal Context

Section 35 of the Canadian Constitution Act, 1982, states that *"aboriginal peoples of Canada" includes the Indian, Inuit and Métis peoples of Canada*. Statistics Canada (2008) notes that *these distinct groups have unique heritages, languages, cultures*.

The term 'Indian' has a historical origin as a misnomer relating to the misconception by Christopher Columbus that he had landed in India. Although it continues to have legal significance through its use in legislation, historical use of the term Indian pejoratively has resulted in many choosing to avoid its use. In the legal sense, Indian is a term used to define indigenous people under Canada's Indian Act: "…a person who pursuant to the Act is registered as an Indian or is entitled to be registered as an Indian." There are three legal definitions that use the term Indian: Status Indian, Non-Status Indian, and Treaty Indian.

'First Nation' is an undefined term that came into usage in the 1970s and 1980s as many Indian bands started to replace the word 'band' in their name with 'First Nation'. Although its usage is not universal, First Nation appears to have become the preferred term. It has also become common to describe an individual as being a 'First Nations person'.

3.2 Northwest BC Aboriginal Context

3.2.1 Aboriginal Population

There are over 600 First Nations across Canada. In northwest BC, First Nations people comprise a significant proportion of population. According to the 2001 Census, there were 170,000 aboriginal people living in BC while the non-Aboriginal population was 3,698,850. The aboriginal population of BC has been increasing more rapidly than the rest of the province's population. From 1996 to 2001, for instance, the aboriginal population increased by 21.7% while the non-aboriginal population increased by 4.2% (BC Stats 2007)[2].

In British Columbia, First Nations are defined as "…those people that can trace their ancestry to the aboriginal people that inhabited the land that is now British Columbia prior to the arrival of Europeans and Americans in the late 18th century" (http://www.first-nations.com/). From a legal perspective, First Nations have certain territorial or land rights if they can prove their occupancy of the land dates back prior to 1867, as per the *Constitution Act*: Part II: Rights of

[2] At the time of writing this document, 2006 statistics were not available for Aboriginal populations and demographics.

the Aboriginal Peoples of Canada Section 35 (1)"…The existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed." (MARR 2008)

3.2.2 Relationship to the Land and Subsistence Activities

Many residents of northwestern BC rely on, or participate in, subsistence activities. Hunting, fishing and trapping are common pursuits, as is the gathering of berries and other "country foods" – Health Canada's term meaning 'cultural diet'. These activities are especially important to local First Nation groups, and constitute a significant contribution to their economies and livelihoods. Participation in subsistence activities varies seasonally. For example, summer months see a significant migration of First Nations members from around the region to the banks of numerous rivers, where families congregate to fish the annual run of salmon. Summer and fall is also the time for the pursuit of traditional hunting practices.

3.2.3 Socio-economic Profile

Thirty two percent of the male First Nation population in the region is employed in the resource extraction sector (e.g., forestry, mining, fisheries) while First Nation females make up approximately 6% of the sector. In general, First Nation people exhibit lower levels of education, skills training (including trades), and employment than non-aboriginal population in the same area. The predominant reasons for unemployment among the First Nation population include (Skeena Native Development Society 2007):

- a lack of education, training, skills and/or work experience;
- low self-esteem, and/or a lack of motivation; and
- a prevalence of seasonal jobs and few year-round opportunities;

The isolation of the region contributes to the challenges outlined above, as opportunities for education and training are limited due to distance and the inability to access educational institutions. The lack of trade apprenticeship positions, in particular, has been highlighted as an issue preventing residents from obtaining trades certificates, which are often needed for employment. Although opportunities for education, training and employment may exist outside of the region, it is difficult for many First Nation residents to leave the support network of their families and culture. Access to financial resources is also a limiting factor.

The social and personal negative legacies of the residential school system are also strongly evident among First Nation people. The Indian residential school system in Canada was operated in the late 1800s and early to mid 1900s by various churches. The system was funded under the *Indian Act* by Indian and Northern Affairs Canada (INAC). The foundations of the system were the pre-confederation governance systems that assumed the inherent superiority of British ways, and the need for Indians to become English-speakers, Christians, and farmers. The first problem with the residential school system was the fundamental intent to assimilate Indian people (now referred to as First Nations) into non-aboriginal culture. The second problem was that many residential school students experienced physical and sexual abuse, poor sanitation, and a lack of medical care. The outcome was high rates of tuberculosis.

Residual effects may manifest in a variety of forms, including relationships dysfunction, substance misuse, depression, and anger. These factors induce cycles that indirectly oppress many individuals.

3.2.4 BC Treaty Negotiation Process

At the heart of Aboriginal issues lie inter-nation and governmental land claim negotiations. The framework through which modern land claims are reconciled are treaty negotiations. In British Columbia, the BC Treaty Commission coordinates and facilitates the BC treaty negotiation process. The six-stage negotiation process is voluntary and open to all First Nations in British Columbia. Currently, there are 47 First Nations in the BC Treaty Commission process (MARR 2008). Interests concerning aboriginal rights and title are central to the negotiations. Natural resource based project developments therefore have significant implications for the First Nations and may potentially influence these negotiations. Table 3.2-1 below summarizes the treaty process stages.

Table 3.2-1
BC Treaty Process: Six-Stages of Negotiation

Treaty Negotiation Stage	Description
Stage 1 **Statement of intent to negotiate**	A First Nation files with the BC Treaty Commission a statement of intent to negotiate with Canada and BC. The statement of intent: 1. identifies the First Nation's governing body and the people that body represents; 2. shows that the governing body has a mandate to enter the treaty process; 3. describes the geographic area of the First Nation's traditional territory in BC; and 4. identifies any overlaps in territory with other First Nations.
Stage 2 **Readiness to negotiate**	The Treaty Commission must convene an initial meeting of the three parties within 45 days of receiving a statement of intent. For most First Nations, this will be the first occasion on which they sit down at a treaty table with representatives of Canada and BC. This meeting allows the Treaty Commission and the parties to exchange information, consider the criteria for determining the parties' readiness to negotiate and generally identify issues of concern. Each party must demonstrate that it has: 1. a commitment to negotiate; 2. a qualified negotiator who has been given a clear mandate; 3. sufficient resources to undertake negotiations; and 4. a ratification procedure. Note: the First Nation must have a plan for addressing any issues of overlapping territory with neighbouring First Nations. The governments of Canada and BC must have a formal means of consulting with other parties, including local governments and interest groups.
Stage 3 **Negotiation of a framework agreement**	The three parties negotiate a framework agreement, which identifies the issues to be negotiated, goals, procedures and a timetable for negotiations. Canada and BC engage in public consultation at the regional and local levels. The parties establish a public information program that will continue throughout the negotiations.

(continued)

Table 3.2-1
BC Treaty Process: Six-Stages of Negotiation (completed)

Treaty Negotiation Stage	Description
Stage 4 **Negotiation of an agreement in principle**	The three parties examine in detail the issues identified in the framework agreement, with the goal of reaching an agreement in principle. The agreement in principle identifies and defines a range of rights and obligations, and forms the basis for the treaty. The parties also begin to plan for implementation of the treaty.
Stage 5 **Negotiation to finalize a treaty**	Technical and legal issues are resolved to produce a final agreement that embodies the principles outlined in the agreement in principle and formalizes the new relationship among the parties. The treaty formalizes the new relationship among the parties and embodies the agreements reached in the Agreement in Principle. Once signed and formally ratified, the final agreement becomes a treaty.
Stage 6 **Implementation of the treaty**	Plans to implement the treaty are put into effect or phased in as agreed. Long-term implementation plans need to be tailored to specific agreements. The table remains active in order to oversee implementation of the treaty.

Source: BC Treaty Commission.

3.2.5 Environmental Assessments and Aboriginal Consultation

High mineral prices have resulted in a rapid increase in new mining projects in northwest British Columbia. In the Stikine and Taku regions alone, seven new mines have been proposed, and many more exploration projects are underway. Activities during all phases of each project's development occur on traditional aboriginal territories. Today, there is an upsurge of mechanisms being used to include aboriginal perspectives in decision-making processes. At the core of these approaches is the need for effective communication and consultation.

> "*No longer is it aboriginal participation in mining; but it is now mining company participation in the aboriginal community*"
>
> - Hans Matthews, President of the Canadian Aboriginal Minerals Association, 1999.

Section 35 of the *Constitution Act* (1982) recognized and affirmed the aboriginal and treaty rights of the aboriginal people of Canada. The duty of the Crown to consult and accommodate aboriginal people has its roots in the concept of the 'honour of the Crown' and has been defined through case law in the 1990s and 2000s. The nature and scope of the duty of consultation varies with the circumstances, but must be in good faith and with the intention of substantially addressing the concerns of the aboriginal people whose lands are at issue.

The duty to consult arises when the Crown has real or constructive knowledge of the potential existence of aboriginal rights and contemplates conduct that might adversely affect that right. The scope of consultation is expected to be proportionate to the strength of the aboriginal rights and the implications of the potential impact.

The legal duty to consult is incumbent on the Crown, not on industry. However, the Crown can delegate procedural aspects of the consultation to industry, but this will not satisfy its legal duty to consult.

The *British Columbia Environmental Assessment Act (BCEAA)* and the *Canadian Environmental Assessment Act (CEAA)* contain specific provisions for consultation with both First Nations and the public as a component of Environmental Assessment. The BC EA consultation process is structured to meet the needs and interest of participating First Nations, stakeholders, organizations, and members of the public.

The *Provincial Policy for Consultation* with First Nations is based in part on BC's view of the court-identified requirements to consult with First Nations. This policy requires that government agencies consult with First Nations about their aboriginal interests in respect to the proposed development. British Columbia's EA process is inherently built upon First Nation consultation and public engagement and is coordinated by the Environmental Assessment Office (EAO). The *BC Environmental Assessment Act* provides opportunities for First Nations and the public to bring forth interests and concerns regarding the proposed project and address uncertainties that may exist with respect to the project.

The BC EA process provides a regulatory mechanism to ensure that the issues and concerns of the public, First Nations, interested stakeholders and government agencies are considered. In practical terms however, the effectiveness of communication and consultation with relevant First Nations is driven by relationships that are developed, and are ultimately dependent on, industry's ability to facilitate.

3.2.6 The New Relationship

Flowing from the Supreme Court of Canada's decisions in Haida (2004) and Taku (2004) with respect to the Crown's duty to consult with and accommodate First Nations, came a document initiated by Premier Gordon Campbell and the by BC provincial First Nations leadership[3] entitled '*The New Relationship'* (2005) . The purpose and vision of the document is to build a "…new government-to-government relationship based on respect, recognition and accommodation of aboriginal title and rights" …(this) includes "respect(ing) our …laws and responsibilities. Through this relationship, (there is a commitment to) reconciliation of Aboriginal and Crown titles and jurisdiction" (The New Relationship 2005).

The relationship's goals explicitly aim to achieve First Nation self-determination through the exercise of their aboriginal title and rights, including land and resource management and the economic component tied into infringements on rights. Resource development is to reflect First Nation laws and knowledge and be carried out in a sustainable manner to preserve lands for present and future generations. The processes by which these goals are attained include principles that govern the relationship's process and actions. Key to these principles is

[3] The three main First Nations leadership organizations in BC include: the First Nations Summit, the Union of BC Indian Chiefs, and the BC Assembly of First Nations.

government-to-government shared decision making, capacity funding, identifying effective procedures for consultation, and developing new mechanisms and agreements for land and resource protection (The New Relationship 2005).

3.3 The Woodjam Project and First Nations

The Woodjam project is situated within the traditional territory of one First Nation group. This group, along with four other groups with territories or reserves in the general vicinity are described below. Figure 3-1 illustrates each respective group's traditional territory or reserve wherever relevant.

3.3.1 Northern Shuswap Treaty Society/Tribal Council

There are no Indian Reserves located within the Woodjam Project claim area. However, the entirety of the claim is situated within the asserted Traditional Territory of the Northern Shuswap Treaty Society/Tribal Council. The group is also known as Northern Secwepemec te Qelmucw (NStQ) and formerly known as the Cariboo Tribal Council.

The NStQ's traditional territory covers an area between Quesnel and Clinton (north to south) and Alexis Creek and Clearwater (west to east).

Members of the NStQ (the acronym they have chosen to use), who are collectively in Stage 4 of the BC Treaty Process (BCTC 2007) include: Williams Lake Indian Band, Soda Creek Indian Band, Canim Lake Indian Band and Canoe Creek Indian Band. A summary of the Indian Reserves for each Band and an approximate distance from the town of Horsefly is described below. Information for the Canoe Creek Indian Band - also a member of the NStQ - has not been included because their reserves are a fair distance away from the claim area.

Williams Lake Indian Band: located roughly 40 km SW of the Project area. A member band of the NSTQ, they have eight reserves.

Soda Creek Indian Band: located roughly 50 km W of the Project area. They have two reserves

Canim Lake Indian Band: located roughly 70 km SE of the Project area and has six reserves.

3.3.2 Key First Nations considerations for the Woodjam Project

The following highlights key areas to consider concerning the Northern Shuswap Treaty Society and Tribal Council and its member bands.

3.3.2.1 Williams Lake Indian Band

The Williams Lake Indian Band will be the primary focus of initial First Nations engagement as they are the closest to the Woodjam project.

Chief Ann Louie and Council govern the Williams Lake Indian Band, while administration and department managers report to Chief and Council. The band's administration has a natural

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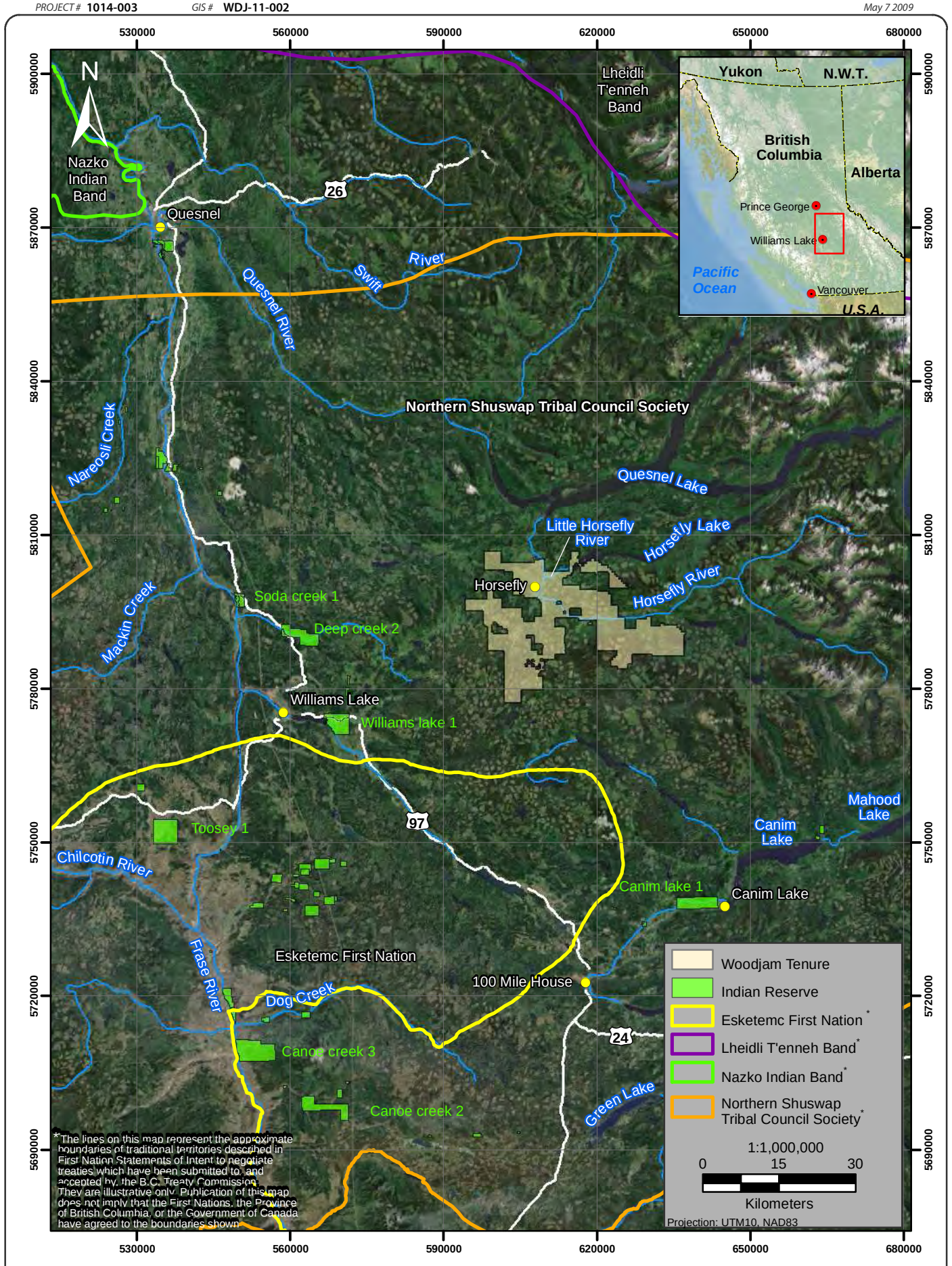

GOLD FIELDS

First Nations Traditional Territories, Statement of Intent Boundaries and Reserve Locations in Relation to the Woodjam Mineral Claim Area

Figure 3-1

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resources department, along with a wide range of other programs and services including: public works, education, employment, recreation, finance, social development, natural resources, GIS, lands, and self government departments (Williams Lake Indian Band 2009a).

The Band as a whole is working in conjunction with the Northern Shuswap Treaty Society concerning various issues, decision making and in the delivery of services to the WLIB membership. Details on engagement with the Northern Shuswap Treaty Society and Williams Lake Indian Band are described in Section 4.1 of this report.

3.3.2.2 Land use and resource management

The Northern Shuswap Treaty Society and Tribal Council have an active Natural Resources Department, which includes a Fisheries Program that provides technical assistance in natural resources issues and with the coordination of the four member NStQ First Nations in their natural resources management (NStQ 2003a). The NStQ are in the development of a Land Use Plan that incorporates both the management objectives of the Horsefly SRMP as well as objectives specific to traditional knowledge and land use based on their own previously conducted studies.

Areas of value and concern regarding land and resource use in the area include: monitoring logging amounts; development impacts to cultural heritage areas; red and blue listed species and cultural tourism (Integrated Land Management Bureau, 2009).

Forestry has traditionally been the primary industry in the area, however, the NStQ have not gained much benefit in the past and may possibly view it as an infringement on their Aboriginal Rights. Industry practices hinder the ability to practice activities such as hunting, harvesting medicinal plants, berry picking (NSQT 2003a).

3.3.2.3 Fisheries

As part of the Secwepemc people, the NStQ, along with the Williams Lake Indian Band, are actively involved in traditional fishing practices in the area within and surrounding the Woodjam claim area. Salmon, and in particular, the Horsefly River sockeye salmon are of significant value and interest to the First Nations in this territory and the First Nations in the area are committed to conservation and preservation measures “to protect all fish resources in Secwepemcul’ecw” (Williams Lake Indian Band 2009b).

3.3.2.4 Wildlife, hunting and trapping

Hunting and trapping are held valuable to the NStQ and the Williams Lake Indian Band. Hunting still remains a vital part of the Secwepemc culture and is conducted by various community members in the general region. Meat is distributed to families and Elders that otherwise could not afford it. Moose are prevalent

3.3.2.5 Archaeology

A cursory review on RAAD (Remote Access to Archaeological Data) found a number of archaeological sites within the claim area. As the Woodjam claim area is substantially large, it is difficult to know exactly how many sites there are in the claim area. However, based on certain

landforms, it is evident that potential for archaeological sites exist. Given the amount of forestry work in the region, some of these sites may have been recorded as a result of studies done for cutblocks. According to the Horsefly SRMP, semi-permanent villages were located in various areas including Quesnel and Horsefly Lakes (Integrated Land Management Bureau 2009). An Archaeological Overview Assessment may be required to identify where those sites are to be able to avoid those areas, depending on where exploration activities would be concentrated.

3.3.2.6 Traditional Knowledge and Land Use

The Quesnel Lake area, referred to as "Ti'weltk area" is considered sacred to the NStQ. Values in the area include camping; hunting and trapping; gathering medicinal plants; berry picking; salmon and trout fishing and spiritual uses (Integrated Land Management Bureau 2009).

3.3.2.7 Status of Treaty Negotiations

The Northern Shuswap Treaty Society and Tribal Council are in Stage 4 of the BC Treaty process and negotiate on behalf of their member bands. Fishing rights are a critical component to the group

3.3.2.8 Involvement in Mining

The NStQ have been engaged and consulted on environmental assessments and permitting processes for by various mining and exploration projects in the region. The Williams Lake Indian Band in particular is closely involved in consultation for the Prosperity Copper/Gold mine project, approximately 125 km southwest of Williams Lake. As with other mining developments in the region, preservation of fisheries and wildlife habitat continue to be the primary focus of concern.

3.3.2.9 Other First Nations in the Area

The following is a brief overview of other neighbouring First Nations in the region. They are presented here to provide wider aboriginal context and understanding of the territories adjacent to that of the Northern Shuswap's territory.

Esketemc First Nation

Although it does not overlap with the claim area, the Esketemc First Nation's asserted Traditional Territory Boundary is southwest of the Woodjam property. The 18 reserves belonging to the Esketemc First Nation are located around the town of Alkali Lake and are roughly 80 km SW of the Project Area.

Given the location of the territory, immediate engagement or consultation would not be necessary with this group. However the potential for downstream effects should the Project be developed should be monitored and the Esketemc should be engaged if project activities trigger the potential for downstream effects.

Toosey First Nation

While the Toosey First Nation (Tl'esqox) does not have a traditional territory boundary map, it is worth noting the location of their reserves, which are approximately 83 km southwest of Horsefly. As with the Esketemc, engaging or consulting with this group is not necessary;

however, project progress and activities should be monitored in order to determine potential water quality or land use issues that may involve the Toosey First Nation.

Nazko Indian and Lheidli T'enneh Band

There are also two other FNs which have SoI boundaries in the region: Nazko Indian Band approximately 100 km to the NW (in Stage 3 of the BC Treaty Process) and Lheidli T'enneh Band approximately 80 km to the NE of the Project (in Stage 5 of the BC Treaty Process). Reserve information is not included for these groups as they are located a fair distance from the Project area. However, their SoI boundaries have been represented on Figure 3-1.

4. PROPOSED FIRST NATIONS ENGAGEMENT

4. Proposed First Nations Engagement

The following section describes recommended strategies for effectively engaging with the Northern Shuswap Treaty Society/Tribal Council or, the Northern Northern Secwepemec te Qelmucw (NStQ). General approaches are outlined for consideration for future consultation pending the development of the Woodjam project[4].

4.1 Northern Secwepemec te Qelmucw (NStQ) Consultation

4.1.1 Assessment of NStQ Title and Rights

Should the Woodjam project proceed into further permitting and development stages, an understanding of specific NStQ Aboriginal Title and Rights is recommended. This will entail desk based research along with communications with the Northern Shuswap Treaty Society/Tribal Council.

4.1.2 Company and project introductions

It is recommended that the NstQ be contacted early in the development process and prior to submitting notices of work or referrals through the government. Familiarization with the Project through direct contact with the NStQ will benefit each party and set a positive starting foundation. Included in the project introductions should be maps that are easy to understand and include key landmarks such as water body and community names. The NStQ acts on behalf of their member First Nations and bands (as listed above). However, they will do so "at the request of, and under the direction of, the member First Nations" (NStQ 2003). As such, it is recommended that Gold Fields initiates engagement with the Williams Lake Indian Band and takes direction from the Chief and Council as to whether to also engage the NStQ.

4.1.3 Involvement in archaeology and traditional knowledge studies

The NStQ and local member band members have capacity as local experts to be involved in archaeology and traditional knowledge studies from the early stages of the Project development. It is recommended that members of NStQ be employed for work within their territory wherever possible.

4.1.4 Consultation communities

Gold Fields Mining Corp will be required to share information about the proposed Woodjam project though community engagement and consultation. This generally occurs by way of project information leadership and community meetings in the towns that are closest to the Project; where relevant First Nations members live; and/or communities from which contractors and business services may be sourced. The communities closest to the Woodjam project are

[4] The names 'Northern Shuswap Treaty Society'; 'Northern Shuswap Tribal Council'or, the Northern Secwepemec te Qelmucw (NSTQ) are to be used interchangeably. It has been observed that the traditional name of "Northern Secwepemec te Qelmucw (NSTQ)" is preferred. As such, this section uses "NSTQ".

Williams Lake and Horsefly. It is anticipated that introductory meetings with First Nations would take place in Williams Lake.

4.2 Community Engagement and Consultation Approaches

4.2.1 Relationship building

Initiating communication and relationship building with each First Nation group is recommended before any field activities can proceed. Given recent tensions between First Nations groups and the Provincial government, case law and Aboriginal-corporate industry trends in BC, it is recommended that company and project introductions be made as early as possible, preferably before entering the government review process. Trust and respect are fundamental to paving the way to good relations, effective communication and successful partnership building.

4.2.2 Capacity Funding, Protocols and Agreements

Once the initial phase of a relationship has been formed, and the Project has entered into the review and permitting stages of development, discussions concerning capacity, protocols and agreements should commence. Once a project is approved, longer term agreements and partnerships including joint ventures may be further developed. Table 4.2-1 below summarizes such suggested agreements and protocols.

Table 4.2-1
Recommended First Nations Agreements and Protocols

Agreement or Protocol	Purpose	Sample Components
Memorandum of Understanding (MOU) or Framework Agreement	General commitment between two parties that establishes an agreement to work together and the way in which each party will work together.	Guiding participation principles; List of specific agreements and protocols to be developed; Budget and work plan; Issues to be addressed through consultation.
Communication Protocol and/or Agreement	Document that demonstrates both parties' commitment to engage and communicate in way that is mutually acceptable. It is a way of formalizing the communication process.	EA timelines and milestones; Preferred communication mechanisms (phone; email; fax; face-to-face; etc.); Relevant and appropriate point and order of contact; Understanding of each parties' leadership position, roles and responsibilities.
Information Sharing Protocol	Formalized expectation and procedure that describes what information is to be shared and how it will be shared	Information required by Proponent/Consultant; Information required by First Nation; Method and timing of information exchange
Confidentiality Agreement	Document that stipulates how information shared between parties is used.	Identification of what information is confidential; who has access to that information; and under what circumstances. Optional costs for information access.

(continued)

Table 4.2-1
Recommended First Nations Agreements and Protocols (completed)

Agreement or Protocol	Purpose	Sample Components
Capacity Funding Agreement	Document that outlines the resources needed and how they will be made available to the First Nation(s) – ie. a commitment to develop the capacity to properly participate in the EA process in a meaningful manner and make informed decisions.	Identification of EA timelines and milestones; Identification of documents requiring review; Identification of meetings and other communication required; Identification of resources (funding; time, expertise; administration etc) required to achieve deliverables; May also include funding a Project Community Liaison Officer.
Traditional Knowledge Agreement	Document that demonstrates both parties' commitment to collaborate on the process of Traditional Knowledge and Land Use information collection; information sharing; and integration of same into the EA application	Description of research and confidentiality protocols; action plans; study deliverables; dual-party roles and responsibilities; access to information; budgets and work plans.
Accommodation Agreement; Participation Agreement; Impact and Benefit Agreement	Document that describes both parties commitment to collaboration and/or partnership; as well as how the First Nations will benefit economically from the Project.	Statement of cooperation and collaboration; Social and economic development agreements; Compensation stipulations; Business partnership and human resources commitments

4.2.3 Recognition of Aboriginal Rights and Title

Explicitly stating recognition of each First Nations rights and title to the land surrounding the project is paramount to developing a foundation of respect and trust. There is an assumed mutual understanding that land claims may remain disputed, yet acknowledging the fact that they are being asserted needs to be confirmed during discussions and reflected in agreements. Aboriginal rights are ultimately at the core of each interest, issue and all reconciliation thereof.

4.2.4 Cross Cultural Communication and Consultation Protocol

One of the challenges with efforts to consult with First Nations is disparity between western and contemporary (post colonial) regulatory processes and cultural practices. For instance, government and third parties such as industry are directed to consult with elected political First Nation members (i.e., band Chiefs and Council). Challenges arise however, when First Nations need to reconcile their traditional societal governance processes which include elder and hereditary chief consultation.

Understanding how each First Nation works and establishing a mutually agreed upon communication protocol contributes to clarity and certainty that consultation is taking place in a meaningful and cross-culturally effective way.

4.2.5 Communication and Information Distribution

Through proper engagement, communication and consultation, the proponent can gain greater confidence and certainty regarding the proposed project and potentially affected groups. Providing clear information in a language and format that is comprehendible is the key to ensuring that community leaders and members understand the scope of the project and potential impacts. This way, both parties can attempt to identify early on, what concerns exists and seek to avoid adverse effects and/or provide mitigation measures.

4.2.6 Integration of Traditional Ecological Knowledge

As part of the BC Environmental Assessment of proposed projects, proponents are required to conduct Traditional Ecological Knowledge/Use (TEK/TU) studies that rely on the transfer of information and knowledge from community members.

TEK/TU studies are necessary to assess the potential impacts from the proposed development on communities and the environment. They will be used in combination with information from other baseline studies to prepare the Environmental Assessment (EA) for the projects. The EAs will be submitted to the government as part of the process for obtaining permits and approval to develop a mine. The EA describes all potential environmental and social effects of mine development.

Traditional Knowledge is defined by the provincial Environmental Assessment Office (EAO) as "…a body of knowledge built up over time, and continuing into the present, by people living in closest contact with the natural environment. It includes understanding of plants and animals (properties or locations), the functioning and management of ecosystems, and the reliance on species for food, medicines, fuel, or shelter."

The EAO requires that Traditional Knowledge (TK) and community information are brought into the environmental assessment process. For the Woodjam project, this study would be conducted using existing ethnographic information alongside interviews with local Elders and land users of the study area. The information produced from these studies would be integrated with other modes of social and biological information collection.

Effectively incorporating the results of Traditional Ecological Knowledge studies with the results of scientific interdisciplinary studies is critical to the success of current environmental assessment and permitting applications. Traditional Knowledge studies require unique and cross-culturally collaborative research approaches that directly involve local community members.

4.2.7 Country Foods Study

A country foods study evaluates the quality of locally harvested foods including: fish, land animals, birds and plants. The country foods that are eaten most by community members are the main foods of interest in the study. All foods, including non-harvested foods, contain small amounts of substances such as metals. Many of these metals occur naturally in the environment and are required by the body to maintain proper health and function. When people eat these foods, the metals are transferred to them in their diet. The country foods study is aimed at

assessing the baseline (naturally occurring) levels of metals that harvesters currently consume from their diet.

A country foods study is mandated by Health Canada for most environmental assessments. Yet, as with a Traditional Knowledge study and, if done effectively, it can also be a direct means of involving and collaborating with local community members in a positive and constructive way. Community members who indicate that they harvest and consume foods from the proposed project area are identified as study candidates. Those who demonstrate an interest in participating in this study are then contacted to participate in interviews and site visits with in-house toxicologists and local community researchers.

4.2.8 Socio-Economic Benefits

The natural resources sector represents an opportunity for First Nations communities to prosper in terms of employment, economic development and self-reliance. The socio-economic benefits associated with the Woodjam Project would need to be clearly outlined and accompanied by plans to leverage these benefits for local community members.

In addition to demonstrating commitment to First Nations employment and economic development, commitment to fish and wildlife resources should also be considered under the context of socio-economics. Fishing and hunting are a part of the Northern Shuswap's or Secwepemec's subsistence economy and this would need to be factored into overall socio-economic effects assessments.

4.2.9 Training and Skills Development

Communities can only benefit from employment offered from the mine if they have the ability to do so. More and more mining companies are dedicating resources to community capacity building. As opposed to simply labour level positions, training and development initiatives are seeing First Nations members in roles of responsibility, including the areas of environmental monitoring, technical, trades, administration and management.

Demonstrating commitment not only to mining related capacity building, but towards areas of value to the communities such as cultural revitalization programs is fundamental to Aboriginal-corporate relations.

4.2.10 Effective Intercultural Communication

Successful aboriginal engagement and consultation is in large part about process and how things are done. No matter what the event, activity, effort, information or intention, if it is not done in a politically or culturally sensitive manner, chances of failure and miscommunication increase exponentially. Some key points to consider when engaging with each aboriginal group include:

Respect though acknowledgment

Demonstrating an appreciation for an individual group's belief, cultural identity, values and aspirations is critical to gaining their trust. No matter what conflicting information exists outside of their belief system (e.g., where their territory extends to), it is important to truly articulate a willingness to understand their perspective, intentions, and position.

Unique and committed relationships

Even though each aboriginal group may know you are forming relationships with other groups, it is important that all focus and references be on the group you are talking to in that moment. For instance, do not refer to other aboriginal groups' agreements; perspectives or activities. There is an implicit understanding that a proponent may have relationships with multiple groups. Yet each group should feel a sense of perceived exclusivity or uniqueness in regards to their relationship with the proponent. Also note that in some instances one First Nation may share information, for example Agreement details, with another.

Verbal and non verbal communication

When presenting information, whether in a conversation, small meeting or a large forum, it is critical to use non-technical terms and a high level of visual aids such as photos, samples or models. Too often, for instance, Power Point presentations are riddled with text and technical information, most of which, if not all, is lost on much of the audience.

When communicating with elders, it is important to not make direct eye contact for extended periods of time. This is counter-intuitive for most of us, as we associate eye contact as a reflection of honesty. In Asian and Aboriginal cultures (older generations in particular, where there is still a reverence and deference towards elders), eye contact is implicitly perceived as a threat to one's authority and/or an attempt to intimidate.

The communication style you use should be natural to you, yet also project an air of humility, openness and curiosity. This will come through with lowered, calm voice volume; tone; and body language that all reflect a non-threatening and modest air.

Maps and territory boundaries

When in meetings, it is not recommended to impose the aboriginal group's territory as a data layer unless they have requested it. And more importantly, never use a map in a meeting with multiple aboriginal territories. This will create highly contentious situations whereby the Proponent will be seen to be validating other competing claims and negating one group's land claim assertion and/or treaty negotiation.

5. SUMMARY OF PERMITTING STRATEGY AND RECOMMENDATIONS FOR THE WOODJAM PROJECT

5. Summary of Permitting Strategy and Recommendations for the Woodjam Project

5.1 Permitability Analysis

In our opinion, if an economically viable ore body is delineated in the Woodjam exploration claim block, it would be permitable through the British Columbia and Canadian environmental assessment processes.

The most sensitive issue will be water quality as it relates to fisheries. Fish habitat alterations and destruction will be a key component, potentially involving fish compensation. The waste management permits will be stringent and require extensive monitoring.

5.2 First Nations Relations and Social License to Operate

The First Nations communities need to be engaged and consulted early in the process in a meaningful and transparent manner. Trust, respect and positive relationships are fundamental and need to be fostered through dialogue on a continuous basis. Funding agreements to assist the First Nations to participate in the environmental assessment process are required as a first step. The BC EAO has a mandate to provide funding to each First Nation group, but the practical reality is that the amount granted is minimal and industry is relied upon to bolster financial capacity to involve First Nations. Funding and communication agreements are essentially the formalization of a proponent's commitment to the First Nations to work together throughout the EA process and eventually, into the project's development stage.

5.3 Strategic EA Process Principles:

The overall recommended principles for permitting the Woodjam Project involves:

- clear understanding of water quality and fisheries issues in the Horsefly River/Quesnel River Watersheds;
- awareness and adherence to legislated regional land use and sub-regional sustainable management plans encompassing the claim area and Quesnel River watershed;
- integrated approach to environmental, social and economic management process;
- good understanding of the Aboriginal context in which the Woodjam Project's environmental assessment would take place;
- creation of strong relationship with the Northern Shuswap Treaty Society;
- substantial time and finances to negotiate necessary agreements and protocols;
- presence in local communities and engagement of leaders and residents;
- cross-cultural relationship building and communication skills;
- incorporation of community values, including traditional knowledge and land use into comprehensive scientific environmental baseline studies and assessment; and

- direct and ongoing demonstration of commitment to environmental and social sustainability and integrity.

5.4 Recommendations

5.4.1 Exploration Program

Engage and consult the Williams Lake Indian Band and Northern Shuswap Treaty Society if necessary prior to submitting Notice of Work. Conduct preliminary archaeology and water quality studies prior to, and during exploration activities.

5.4.2 Environmental Baseline Study

The initial baseline work should consist primarily of water quality evaluation and fisheries habitat identification. It is suggested that a water sampling program be initiated in the spring at five to ten locations in the vicinity of the mineral deposit zones along with reference and downstream watersheds to establish background conditions and monitor the effects of the exploration drilling and potential trenching in the area. The sampling should be completed during the freshet; mid summer, fall and late fall. Preliminary fisheries habitat identification should be initiated as soon as possible. If the exploration is encouraging, it is recommended that an automated meteorology station be established on-site to monitor standard meteorological parameters such as precipitation, wind speed and direction, solar radiation and snowpack. This information is required for engineering design and impact evaluation and the length of the monitoring record is always a limitation for long-term water balance issues. An expanded environmental baseline program could be developed and initiated during the second field season if the exploration results are favourable.

5.4.3 First Nations Engagement Plan

It is recommended that dialogue with the Williams Lake Indian Band Chief and Council and the Northern Shuswap Treaty Society/Tribal Council be initiated as early as possible in the Woodjam project's development and prior to commencing formal environmental or geological drilling tests. The following is a proposed First Nations engagement plan.

5.4.3.1 June, 2009: Initiate Communication

Initiate contact with Williams Lake Indian Band and the Northern Shuswap Treaty Society/Tribal Council by formal letter introducing Gold Fields and the proposed Woodjam Project. Request a leadership meeting in their community to discuss the Woodjam Project.

5.4.3.2 July-August 2009: Leadership meetings

Meet with the Williams Lake Indian Band Council members and Northern Shuswap Treaty Society's leaders and natural resources department heads in to introduce Gold Fields and Woodjam Project and obtain preliminary information regarding their issues and interests.

5.4.3.3 August – September 2009: Follow-up and Ongoing Communications

Follow up and ongoing written and verbal communications with the Williams Lake Indian Band and the Northern Shuswap Treaty Society/Tribal Council regarding the status of the Project and future activities.

5.4.3.4 Commencement of EA process

Meet with The Northern Shuswap Treaty Society/Tribal Council to discuss environmental baseline studies and environmental assessment (EA) capacity funding agreements and communication protocols.

6. LITERATURE REVIEW AND REFERENCES

6. Literature Review and References

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Appendix 27:
Rescan Environmental Services Ltd: Woodjam Gold-Copper Project
Environmental Baseline Audit and Water Quality Evaluation

Gold Fields Ltd.

Woodjam Gold-Copper Project Environmental Baseline Audit and Water Quality Evaluation






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August 2009

WOODJAM GOLD-COPPER PROJECT:

ENVIRONMENTAL BASELINE AUDIT AND WATER QUALITY EVALUATION

August 2009
Project #1014-006/Report Version A.1

Prepared for:

Gold Fields Ltd.

Prepared by:

Rescan™
Engineers and Scientists

Rescan™ Environmental Services Ltd.

Executive Summary

Executive Summary

In July 2009, Gold Fields signed an Option and Joint Venture Exploration Agreement with Fjordland Exploration Inc. and Cariboo Rose Resources Ltd. Previous drilling on the Woodjam North Property totals approximately 21,260 m in 91 holes. The property hosts several gold-copper alkalic porphyry-type deposits including the Megabuck, Takom, and Deerhorn Zones.

The objective of the audit was to assess the exploration drill holes in the Megabuck, Takom and Deerhorn zones of the Project area and identify any environmental or reclamation issues. The sites were generally reclaimed with a few exceptions. There were no signs of ARD, no presence of artesian holes, and no sign of hydrocarbon contamination. Some sites had debris and low vegetation cover. The drill sites were generally recontoured except for a few where equipment ruts were present. These remnants of exploration have no consequences on the environment other than evidence of man's pass or presence in the area. To complete the reclamation in the area to high standards, it is recommended that a general clean-up be completed. This work would entail removal of debris such as bentonite bags, rags, lumber, metal, pallets and old core boxes. It would also include backfilling a few sumps, a small trench and re-seeding some areas. One drill casing extending 40 cm above ground should be cut at ground level. This is a small job requiring a few days of work for a couple of First Nations people in the area.

The water quality data collected in August 2009 indicates that for the majority of the physical variables and metals assessed, a spatial pattern could be observed. Concentrations were highest in Deerhorn Creek, followed by Mussel Creek and Woodjam Creek and lowest in Horsefly River. BC and/or CCME water quality guidelines were exceeded at Deerhorn Creek (DC-1) for total aluminium, cadmium, chromium, copper and iron concentrations. Background total and dissolved chromium concentrations at Woodjam Creek exceeded both BC and CCME guidelines.

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WOODJAM GOLD-COPPER PROJECT:
ENVIRONMENTAL BASELINE AUDIT AND WATER QUALITY EVALUATION

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PLATE **PAGE**

1. Introduction

1. Introduction

At the request of Gold Fields Limited (Gold Fields), Rescan Environmental Services Ltd. (Rescan) conducted an environmental baseline audit at the Woodjam gold-copper property (Woodjam North Property) located 53 km east of the City of Williams Lake, in the Cariboo Region of British Columbia. A water quality baseline program was also initiated. The Woodjam claim area is located in the Horsefly River Watershed which drains northwards into the Quesnel Lake (Figure 1-1.1). The area is composed of rolling hill mainly forested with gentle forested terrain, with few rock outcrop exposures (Plate 1-1.1). The land is generally covered by fir and pine forest with some old growth cedars.

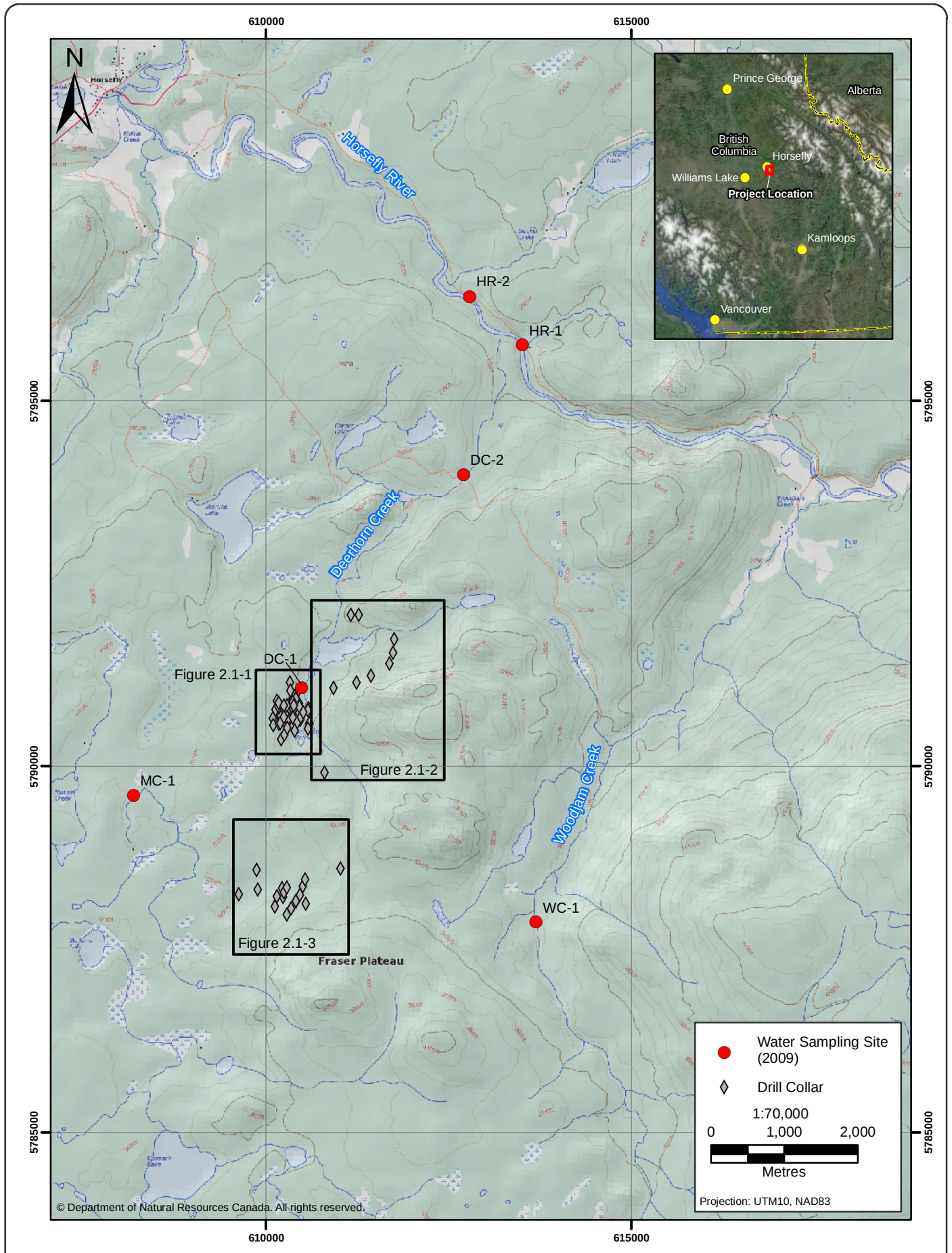
On July 30, 2009, Gold Fields signed an Option and Joint Venture Exploration Agreement with Fjordland Exploration Inc. and Cariboo Rose Resources Ltd granting an option to Gold Fields Horsefly Exploration Corporation, to earn up to a 70% interest in the northern portion of the Woodjam North Property. Previous drilling on the Woodjam North Property totals approximately 21,260 m in 91 holes. The property hosts several gold-copper alkalic porphyry-type deposits including the Megabuck, Takom, and Deerhorn zones. The gold-copper style mineralization occurs within contact aureoles of monzonitic intrusive bodies intruding Takla volcanic rocks (Fjordland 2009).

Plate 1-1.1. Overview of Takom Zone.

The objective of the audit was to assess all the exploration drill holes in the Megabuck, Takom and Deerhorn zones of the Project area and identify any potential environmental or reclamation issues. Specifically, the condition of the drill pads were assessed for the presence of any debris or casings, presence of artesian holes, evidence of ARD, condition of vegetation cover, recontouring condition,

evidence of hydrocarbon contamination, condition of access roads, evidence of cuttings, or the presence of sumps. In summary, the reclamation status of the drill pads was assessed.

In addition, six waterbodies were sampled for water to initiate a baseline program. Water was collected and analyzed for general physico-chemicals, nutrients, anions, total organic carbon, and total and dissolved metals. Sites were selected in the vicinity and downstream of the mineralized zones and also at reference sites.



Woodjam Project
Water Quality Locations and Drill Sites

Figure 1.1-1

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2. Environmental Baseline Audit

2. Environmental Baseline Audit

2.1 INTRODUCTION

The site was visited on August 10 and August 11 by François Landry, M.Sc., R.P.Bio. (Rescan) with assistance of Bruce Laird (Gold Fields). The areas visited were divided into three zones, the Megabuck Zone southwest of Deerhorn Lake (Figure 2.1-1), the Deerhorn Zone (Megabuck East) located northeast of Megabuck (Figure 2.1-2), and the Takom Zone, located 2 km south of Megabuck (Figure 2.1-3). The majority of the holes are all located within the Megabuck Zone.

An attempt was made to assess all of the 91 holes. Maps with roads and drill collar coordinates were used for orientation. Drilling in the area started in 1974, therefore some of the sites were 37 years old and overgrown. Eighteen holes could not be pin pointed. The majority of these holes (10) were from 1983, hence the regrowth of vegetation made it almost impossible to find them, five of these were from 1974, one from 1977, and two from 1999. The list of those holes is located in Appendix 2.1-1. There was no evidence of environmental issues in the general area of the drill holes that could not be located.

In most situations the collars were located. For some holes the collars could not located, but the drill pad could. A total of 73 drill areas were inspected. The majority of the holes were at the Megabuck deposit. 67 holes totalling 17,236 m have been drilled at the Megabuck deposit defining a 200-m wide, moderately plunging, mineralized envelope (Fjordland 2009).

2.2 RESULTS

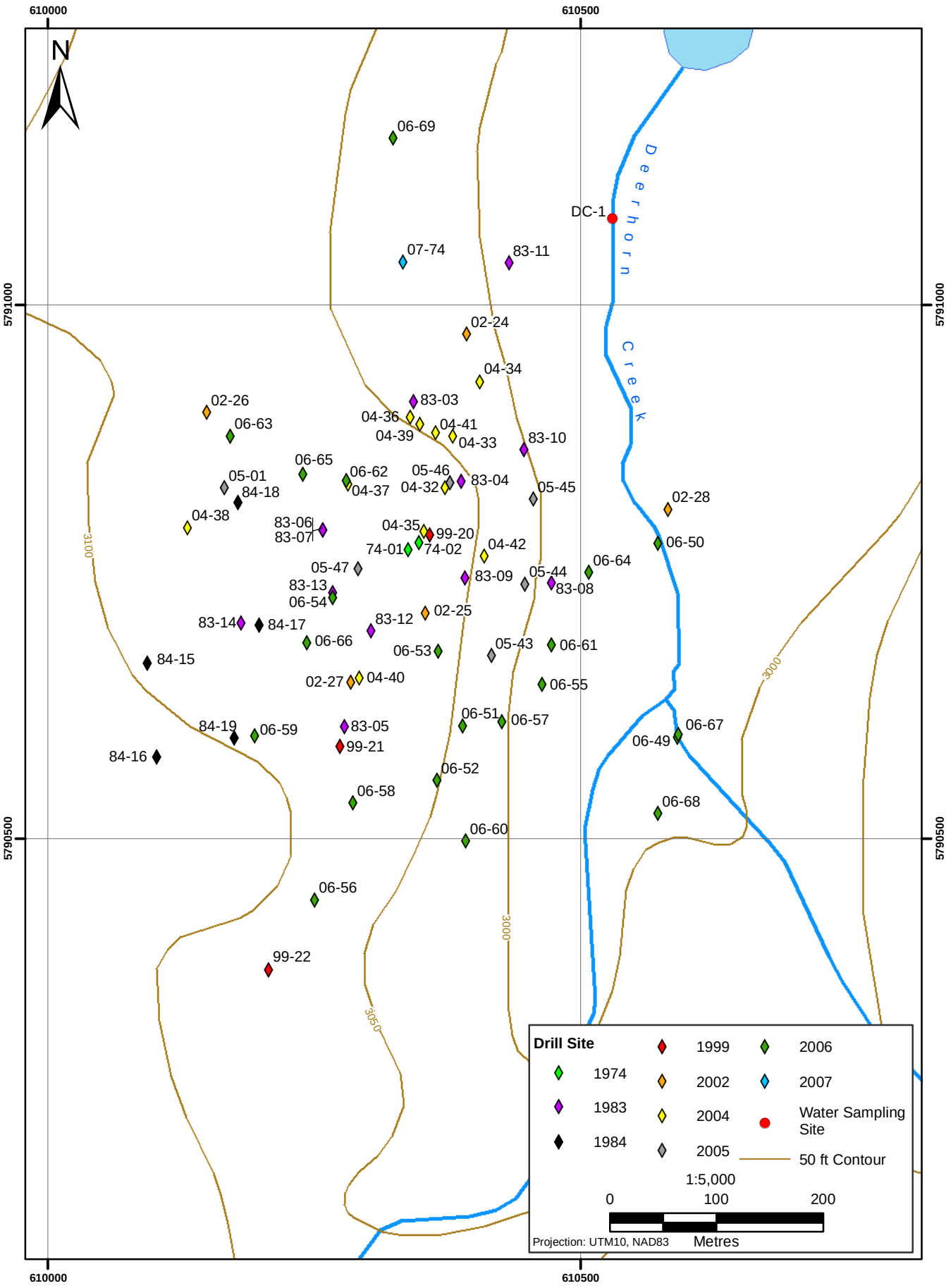
Comments on all 73 holes inspected are presented in Appendix 2.2-1 and photographs of each hole or pad are presented in Appendix 2.2.-2. There were no artesian holes and therefore no water samples were obtained at any of the holes. There was also no sign of ARD or hydrocarbon contamination at any of the holes inspected. A small shallow hand trench on the northern slope of the small knoll located on the Megabuck Zone is one of the early testaments to exploration in the area covered by the current claims (Plate 2.2-1). There were no sign of ARD along this trench. The small trench should be backfilled.

The following sections describe any environmental issues that were noted. These include the status of revegetation, the recontouring of each site and presence of equipment ruts, the presence of cuttings, sumps and ponds, presence of debris and condition of access roads.

2.2.1 Re-vegetation

All drill pads were likely seeded once drilling was completed. The majority of the areas were well reclaimed (Plates 2.2-2 to 2.2-4), however a few drill sites had lower success such as holes 05-44, 05-04, and 08-94 (Plates 2.2-5 to 2.2-7). A drill hole in 2008 was not seeded (B. Laird. pers. comm.). Two holes from 2005 drill programs had sparse vegetation covers. This might be attributable to the use of Reverse Circulation (RC) drills at the sites. RC drills were used in 2005 (B. Laird. pers. comm.).

In Appendix 2.2-1, comments of percent vegetation coverage is presented for many sites and vary from 10% to 100%. In most cases, vegetation included legumes and grasses, and in some instances natural invasion by small shrubs and trees which is good.



Woodjam Project Exploration Drill Sites
Megabuck Zone

Figure 2.1-1

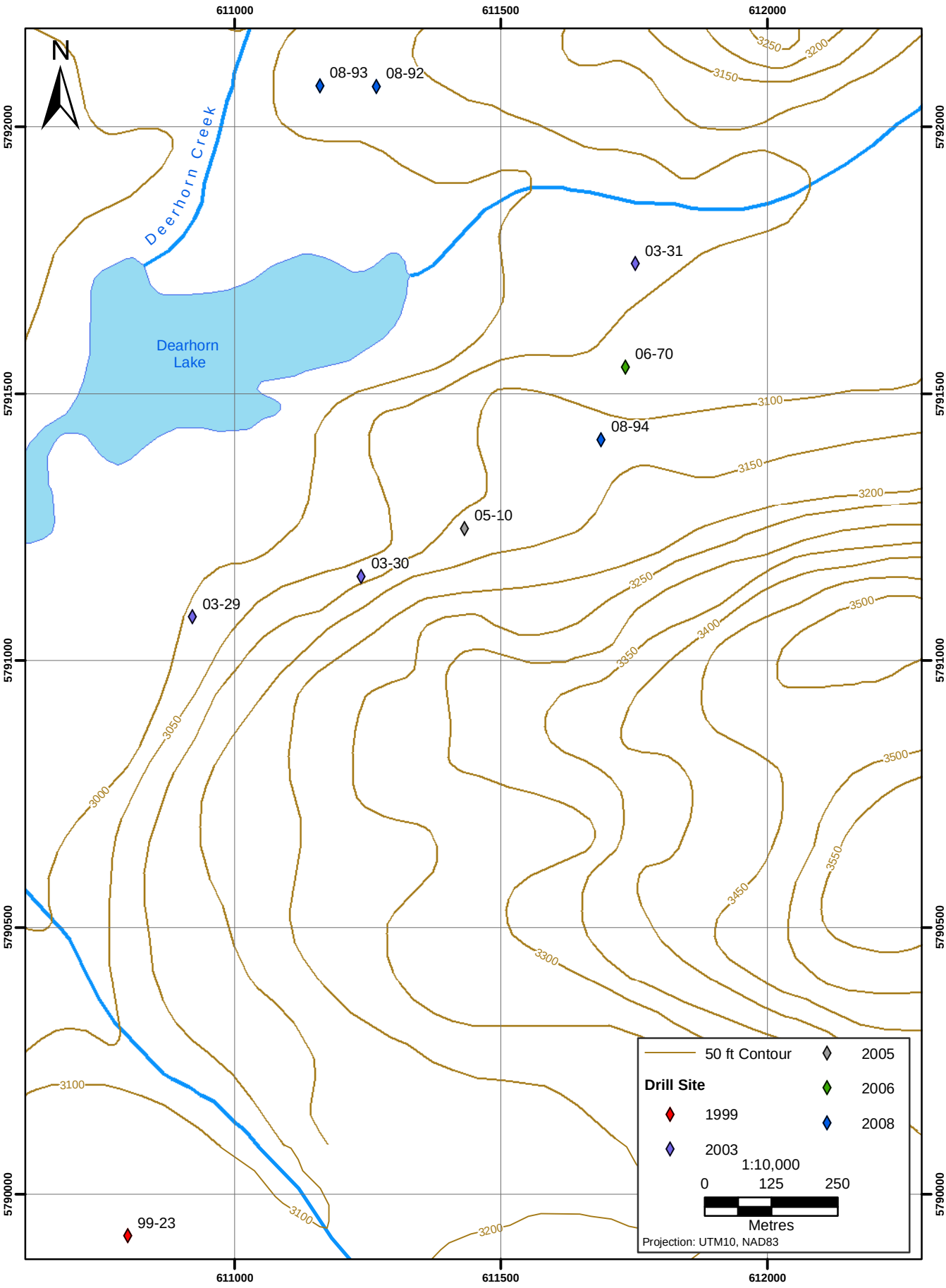


Figure 2.1-2

Woodjam Project Exploration Drill Sites
Dearhorn Zone

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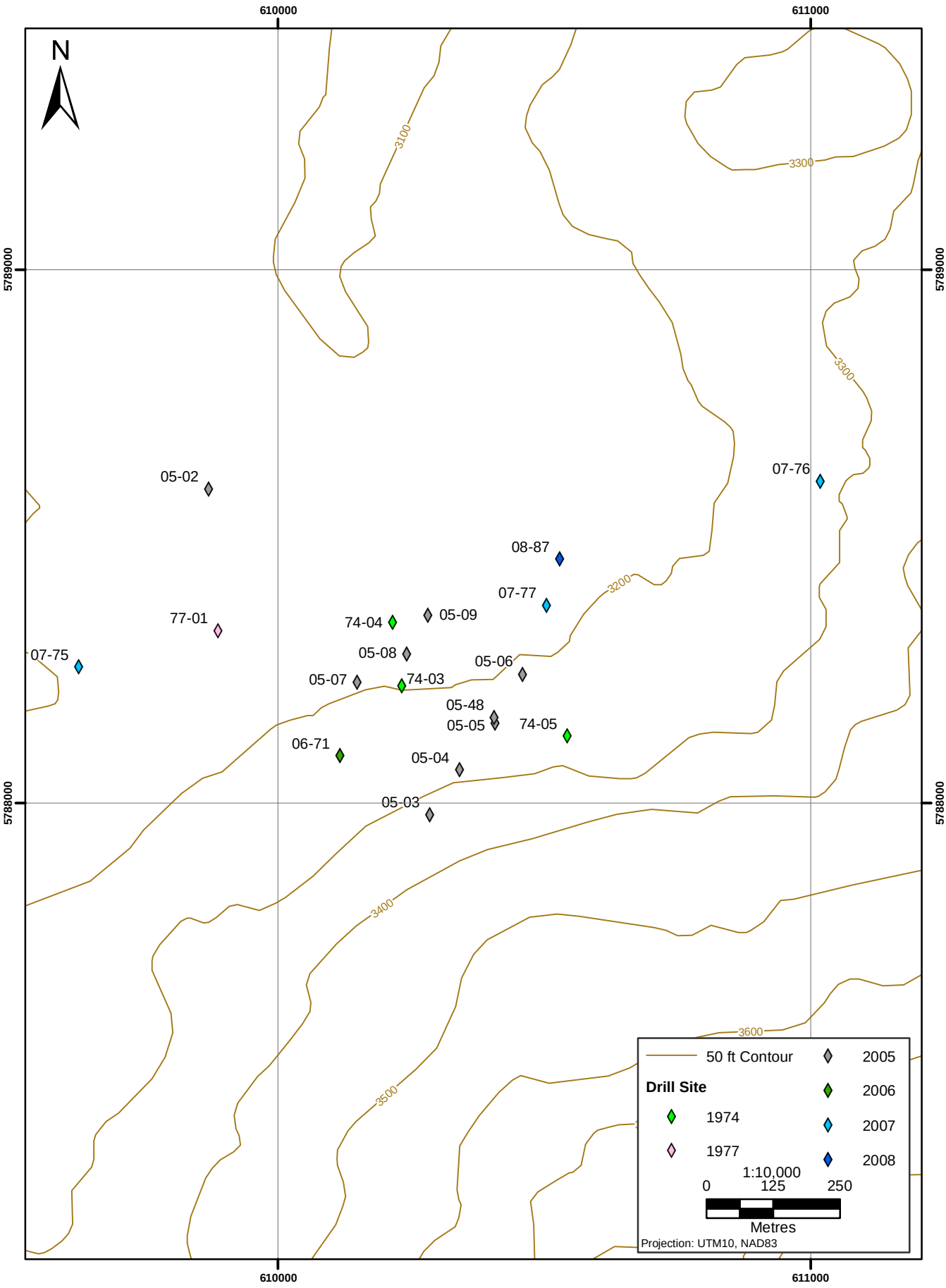


Woodjam Project Exploration Drill Sites
Takom Zone

Figure 2.1-3

Plate 2.2-1. Shallow trench in Megabuck Zone.

Plate 2.2-2. Conifer stand at holes 83-06 and 83-07.

Plate 2.2-3. Drill site completely covered by vegetation at hole 04-39.

Plate 2.2-4. Heavy growth of clover and grasses at hole 07-77.

Plate 2.2-5. Low vegetation cover at hole 05-44

Plate 2.2-6. Low vegetation cover at hole 05-04

Plate 2.2-7. Low vegetation cover at hole 08-94

2.2.2 Ruts and Tracks

Sites should be recontoured when reclaimed and deep tracks made by equipment should be levelled off. When large tracks or ruts are left in place, proper drainage of the site may be inhibited and water may accumulate in these ruts. Reduced vegetation growth within the tracks because of too much water may also reduce growth in adjacent areas. In some cases, these tracks may become erosion gullies.

Ruts/tracks were observed at 11 sites and varied in depths, widths and lengths. Plates 2.2-8 and 2.2-9 illustrate this at two sites.

Plate 2.2-8. Hole 05-10

Plate 2.2-9. Access to Hole 08-87

2.2.3 Cuttings

Drill cuttings should not be left on surface of drill sites. Five holes had remains of cuttings (05-01, 05-02, 05-04, 05-09, and 06-52), and four of these holes were from RC drills (B. Laird, pers. Comm.). Four of those sites had small areas of cuttings, and hole 05-09 had a larger volume than the other sites (Plate 2.2-10). The amount of cuttings measured approximately, 15 m long by 0.5 m wide by 0.15 m high. Plate 2.2-11 demonstrate another hole with cuttings left in place.

Plate 2.2-10. Hole 05-09 cuttings from RC drill. Mound of cuttings 15 m long by 0.5 m wide by 0.15 m high.

Plate 2.2-11. Hole 05-01 cuttings from RC drill.

2.2.4 Sumps and Ponds

Sumps that have been constructed to collect drilling mud should be buried providing the drilling mud does not contain materials harmful to plants or groundwater (BC Ministry of Energy, Mines and Petroleum Resources et al. 2009). All sumps at each drill site visited were filled with the exception of three holes (06-71, 06-55, and 07-76) (Plates 2.2-12, 2.2-13 and 2.2-14). Two of these sumps were dry and one (06-71) had water. There was no evidence of any other sumps at the drill sites inspected. However, there were two areas where larger sumps/ponds appeared to have been dug out for use as water sources. These were located near holes 77-01 and 08-87. There were two of them on either side of the road at both of these locations (Plates 2.2-15 and 2.2-16). These sumps should be filled.

2.2.5 Debris

As part of reclamation measures, no debris should be left at drill sites. Debris encountered during the inspection, included lumber, scrap metal, burlap sacks, bentonite bags, wood pallets, and rags. Pieces of 2x4 or 2x6 lumber were observed at five sites. Examples of what was left can be seen in Plates (2.2-17 and 2.2-18). Wood pallets were left at two of the drill sites (05-47 and 06-70) (Plates 2.2-19 and 2.2-20). At hole 05-47, six pallets were left.

Plate 2.2-12. Sump at hole 06-55.

Plate 2.2-13. Sump at hole 06-71.

Plate 2.2-14. Sump at hole 07-76.

Plate 2.2-15. Pond/sump near hole 77-01.

Plate 2.2-16. Pond/sump near hole 08-87.

Other debris included scrap metal and bentonite bags. In proximity to hole 74-02, a large piece of metal was found (Plate 2.2-21). The worst hole surveyed was hole 02-25, where the site was littered with debris, including bentonite bags, wire mesh, and rags (Plate 2.2-22).

Plate 2.2-17. Hole 03-31with pieces of 2x4 lumber on ground.

Plate 2.2-18. Hole 06-68 with pieces of 2x4 lumber on ground.

Plate 2.2-19. Hole 06-70 with wood pallets.

Plate 2.2-20. Hole 05-47 with wood pallets.

Plate 2.2-21. Piece of metal in proximity to Hole 74-02.

Plate 2.2-22. Hole 02-25 littered with debris.

Drill holes should be capped below the ground. One site (02-24) had a section of casing still in place above ground which measured approximately 40 cm.

Old core boxes if needed should be rearranged and covered with plastic sheets. The photos in Plates 2.2-23 and 2.2-24 show the old abandoned core boxes.

Plate 2.2-23 Core boxes near hole 74-01.

Plate 2.2-24 Core boxes near hole 74-01.

2.2.6 Access Roads

A large series of access roads have been developed in the area for exploration purposes. The majority of the side roads have been seeded and there has been some good regrowth. Most of the road edges are recontoured and the regrowth status is clearly related to the year the holes were drilled. Roads built in 2008 were just seeded in October of 2008 (B. Laird, pers. comm.) and therefore have low vegetation cover (Plates 2.2-25 and 2.2-26). An access road built and reclaimed in 2007 shows a net difference in vegetation growth (Plate 2.2-27). Two other access roads built a year earlier in 2006, definitely show high growth of legumes and sedges and have fallen trees along the road (Plates 2.2-28 and 2.2-29). There are no issues with these roads. One road built in 2003 demonstrates the success of reclamation, with trees growing on the road bed (Plate 2.2-30). Overall, reclamation of these access roads has been successful. Roads built in 2008 will need to be revisited in 2010 to inspect their status.

2.3 SUMMARY

Overall, the sites were well reclaimed with a few exceptions. There were no signs of ARD, no presence of artesian holes, and no sign of hydrocarbon contamination. Most sites were clear of debris; however, one site had debris, including bentonite bags, rags and scrap metal. A few other sites had minimal debris such as lumber, metal, and pallets. Cuttings were found at five holes. One area had old core boxes.

Three pads had sumps, and there were two areas with larger sumps/ponds that may have been used as a water source. These sumps are shallow and do not present a hazardous safety issue but should be backfilled.

Most sites were completely covered by vegetation. A few sites had lower coverage. The sites were well recontoured except for a few where machine tracks were present.

To complete the reclamation of the drill sites, it is recommended that the debris left around some of the sites should be collected, backfill small sumps, backfill small trench, bury cuttings in a few areas, backfill ruts and re-seed a few areas. There is approximately 5 days work for a couple of people to clean-up the site.

Plate 2.2-25. Road access near holes 08-92and 08-93 with low vegetation growth.

Plate 2.2-26. Road access near hole 08-87 with tracks and low vegetation growth.

Plate 2.2-27. Road access to hole 07-76 with greater vegetation coverage

Plate 2.2-28. Road access to hole 06-71 with 100% vegetation coverage with 60-75 cm height.

Plate 2-2-29. Road access to holes 06-67, 06-49,and 06-68 with high vegetation coverage and fallen trees.

Plate 2.2-30. Road access to hole 03-30 fully revegetated with trees growing.

3. Water Quality Evaluation

3. Water Quality Evaluation

3.1 INTRODUCTION

This section provides a summary of the water quality sampling program carried out on August 11, 2009. The Woodjam claim area is centred around the community of Horsefly, and located within the Horsefly River Watershed (Figure 1.1-1). Gold-copper exploration activity has been taking place in the vicinity of Deerhorn Lake since 1974. A total of 91 holes have been drilled since. Water samples were collected at two receiving environment sites in Deerhorn Creek and two sites within the Horsefly River (one upstream of Deerhorn Creek and one downstream). Woodjam and Mussel creeks were also sampled as reference sites. All samples were analyzed for general variables, nutrients and total and dissolved metals. Results were compared to the*"British Columbia Approved Water Quality Guidelines, 2006 Edition"* (BC MOE 2006) and federal "*Canadian Environmental Quality Guidelines*" (CCME1999). These are typical guidelines against which project conditions are assessed for the protection of aquatic life as well as for water quality monitoring during mine permitting and effects assessments. Sampling coordinates, field sampling results and notes are presented in Table 3.1-1 below. Sampling analyses results are summarized in Section 3.3.

Table 3.1-1. Location and Field Sampling Results for Woodjam Project Water Quality Samples

Sampling Date	Location	Sample	UTM Coordinates		pH	Conductivity	Notes
			Northing	Easting			
August 11, 2009	Deerhorn Creek	DC-1	5791082	610484	8.23	333	Turbid water, potentially caused by cows in the area
		DC-2	5793989	512702	7.55	339	Almost no flow
	Horsefly River	HR-1	5795761	613513	8.15	91.5	Large river
		HR-2	5796428	612784	8.05	90.3	Large river
	Woodjam Creek	WC-1	5787870	613698	8.33	163	Clear, small creek. Sampled upstream of bridge
	Mussel Creek	MC-1	5789609	608182	7.57	262	Sampled upstream of culvert

3.1.1 Site Description

3.1.1.1 Deerhorn Creek

DC-1 is the closest sampling site to the recent l exploration activities (Plate 3.1-1). This narrow, low-flowing creek meanders through forested areas and open areas utilized by cattle, downwards to site DC-2. At the time of sampling, DC-1 was highly turbid. It was probably caused by cattle that had recently crossed the creek and stirred up sediments. DC-2 (Plate 3.1-2) is located approximately 3 km downstream of DC-1 and is also adjacent to areas used by cattle. At the time of sampling there was very limited flow at DC-2.

Plate 3.1-1. Downstream view of DC-1

Plate 3.1-2. Upstream view of DC-2

3.1.1.2 Horsefly River

Horsefly River is a wide and shallow river, with predominately boulder and cobble substrate. Both sampling sites HR-1 (Plate 3.1-3) and HR-2 (Plate 3.1-4) have very similar environments. HR-1 is located upstream of the confluence with Deerhorn Creek and HR-2 is located downstream of the confluence.

Plate 3.1-3. Downstream view of HR-1

Plate 3.1-4. Upstream view of HR-2

3.1.1.3 Woodjam Creek

WC-1 is a small, clear creek with moderate flow and cobble/gravel substrate. It is the only sample site that lies outside of the claim area (Plate 3.1-5).

Plate 3.1-5. Upstream view of WC-1

3.1.1.4 Mussel Creek

MC-1 is a small, clear creek which was sampled upstream from a culvert as seen in Plate 3.1-6.

Plate 3.1-6. Upstream view of MC-1

3.2 METHODOLOGY

One water sample was collected per site and analyzed for general physico-chemical variables, anions, nutrients, total organic carbon (TOC), and total and dissolved metals at the lowest available detection limit by ALS Environmental Services of Vancouver (ALS). For each sample, the scientist stood in the stream facing upstream and filled each sample bottle. Preservatives were added for total metals (ultra-pure nitric acid), TOC (hydrochloric acid), and nutrients (sulphuric acid). No air bubbles were left in any of the bottles. Samples were transported to Vancouver on the same day and shipped to ALS the following day.

During laboratory analysis some variables could not be measured reliably below a specified detection limit and are reported by the analytical laboratory as below that detection limit. For the purposes of statistical analyses and graphical presentation, these values (called non-detects) were replaced with half of the detection limit.

As part of the quality assurance and quality control (QA/QC) program, a duplicate sample was taken at HR-1 and a travel blank was analyzed. The travel blank bottles were filled with de-ionized water (DDW) at the analytical laboratory and shipped with the collected samples but was never opened. The travel blanks provides an assessment of potential contamination from travel or from the analytical laboratory. Duplicate samples are used to measure the variability inherent in field sampling (environmental heterogeneity, sampler handling leading to contamination) by using the relative percent difference (RPD) calculation,

where: $$RPD = 100 \mid rep1 - rep2 \mid /[(rep1 + rep2)/2].$$

The BC provincial government suggests that any field duplicates with RPD values exceeding 20% should be noted and data should be interpreted accordingly (BCMWLAP 2003). Where concentrations are within five times the method detection limit (MDL), the RPD calculation is not calculated. This is because the RPD is more sensitive to variation as values approach the analytical detection limit and the resulting calculation maybe misleading.

3.3 RESULTS AND DISCUSSION

Presented variables are based on available guidelines and project relevance. Unless otherwise noted, total metals are presented graphically. Dissolved metal concentrations are discussed in conjunction with total metals. Many water quality variables had a high proportion (>50%) of samples below their respective analytical detection limits: total suspended solids, ammonia, total cobalt, lead, silver, tin, titanium, zinc, dissolved iron, and total and dissolved antimony, boron, chromium, vanadium. The following variables were not detected in any sample: bromide, chloride, nitrite, total and dissolved beryllium, bismuth, lithium, mercury, phosphorus, thallium, and dissolved cadmium, cobalt, lead, silver, tin, titanium and zinc.

Analytical detection limits are presented in Appendix 3.3-1. A summary of the results are presented in Appendix 3.3-2 (physical variables, cyanides and nutrients), Appendix 3.3-3 (total metals), and Appendix 3.3-4 (dissolved metals). CCME and BC guidelines for total metals were used to screen both total and dissolved metal concentrations, except for dissolved aluminum, which has specific BC guidelines.

Travel blank data are provided in Appendix 3.3-5 and field duplicate data assessment is provided in Appendix 3.3-6.

3.3.1 General Physical Variables and Nutrients

Numerous physical variables followed a similar spatial pattern, whereby concentrations were highest in Deerhorn Creek, followed by Mussel Creek and Woodjam Creek, then lowest in Horsefly River. This included hardness, conductivity, total dissolved solids, and total alkalinity. This spatial pattern is likely due to the size of the waterbody in addition to the surrounding environment. DC-1 and DC-2 are low-flow, small creeks that meander through areas used by cattle. In this type of environment, certain water quality variables may accumulate in the water due to evaporation or sediment disturbance. Horsefly River is a large river that receives water from numerous drainages which likely dilutes concentrations of these physical variables.

Hardness concentrations ranged from 39.7 mg/L (HR-2) to 170 mg/L (DC-1) (Figure 3.3-1). Conductivity was lowest at HR-2 with 89.1 µS/cm and highest at DC-1 with 330 µS/cm (Figure 3.3-1). Total dissolved solids concentrations ranged from 55 mg/L (HR-1 and HR-2) to 230 mg/L (DC-1) (Figure 3.3-2), and total alkalinity ranged from 36.7 mg/L (HR-2) to 181 mg/L (DC-1) (Appendix 3.3-2).

Total phosphate (TP) and total organic carbon (TOC) followed a similar pattern as variables discussed above, the only difference being that concentrations were generally much higher in DC-1 compared to DC-2. Overall, TOC concentrations were approximately nine times greater at DC-1 compared to HR-1 and HR-2, while TP concentrations were nearly five times greater at DC-1 than at these two sites. TOC concentrations ranged from 1.83 mg/L (HR-2) to 32.4 mg/L (DC-1) (Figure 3.3-2). TP concentrations ranged from 0.0021 mg/L (HR-2) to 0.214 mg/L (DC-1) (Figure 3.3-3).

Sulphate (SO_4) concentrations followed a reverse trend, in which concentrations were greatest in Horsefly River compared to all other sites (Figure 3.3-3). However, SO_4 concentrations were generally low throughout the entire study area, ranging from below the detection limit <0.50 mg/L (MC-1) to 5.97 mg/L (HR-1). The BC Max Guideline (100 mg/L) was never exceeded.

Water pH values were slightly alkaline at all sites and ranged from 7.81 pH (DC-2) to 8.27 pH (DC-1) (Figure 3.3-4). Values fell within the CCME minimum and maximum guidelines for pH (6.5 to 9.0).

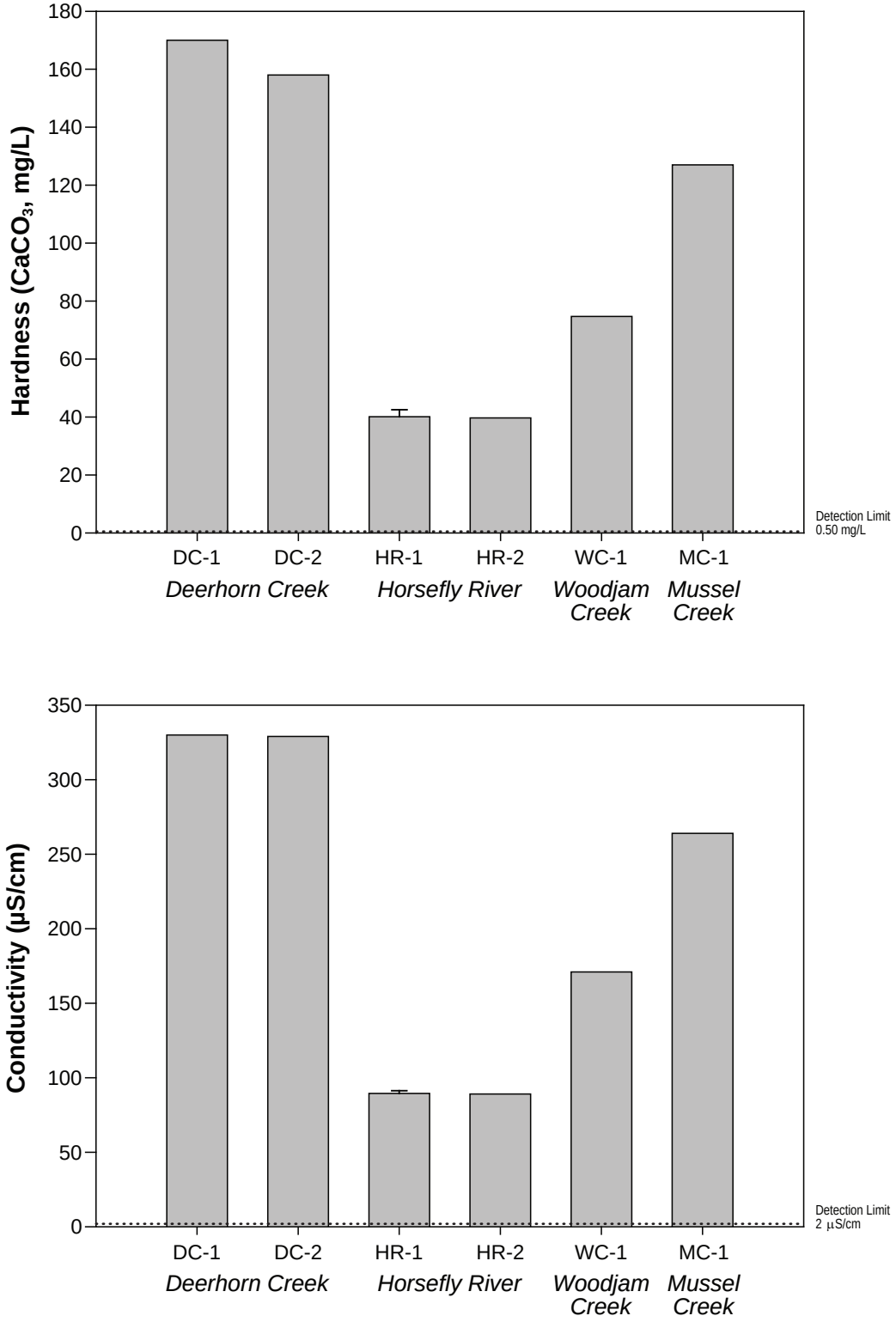
Total suspended solids (TSS) were only detected at site DC-1 with a concentration of 149 mg/L. As mentioned previously, the water quality at this site was very turbid during sampling and was potentially disturbed by recent cattle crossings (Appendix 3.3-2). The high TSS concentration likely contributed to the higher metal concentrations observed at this site (Section 3.3.2).

Like TSS, turbidity values were much higher at DC-1 compared to the other stream sites, and ranged from 0.41 NTU to 117 NTU (Figure 3.3-4).

Total nitrogen (TN) is a measure of inorganic and organic nitrogen, while total kjeldahl nitrogen (TKN) just measures organic nitrogen concentrations. Concentrations of TN and TKN both ranged from 0.10 mg/L (HR-1) to 1.75 mg/L (DC-1) (Figure 3.3-5). This indicates that nitrogen was primarily in the organic form. For both variables concentrations were approximately six times greater at DC-1 compared to the other sites.

3.3.2 Total and Dissolved Metals

Metal concentrations were generally higher in Deerhorn Creek and in Mussel Creek. As previously discussed, the high levels of total suspended solids at DC-1 likely resulted in high metal concentrations at this site, in particular in the particulate form.



Note: Error bars represent one standard error of the mean.

Gold Fields

Hardness and Conductivity Values at Water Quality Sites in the Woodjam Project Area

Figure 3.3-1

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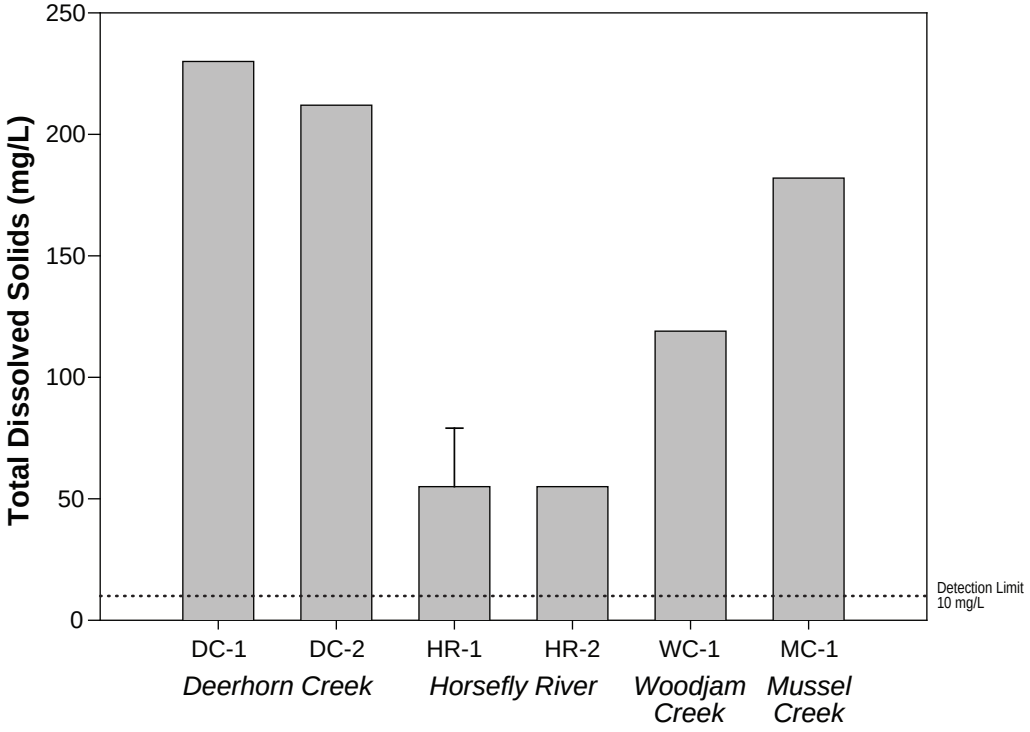

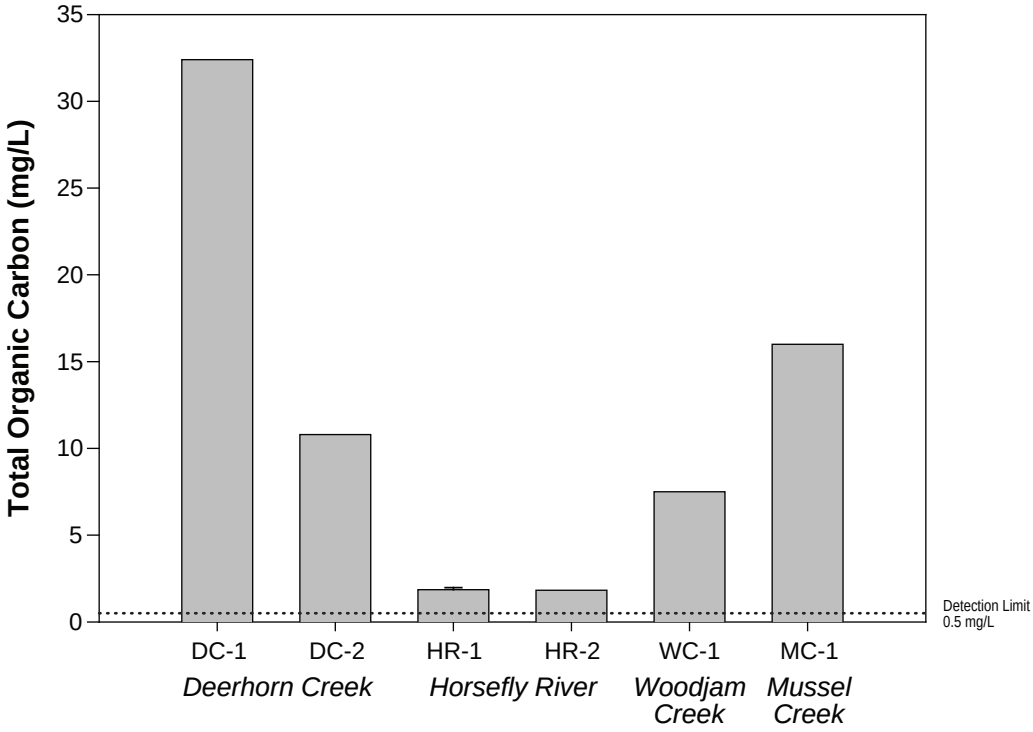

Note: Error bars represent one standard error of the mean.

Total Dissolved Solid (TDS) and Total Organic Carbon (TOC) Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-2

Gold Fields

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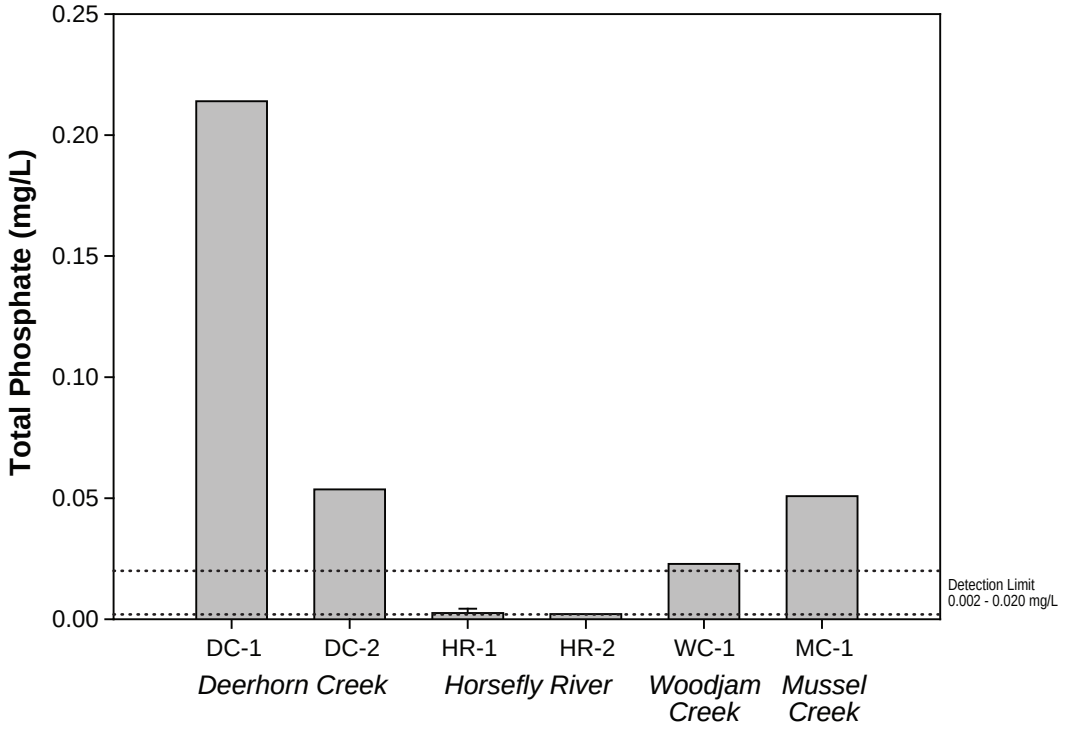

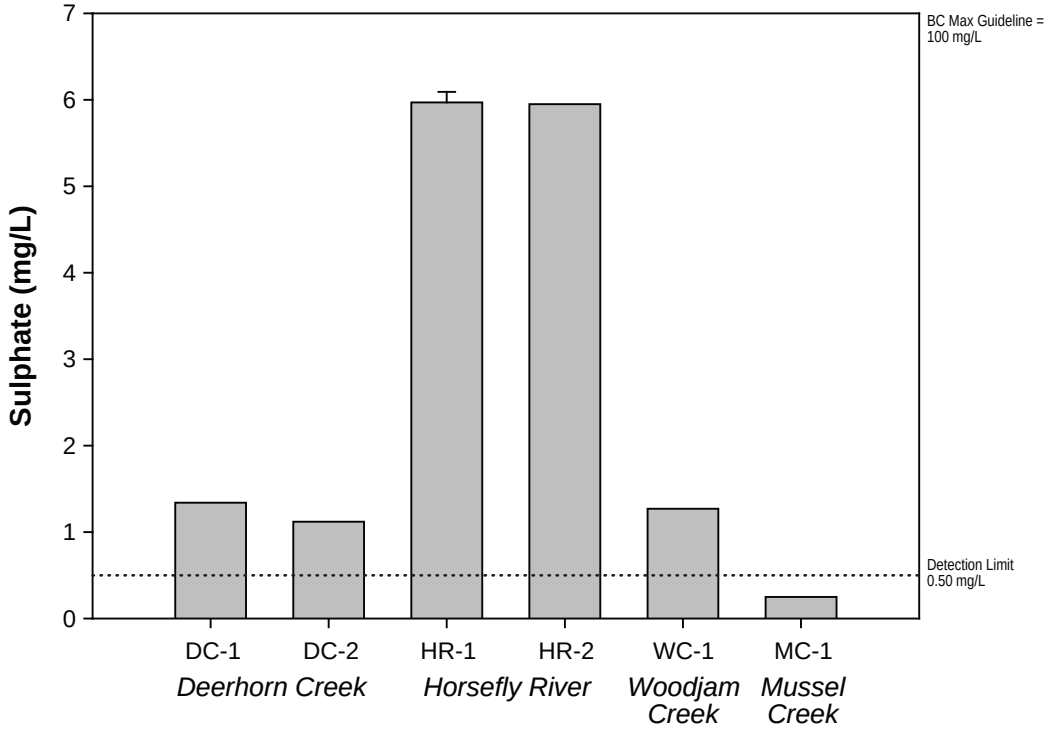

Note: Error bars represent one standard error of the mean.

Total Phosphate and Sulphate Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-3

Gold Fields

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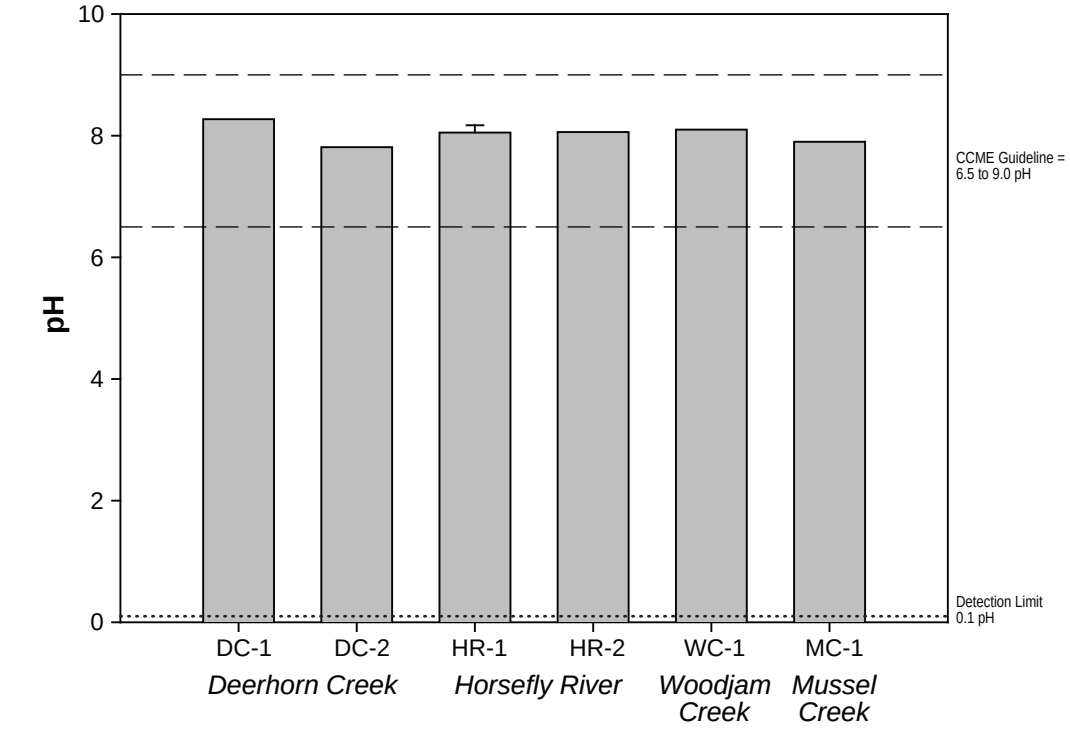

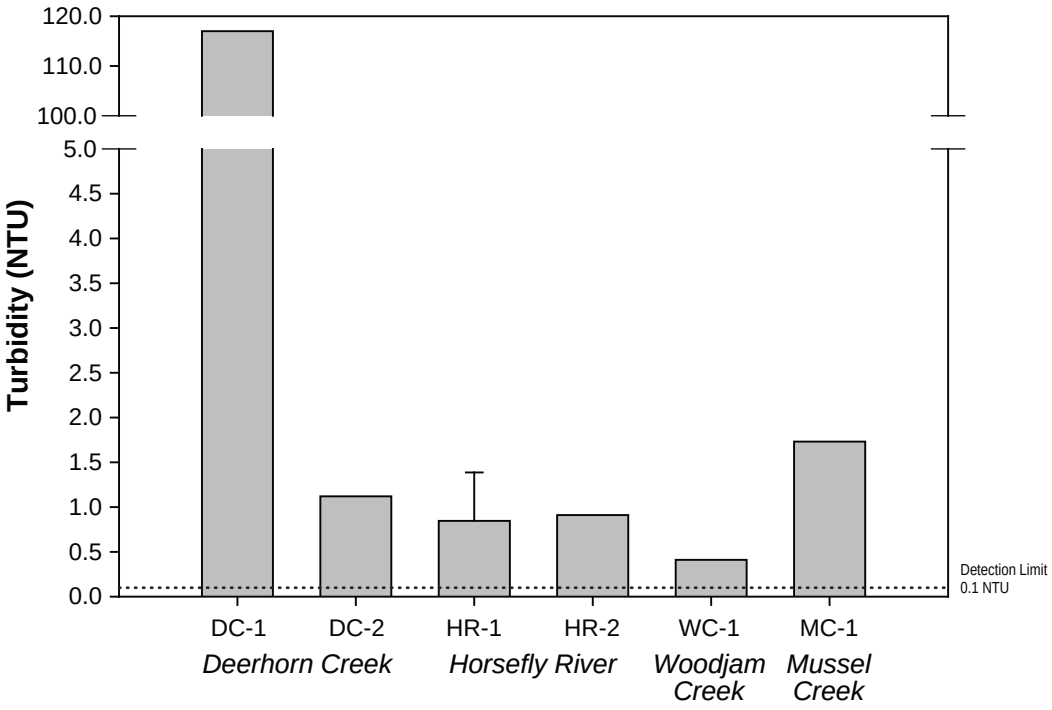

Note: Error bars represent one standard error of the mean.

GOLD FIELDS

pH and Turbidity Values at Water Quality Sites in the Woodjam Project Area

Figure 3.3-4

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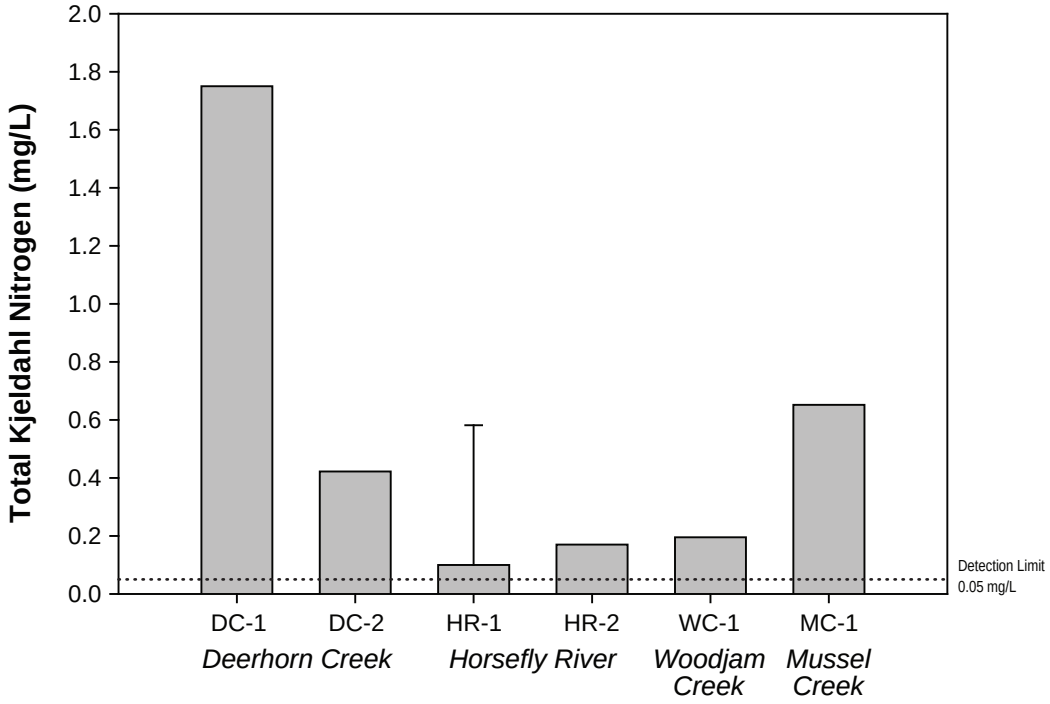
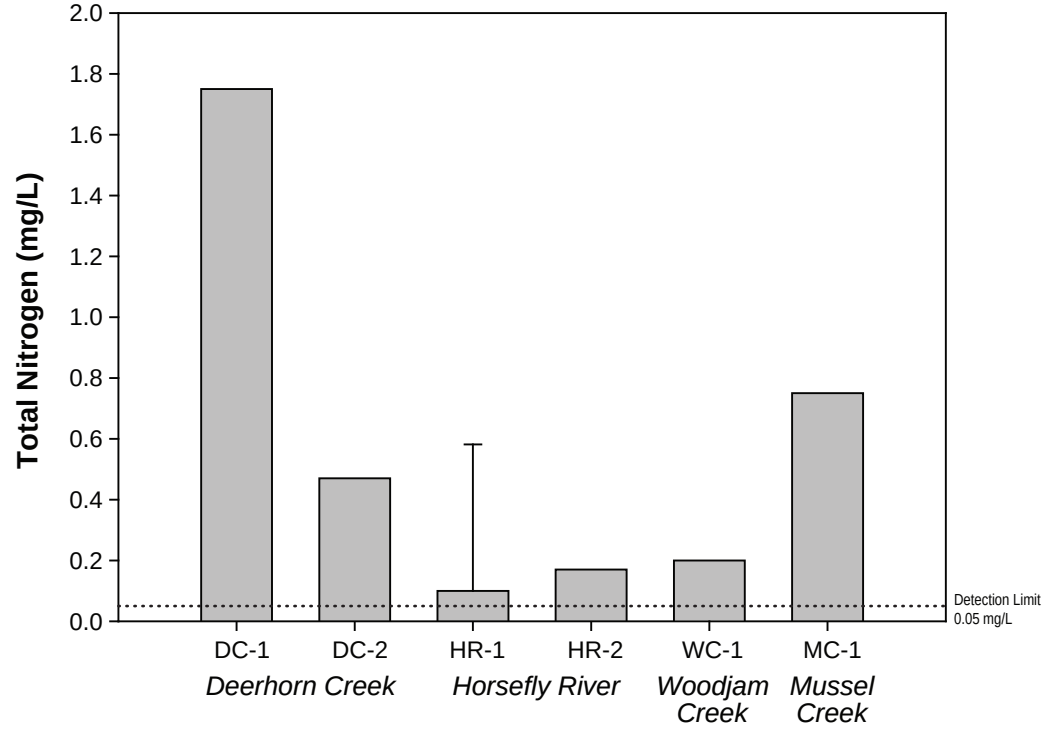




Note: Error bars represent one standard error of the mean.

Total Kjeldahl Nitrogen (TKN) and Total Nitrogen (TN) Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-5

Total aluminum was approximately a hundred times greater at the upstream site on Deerhorn Creek (DC-1) than those observed at the other five sites in the study area (Figure 3.3-6). T-Al was 2.00 mg/L at DC-1, while concentrations ranged from 0.0045 mg/L to 0.0219 mg/L at the other sites. The T-Al at DC-1 exceeded the pH dependent CCME guideline of 0.100 mg/L. In contrast, dissolved aluminum at DC-1 were very low (0.0056 mg/L) indicating, that at this site in particular, the majority of the aluminum present in the stream was in particulate form (Appendix 3.3-4). To a lesser degree, a similar trend was apparent at the remaining five sites; D-Al concentrations were lower than concentrations observed for total fractions at these sites, ranging from 0.0022 mg/L to 0.0166 mg/L.

Arsenic (total and dissolved) concentrations were greatest in Deerhorn Creek (DC-1 and DC-2) and Mussel Creek (MC-1) with lower concentrations being measured at Woodjam Creek (WC-1) and in the Horsefly River (HR-1 and HR-2). T-As concentrations ranged from 0.00225 mg/L (DC-1) to 0.00022 mg/L (HR-1) (Figure 3.3-6). D-As concentrations were similar to total concentrations, ranging from 0.00151 mg/L (DC-1) to 0.00021 mg/L (HR-1) (Appendix 3.3-4), indicating that the majority of the arsenic measured was in a dissolved form. CCME and BC guidelines were not exceeded at any sites.

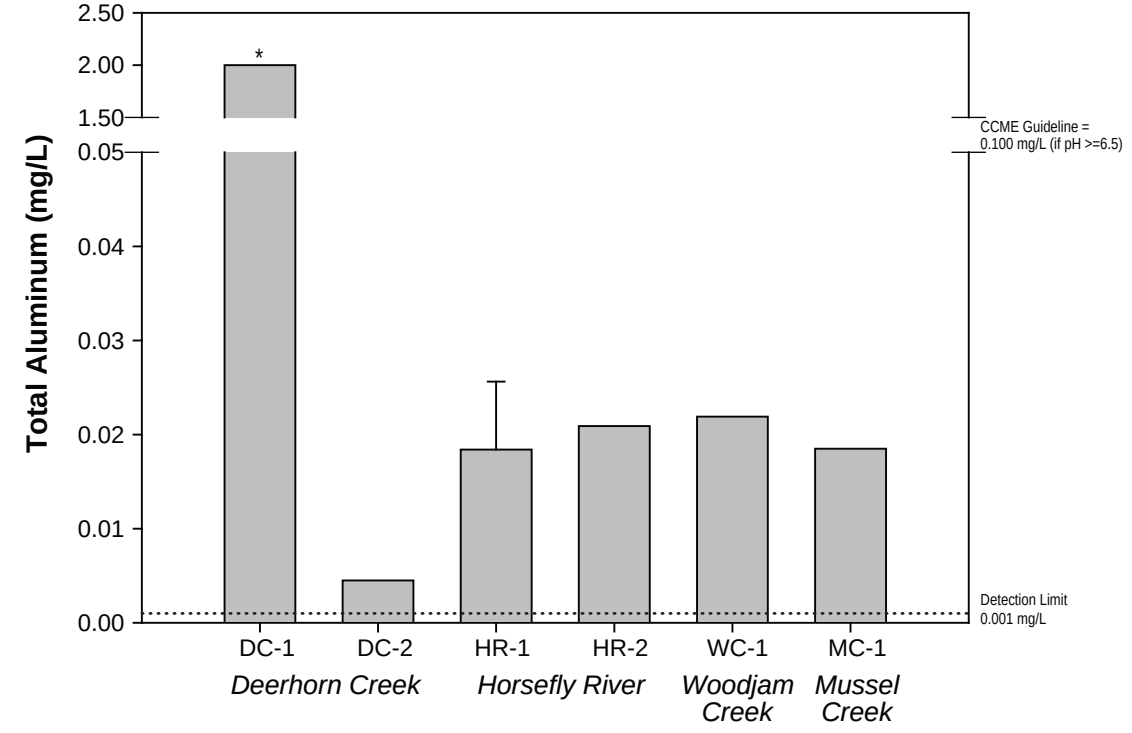
Total cadmium at DC-1 measured 0.00005 mg/L and exceeded the CCME guideline of 0.000017 mg/L (Appendix 3.3-3). Concentrations were below or just above the analytical detection limit (0.00001 mg/) at the other five sites. Dissolved cadmium concentrations were below detection limits at all sites.

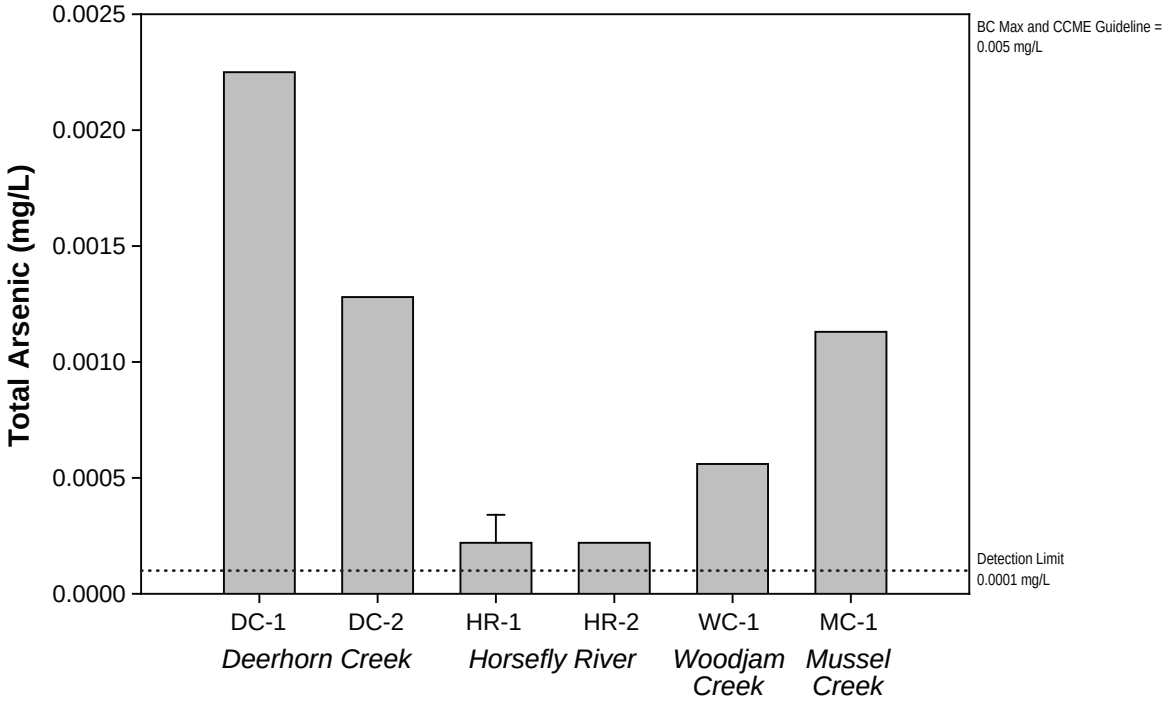
Total chromium concentrations exceeded BC Max and CCME guidelines (0.001 mg/L) at DC-1 and WC-1, with concentrations of 0.0039 mg/L and 0.00113 mg/L respectively (Figure 3.3-7). Concentrations were below detection limits (0.0005 mg/L) at the remaining four sites. Dissolved chromium concentrations were below detection limits (0.0005 mg/L) at all sites with the exception of WC-1 (Appendix 3.3-4). At this site a concentration of 0.00101 mg/L was measured, exceeding guideline concentrations.

Total copper concentrations ranged from 0.00034 mg/L (DC-2) to 0.0131 mg/L (DC-1). The concentration at DC-1 exceeded the hardness dependent BC Mean and CCME guidelines (Figure 3.3-7). The concentration of copper may be explained by the proximity of this site to the deposit. Dissolved copper concentrations followed the pattern observed for total concentrations, with the highest concentration occurring at DC-1 (0.00209 mg/L), slightly lower concentrations being measured at WC-1 and the lowest concentrations being measured on the Horsefly River and at the downstream site on the Deerhorn Creek (DC-2) (0.00042 mg/L) (Appendix 3.3-4). Dissolved copper concentrations did not exceed guidelines at any of the sites.

Total iron concentrations were highest in the Deerhorn Creek and Mussel Creek sites, with a maximum concentration of 2.26 mg/L being measured at DC-1 (Figure 3.3-8). This concentration exceeded the BC Max and CCME guideline of 0.3 mg/L. Total iron concentrations in the Horsefly River and in Woodjam Creek were lower, with the lowest concentration being measured at Woodjam Creek (0.041mg/L). Dissolved iron concentrations were close to or below the detection limit (0.03 mg/L) at all sites and did not exceed guidelines (Appendix 3.3-4).

Total molybdenum concentrations were below CCME and BC guidelines (0.073 mg/L and 2 mg/L; respectively) at all sites, with the greatest concentrations being found at the sites on the Deerhorn Creek (0.00216 mg/L at DC-1) and slightly lower concentrations being measured at the other sites, with a lowest concentration occurring at HR-1 (0.000785 mg/L) (Figure 3.3-8). Dissolved molybdenum





Notes: Error bars represent one standard error of the mean.
** Indicates exceeded CCME Guideline.*

GOLD FIELDS

Total Aluminum and Total Arsenic Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-6

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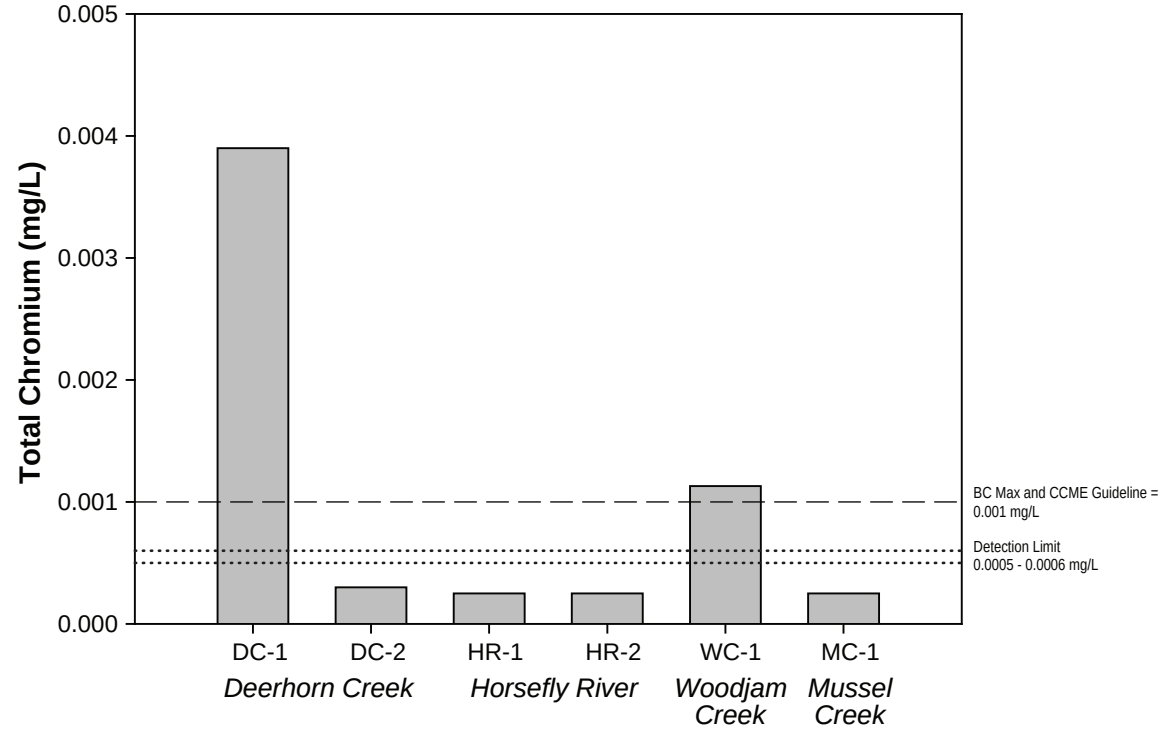

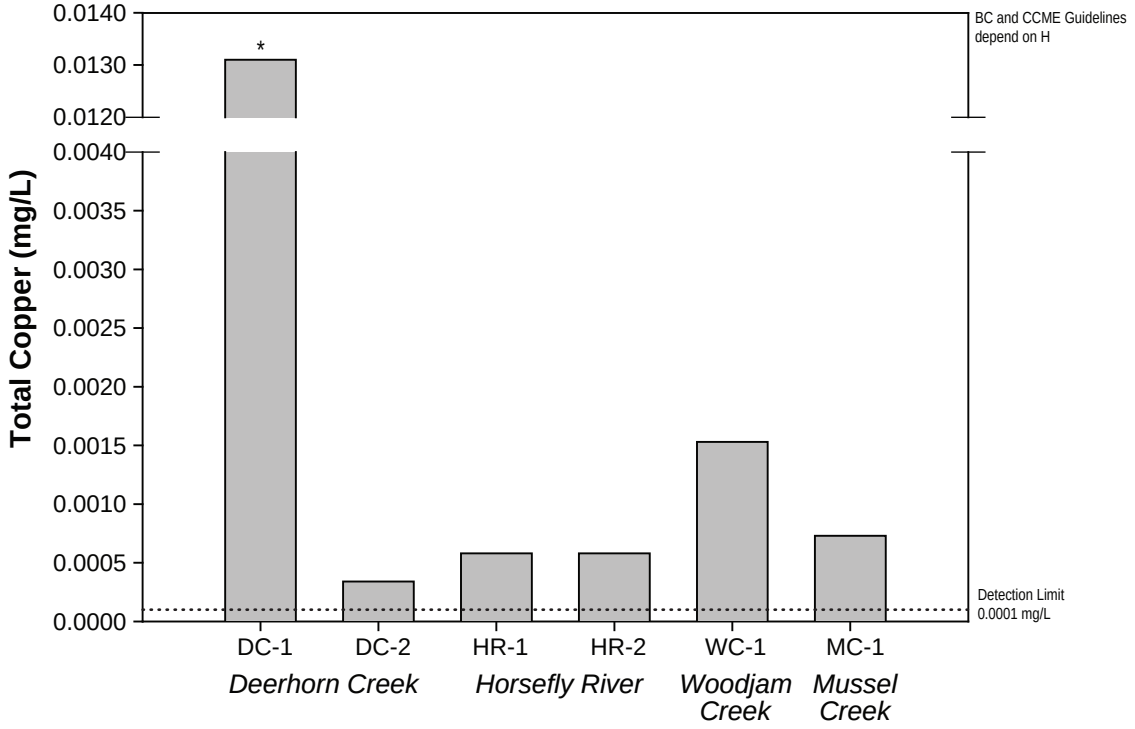

*Note: * Indicates exceeded BC Mean and CCME Guideline.*

Gold Fields

Total Chromium and Total Copper Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-7

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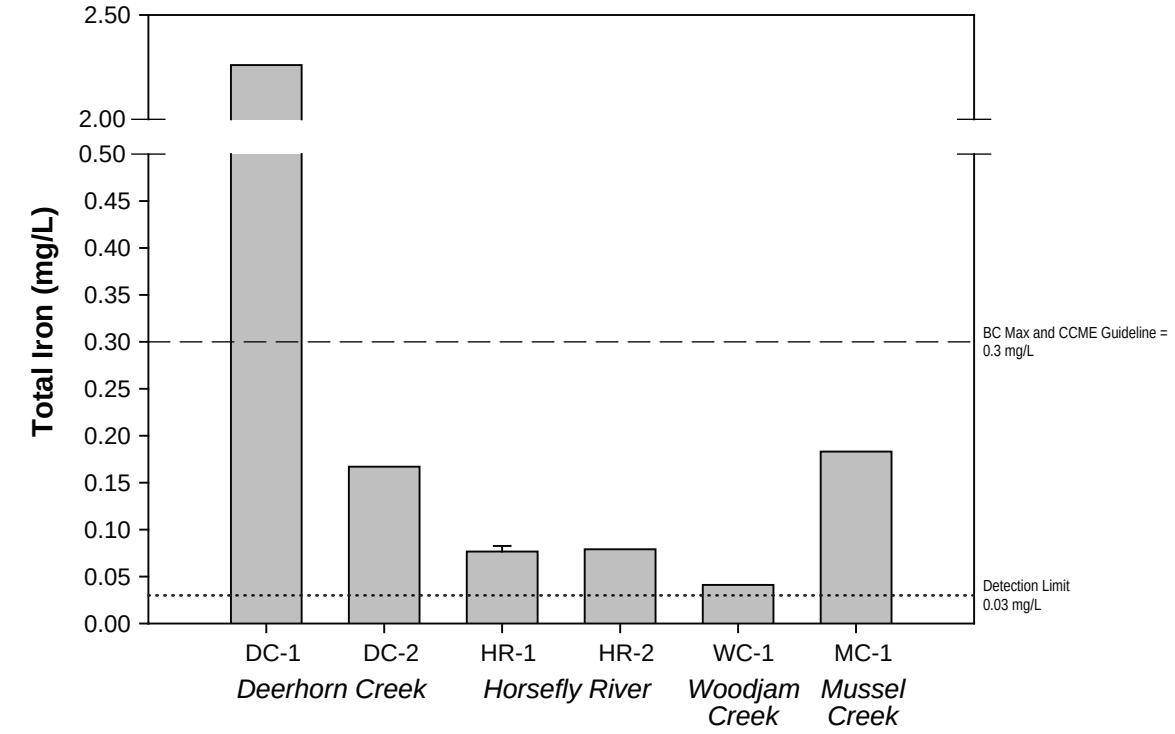
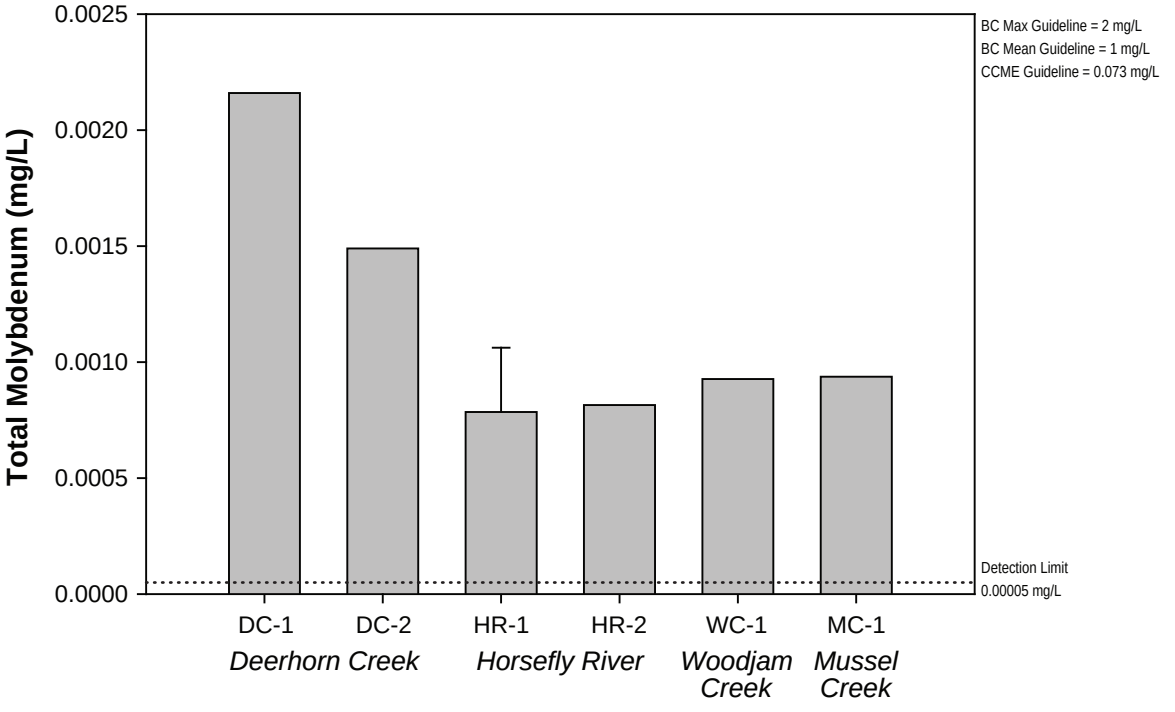




Note Error bars represent one standard error of the mean.

Total Iron and Total Molybdenum Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-8

concentrations followed the same trend as total molybdenum, and were within a similar range, with concentrations ranging from 0.00204 mg/L to 0.00085454 mg/L (Appendix 3.3-4). This indicates that the majority of the molybdenum present was in a dissolved form.

Nickel concentrations (total and dissolved) were highest in Deerhorn Creek, Woodjam Creek and Mussel Creek, with concentrations close to the analytical detection limit (0.0005 mg/L) being measured at sites on the Horsefly River. The highest concentration of total nickel was measured at DC-1 (0.00448 mg/L) which did not exceed the hardness dependent BC or CCME guidelines (Figure 3.3-9). Dissolved nickel were slightly lower at Deerhorn Creek and were greatest at MC-1, with a concentration of 0.002 mg/L (Appendix 3.3-4). This indicates that at Deerhorn Creek, the majority of nickel was in particulate form.

Total selenium was greatest at DC-1 (0.0007 mg/L) and did not exceed the BC or CCME guideline (0.002 mg/L and 0.001 mg/L; respectively) (Figure 3.3-9). Total selenium was below detection limits (0.0001 mg/L) at DC-2. Dissolved selenium was half as great as the total selenium concentration found at DC-1 (0.00027 mg/L), with similar concentrations of dissolved selenium being measured at HR-1 (0.000225 mg/L) and HR-2 (0.00026 mg/L) (Appendix 3.3-4).

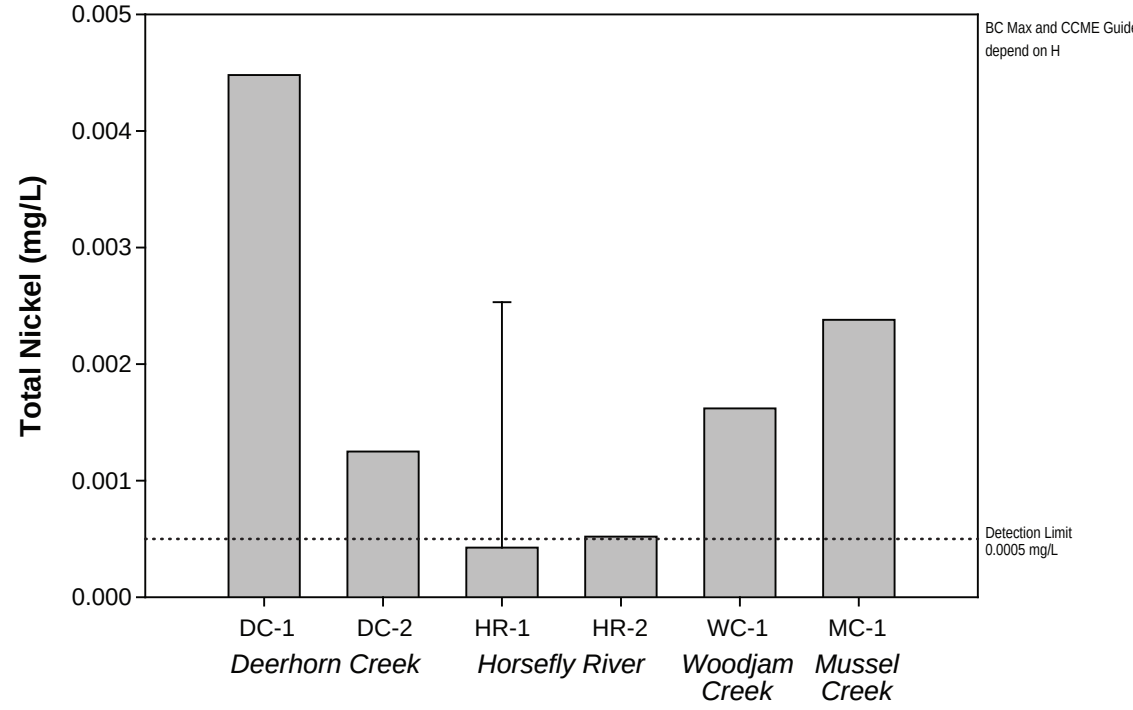
Total zinc concentrations were close to or below the analytical detection limit (0.001 mg/L) at all sites except for DC-1 (Appendix 3.3-3). At DC-1, total zinc measured 0.0065 mg/L and was below the hardness dependent BC and CCME guidelines (Appendix 3.3-4).

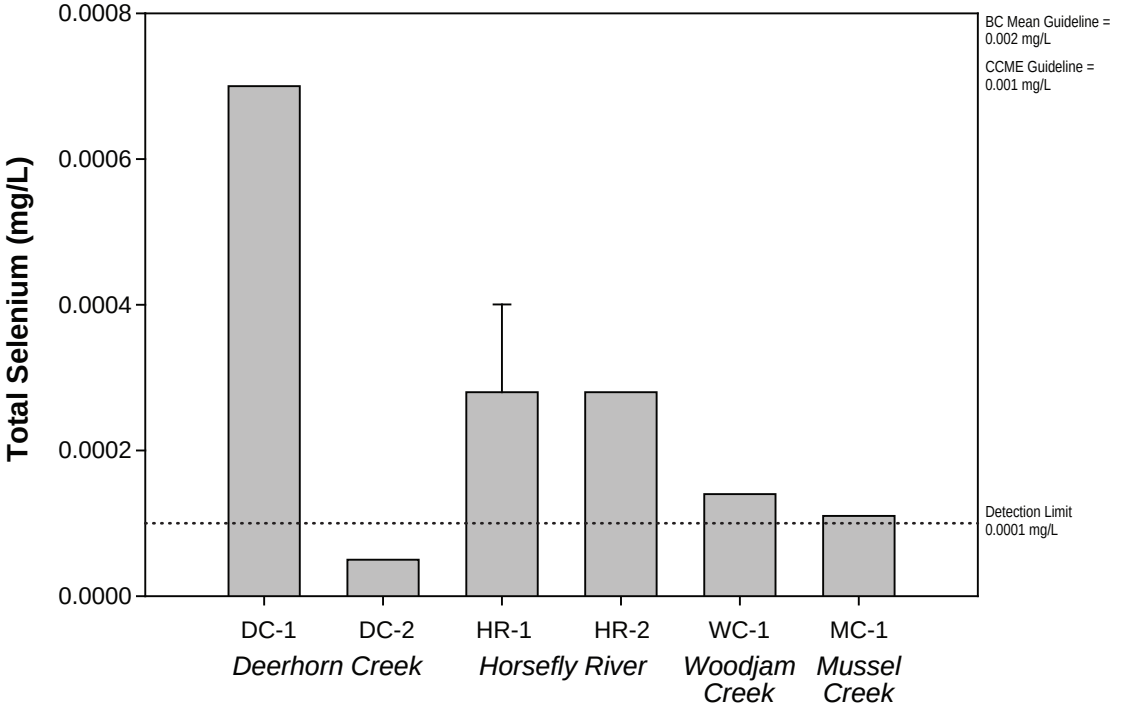
3.3.3 Quality Assurance/Quality Control

The travel blank data are presented in Appendix 3.3-5. No variables showed levels above the detection limits except for pH and acidity which are regularly detected in blank samples. One duplicate was taken between the six stream sites. The RPD value was used as a measure of the variability inherent in field sampling (as a result of environmental heterogeneity, and potential sampler handling leading to contamination) (Appendix 3.3-6). Only 31% (28/89) of variables were above detection limits and thus used in RPD calculations. Of these RPD calculations only 14% (4/28) had an RPD above 5%, and only 4% (1/28) had RPDs above 10%. None of the RPD calculations were greater than 20%, indicated that variability was very low and that results the water quality results are reliable.

3.4 SUMMARY

The water quality data collected in August 2009 for the Woodjam Project indicates that for the majority of the physical variables and metals assessed, a spatial pattern could be observed. Concentrations were highest in Deerhorn Creek, followed by Mussel Creek and Woodjam Creek, then lowest in Horsefly River. This spatial pattern is likely due to the size and land use associated with each waterbody. The site DC-1 is also adjacent to the main deposit High total suspended solids at DC-1 contributed to high total metal concentrations at this site. BC and/or CCME water quality guidelines were exceeded at DC-1 for total aluminium, cadmium, chromium, copper and iron concentrations. Total and dissolved chromium concentrations at Woodjam Creek exceeded both BC and CCME guidelines.





Note: Error bars represent one standard error of the mean.

Gold Fields

Total Nickel and Total Selenium Concentrations at Water Quality Sites in the Woodjam Project Area

Figure 3.3-9

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References

References

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Appendix 2.1-1
Drill Sites that Could not be Located

Appendix 2.1-1. Drill Sites that Could not be Located

Hole Identification	Easting	Northing
74-01	610338	5790771
74-02	610348	5790778
74-03	610232	5788221
74-04	610215	5788340
74-05	610544	5788127
77-01	609887	5788324
83-03	610343	5790910
83-08	610473	5790740
83-09	610391	5790745
83-10	610447	5790865
83-12	610303	5790695
83-14	610181	5790702
84-15	610093	5790665
84-16	610102	5790577
84-17	610198	5790700
84-19	610175	5790595
99-21	610274	5790587
99-22	610207	5790378

Appendix 2.2-1
Field Notes Taken for each Drill Site Visited, August 10 and 11, 2009

GOLD FIELDS

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Appendix 2.2-1. Field Notes Taken for each Drill Site Visited, August 10 and 11, 2009

Year	Drill Site	Easting	Northing	Comments
1974	74-01	610338	5790771	next to core boxes, could not find hole, revegetated
	74-02	610348	5790778	could not find hole, metal scrap in proximity
1983	83-04	610388	5790835	same location as 83-04
	83-05	610278	5790605	could not find collar but took a picture, 100% revegetated
	83-06	610258	5790790	patch of conifers, excellent revegetation
	83-07	610258	5790790	patch of conifers, excellent revegetation
	83-11	610433	5791040	on side of trail, completely revegetated, no stakes to identify hole
	83-13	610267	5790731	same location as 06-54
1984	84-18	610178	5790815	could not find the hole, but area fully vegetated
1999	99-23	610799	5789922	no debris, alder growth
2002	02-24	610393	5790973	casing sticking out ~40 cm, many small conifers growing, lots of vegetation
	02-25	610354	5790712	bentonite bags present, metal scrap, rags, wire mesh, some vegetation cover
	02-26	610149	5790900	good vegetation cover, 2 cut logs
	02-27	610284	5790647	large site with large (60 cm) ruts and no recontouring, no debris, fully grown
	02-28	610582	5790809	good regrowth, small alders growing, 4 pieces of cut logs
2003	03-29	610921	5791083	open grassy area, 100 % cover, used by cows
	03-30	611238	5791159	good growth of grasses, small alders growing, good growth of alders along road access
	03-31	611753	5791745	pieces of 2x4 lumber on the ground, regrowth of grasses and small shrubs growing
2004	04-32	610373	5790830	same location as 05-40
	04-33	610380	5790878	excellent regrowth, no debris
	04-34	610405	5790929	small ruts ~ 30 cm deep, small conifers and alders, three small cut logs
	04-35	610353	5790789	3 holes, first on left of photo is 04-35, 3rd one might be mislabelled 04-41, good revegetation, legde not recontoured
	04-36	610340	5790896	excellent regrowth
	04-37	610281	5790833	same location as 06-62
	04-38	610131	5790792	lots of grasses
	04-39	610349	5790889	excellent regrowth
	04-40	610292	5790651	same location as 02-27
	04-41	610364	5790881	excellent regrowth, no debris
	04-42	610409	5790765	no recontouring done, two pile of soils, some ruts, burlap sacks
2005	05-01	610166	5790830	good vegetation cover, some ruts, cuttings from RC drill
	05-02	609870	5788591	patches of cuttings, 90% vegetation cover, shallow ruts
	05-03	610285	5787980	100% vegetation cover, no debris
	05-04	610341	5788064	only 10% vegetation cover, mound of cuttings, some timber cut
	05-05	610408	5788152	same location as above
	05-06	610460	5788244	most of site with 100% vegetation coverage (1 m high) except near hole with 80% cover
	05-07	610149	5788229	can not locate hole, but pad has been located, some ruts
	05-08	610242	5788281	100% regrowth, no debris
	05-09	610282	5788354	small trees growing, cuttings from RC splitter (10 m x 50 cm wide x 15 cm high)
	05-10	611432	5791249	some ruts left (2 ~45 cm deep), good regrowth
	05-46	610377	5790834	fully revegetated, one 2x4 piece of lumber
	05-43	610416	5790672	100% regrowth?????
	05-44	610448	5790739	some ruts, half of site has only 30% regrowth
	05-45	610456	5790819	some 60 cm ruts at far end , no debris, 100% regrowth
	05-47	610291	5790753	6 pallets, 70% vegetation cover, tall grasses
	05-48	610406	5788162	100% vegetation cover, 2 pieces of lumber cut, a few logs
2006	06-63	610171	5790878	70% vegetation cover
	06-49	610591	5790596	same location as 06-67
	06-50	610573	5790777	a couple small pieces of 2x4, ~40% vegetation cover
	06-51	610389	5790606	~90% vegetated, some ruts (~30 cm), one piece of timber
	06-52	610365	5790555	mix of bentonite and cuttings, good revegetation and 1 piece of 2x6 lumber
	06-54	610267	5790726	no debris, 100 % vegetation cover, sum ruts, large boulders
	06-55	610464	5790645	sump (5m x 2m) not filled, 12 pieces of cut logs, some ruts
	06-56	610250	5790443	good regrowth, located in the middle of a road, small ruts
	06-57	610426	5790610	very large road access to site, 3 small pieces of timber, small ruts, 100% vegetation cover
	06-58	610286	5790534	no debris, very small ruts on one side of pad, mostly covered by vegetation
	06-59	610194	5790597	small ruts, one cut log, 100% vegetation coverage
	06-60	610392	5790498	some bare areas with not much vegetation
	06-61	610473	5790682	small ruts, large open area, no debris
	06-62	610280	5790836	100% covered with vegetation, a couple pieces of cut wood, small ruts
	06-64	610508	5790750	four pieces of cut wood, ruts length of pad, 100% revegetation
	06-65	610239	5790842	good vegetation cover, one area without vegetation (1.5 m x 1.5 m), a few ruts
	06-66	610243	5790684	small ruts of 22 cm, one small cut log, 100% vegetated
	06-67	610592	5790598	excellent regrowth, some small cut logs
	06-68	610573	5790524	small ruts ~ 30 deep, a few pieces of 2x4 lumber, lots of clover and some large shrubs
	06-69	610324	5791157	grasses 70% cover, 8 pieces of cut logs, small ruts
	06-70	611734	5791551	wood pallets left at site, mostly revegetated
	06-71	610116	5788090	excellent growth, clovers 60 cm high, 100% coverage, sump not filled, small pieces of wood cut
2007	07-74	610333	5791041	100% cover mostly clover with some grasses
	07-75	609626	5788256	mostly vegetated, area of 2 m x 5 m with 50% cover
	07-76	611019	5788605	sump left in place, some ruts, no debris, 80% low vegetation coverage
	07-77	610505	5788372	excellent vegetation regrowth, 50 cm tall clover
2008	08-87	610529	5788458	a few ruts (20 cmm deep), 90% low vegetation cover, just seeded in October 2008
	08-92	611266	5792077	75% re-vegetation cover (mainly clover), road access was seeded in October 2008 and has grown well
	08-93	611160	5792078	50% cover
	08-94	611689	5791415	one area not seeded (~ 7m x 7m)

Appendix 2.2-2
Drill Holes Assessed, August 2009

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Appendix 2.2-2 – Drill Holes Assessed, August 2009

1974

Hole 74-01

Hole 74-02

1983

Hole 83-05

Hole 83-11

1984

Hole 84-18

1999

Hole 99-23

Hole 99-21

2002

Hole 02-24

Hole 02-25

Hole 02-25 (debris)

Hole 02-26

Hole 02-28

2003

Hole 03-29

Hole 03-30

Hole 03-31

2004

Hole 04-33

Hole 04-34

Hole 04-35

Hole 04-35 99-20 and another

Hole 04-36

Hole 04-38

Hole 04-39

Hole 04-41

Hole 04-42

2005

Hole 05-01

Hole 05-02

Hole 05-03

Hole 05-04

Hole 05-05 and 05-48

Hole 05-06

Hole 05-07

Hole 05-08

Hole 05-09

Hole 05-09 (cuttings)

Hole 05-10 (ruts)

Hole 05-10

Hole 05-40, 04-32 and 04-40

Hole 05-43

Hole 05-44

Hole 05-45

Hole 05-47 pallets

Hole 05-47

2006

Hole 06-50

Hole 06-51

Hole 06-52

Hole 06-53

Hole 06-54 and 83-13

Hole 06-55 (sump)

Hole 06-55

Hole 06-56

Hole 06-57

Hole 06-57 (access)

Hole 06-58

Hole 06-59

Hole 06-60

Hole 06-61

Hole 06-62 and 04-37

Hole 06-63

Hole 06-65

Hole 06-66

Hole 06-67 and 06-49

Hole 06-68

Hole 06-69

Hole 06-70 (pallets)

Hole 06-70

Hole 06-71 (sump)

Hole 06-71

2007

Hole 07-74

Hole 07-75

Hole 07-76 (sump)

Hole 07-76

Hole 07-77

2008

Hole 08-87

Hole 08-92

Hole 08-93

Hole 08-94

Appendix 3.3-1
Stream Water Quality Detection Limits, 2009

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Appendix 3.3-1. Stream Water Quality Detection Limits, 2009

Sample ID		WC-1	MC-1	DC-1	DC-2	HR-1	HR-2	HR-1 DUP
Date Sampled		11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09
Time Sampled	**Units**	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		L805164-1	L805164-2	L805164-3	L805164-4	L805164-5	L805164-6	L805164-7
Nature		Water	Water	Water	Water	Water	Water	Water
Physical Tests								
Colour, True	CU	5	5	5	5	5	5	5
Conductivity	mS/cm	2	2	2	2	2	2	2
Hardness (as $CaCO_3$)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5
pH	pH	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total Suspended Solids	mg/L	3	3	3	3	3	3	3
Total Dissolved Solids	mg/L	10	10	10	10	10	10	10
Turbidity	NTU	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Anions and Nutrients								
Acidity (as $CaCO_3$)	mg/L	1	1	1	1	1	1	1
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2
Alkalinity, Total (as $CaCO_3$)	mg/L	2	2	2	2	2	2	2
Ammonia as N	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Bromide (Br)	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fluoride (F)	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Nitrate (as N)	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Nitrite (as N)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Nitrogen	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Phosphate as P	mg/L	0.002	0.002	0.02	0.002	0.002	0.002	0.002
Sulphate (SO_4)	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total Metals								
Aluminum (Al)-Total	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Total	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Total	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Total	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Calcium (Ca)-Total	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02

(continued)

Appendix 3.3-1. Stream Water Quality Detection Limits, 2009 (continued)

Sample ID		WC-1	MC-1	DC-1	DC-2	HR-1	HR-2	HR-1 DUP
Date Sampled		11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09
Time Sampled	**Units**	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		L805164-1	L805164-2	L805164-3	L805164-4	L805164-5	L805164-6	L805164-7
Nature		Water	Water	Water	Water	Water	Water	Water
Total Metals (continued)								
Chromium (Cr)-Total	mg/L	0.0005	0.0005	0.0005	0.0006	0.0005	0.0005	0.0005
Cobalt (Co)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Total	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Total	mg/L	0.00005	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Total	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Total	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Total	mg/L	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Total	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	mg/L	2	2	2	2	2	2	2
Strontium (Sr)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Total	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Total	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Total	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Dissolved Metals								
Aluminum (Al)-Dissolved	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Antimony (Sb)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Arsenic (As)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Barium (Ba)-Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Beryllium (Be)-Dissolved	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Bismuth (Bi)-Dissolved	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadmium (Cd)-Dissolved	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001

(continued)

Appendix 3.3-1. Stream Water Quality Detection Limits, 2009 (completed)

Sample ID		WC-1	MC-1	DC-1	DC-2	HR-1	HR-2	HR-1 DUP
Date Sampled		11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09	11-Aug-09
Time Sampled	**Units**	00:00	00:00	00:00	00:00	00:00	00:00	00:00
ALS Sample ID		L805164-1	L805164-2	L805164-3	L805164-4	L805164-5	L805164-6	L805164-7
Nature		Water	Water	Water	Water	Water	Water	Water
Dissolved Metals (continued)								
Calcium (Ca)-Dissolved	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chromium (Cr)-Dissolved	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Cobalt (Co)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Iron (Fe)-Dissolved	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Lead (Pb)-Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Manganese (Mn)-Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Mercury (Hg)-Dissolved	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	mg/L	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Nickel (Ni)-Dissolved	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Phosphorus (P)-Dissolved	mg/L	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Selenium (Se)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Silver (Ag)-Dissolved	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	mg/L	2	2	2	2	2	2	2
Strontium (Sr)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Thallium (Tl)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Tin (Sn)-Dissolved	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Titanium (Ti)-Dissolved	mg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	mg/L	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)-Dissolved	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Organic Parameters								
Total Organic Carbon	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Appendix 3.3-2
Summary of Water Quality for Physical Variables, Nutrients, and Total Organic Carbon for the Woodjam Project, August 11, 2009

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Appendix 3.3-2. Summary of Water Quality for Physical Variables, Nutrients, and Total Organic Carbon for the Woodjam Project, August 11, 2009

		DC-1	DC-2	HR-1	HR-1 DUP	HR-2	WC-1	MC-1	BC guidelines		CCME guideline
									Max	30-d mean	
Colour	CU	58.7	25.9	5.5	5.5	5.8	29.1	49.1		<80% light transmission	
Conductivity	µS/cm	330	329	89.6	89.3	89.1	171	264			
Total Dissolved Solids		230	212	57	53	55	119	182			
Hardness	$CaCO_3$	170	158	39.9	40.3	39.7	74.7	127			
pH		8.27	7.81	8.06	8.04	8.06	8.1	7.9		6.5-9	6.5-9
Total Suspended Solids		149	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	A	A	25 above background
Turbidity	NTU	117	1.12	0.8	0.89	0.91	0.41	1.73	A	A	
Acidity (to pH 8.3)	$CaCO_3$	<1.0	6.4	1.8	2	1.8	2.9	4.2			
Alkalinity	$CaCO_3$	181	177	36.7	36.8	36.7	81.1	137			
Bromide	Br	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050			
Chloride	Cl	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	600	150	
Fluoride	F	0.088	0.099	0.021	0.021	0.021	0.062	0.089	A		
Sulphate	SO_4	1.34	1.12	5.96	5.98	5.95	1.27	<0.50	100, 50 B		
Ammonia Nitrogen	N	<0.0050	0.0114	<0.0050	<0.0050	<0.0050	<0.0050	0.0154	C	C	
Total Kjeldahl Nitrogen	N	1.75	0.422	0.06	0.14	0.17	0.195	0.652			
Nitrate Nitrogen	N	0.0058	0.0476	<0.0050	<0.0050	<0.0050	0.005	0.0979	200	≤40	13
Nitrite Nitrogen	N	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	D	D	
Total Nitrogen	N	1.75	0.47	0.06	0.14	0.17	0.2	0.75			
Total Phosphate	P	0.214	0.0536	0.0027	0.0024	0.0021	0.0228	0.0508			
Total Organic Carbon	C	32.4	10.8	1.85	1.87	1.83	7.5	16		+/-20% background	

Expressed as mg/L except colour (CU), conductivity (µS/cm), pH (pH units), turbidity (NTU).

A: depends on background.

for TSS: if background ≤25 mg/L, then max 25 mg/L increase in 24 h, and a mean increase of 5 mg/L over 30 d. If background 25-250 mg/L, then max increase of 25 mg/L. If background >250 mg/L, then max 10% increase.

for turbidity: if background <8 NTU, then max 8 NTU increase in 24 h, and a mean increase of 2 mg/L in 30d. If background 8-80 NTU, then max increase of 8 NTU. If background >80 NTU, then max 10% increase.

for fluoride: 0.3 mg/L max for hardness 50 mg/L CaCO3 or higher, 0.2 mg/L max F for hardness <50 mg/L CaCO3.

B: alert to monitor aquatic moss populations.

C: depends on T and pH - consult tables (guideline max ranges from 0.681-27.7 mg/L and 30 d mean ranges from 0.131-2.08 mg/L for temperatures 0-14 deg C).

D: Nitrite BC Max 0.06 mg/L and 30 d mean 0.02 mg/L for Cl<2mg/L. BC Max nitrite 0.12 mg/L and 30 d mean 0.04 mg/L for Cl 2-4 mg/L.

E: weak-acid dissociable CN concentration.

< indicates that values are below detection limits

Appendix 3.3-3
Summary of Water Quality for Total Metals for the Woodjam Project, August 11, 2009

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Appendix 3.3-3. Summary of Water Quality for Total Metals for the Woodjam Project, August 11, 2009

									BC guidelines		CCME
		DC-1	DC-2	HR-1	HR-1 DUP	HR-2	WC-1	MC-1	Max	30-d mean	guideline
Aluminum	T-Al	2	0.0045	0.019	0.0178	0.0209	0.0219	0.0185			0.1 A
Antimony	T-Sb	0.00019	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.02 B		
Arsenic	T-As	0.00225	0.00128	0.00023	0.00021	0.00022	0.00056	0.00113	0.005 B		0.005
Barium	T-Ba	0.0602	0.0285	0.00918	0.00898	0.00943	0.019	0.0127	5 B	1 B	
Beryllium	T-Be	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		0.0053 B	
Bismuth	T-Bi	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Boron	T-B	0.018	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	1.2		
Cadmium	T-Cd	0.000051	<0.000010	0.000013	0.000011	0.000011	<0.000010	<0.000010	A, B		0.000017
Calcium	T-Ca	54.4	39.5	12.2	12.1	12.4	17	30.1			
Chromium	T-Cr	0.0039	<0.00060	<0.00050	<0.00050	<0.00050	0.00113	<0.00050	0.001 B		A
Cobalt	T-Co	0.0011	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	0.00023	0.110	0.004	
Copper	T-Cu	0.0131	0.00034	0.00058	0.00058	0.00058	0.00153	0.00073	C	C	A
Iron	T-Fe	2.26	0.167	0.077	0.076	0.079	0.041	0.183	0.3 B		0.3
Lead	T-Pb	0.000659	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.00010	D	D	A
Lithium	T-Li	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	5 B		
Magnesium	T-Mg	12.4	14.4	2.08	2.04	2.08	7.65	12.7			
Manganese	T-Mn	0.13	0.526	0.00908	0.00896	0.0067	0.00405	0.0797	E	E	
Mercury	T-Hg	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0001	0.00002	0.000026 A
Molybdenum	T-Mo	0.00216	0.00149	0.000808	0.000762	0.000815	0.000927	0.000937	2	1	0.073
Nickel	T-Ni	0.00448	0.00125	0.0006	<0.00050	0.00052	0.00162	0.00238	A		A
Phosphorus	T-P	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30			
Potassium	T-K	2.23	3.02	0.7	0.682	0.699	1.59	1.51			
Selenium	T-Se	0.0007	<0.00010	0.00029	0.00027	0.00028	0.00014	0.00011		0.002	0.001
Silicon	T-Si	12.9	8.48	2.3	2.28	2.28	8.56	6.02			
Silver	T-Ag	0.000042	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	F	F	0.000100
Sodium	T-Na	4.9	6	<2.0	<2.0	<2.0	3.5	5.9			
Strontium	T-Sr	0.31	0.254	0.0678	0.0653	0.0681	0.171	0.204			
Thallium	T-Tl	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0003 B		0.0008
Tin	T-Sn	0.0001	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium	T-Ti	0.065	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.1 B		
Uranium	T-U	0.000882	0.00017	0.000095	0.000092	0.000097	0.000168	0.000253	0.3 B		
Vanadium	T-V	0.0091	<0.0010	<0.0010	<0.0010	<0.0010	0.0021	0.0013			
Zinc	T-Zn	0.0065	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	G	G	0.0300

Expressed as mg/L.

A: depends on background, CCME guideline:

for aluminum: pH>6.5

*for cadium guideline = 0.001 * 10 $^{(0.86[\log(\text{hardness})] - 3.2)}$ mg/L*

for chromium guideline = 0.001 mg/L (Cr VI), or 0.0089 (Cr III) , interim

for copper: CCME = 0.002 mg/L at 0-120 mg/L [$CaCO_3$], 0.003mg/L at 120 - 180 mg/L [$CaCO_3$], 0.004 mg/L at > 180 mg/L [$CaCO_3$]

for lead = 0.001 mg/L for [$CaCO_3$]=0-60 mg/L, 0.002 mg/L for [$CaCO_3$]=60-120 mg/L, 0.004 mg/L for [$CaCO_3$]=120-180 mg/L, 0.007 mg/L for [$CaCO_3$] >180 mg/L

for mercury, inorganic fraction

for nickel: both BC and CCME guideline = 0.025 mg/L at 0-60 mg/L [$CaCO_3$], 0.065mg/L at 60 - 120 mg/L [$CaCO_3$], 0.110 mg/L at 120 - 180 mg/L [$CaCO_3$], 0.150 mg/L at > 180 mg/L [$CaCO_3$].

B: Working BC guideline.

C: Max. Cu guideline of (0.094(hardness)+2) µg/L. The 30-d mean Cu guideline is ≤ 2 µg/L for hardness ≤ 50 mg/L, and guideline is ≤ 0.04(mean hardness) µg/L for hardness > 50mg/L.*

D: Max Pb guideline of e $^{(1.273 \ln(\text{hardness}) - 1.460)}$ if hardness > 8mg/L; 0.003 mg Pb/L if hardness ≤ 8mg/L. 30-day mean Pb guideline of ≤3.31 + e $^{(1.273 \ln(\text{mean hardness}) - 4.704)}$ for hardness > 8mg/L only; otherwise no 30-d mean guideline.

E: BC Max Mn guideline 0.01102(hardness)+0.54 mg/L; 30-day mean Mn guideline 0.0044(mean hardness)+0.605 mg/L.

F: for silver: BC Max = 0.003 mg/L if hardness > 100 mg/L, Max= 0.0001 mg/L if hardness < 100 mg/L, BC 30-d Mean = 0.0015 mg/L if hardness > 100 mg/L, Mean= 0.00005 mg/L if hardness < 100 mg/L.

G: Max Zn guideline = [33 + 0.75(hardness - 90)] ug/L, minimum of 33 ug/L. 30-day mean Zn guideline = [7.5 + 0.75*(hardness - 90)] ug/L, min of 7.5 ug/L.*

< indicates that values are below detection limits

Outlined cells indicate CCME Exceedances

Grey cells indicate BC Guideline Exceedances

Appendix 3.3-4
Summary of Water Quality for Dissolved Metals for the Woodjam Project, August 11, 2009

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Appendix 3.3-4. Summary of Water Quality for Dissolved Metals for the Woodjam Project, August 11, 2009

									BC guidelines		CCME
		DC-1	DC-2	HR-1	HR-1 DUP	HR-2	WC-1	MC-1	Max	30-d mean	guideline
Aluminum	D-Al	0.0056	0.0022	0.009	0.0091	0.0089	0.0166	0.0023	0.1*	0.05*	
Antimony	D-Sb	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.02 B		
Arsenic	D-As	0.00151	0.00106	0.00022	0.0002	0.0002	0.00055	0.00107	0.005 B		0.005
Barium	D-Ba	0.033	0.0244	0.00892	0.00894	0.00894	0.0186	0.0119	5 B	1 B	
Beryllium	D-Be	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050		0.0053 B	
Bismuth	D-Bi	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050			
Boron	D-B	0.014	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	1.2		
Cadmium	D-Cd	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	A, B		0.000017
Calcium	D-Ca	48.2	39.3	12.5	12.7	12.4	17.2	29.9			
Chromium	D-Cr	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00101	<0.00050	0.001 B		A
Cobalt	D-Co	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.110	0.004	
Copper	D-Cu	0.00209	0.00042	0.00047	0.00053	0.00049	0.00131	0.0006	C	C	A
Iron	D-Fe	0.045	<0.030	<0.030	<0.030	<0.030	0.03	0.07	0.3 B		0.3
Lead	D-Pb	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	D	D	A
Lithium	D-Li	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	5 B		
Magnesium	D-Mg	12	14.5	2.09	2.11	2.09	7.68	12.7			
Manganese	D-Mn	0.000535	0.000332	0.000228	0.000208	0.000156	0.00165	0.00189	E	E	
Mercury	D-Hg	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.0001	0.00002	0.000026 A
Molybdenum	D-Mo	0.00204	0.00149	0.000869	0.00084	0.000845	0.000992	0.000966	2	1	0.073
Nickel	D-Ni	0.00117	0.00129	<0.00050	<0.00050	<0.00050	0.00156	0.002	A		A
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30			
Potassium	D-K	2.08	3	0.721	0.71	0.713	1.6	1.5			
Selenium	D-Se	0.00027	<0.00010	0.00025	0.0002	0.00026	0.00012	<0.00010		0.002	0.001
Silicon	D-Si	8.7	8.37	2.25	2.25	2.22	8.57	6.19			
Silver	D-Ag	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	F	F	0.000100
Sodium	D-Na	5.2	6	<2.0	<2.0	<2.0	3.5	6			
Strontium	D-Sr	0.277	0.251	0.069	0.0686	0.0678	0.169	0.201			
Thallium	D-Tl	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.0003 B		0.0008
Tin	D-Sn	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.1 B		
Uranium	D-U	0.000805	0.00018	0.000096	0.000097	0.000095	0.000176	0.000242	0.3 B		
Vanadium	D-V	0.0044	<0.0010	<0.0010	<0.0010	<0.0010	0.0021	0.001			
Zinc	D-Zn	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	G	G	0.0300

Expressed as mg/L.

**for pH>6.5.*

Note: Total metal Water Quality Guidelines (WQG) shown where available, to facilitate comparison of dissolved concentrations to guideline values.

A : depends on background, CCME guideline:

for aluminum: pH>6.5

*for cadium guideline = 0.001 * 10 $^{(0.86[\log(\text{hardness})] - 3.2)}$ mg/L*

for chromium guideline = 0.001 mg/L (Cr VI), or 0.0089 (Cr III) , interim

for copper: CCME = 0.002 mg/L at 0-120 mg/L [$CaCO_3$], 0.003mg/L at 120 - 180 mg/L [$CaCO_3$], 0.004 mg/L at > 180 mg/L [$CaCO_3$]

for lead = 0.001 mg/L for [$CaCO_3$]=0-60 mg/L, 0.002 mg/L for [$CaCO_3$]=60-120 mg/L, 0.004 mg/L for [$CaCO_3$]=120-180 mg/L, 0.007 mg/L for [$CaCO_3$] >180 mg/L

for mercury, inorganic fraction

for nickel: both BC and CCME guideline = 0.025 mg/L at 0-60 mg/L [$CaCO_3$], 0.065mg/L at 60 - 120 mg/L [$CaCO_3$], 0.110 mg/L at 120 - 180 mg/L [$CaCO_3$], 0.150 mg/L at > 180 mg/L [$CaCO_3$].

B: Working BC guideline.

C: Max. Cu guideline of (0.094(hardness)+2) µg/L. The 30-d mean Cu guideline is ≤ 2 µg/L for hardness ≤ 50 mg/L, and guideline is ≤ 0.04(mean hardness) µg/L for hardness > 50 mg/L.*

D: Max Pb guideline of e $^{(1.273 \ln(\text{hardness}) - 1.460)}$ if hardness > 8mg/L; 0.003 mg Pb/L if hardness ≤ 8mg/L. 30-day mean Pb guideline of ≤3.31 + e $^{(1.273 \ln(\text{mean hardness}) - 4.704)}$ for hardness > 8mg/L only; otherwise no 30-d mean guideline.

E: BC Max Mn guideline 0.01102(hardness)+0.54 mg/L; 30-day mean Mn guideline 0.0044(mean hardness)+0.605 mg/L.

F: for silver: BC Max = 0.003 mg/L if hardness > 100mg/L, Max= 0.0001 mg/L if hardness < 100 mg/L, BC 30-d Mean = 0.0015 mg/L if hardness > 100 mg/L, Mean= 0.00005 mg/L if hardness < 100 mg/L.

G: Max Zn guideline = [33 + 0.75(hardness - 90)] ug/L, minimum of 33 ug/L. 30-day mean Zn guideline = [7.5 + 0.75*(hardness - 90)] ug/L, min of 7.5 ug/L.*

< indicates that values are below detection limits

Outlined cells indicate CCME Exceedances

Grey cells indicate BC Guideline Exceedances

Appendix 3.3-5
Stream Water Quality Travel Blank, 2009

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Appendix 3.3-5. Stream Water Quality Travel Blank, 2009

Sample ID		TRAVEL BLANK
Date Sampled		08-Aug-09
Time Sampled	**Units**	00:00
ALS Sample ID		L805164-8
Nature		Water
Physical Tests		
Colour, True	CU	<5.0
Conductivity	mS/cm	<2.0
Hardness (as $CaCO_3$)	mg/L	<0.50
pH	pH	5.63
Total Suspended Solids	mg/L	<3.0
Total Dissolved Solids	mg/L	<10
Turbidity	NTU	<0.10
Anions and Nutrients		
Acidity (as $CaCO_3$)	mg/L	1.6
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	<2.0
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	<2.0
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	<2.0
Alkalinity, Total (as $CaCO_3$)	mg/L	<2.0
Ammonia as N	mg/L	<0.0050
Bromide (Br)	mg/L	<0.050
Chloride (Cl)	mg/L	<0.50
Fluoride (F)	mg/L	<0.020
Nitrate (as N)	mg/L	<0.0050
Nitrite (as N)	mg/L	<0.0010
Total Kjeldahl Nitrogen	mg/L	<0.050
Total Nitrogen	mg/L	<0.050
Total Phosphate as P	mg/L	<0.0020
Sulphate (SO4)	mg/L	<0.50
Total Metals		
Aluminum (Al)-Total	mg/L	<0.0010
Antimony (Sb)-Total	mg/L	<0.00010
Arsenic (As)-Total	mg/L	<0.00010
Barium (Ba)-Total	mg/L	<0.000050
Beryllium (Be)-Total	mg/L	<0.00050
Bismuth (Bi)-Total	mg/L	<0.00050
Boron (B)-Total	mg/L	<0.010
Cadmium (Cd)-Total	mg/L	<0.000010
Calcium (Ca)-Total	mg/L	<0.020
Chromium (Cr)-Total	mg/L	<0.00050
Cobalt (Co)-Total	mg/L	<0.00010
Copper (Cu)-Total	mg/L	<0.00010
Iron (Fe)-Total	mg/L	<0.030
Lead (Pb)-Total	mg/L	<0.000050
Lithium (Li)-Total	mg/L	<0.0050
Magnesium (Mg)-Total	mg/L	<0.0050
Manganese (Mn)-Total	mg/L	<0.000050
Mercury (Hg)-Total	mg/L	<0.000010
Molybdenum (Mo)-Total	mg/L	<0.000050
Nickel (Ni)-Total	mg/L	<0.00050
Phosphorus (P)-Total	mg/L	<0.30
Potassium (K)-Total	mg/L	<0.050

(continued)

Appendix 3.3-5. Stream Water Quality Travel Blank, 2009 (completed)

Sample ID		TRAVEL BLANK
Date Sampled		08-Aug-09
Time Sampled	**Units**	00:00
ALS Sample ID		L805164-8
Nature		Water
Total Metals (continued)		
Selenium (Se)-Total	mg/L	<0.00010
Silicon (Si)-Total	mg/L	<0.050
Silver (Ag)-Total	mg/L	<0.000010
Sodium (Na)-Total	mg/L	<2.0
Strontium (Sr)-Total	mg/L	<0.00010
Thallium (Tl)-Total	mg/L	<0.00010
Tin (Sn)-Total	mg/L	<0.00010
Titanium (Ti)-Total	mg/L	<0.010
Uranium (U)-Total	mg/L	<0.000010
Vanadium (V)-Total	mg/L	<0.0010
Zinc (Zn)-Total	mg/L	<0.0010
Dissolved Metals		
Aluminum (Al)-Dissolved	mg/L	-
Antimony (Sb)-Dissolved	mg/L	-
Arsenic (As)-Dissolved	mg/L	-
Barium (Ba)-Dissolved	mg/L	-
Beryllium (Be)-Dissolved	mg/L	-
Bismuth (Bi)-Dissolved	mg/L	-
Boron (B)-Dissolved	mg/L	-
Cadmium (Cd)-Dissolved	mg/L	-
Calcium (Ca)-Dissolved	mg/L	-
Chromium (Cr)-Dissolved	mg/L	-
Cobalt (Co)-Dissolved	mg/L	-
Copper (Cu)-Dissolved	mg/L	-
Iron (Fe)-Dissolved	mg/L	-
Lead (Pb)-Dissolved	mg/L	-
Lithium (Li)-Dissolved	mg/L	-
Magnesium (Mg)-Dissolved	mg/L	-
Manganese (Mn)-Dissolved	mg/L	-
Mercury (Hg)-Dissolved	mg/L	-
Molybdenum (Mo)-Dissolved	mg/L	-
Nickel (Ni)-Dissolved	mg/L	-
Phosphorus (P)-Dissolved	mg/L	-
Potassium (K)-Dissolved	mg/L	-
Selenium (Se)-Dissolved	mg/L	-
Silicon (Si)-Dissolved	mg/L	-
Silver (Ag)-Dissolved	mg/L	-
Sodium (Na)-Dissolved	mg/L	-
Strontium (Sr)-Dissolved	mg/L	-
Thallium (Tl)-Dissolved	mg/L	-
Tin (Sn)-Dissolved	mg/L	-
Titanium (Ti)-Dissolved	mg/L	-
Uranium (U)-Dissolved	mg/L	-
Vanadium (V)-Dissolved	mg/L	-
Zinc (Zn)-Dissolved	mg/L	-
Organic Parameters		
Total Organic Carbon	mg/L	<0.50

Appendix 3.3-6
Relative Percent Difference (RPD) Results for Stream Water Quality, 2009

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Appendix 3.3-6. Relative Percent Difference (RPD) Results for Stream Water Quality, 2009

Sample ID Date Sampled ALS Sample ID Nature	Units	5xDL	HR-1 11-Aug-09 L805164-5 Water	DUP-1 11-Aug-09 L805164-7 Water	RPD%
Physical Tests					
Colour, True	CU	25	5.5	5.5	*
Conductivity	mS/cm	10	89.6	89.3	0
Hardness (as $CaCO_3$)	mg/L	2.5	39.9	40.3	1
pH	pH	0.5	8.06	8.04	0
Total Suspended Solids	mg/L	15	**1.5**	**1.5**	*
Total Dissolved Solids	mg/L	50	57	53	7
Turbidity	NTU	0.5	0.8	0.89	11
Anions and Nutrients					
Acidity (as $CaCO_3$)	mg/L	5	1.8	2	*
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	10	36.7	36.8	0
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	10	**1**	**1**	*
Alkalinity, Hydroxide (as $CaCO_3$)	mg/L	10	**1**	**1**	*
Alkalinity, Total (as $CaCO_3$)	mg/L	10	36.7	36.8	0
Ammonia as N	mg/L	0.025	**0.0025**	**0.0025**	*
Bromide (Br)	mg/L	0.25	**0.025**	**0.025**	*
Chloride (Cl)	mg/L	2.5	**0.25**	**0.25**	*
Fluoride (F)	mg/L	0.1	0.021	0.021	*
Nitrate (as N)	mg/L	0.025	**0.0025**	**0.0025**	*
Nitrite (as N)	mg/L	0.005	**0.0005**	**0.0005**	*
Total Kjeldahl Nitrogen	mg/L	0.25	0.06	0.14	*
Total Nitrogen	mg/L	0.25	0.06	0.14	*
Total Phosphate as P	mg/L	0.01	0.0027	0.0024	*
Sulfate (SO4)	mg/L	2.5	5.96	5.98	0
Total Metals					
Aluminum (Al)-Total	mg/L	0.005	0.019	0.0178	7
Antimony (Sb)-Total	mg/L	0.0005	**0.00005**	**0.00005**	*
Arsenic (As)-Total	mg/L	0.0005	0.00023	0.00021	*
Barium (Ba)-Total	mg/L	0.00025	0.00918	0.00898	2
Beryllium (Be)-Total	mg/L	0.0025	**0.00025**	**0.00025**	*
Bismuth (Bi)-Total	mg/L	0.0025	**0.00025**	**0.00025**	*
Boron (B)-Total	mg/L	0.05	**0.005**	**0.005**	*
Cadmium (Cd)-Total	mg/L	0.00005	0.000013	0.000011	*
Calcium (Ca)-Total	mg/L	0.1	12.2	12.1	1
Chromium (Cr)-Total	mg/L	0.0025	**0.00025**	**0.00025**	*
Cobalt (Co)-Total	mg/L	0.0005	**0.00005**	**0.00005**	*
Copper (Cu)-Total	mg/L	0.0005	0.00058	0.00058	0
Iron (Fe)-Total	mg/L	0.15	0.077	0.076	*
Lead (Pb)-Total	mg/L	0.00025	**0.000025**	**0.000025**	*
Lithium (Li)-Total	mg/L	0.025	**0.0025**	**0.0025**	*
Magnesium (Mg)-Total	mg/L	0.025	2.08	2.04	2
Manganese (Mn)-Total	mg/L	0.00025	0.00908	0.00896	1
Mercury (Hg)-Total	mg/L	0.00005	**0.000005**	**0.000005**	*
Molybdenum (Mo)-Total	mg/L	0.00025	0.000808	0.000762	6
Nickel (Ni)-Total	mg/L	0.0025	0.0006	**0.00025**	*
Phosphorus (P)-Total	mg/L	1.5	**0.15**	**0.15**	*
Potassium (K)-Total	mg/L	0.25	0.7	0.682	3

Values in bold are half the detection limit. *(continued)*

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

** Denotes that RPD was not calculated due to one or more values <5 times the detection limit.*

Yellow values have a RPD % equal to or greater than 20%.

Appendix 3.3-6. Relative Percent Difference (RPD) Results for Stream Water Quality, 2009 (completed)

Sample ID Date Sampled ALS Sample ID Nature	Units	5xDL	HR-1 11-Aug-09 L805164-5 Water	DUP-1 11-Aug-09 L805164-7 Water	RPD%
Total Metals (continued)					
Selenium (Se)-Total	mg/L	0.0005	0.00029	0.00027	*
Silicon (Si)-Total	mg/L	0.25	2.3	2.28	1
Silver (Ag)-Total	mg/L	0.00005	**0.000005**	**0.000005**	*
Sodium (Na)-Total	mg/L	10	**1**	**1**	*
Strontium (Sr)-Total	mg/L	0.0005	0.0678	0.0653	4
Thallium (Tl)-Total	mg/L	0.0005	**0.00005**	**0.00005**	*
Tin (Sn)-Total	mg/L	0.0005	**0.00005**	**0.00005**	*
Titanium (Ti)-Total	mg/L	0.05	**0.005**	**0.005**	*
Uranium (U)-Total	mg/L	0.00005	0.000095	0.000092	3
Vanadium (V)-Total	mg/L	0.005	**0.0005**	**0.0005**	*
Zinc (Zn)-Total	mg/L	0.005	**0.0005**	**0.0005**	*
Dissolved Metals					
Aluminum (Al)-Dissolved	mg/L	0.005	0.009	0.0091	1
Antimony (Sb)-Dissolved	mg/L	0.0005	**0.00005**	**0.00005**	*
Arsenic (As)-Dissolved	mg/L	0.0005	0.00022	0.0002	*
Barium (Ba)-Dissolved	mg/L	0.00025	0.00892	0.00894	0
Beryllium (Be)-Dissolved	mg/L	0.0025	**0.00025**	**0.00025**	*
Bismuth (Bi)-Dissolved	mg/L	0.0025	**0.00025**	**0.00025**	*
Boron (B)-Dissolved	mg/L	0.05	**0.005**	**0.005**	*
Cadmium (Cd)-Dissolved	mg/L	0.00005	**0.000005**	**0.000005**	*
Calcium (Ca)-Dissolved	mg/L	0.1	12.5	12.7	2
Chromium (Cr)-Dissolved	mg/L	0.0025	**0.00025**	**0.00025**	*
Cobalt (Co)-Dissolved	mg/L	0.0005	**0.00005**	**0.00005**	*
Copper (Cu)-Dissolved	mg/L	0.0005	0.00047	0.00053	*
Iron (Fe)-Dissolved	mg/L	0.15	**0.015**	**0.015**	*
Lead (Pb)-Dissolved	mg/L	0.00025	**0.000025**	**0.000025**	*
Lithium (Li)-Dissolved	mg/L	0.025	**0.0025**	**0.0025**	*
Magnesium (Mg)-Dissolved	mg/L	0.025	2.09	2.11	1
Manganese (Mn)-Dissolved	mg/L	0.00025	0.000228	0.000208	*
Mercury (Hg)-Dissolved	mg/L	0.00005	**0.000005**	**0.000005**	*
Molybdenum (Mo)-Dissolved	mg/L	0.00025	0.000869	0.00084	3
Nickel (Ni)-Dissolved	mg/L	0.0025	**0.00025**	**0.00025**	*
Phosphorus (P)-Dissolved	mg/L	1.5	**0.15**	**0.15**	*
Potassium (K)-Dissolved	mg/L	0.25	0.721	0.71	2
Selenium (Se)-Dissolved	mg/L	0.0005	0.00025	0.0002	*
Silicon (Si)-Dissolved	mg/L	0.25	2.25	2.25	0
Silver (Ag)-Dissolved	mg/L	0.00005	**0.000005**	**0.000005**	*
Sodium (Na)-Dissolved	mg/L	10	**1**	**1**	*
Strontium (Sr)-Dissolved	mg/L	0.0005	0.069	0.0686	1
Thallium (Tl)-Dissolved	mg/L	0.0005	**0.00005**	**0.00005**	*
Tin (Sn)-Dissolved	mg/L	0.0005	**0.00005**	**0.00005**	*
Titanium (Ti)-Dissolved	mg/L	0.05	**0.005**	**0.005**	*
Uranium (U)-Dissolved	mg/L	0.00005	0.000096	0.000097	1
Vanadium (V)-Dissolved	mg/L	0.005	**0.0005**	**0.0005**	*
Zinc (Zn)-Dissolved	mg/L	0.005	**0.0005**	**0.0005**	*
Organic Parameters					
Total Organic Carbon	mg/L	2.5	1.85	1.87	*

Values in bold are half the detection limit.

RPD = Relative Percent Difference relative to mean (in %).

DL = Analytical Detection Limit.

** Denotes that RPD was not calculated due to one or more values <5 times the detection limit.*

Yellow values have a RPD % equal to or greater than 20%.

Appendix 28:
Rescan Environmental Services Ltd: Archaeological Overview Assessment for Woodjam North and South Tenure in Central Interior BC

Gold Fields Ltd.

Archaeological Overview Assessment for Woodjam North and South Tenure in Central Interior BC




DRAFT

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October 2009

Woodjam Gold-Copper Project

Archaeological Overview Assessment for Woodjam North and South Tenure in Central Interior BC

October 2009
Project #1014-007

Prepared for:

Gold Fields

Prepared by:

Rescan™ Engineers and Scientists

Rescan™ Environmental Services Ltd.
Vancouver, British Columbia

DRAFT

Executive Summary

This report presents the results of a desk based Archaeological Overview Assessment (AOA) for the Gold Fields Ltd. Woodjam North and South tenures in the central-interior of British Columbia conducted by Rescan Environmental Services Ltd (Rescan). This study reflects that the project is still early in the exploration phase and as such the exact location of project developments (drilling pad and access road construction) are currently unknown. The main objective of this AOA were to conduct a literature review, compile a map of known archaeological sites in the area, determine the archaeological potential in the Project area, and develop recommendations for future work, if necessary, based on the background research conducted.

The *Heritage Conservation Act* protects all archaeological site, recorded and unrecorded, whether on Provincial, Crown, or private lands that predate 1846. Burial and rock art sites are protected regardless of age. There are 32 recorded archaeological sites within the Project area (North and South Tenures) and more sites immediately outside the Project area. Additionally, previous AOA studies of the area region suggest that large potions of the Project area have moderate to high archaeological potential.

It is recommended that once the locations of drill pads and access are determined they be reviewed by a qualified archaeologist to assess the archaeological potential and make recommendations, prior to ground altering activities. The recommendations may include an Archaeological Impact Assessment (AIA) conducted under a Section 14 Heritage Inspection Permit, issued under the *Heritage Conservation Act*.

Acknowledgments

Rescan Environmental Services Ltd. would like to thank Gold Fields Ltd. for the opportunity to conduct this study.

Credits

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Reviewed by	Lisa Seip M.A. RPCA

Archaeological Overview Assessment for Woodjam North and South Tenure in Central Interior BC

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1. Introduction

This report presents the results of an Archaeological Overview Assessment (AOA) of the north and south tenures for Gold Fields proposed Woodjam Project (the Project) in the central interior of BC. The Project is within the asserted traditional territory of Northern Shushwap Treaty Society/Tribal Council. The Project claim area is approximately 480 km^2 and encompasses the community of Horsefly, BC and is located approximately 70 km east of Williams Lake, BC (Figure 1-1). The claim area is highly mineralized and encompasses at least five copper-gold, copper only, and gold only occurrences. These occurrences are situated approximately 10 km south of Horsefly.

1.1 DEVELOPMENT TYPE, FACILITIES AND SCHEDULE

Gold Fields Ltd. and Fjordland Exploration Inc. own the rights to both the North and South Woodjam tenures. Currently their focus is primarily on the south tenure and therefore all work conducted by Gold Fields is currently being focused on this area. The Project is currently in the exploration phase and the only proposed developments within the Project area at this time are drill locations. The exact location of these proposed pads is currently undecided. Drilling is scheduled to start in October 2009.

1.2 POTENTIAL IMPACTS TO ARCHAEOLOGICAL SITES

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Impacts from this project are expected to include but may not be limited to: (1) the clearing or grading of access roads to the proposed drill pads; and (2) the clearing, and grading of the proposed drill pads and the disturbance of Culturally Modified Trees (CMTs) from logging activities associated with construction.

1.3 OBJECTIVES

The main objectives of the archaeological overview assessment (AOA) study were to: (1) to secure data from the Archaeology Branch in Victoria for any previously recorded sites within and immediately adjacent to the mine site and proposed developments and to review any historic literary accounts of this locality; (2) to compare the above information with the currently proposed development plan and initially determine where potential conflicts could exist; (3) to prepare an AOA report that will summarize and present the data gathered, and offer recommendation options for any further archaeological work that may be required, such as a more detailed archaeological impact assessment, mitigation, monitoring, etc.

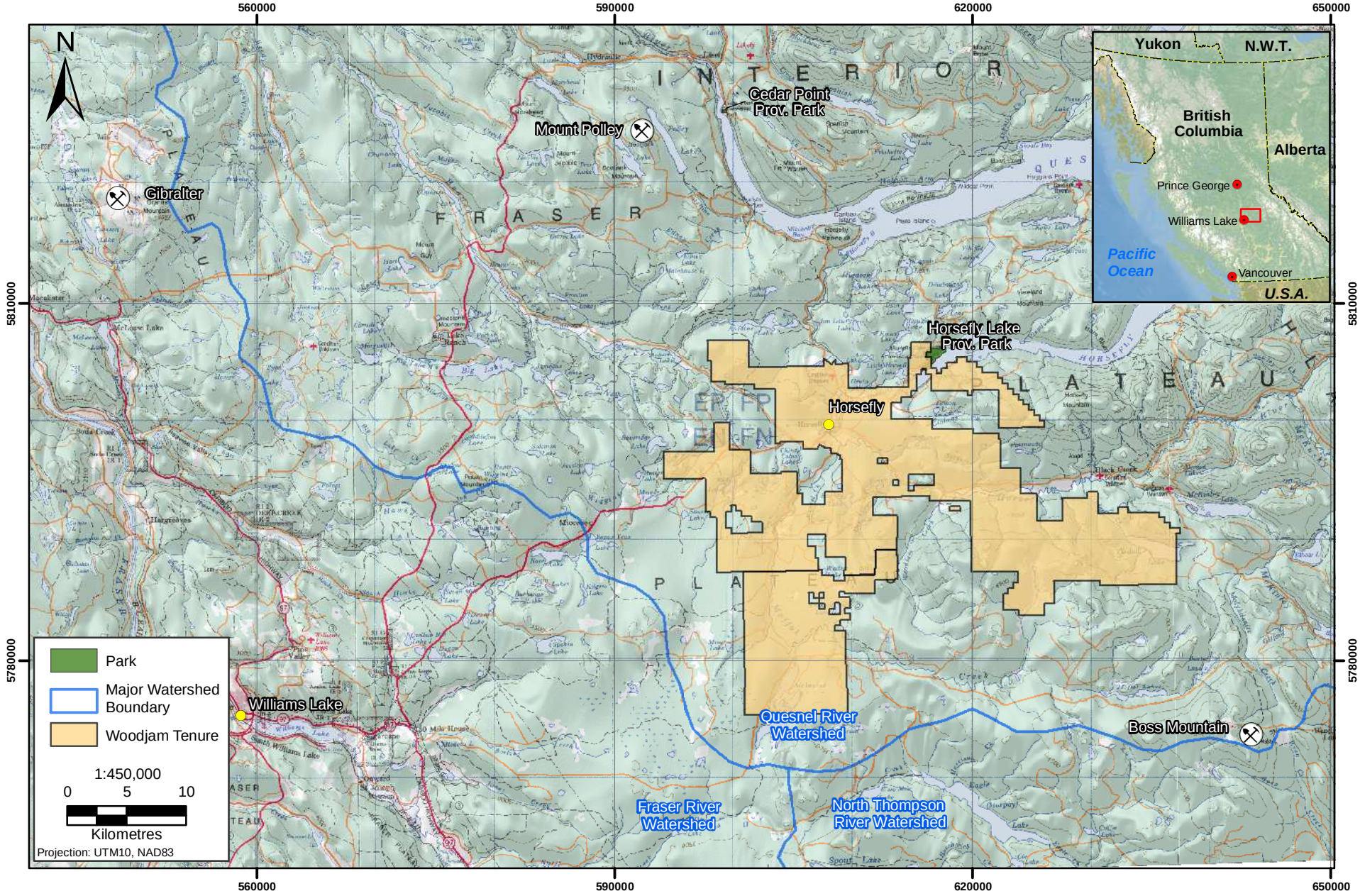

Figure 1-1

GOLD FIELDS

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Woodjam Tenure Location

Figure 1-1

Rescan™ Engineers & Scientists

2. Study Methodology

This AOA included a literature review, and an assessment of archaeological data based reviewed material.

2.1 BACKGROUND REVIEW

Background information reviewed for the Project area and the surrounding region included ethnographic and historic studies, previous archaeological investigations and previously recorded archaeological sites. Reports on past archaeological studies were obtained from the Archaeology Branch of the Ministry of Tourism, Sport and the Arts (Archaeology Branch) and archaeological site forms were obtained through a database search of the Remote Access to Archaeological Data (RAAD), held by the Archaeology Branch. Published information, available at the libraries of Simon Fraser University, University of British Columbia and the Vancouver Public Library, was also reviewed.

2.2 ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL

Archaeological potential is the probability that a given area may contain an archaeological site. For the purpose of this report potential is described as being high, moderate-high, moderate, or low. Some features which could give an area high potential for archaeological sites could be: proximity to potable water; easily habitable terrain (i.e., flat, well drained, etc.); proximity to raw materials (i.e., stone for making tools); proximity to food sources (i.e., game, berries, fish, etc.); and proximity to culturally significant or sacred areas. High archaeological potential does not guarantee the presence of an archaeology site, and low archaeological potential does not mean that there will not be a site at that location.

3. Background

3.1 NATURAL SETTING

The Project Area is located in central interior BC, on the interior plateau, within the Horsefly River watershed, which drains northward into Quesnel Lake. Terrain is typically rolling hills with few rocky outcrops. Within the project area elevation varies from around 850 m ASL in marshy areas to 1,240 m ASL.

Climatically the region is typical for interior BC. Winters are cold (averaging 18°C in winter), and snowpack is usually between 1 – 2 m by the April thaw. Summers are warm and relatively wet. Typical vegetation is pine and fir forests, with some old growth cedars. Fish are abundant in the area and include trout, lake trout, Dolly Varden, bull trout, salmon (Chinook, coho, kokanee, and sockeye), and steelhead trout. Wildlife in the area includes moose, mule deer, coyotes, black bears, cougars, and waterfowl.

The region was covered with ice during the last period of glaciation. Around 12,000 BP the ice started retreating but it was not until around 10,000 BP that human habitation was possible in the region (Clague 1981). Since that time the climate has undergone some major changes in temperature, precipitation, and consequently vegetation. Directly following the retreat of the ice the climate was cool and moist. Grasslands were established in the valley bottoms while the upper elevations were vegetated with pioneering forests. Between 10,000 and 8,000 BP, the time we see the first signs of human habitation, the climate changed, and a warmer, drier period began. Grasslands and sage lands reached their maximum and it is possible that unforested vegetation stretched from the valley bottoms to the alpine. Following this, until about 4,500 BP the climate became moister, but remained warmer than present. Forests re-established themselves, grasslands shrank, and water tables would have risen. After 4,500 temperatures cooled somewhat and the present climate and vegetation established itself (Hebda 1995).

3.2 ETHNOGRAPHIC BACKGROUND

The Project lies within the traditional territories of the Secwepemc. The aboriginal language spoken during the historic period in this region is Interior Salish, which is a division of the Salishan language family spoken from the north coast of Oregon up to British Columbia and up the Fraser River watershed area. More specifically the Secwepemc people speak Secwepemctsin (First Peoples' Language Map of BC website http://maps.fphlcc.ca/).

The Secwepemc relied on a varied diet to sustain them throughout the course of the year. Their yearly round incorporated a variety of habitation and food procurement strategies that had them moving over large areas within their territory. Winter months were spent in semi-subterranean pithouses. These structures ranged in size and could accommodate between 15 and 100 people at a time (Alexander 1997). During the cold months people ate preserved food which they had gathered during the rest of the year. This would most likely have been primarily dried or smoked salmon, supplemented with other dried or preserved foods (Alexander 1997, Dawson 1892, Teit 1909). Once the spring thaw had started people moved from their winter dwellings and into temporary lodges constructed with mats or bark. Ethnographic information indicates traditional hunting territories included the areas, "around the eastern parts of Horsefly and Quesnel Lakes" (Teit 1909). For more detailed information on the lifeways of the Secwepemc refer to Teit (1909), Dawson (1892), and Alexander (1997).

3.3 HISTORIC BACKGROUND

Near the centre of the Woodjam Tenure area is the community of Horsefly, located on the banks of the Horsefly River in the Fraser Plateau of British Columbia. The written historical accounts of the Project area are focused on the economic development of Horsefly and surrounding towns of Quesnel and Williams Lake.

The earliest European exploration of the Fraser Plateau was conducted by Alexander Mackenzie who travelled as far south as Alexandria (between Williams Lake and Quesnel) in 1793, and Simon Fraser's voyage down the Fraser River in 1808 (Lamb 1970, Lamb and Gnarowski 2007). European settlement in the region began with Fort Alexandria (established in 1821) which became a regional centre for the fur trade. Catholic Missions were established in the area during the 1840's (Morice 1970). Settlement in the Horsefly area intensified after June 1859, with the discovery of gold on the Horsefly River by Peter Dunlevy. Dunlevy was an American who was led to the discovery site by Long Baptiste, an Aboriginal man he met in Lac La Hache (Horsefly Community Website 2009). The Cariboo Gold Rush during the 1860s resulted in an influx of would-be prospectors to the region and the establishment of a gold rush town near Dunlevy's discovery. The Cariboo Gold Rush also saw the establishment of Barkerville near the location of a famous gold discovery made by William Barker in 1862, and development of Quesnel into a regional commercial center (Horsefly Historical Society 2009, Quesnel Museum and Archives 2009).

In 1887, Thaddeus Harper started the first hydraulic mine in the region and the resulting settlement became known as "Harper's Camp". Residents renamed the community "Horsefly" around 1920 and Horsefly remains an unincorporated village today with a population of approximately 1000. The post-gold rush economy of Horsefly has been focused on farming and cattle ranching, logging, and to a lesser extent mining, trapping and tourism (Horsefly Community Website 2009, Horsefly Historical Society 2009).

3.4 PREVIOUS ARCHAEOLOGICAL RESEARCH IN THE STUDY AREA

Archaeological research within the North and South Tenures of the Project area has been carried out since 1970. The majority of the archaeological studies have been prepared for the forestry industry or conducted by the provincial government's Archaeology Branch. In his 1970 *Archaeological Sites Advisory Board Cariboo Survey – 1970* Paul Sneed conducted an archaeological survey that included the Project area (Sneed 1970). Sneed identified numerous archaeological sites in the Cariboo including FbRh-1 a prehistoric lithic scatter within the Project area. Since the recording of FbRh-1 an additional 31 sites have been located within the Project area, 26 in the North Tenure (see Hewer 1996, Bond et al 2003, Sneed 1970, Wilson and Weinberger 1998, 1999, and 2000, Terra Archaeology Permit # 2006-201 n.d. and 2009-100 n.d., Wilson n.d., Weinberger 2004a and 2004b) and five in the South Tenure (Wilson and Weinberger 1998 and Commisio 2002).

Archaeological sites within the Project area include lithic scatters, cultural depressions, house pits, and CMTs. Lithic scatters can be found in both surface and sub-surface contexts and consist of stone tools and/or the debitage resulting from their creation. Lithic scatters are the most common indicator of prehistoric human occupation due to their longevity within the archaeological record. Cultural depressions may be indications of a variety of prehistoric uses including habitation (pit house), subsistence (cache and roasting pits) or burials. CMTs indicate a human presence in the area and are treated as archaeological sites if the alteration predates 1846. CMT types include bark-stripped trees, blazed trees, message trees, arborglyph and arborgraph trees, sap collection trees, entwined trees, and kindling trees amongst others (CMT Handbook 2001).

4. Results

The data accumulated during this AOA through RAAD searches and literature reviews indicate widespread prehistoric activity within the Project area. There are 32 recorded archaeological sites within the Project area and many others within close proximity (Figure 4-1). These are listed in Table 4-1 (data gaps in the table are the result of incomplete site forms). Archaeological sites within the study area include cultural depressions, lithic scatters, and CMTs. Historic occupation of the project area has been largely based on resource development including fur trading, forestry, mining and farming.

4.1 STUDY AREA ARCHAEOLOGICAL POTENTIAL ASSESSMENT

An AOA of the asserted traditional territories of the Northern Secwepemc First Nations conducted by I.R. Wilson in 1998 rated approximately half of the Woodjam Tenure area as having moderate to high potential for containing archaeological sites. (Wilson et al 1998). Based on evidence from archaeological sites found since this potential assessment was conducted the area designated as moderate to high potential should be larger than stated at the time of the report.

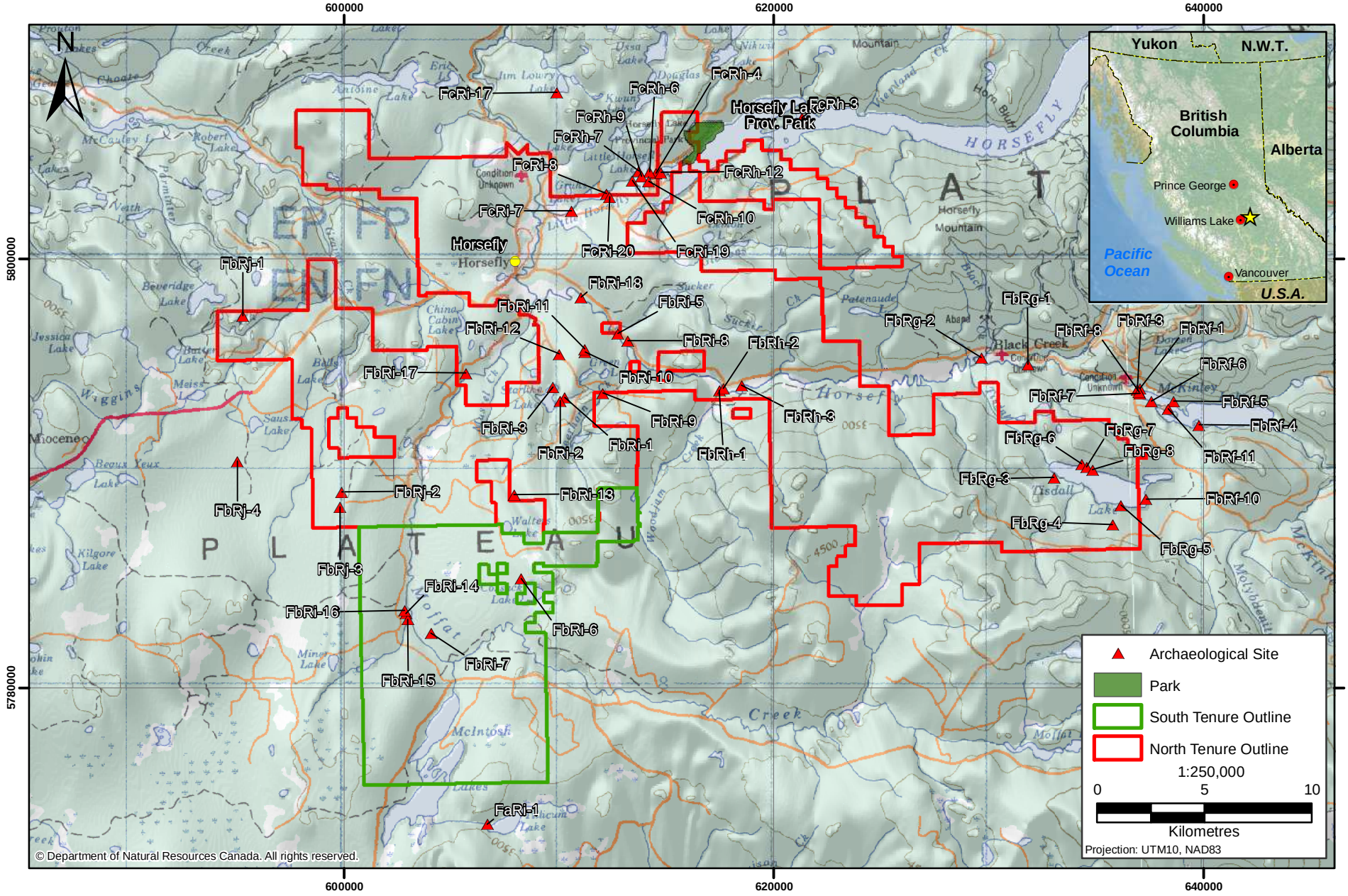


Figure 4-1

DRAFT **Archaeological Sites in the Area of the Project**

Figure 4-1

Table 4.1. Archaeological Sites Within or in Close Proximity to Project Area

Borden Number	Project Area	Site Type	Site Description	General Location
FaRi-1	Adjacent to South Tenure	Prehistoric	Lithic Scatter	North shore of Tillicum lake
FbRf-1	Adjacent to North Tenure	Prehistoric	Lithic Scatter	West end of McKinley Lake
FbRf-3	Adjacent to North Tenure	Prehistoric	Cultural Depression	West end of McKinley Lake
FbRf-4	Adjacent to North Tenure	Prehistoric	Lithic Scatter	Island in McKinley Lake
FbRf-5	Adjacent to North Tenure	Prehistoric	Lithic Scatter	North shore of McKinley Lake
FbRf-6	Adjacent to North Tenure	Prehistoric	Cultural Depression	South shore of McKinley Lake
FbRf-7	Adjacent to North Tenure	Prehistoric	Cultural Depression	Southwest shore of McKinley Lake
FbRf-8	Adjacent to North Tenure	Prehistoric	Cultural Depression	Southwest shore of McKinley Lake
FbRf-10	Adjacent to North Tenure	Prehistoric	Lithic Scatter	East shore of Tsidall Lake
FbRf-11	Adjacent to North Tenure	Prehistoric	Lithic Scatter	Six kilometers northwest of Tsidall Lake
FbRg-1	Adjacent to North Tenure	Prehistoric	Lithic Scatter	South bank of Horsefly River
FbRg-2	Adjacent to North Tenure	Prehistoric	Cultural Depression	Black Creek and Horsefly River confluence
FbRg-3	North Tenure	Prehistoric	Lithic Scatter	South of Tisdall Lake
FbRg-4	North Tenure	Historic	CMT Site	One kilometer south of Tisdall Lake
FbRg-5	North Tenure	Prehistoric	Lithic Scatter	South of Tisdall Lake
FbRg-6	North Tenure	Prehistoric	Lithic Scatter	North shore of Tisdall Lake
FbRg-7	North Tenure	Prehistoric	Lithic Scatter	North end of Tisdall Lake
FbRg-8	North Tenure	Prehistoric	Lithic Scatter	North end of Tisdall Lake
FbRh-1	North Tenure	Prehistoric	Lithic Scatter	South bank of Horsefly River
FbRh-2	North Tenure	Prehistoric	Lithic Scatter	North bank of Horsefly River at Woodjam Creek confluence
FbRh-3	North Tenure	Prehistoric	Lithic Scatter	North bank of Horsefly River
FbRi-1	North Tenure	Prehistoric	Lithic Scatter	East of Starlike Lake
FbRi-2	North Tenure	Prehistoric	Lithic Scatter	East of Starlike Lake
FbRi-3	North Tenure	Prehistoric	Cultural Depression	North shore of Starlike Creek
FbRi-5	North Tenure	Prehistoric	Lithic Scatter	Near Horsefly River and Sucker Creek confluence
FbRi-6	South Tenure	Prehistoric	Cultural Depression	East of Cossack Lake
FbRi-7	South Tenure	Prehistoric	Lithic Scatter	Three kilometers north of McIntosh Lake
FbRi-8	North Tenure	Prehistoric	House Pit	Near Horsefly River and Sucker Creek confluence
FbRi-9	North Tenure	Prehistoric	Lithic Scatter	Between Starlike and Corner Lakes
FbRi-10	North Tenure		CMT Site	One kilometer north of Corner Lake
FbRi-11	North Tenure		CMT Site	One kilometer north of Corner Lake
FbRi-12	North Tenure		CMT Site	One kilometer northeast of Triplet Lake
FbRi-13	North Tenure		CMT Site	One kilometer north of Walters Lake
FbRi-14	South Tenure	Prehistoric	Lithic Scatter	West of Moffat Creek
FbRi-15	South Tenure	Prehistoric	Lithic Scatter	West of Moffat Creek
FbRi-16	South Tenure	Prehistoric	Lithic Scatter	West of Moffat Creek
FbRi-17	Adjacent to North Tenure	Prehistoric	Lithic Scatter	North bank of Moffat Creek
FbRi-18	North Tenure	Prehistoric		Northeast bank of Horsefly River
FbRj-1	North Tenure	Historic	CMT Site	One kilometer southeast of Beveridge Lake
FbRj-2	North Tenure	Prehistoric	Lithic Scatter	Overlooking a meadow and wetland
FbRj-3	North Tenure	Prehistoric	Lithic Scatter	Knoll overlooking a wetland
FbRj-4	Adjacent to North Tenure	Prehistoric	Lithic Scatter	Knoll overlooking a wetland

(continued)

Table 4.1. Archaeological Sites Within or in Close Proximity to Project Area (completed)

Borden Number	Project Area	Site Type	Site Description	General Location
FcRh-3	Adjacent to North Tenure	Prehistoric	Lithic Scatter	North shore of Horsefly Lake
FcRh-4	Adjacent to North Tenure	Prehistoric	Lithic Scatter	East end of Horsefly Lake
FcRh-6	Adjacent to North Tenure	Prehistoric	Lithic Scatter	Northeast of Little Horsefly Lake
FcRh-7	Adjacent to North Tenure	Prehistoric	Lithic Scatter	West shore of Little Horsefly Lake
FcRh-9	Adjacent to North Tenure	Prehistoric	Lithic Scatter	South shore of Little Horsefly Lake
FcRh-10	Adjacent to North Tenure	Prehistoric	Lithic Scatter	South shore of Little Horsefly Lake
FcRh-12	North Tenure	Prehistoric	Lithic Scatter	Northwest shore of Horsefly Lake
FcRi-7	North Tenure	Prehistoric	House Pit	South bank of Little Horsefly River
FcRi-8	North Tenure		Cultural Depressions	
FcRi-17	Adjacent to North Tenure			
FcRi-19	Adjacent to North Tenure			
FcRi-20	North Tenure			

5. Recommendations

The *Heritage Conservation Act* (HCA) protects all archaeological sites (including unrecorded sites) that predate 1846, whether on Provincial, Crown, or private lands. Burial sites and rock art sites are protected regardless of age. Impacts to archaeological sites must be managed or avoided by development proponents. Management of archaeological sites can only be accomplished under a HCA site alteration permit regardless of the current condition of the site.

The 32 recorded archaeological sites and the moderate to high archaeological potential of much of the Project area suggest that many as yet unrecorded archaeological sites may be present within the Project area. Prior to the construction of drill pads, access roads, and any other ground altering activities it will be necessary to undertake a more focused study of these footprints to determine whether further work, including an Archaeological Impact Assessment (AIA) if necessary, should be carried out.

6. Closing

This report was prepared by Rescan Environmental Services Ltd on behalf of Gold Fields Ltd. This study was not designed to address issues of traditional use, does not constitute a traditional use study and was written without prejudice to issues of Aboriginal rights and/or title.

This report is intended for Gold Fields Ltd., any reliance or decisions made by third parties on the basis of this report are the sole responsibility of such third parties.

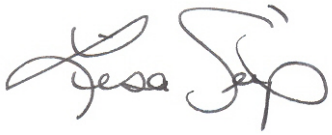
We trust that the information contained in this report is sufficient for your present needs.

Sincerely,

Rescan Environmental Services Ltd.

Daniel Walker M.A. Archaeologist

Reviewed by:



Lisa Seip, M.A. RPCA
Senior Archaeologist

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