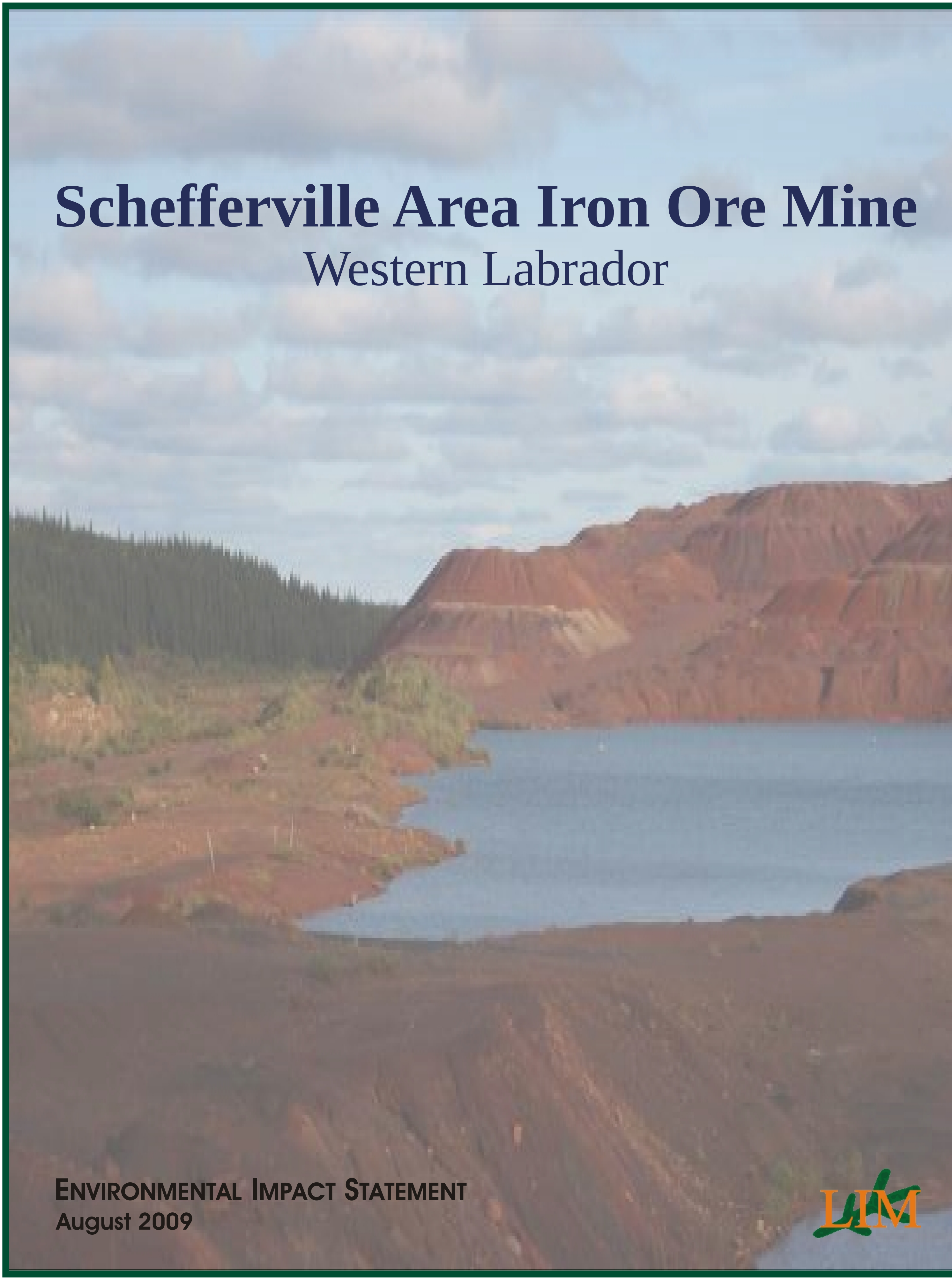


Schefferville Area Iron Ore Mine

Western Labrador

ENVIRONMENTAL IMPACT STATEMENT

August 2009

4.2.2 Wildlife

4.2.2.1 Caribou

Labrador's caribou (*Rangifer tarandus*) can be classified into two main groups, the migratory and sedentary (also known as woodland) ecotypes, which are distinguished by their use of calving grounds or fidelity to specific calving sites. Migratory caribou travel large distances, occupy large home ranges, and aggregate during calving periods. Conversely, sedentary caribou display limited movements, occupy smaller home ranges, and tend to disperse during the calving period (Schaefer et al. 2000; Bergerud et al. 2008).

The Project occupies a portion of Western Labrador which overlaps with the range of the George River (GR) Herd. Straddling the Québec-Labrador peninsula, the GR Herd is one of the world's largest Rangifer populations, with population estimates peaking at almost 800,000 individuals in the 1980's (Couturier et al. 1996; Russell et al. 1996, Rivest et al. 1998). This area of western Labrador overlaps the GR Herd as a portion of their winter range (Jacobs 1996).

In addition to the GR Herd, there is another migratory ecotype that is recognized on the Ungava Peninsula and known as the Rivière-aux-Feuilles ('Leaf River') (RAF) Herd. Existing and recognized sedentary populations include the Lac Joseph (LJ) Herd located south of the Assessment Area, and the Red Wine Mountains (RWM), the Joir River (JR), and the Mealy Mountains (MM) Herds all much further to the east. The Mealy Mountains act as a geographic barrier separating this herd from the other herds of Labrador, but the lack of a geographic barrier between the other three sedentary herds results in an overlap of herd ranges (Schmelzer et al. 2004; Bergerud et al. 2008). Schmelzer et al. (2004) indicates that during the winter months, the George River Caribou Herd encounters the outer limits of their ranges providing the opportunity for the intermingling of animals. The proposed site of the Project occurs entirely within the range of the GR Herd.

Although there is no evidence of sedentary caribou herds existing within the Assessment Area at present, they were reported historically (e.g., Caniapiscau or McPhayden Herds) (LWCRT 2005, Bergerud et al. 2008). The sedentary herds of this region have declined or disappeared since the 1960s with the advent of the snowmobile and expanded transportation network allowing greater access. The migratory and sedentary caribou inhabiting the Ungava peninsula (i.e., Labrador and northeastern Québec) are, and historically have been, an integral component of the way of life for aboriginal and non-aboriginal people for many centuries (Schmelzer and Otto 2003; Loring 2008).

As part of the baseline and monitoring research associated with this Project, LIM co-sponsored an intensive aerial survey of approximately 50 km radius of the Project (plus a similar distance around the NML project) during May 2009 (LIM and NML 2009). Completed in co-operation with the Provincial Governments of Newfoundland and Labrador and of Québec, this intensive survey of a 12,900 km^2 area located only 7 caribou [one group of four (one adult female that was captured and equipped with satellite collar, an adult female with a male calf, and a yearling male), a group of two (one adult male and one yearling male) and a dead female (estimated at 10+ years that was killed by a single wolf)], (Figure 4.19). These sightings and that of another group of caribou tracks were at least 22 km west and southwest of the Project. Measurements of two animals suggest these animals belong to the migratory ecotype, although tissue samples from these animals and a satellite collar deployed on an adult female may provide additional insight as to the herd affiliation.

Assessment Boundaries

Spatial and Temporal

Temporal boundaries for the George River and possible woodland caribou herd effects assessment comprise four timeframes: existing environment, construction phase (approximately six months), operation phase (approximately 5 years), and decommissioning phase (post-operation phase).

The range of the GR Herd occupies over 800,000 km^2 in Labrador and Northern Québec. Caribou from this herd travel large distances over the Québec-Labrador peninsula and aggregate on traditional calving grounds each June demonstrating strong site fidelity (i.e., returning to similar locations annually) (Schmelzer and Otto 2003). The GR Herd has been known to rut and overwinter in this area, but there is no evidence supporting any calving activities in the Assessment Area.

The nearest sedentary herd known to exist in the Schefferville area is the Caniapiscau Herd, located approximately 100 km west. The recognized range of this herd and of the Lac Joseph Herd (Bergerud et al. 2008), located southeast of the Project Area (200 km), are not believed to interact with the Project. RRCS (1989) indicated that the McPhadyen River Herd was known to have overlapped the Schefferville Area. Whether caribou from this woodland herd (or other woodland herd) still exist is unknown. Prior to the May 2009 survey (LIM and NML 2009), the most recent documented search effort was from the mid-1980s (Phillips 1982, St. Martin 1987). At the time of writing, the results from the May 2009 survey suggest that the caribou observed during that period are affiliated with the migratory ecotype (based on physical measurements of two animals), although additional information is being collected (i.e., through the satellite telemetry collar and pending genetics analyses). Despite this information and as a conservative measure in compliance with direction from the resource management agency, it is assumed that woodland caribou remain in the vicinity of Schefferville and as such, a woodland caribou strategy will be implemented during construction and Year 1 of operation, at which time it will be reviewed for appropriateness.

Administrative and Technical

The regulatory requirements and jurisdictional or planning programs that apply to the management of different species are referred to as administrative boundaries. This includes the listing of species by federal or provincial legislation and designations by COSEWIC, the Committee on the Status of Endangered Wildlife in Canada who listed the sedentary caribou populations of Labrador as “Threatened” (COSEWIC 2008, SARA 2008). Hunting of sedentary herds is illegal; however, the hunting of the migratory GR Herd is legal within the seasons (August 10-April 30) and quotas for George River are defined by the provincial government (NLDEC 2008).

Given the available information from the literature and from the results of the May 2009 aerial survey, there is sufficient information available on the migratory and sedentary caribou populations of the area to assess the potential interactions and environmental effects of the Project in light of the proposed mitigation (ongoing) and monitoring efforts associated with this Project.

Assessment Area

The caribou Assessment Area is delineated by a 100 km^2 grid block represented in Figure 4.17. This area includes an approximately 50 km area around the LIM claim areas of James North and James South, as well as the Redmond Mine Area where the initial mining will take place.

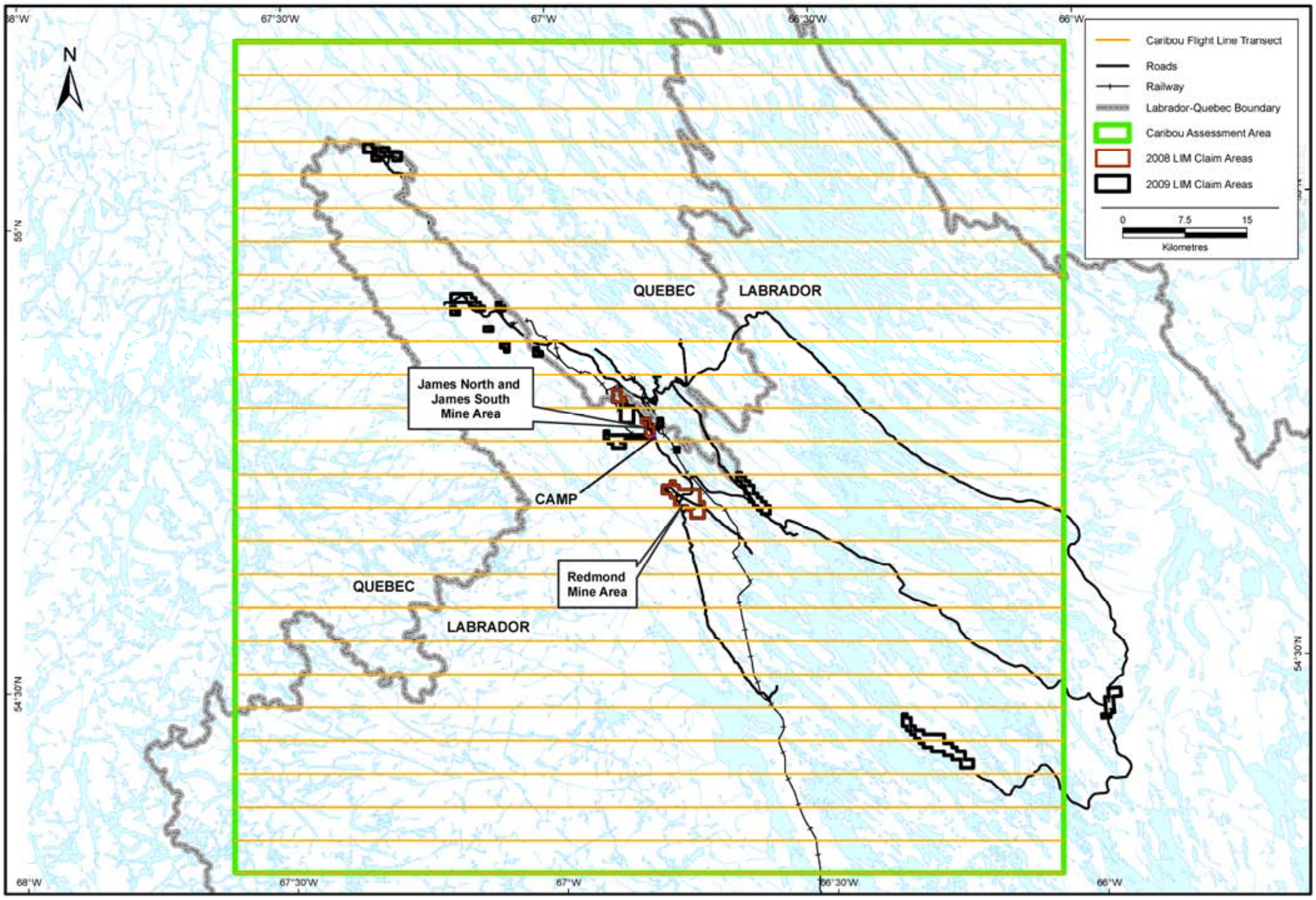


Figure 4.17 Caribou Assessment Area

Sources of Information

Government documents, peer-reviewed literature, and technical reports were examined for relevant information on caribou in Labrador and north-eastern Québec, focusing on the Assessment Area. The Study Team consulted Provincial Wildlife Division personnel in Labrador City, Happy Valley-Goose Bay, and Corner Brook, and representatives attended the 12th North American Caribou Workshop held in Happy Valley-Goose Bay. Local Aboriginal and non-Aboriginal groups were consulted and observations of wildlife and caribou were tracked during field studies. Caribou-related activities and information within the Project area have been monitored by a LIM representative. In addition, LIM has conducted public meetings with the Québec Innu (Montagnais) and traditional knowledge meetings with representatives of the Kawawachikamach Naskapi Nation to acquire traditional knowledge and presented caribou and other wildlife presence on drawings (August 2008 and March 2009). The recent aerial survey of most of the caribou Assessment Area in May 2009 (LIM and NML 2009), provided additional insight regarding distribution and abundance, as well as possible ecotype affiliation of caribou that were observed at this time.

Existing Environment

The caribou herds within Labrador and northeastern Québec occur within three large vegetation biomes. The taiga, in the southernmost portion of caribou range, is characterized by black spruce (*Picea mariana*), jack pine (*Pinus divaricata*), larch (*Larix laricina*) and terrestrial lichens, grading northward to become forest tundra, which is sparsely populated by stunted black spruce and larch (Courtier et, al.1990). The tree line, which stretches from east to west along 58oN latitude in Québec and north of 56oN latitude in the elevated Labrador plateau (Hearn et al. 1990), delineates the transition from forest tundra to arctic tundra. The absence of trees and the presence of a lichen carpet with sparse thickets of stunted ericaceous plants are common to the arctic tundra (Couturier et al. 1990).

LIM operations will occur at the southern edge of the forest tundra, yet reflect extensive surface disturbance from previous mining operations. The baseline report prepared by AECOM (2008) for LIM describes the area as ranging from exposed tundra/exposed bedrock with lichen and sparsely populated trees and low-lying shrubs to low wetlands and boggy areas. Intermediate land classes consist of varied forest types, dominated by spruce-lichen and spruce-moss. The James North and James South properties have been approximately 50 percent disturbed as a result of previous mining activities on the landscape. The James property runs along both sides of an existing road which connects Schefferville to the Redmond property. Sparsely forested parallel ridges and valleys oriented northwest to southeast are typical of the local landscape (AECOM 2008).

Herd Ranges

Migratory Caribou

Schmelzer and Otto (2003) studied the winter range of the GR Herd and noted that the location of their winter range is unpredictable regarding site fidelity; however, after travelling large distances through the winter over the Québec-Labrador peninsula, they aggregate on traditional calving grounds (located several hundred kilometres north of the Assessment Area) each June. The annual range of the GR Herd includes tundra, forest-tundra, and boreal forest habitat and encompasses most of Northern Québec and Labrador between 55oN and 60oN latitude, from the Labrador Sea to Hudson Bay (Messier et al. 1988). There is a 47,000 km^2 tundra area used for calving by the GR Herd, considered smaller than that of any other large Canadian herds (Bergerud and Luttich 2003).

The Rivière-aux-Feuilles Caribou Herd occupies Northern Québec only, but their fall and winter range has often over lapped with that of the GR Herd (Créte et al. 1990). The recognized range of the RAF Herd does not include the Assessment Area (CRA 2004). While the GR Herd has declined in recent years, the RAF Herd has shown an increase, almost doubling in numbers since a census in 1991 at 260,000 and in 2001 at 628,000 individuals (Government of Québec 2005). Créte et al. 1990 state that telemetry data indicates that RAF Caribou calve and spend the summer north of the tree line and partially move south of the tree line in the winter, west of Kuujjuaq (1990). Recent research has suggested that the GR and RAF Herds overlap in their fall rutting range, resulting in genetic overlap, and may be functioning as a metapopulation (Boulet et al. 2007).

Although the ranges for these migratory herds are known, the specific movements of individuals are unpredictable from year to year (Bergerud and Luttich 2003; Schmelzer and Otto 2003). Within their range, caribou may be present in one location for a given year, but absent the next. This pattern was documented for the GR Herd by Schmelzer and Otto (2003) who attributed seasonal variation in winter habitat use to an avoidance strategy by the herd.

Woodland Caribou

In a recent review of sedentary woodland caribou on the Ungava Peninsula, Bergerud et al. (2008) describe the historical and current existence of such herds in this region of northeastern Québec and western Labrador, including the Caniapiscau herd, the McPhadyen River herd, the Lac Joseph herd, and the Red Wine herd.

The eastern edge of the range of the Caniapiscau is described by RRCS (1989) as occurring approximately 100 km to the west of Schefferville. In a review of early aerial surveys (e.g., Banfield and Tener 1958, Des Meules and Brassard 1964, Pichette and Beauchemin 1973), Bergerud et al. (2008) indicate that animals ‘were seen just west of Schefferville’ in the 1950s and 1960s.

The McPhadyen River Herd is indicated by RRCS (1989) as overlapping the area of the Project, but they also do not provide any further detail. Bergerud et al. (2008) describe the efforts of Phillips (1982) and St. Martin (1987) and the confusion from the telemetry data of the latter investigation. Bergerud et al. (2008) suggest that the lack of philopatry observed in these collared animals in the mid-1980s shed doubt as to whether these animals should be ‘called a herd and managed as a unit’.

The Lac Joseph Herd comprises a range of up to 59,000 km^2, that in the 1980s extended to as far north as 50 km southeast of Schefferville, but now has a seasonal range that is south of Churchill Falls (i.e., approximately 200 km southeast of Schefferville). Located over 200 km to the east is the Red Wine Mountains herd with a range of 46,000km^2 (Schmelzer et al. 2004).

The potential overlap of these herds (Figure 4.18) and the Project is adapted from the Labrador recovery strategy for woodland caribou (Schmelzer et al. 2004). Whether woodland caribou in the vicinity of the Project (i.e., within 50 km) remain, is unknown. The Lac Joseph Caribou Herd is the closest recognized sedentary herd to the Assessment Area, approximately 200 km southeast.

Population Sizes and Trends

Many studies have documented the history of the migratory GR Herd throughout the Ungava Peninsula and its annual migrations. In the 1950s, the GR Herd was estimated at 10,000 individuals and experienced a rapid increase to over 600,000 by the mid-1980s (Harrington 1996). This growth occurred despite the fact that accessibility to the herd resulted in increasing hunting pressure. Also, road development made travel to the herd easier, opening up more country to hunting (Harrington 1996). The most recent estimate of this herd is 296,000 individuals, based on a post-calving estimate (Couturier et al. 2004). The cause of the increase and decrease is a matter of much debate. However, the increase in survival and recruitment through decreased density-dependent natural mortality from wolf predation, and legal and illegal hunting, must have been involved (Hearn et al. 1990). Emigration to the increasing Rivière-aux-Feuilles population has also been suggested as a potential cause of the GR Herd’s apparent decline (Boulet et al. 2007).

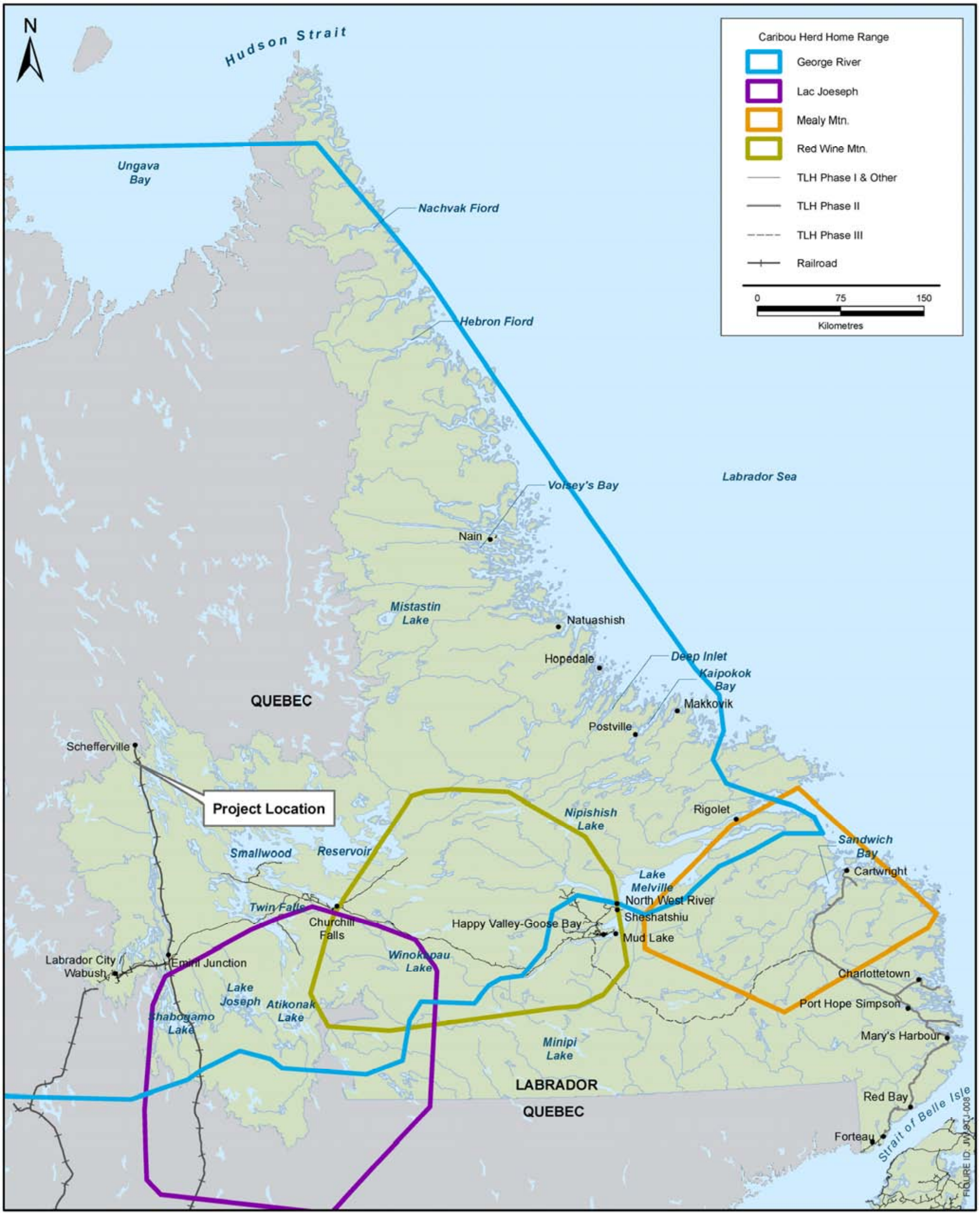


Figure 4.18 Selected Caribou Herd Ranges, Labrador and Northeast Québec (Source: Schmelzer et al. 2004)

The sedentary woodland populations in Labrador have been listed as “Threatened” by the Committee on the Status of Endangered Wildlife in Canada since May 2002 (COSEWIC 2008; SARA 2008). Population trends among the herds are mixed as the Red Wine Mountains Herd is showing a decline in number of individuals, while the Lac Joseph and Mealy Mountain Herds are indicating stabilization or an increase in number of individuals (Newfoundland and Labrador Inland Fish and Wildlife Division 2005). The most recent available estimate of the Caniapiscau herd is described in Bergerud et al. (2008) as 2,700 animals by Brown et al. (1986) and Paré and Huot (1985). There is no known estimate of the McPhadyen River herd and it may be questionable as to whether these caribou still exist. The George River Caribou Herd and Rivière-aux-Feuilles Herd are not listed as populations of conservation concern provincially or federally.

Population declines in the sedentary herds have been examined in relation to moose densities, predation by wolves, hunting and other factors, such as emigration (Coutois et al. 2003). Emigration of Red Wine caribou to the GR Herd may represent the second greatest contributor to loss of radio collared females during the period of decline, although it could not logistically be quantified (Schaefer at al 1999). The most recent population estimates of these herds are presented in Table 4.8.

Table 4.8 Population Estimates for Five Herds in Southern Labrador

Caribou Herd[1]	Population Estimate	Year	Population Trend	References
George River	296,000	2001	Declining	Couturier et al. (2004)
Riviere-aux-Feuilles	628,000	2001	Increasing	Couturier et al. (2004)
Caniapiscau	926 600	1977 1977	Unknown	Le Henaff and Martineau (1981) and Brown et al. (1986) respectively in Bergerud et al. (2008)
McPhadyen River[2]	Unknown	Not completed	Unknown	Bergerud et al. (2008)
Lac Joseph	1,101	2000	Increasing	Chubbs et al. (2001) , Schmelzer et al. (2004)
Red Wine Mountains	87	2003	Declining	Schmelzer et al. *(*2004)
Mealy Mountains	2,585	2002	Increasing	Otto 2002, Schmelzer et al*.* (2004)

[1]Sedentary populations also exist at Joir River and Torngat Mountains in Labrador.

[2] The May 2009 survey completed by LIM and NML observed 7 caribou (including one killed by a wolf) of unknown herd affiliation, over a large portion of the former range of these animals.

Habitat Use and Preference

For the migratory GR Herd, habitat can be described as tundra, forest-tundra and boreal forest habitat characteristic of the Boreal and Taiga Shield Ecozones. Habitat use is affected seasonally as the ranges change from winter to summer. Following an increase in herd population, summer habitat is considered spatially limited and alternative summer range is not available (Messier et al. 1988). Animals tend to avoid areas grazed during the previous winter and select alternate sites with more abundant lichen cover (Schmelzer and Otto 2003) having a preference for *Cladina* spp. (Cote 1998). Woodland caribou do not make migratory movements but there is a seasonal shift during calving and post-calving period to such forest types as black spruce forest, scrub or bog (Nalcor Energy 2009)

Caribou distribution and seasonal movements are a reflection of food availability in all seasons, insect relief during summer, and calving areas that have a low predator density that improves reproduction and survival of herd members. Disturbances that alter or destroy habitat, or change in habitat effectiveness, may displace caribou to less favourable habitats.

Western Labrador experiences a high amount of snowfall annually, with a precipitation frequency of 67 percent recorded in western Labrador (i.e., Wabush (Environment Canada 2008)). Caribou in central Labrador, however, are able to tolerate greater snow depths than most other North American herds (Brown and Theberge 1990). Snow depth affects the ability of caribou to detect (through smell) forage on the ground. In consideration of the extreme snowfall conditions in Labrador, caribou display adaptive feeding strategies. As an example, there is evidence that caribou are capable of distinguishing features to locate forage on the ground despite snow coverage (Brown and Theberge 1990). For sedentary herds, snow cover is a major influence on caribou winter habitat use with animals making greater use of forested areas during years of less snowfall.

Migration Patterns

Winter movements and distribution of the GR Herd can be attributed to many factors including predation risk and snow cover. Bergerud and Luttich (2003) have observed a pattern that may be driven by predation noting that in years of shallow snow cover, the majority of this Herd moved south of the tree line, but in years of deep snow cover, a large portion of the Herd remained above the tree line (2003). Predation by wolves may be more prevalent during heavy snow years as caribou may be more susceptible. In an attempt to decrease predation risk, caribou move into wind-swept tundra habitats whereas the opposite can occur in years of lower snow cover (Bergerud and Luttich 2003) when caribou move into forested habitats.

Bergerud and Luttich (2003), in their study of the GR Herd from 1958 to 1993, also noted that the GR Herd generally localized and reduced travel rates in late November or early December as snow cover increased, moving into the more restricted winter ranges, which can typically be considered from December to mid-March. They also noted the spring migration to calving grounds occurred from mid-March to April with a mean date of April 8 (Bergerud and Luttich 2003). For at least two decades, the females of this herd have used the plateaus of the George River for calving, occurring around mid-June (Toupin et al. 1996). The post-calving or summer range is thought to be regulated by forage limitations (Cote 1998). Typical of sedentary herds, calving locations are dispersed and there is not much consistency or fidelity in year to year site selection.

The GR Herd may be found in and around the Assessment Area during their spring and fall migrations, fall rut, and through the winter, with their range including most of northern Québec and Labrador (Boulet et al. 2007). The GR Herd has gradually shifted its winter range over the years to maximize the availability of forage (Schmelzer and Otto 2003).

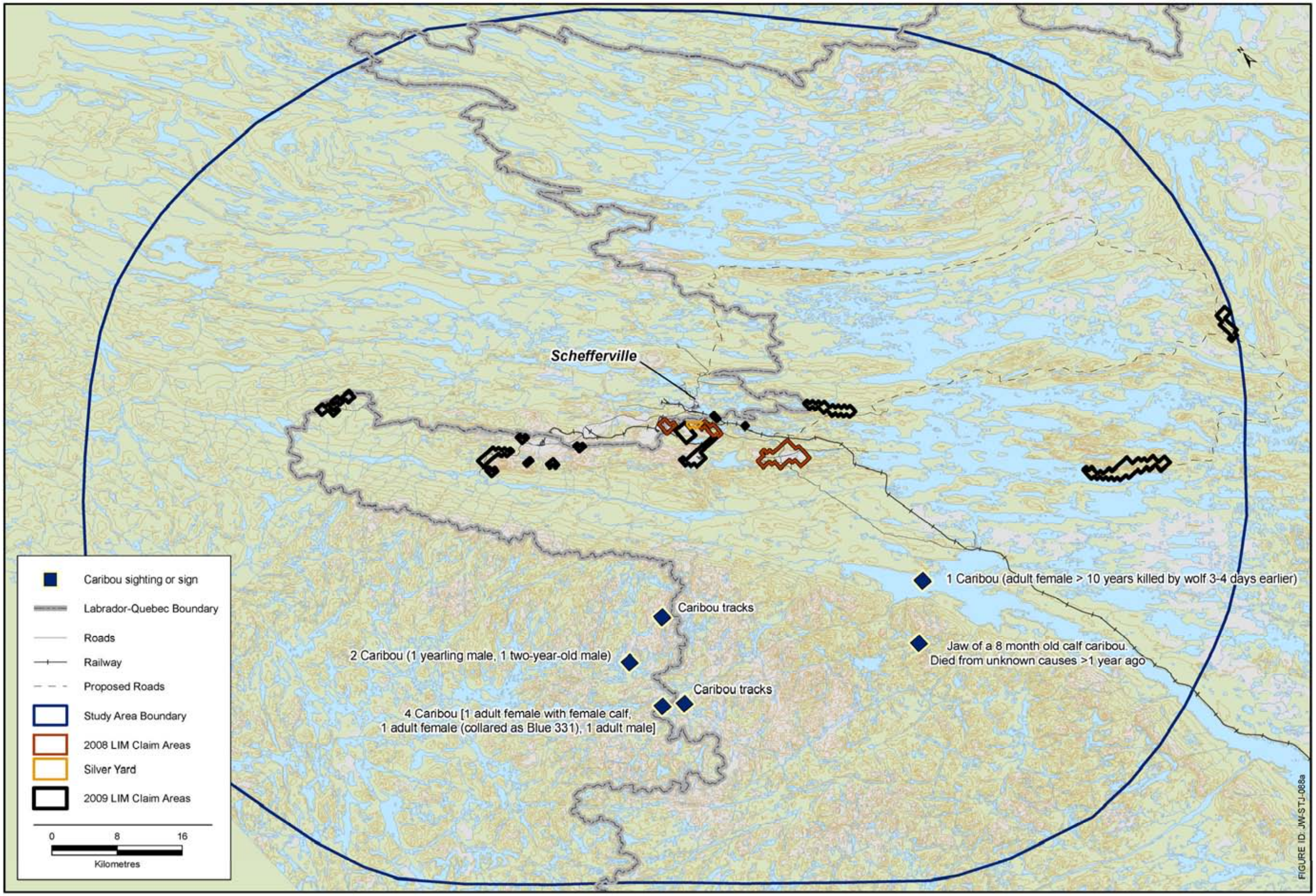


Figure 4.19 Observations of Caribou and Sign during May 2009 Survey

Local Hunting and Outfitting

Harvest quotas for the GR Herd are defined by the NLDEC (2008).

The presence of the GR Herd in Western Labrador and the Schefferville area during fall and winter (Jacobs 1996; Boulet et al. 2007) has created a regionally important outfitting industry. Because winter presence and size of the herd is unpredictable from year to year (Schmelzer and Otto 2003), hunting outfitters in the Schefferville area have had to adapt to their inconsistent movement patterns and seasonal distribution. One Schefferville outfitter states that caribou in the area are constantly changing their migration patterns, meaning that the success of traditional hunting sites varies annually (and within the season) according to the movements of the animals (Larocco 2008). Changes in the migration pattern of the Québec-Labrador caribou have also resulted in outfitters moving their hunting sites or having multiple camps in order to provide an efficient hunt for their clients (Bowhunting Canada 2008). Despite somewhat consistent movements annually, Schefferville residents report variability and during the winter of 2008-2009 did not report any caribou in this area so there was no opportunity for local hunting (R. MacKenzie, pers. comm.). Hunting of sedentary herds is illegal; however, the hunting of the migratory GR Herd is permitted from early August to late April (NLDEC 2008).

4.2.2.2 Other species

In addition to the recent aerial survey in May 2009, information sources on other wildlife species within the vicinity of the Project include a variety of sources. Interviews with wildlife research and conservation staff with the Wildlife Division, other consultants in the Province, McGill University, the Institute of Environmental Monitoring and Research (IEMR), local trappers, and available literature was supplemented with insight provided by LIM staff and contractors who have been active at this location in recent years. In general, there are few larger wildlife species found in these areas, as the Project is situated on the edge of the tundra and comprises thinning forest communities mixed with open barren habitats.

Black Bear (*Ursus americanus*)

During the early May 2009 survey, black bears or their sign (usually tracks) were common in the LIM Project area and surrounding area, with four sightings of live animals and at least ten sightings of tracks throughout the Study Area (LIM and NML 2009). Bear presence was also confirmed northwest of Slimy Lake and southeast of the James Property of the Project area during a meeting with local trappers held 13 August, 2008 in Schefferville. Black Bear are a forest-dwelling animal but were observed to also use barren and ice habitats during the May 2009 (LIM and NML 2009). Forest, barrens and river habitats are important during the summer and fall seasons. Bears have been reported occupying open areas, but tend to avoid recent burns (Jacques Whitford 1997). Seasonal habitat selection is usually related to foraging. Although they are the largest predator in the area, their diet mainly consists of plants, fruits, berries, green leaves, and tubers. They are known for their diversity within their diet, ranging from insects and plants to small mammals, dead animals and leftovers from human presence at local landfills or camping sites (http://dnr.wi.gov/org/land/wildlife/PUBL/wlnotebook/bear.htm).

Bears are frequently found in areas of domestic waste disposal where odours attract them and they become nuisance animals and a cause for concern to human safety. Informants indicate that bears have been observed at the Schefferville landfill, approximately 4 km from the LIM Project area and bear tracks have been noted in the vicinity of the deposits by LIM staff and contractors, but there have been no encounters to date. Nuisance bears have not been reported by workers at the LIM site itself.

Moose (*Alces alces*)

Moose are a relatively new species to Labrador that were first reported in western Labrador in 1949 (Folinsbee 1974). The population expanded to an estimated 5,000 individuals in Labrador by 1990 (Karns 1997). Due to the relatively low numbers of moose in the Schefferville area, there are only five hunting licenses for all of western Labrador designated annually (Parr, T. and Porter, C. 27 November, 2008).

Moose tend to be associated with mid-successional forests, favouring areas of highest forest productivity preferring stands where trees reach heights of 3 m and therefore are available above snow (Newbury et al. 2008; Bergerud and Manuel 1968). They also favour lakeshores and swamps (Banfield 1973). Likely due to habitat constraints, moose are not common in the Project area and sightings or tracks were observed on approximately five occasions during the May 2009 survey. As the Project area is situated on the edge of tundra and thinning forest communities, there are few hardwood species in this part of Labrador thus habitat requirements for this species are limited. Moose and signs were concentrated in the southeast portion of the study area during the May 2009 survey, where one adult male and four other separate locations of tracks were observed (LIM and NML 2009).

Furbearers

There are several furbearers in the vicinity of the Project. The species below, with the exception of wolverine and fisher, are trapped in western Labrador from fall to early spring (exact dates differ depending on species). There are no registered trap lines in Western Labrador and therefore trappers use their own discretion when choosing suitable sites and proximity to others (Porter, C. 27 November, 2008).

Beaver (Castor canadensis)

The beaver population in western Labrador is healthy and actively trapped with good returns (Porter, C. 27 November, 2008). There is a history of beaver in the Slimy Lake area as identified at a meeting held with local trappers on 13 August, 2008 in Schefferville. However, there are no individuals noted in this area at present [nor was any sign observed during the May 2009 survey (LIM and NML 2009)], which may be attributed to the absence of deciduous trees (particularly aspen) in this region, and thus a lack of food source. An old beaver lodge is present but is currently occupied by otter.

Beavers are herbivores, subsisting solely on woody and aquatic vegetation. They will eat fresh leaves, twigs, stems, and bark. Beavers will chew on any species of tree, but preferred species include alder, aspen, birch, maple, poplar and willow. Aquatic foods include cattails, water lilies, sedges and rushes.

Otter (Lutra canadensis)

This amphibious mammal has a healthy population in western Labrador. Typically otter are found no more than a few hundred meters from water and indeed they may be found in almost any water source with the presence of fish in western Labrador (Porter, C. 27 November, 2008) as they are entirely dependent on aquatic habitats for food. They are actively sought by trappers for their thick pelage. An otter has been observed occupying an old beaver lodge on Slimy Lake in the Project area, as noted at a meeting held with local trappers on 13 August, 2008 in Schefferville. A single animal was observed southeast of Schefferville during the May 2009 survey (LIM and NML 2009).

Mink (Mustela vison)

Mink are found throughout western Labrador in small brooks and ponds as they are proficient swimmers. Trappers in western Labrador are having great success with returns this year and it is believed the population is quite healthy (Porter, C. 27 November, 2008), although no presence of mink (i.e., tracks) has been noted at the Project area during summer or winter.

Muskrat (Ondatra zibethicus)

Muskrat numbers in western Labrador are currently at a high level and may be found throughout the region in a variety of aquatic habitats with cattail being an important food source (Feldhamer and Thompson 2003). Trappers in this region are currently experiencing good success (Porter, C. 27 November, 2008). Despite relatively high numbers of this species in the Labrador City area, no evidence of muskrat has been found in the Project area. Lack of suitable vegetation for forage may be a factor.

Coyote (Canis latrans)

Coyote are not prevalent in western Labrador and they have not been observed in the Project area. It is rare to see or hear reports of this species in the western Labrador region (Porter, C. 27 November, 2008) although the presence of large ungulates and snowshoe hare may indicate suitable habitat for coyote.

Ermine (weasel) (Mustela erminea)

Weasel maintains a healthy population in western Labrador where they feed on primarily snowshoe hare, small mammals and birds. They can be found in a variety of habitats including wooded and brushy areas, wetlands and tundra. Ermine have not been reported in the Project area, although it is suspected they are in this area due to suitable habitat and prey availability. Hunting and predation are limiting factors for ermine populations although weasels are not actively sought by trappers, but are reported as incidental catches (Porter, C. 27 November, 2008). Predators may include snowy owls, arctic fox, lynx and large raptors.

Red Fox (Vulpes vulpes)

Red fox has been in decline the past two years in western Labrador. They are relatively common around areas of human presence such as mining and construction sites (Porter, C. 27 November, 2008). There have been few observations of red fox at the mine facilities; one individual and tracks of others were recorded during the May 2009 survey (LIM and NML 2009). Habitat requirements include forests with safe denning sites. The omnivorous red fox preys on small mammals, birds and berries, while predators include wolves and coyotes.

Arctic Fox (Alopex lagopus)

Arctic fox are found throughout the northern part of western Labrador. In this region, their range extends south to approximately 100 km north of Labrador City/Wabush (Porter, C. 27 November, 2008). Arctic fox are occasionally observed in the Project Area (McKenzie, R. 7 May 2009). Wolves, Golden Eagle and bears are common predators of this species.

Lynx (Lynx lynx)

The lynx population is considered healthy, but not dense (Porter, C. 27 November, 2008). There are occasional sightings of lynx in western Labrador. Although some of the most commonly observed tracks in the Project area were of snowshoe hare of which lynx populations are closely linked, the absence of large tracts of forest in this region likely preclude lynx from inhabiting this area. Young lynx rely heavily on dense cover for protection and as a result, regenerating stands and/ or stands with thick understory are important to this species (Mowat and Slough 2003). No lynx have been observed in the Project area (Parks, D. 3 December, 2008) and were not recorded during the May 2009 survey (LIM and NML 2009).

Marten (Martes Americana)

The marten population of western Labrador is considered healthy; however, its presence in the Project area has not been noted. Marten are typically forest dwellers and require a variety of features provided in forest stands and landscapes, therefore habitat requirements may not be met due to lack of forest structure in this area.

Currently, marten are the most important furbearer in Labrador due to the high number of individuals and the high pelt price (Porter, C. 27 November, 2008). Trapping and habitat availability are limiting factors for marten.

Squirrel (Tamiasciurus hudsonicus)

Squirrel are plentiful throughout western Labrador; however, their presence in the Project area is not known. They are typically found in a wide variety of habitats, but may be limited to south of the tree-line as they use coniferous trees for both food and shelter. Since the Project area is on the edge of forest communities, it is thought red squirrel populations may be less dense here than further south. They are not sought by trappers, but are incidentally trapped (Porter, C. 27 November, 2008).

Wolverine (Gulo gulo)

Wolverine, listed both federally and provincially as endangered are typically found wherever there is prey available and has not been linked to specific habitats, occurring throughout its' range in a wide variety of habitats. Although both migratory caribou and wolf are known in this area and are associated with wolverine diet, wolverine presence is currently not known in western Labrador (Porter, C. 27 November, 2008). No observations of wolverine or wolverine sign have been made in the Project area.

Wolf (Canis lupis)

The wolf population is considered stable in the area with little fluctuation based on the availability of small mammal prey. The availability of primary prey, largely ungulates, is thought to be more important to wolf than specific habitat requirements. Wolf is common in western Labrador and individuals have been observed along the southern ridge in an area of open barrens adjacent to the Project site. Wolf tracks were observed only twice during the May 2009 survey [in association with the recently killed caribou located at Menihek Lake (Section 3.1)] and in the southeastern portion of the Study Area (LIM and NML 2009).

Fisher (Martes pennanti)

Overhead cover, denning sites, and foraging habitat, all of which are often provided by deciduous forests, are necessary habitat requirements for this species. As well, coarse woody debris provides necessary structure, which is a factor in defining foraging habitat as well as providing shelter in cold climates. As the Project area is situated on the edge of tundra and thinning forest communities, these requirements are likely not met here thus reducing the likelihood of fisher presence in this area. There has been no evidence of fisher observed in the Project area.

Porcupine (Erethizon dorsatum)

Although not a furbearer, porcupine has been included here due to their importance to local people. The porcupine can be found in a variety of habitats including coniferous, deciduous and mixed forests and can also be found in scrubby areas. Porcupine presence was noted southeast of Wishart Lake (meeting with trappers held 13 August, 2008 in Schefferville) and at other locations during the May 2009 survey (LIM and NML 2009).

Small Mammals

Small mammal populations reached peak levels in western Labrador (from Labrador City to Churchill Falls) in 2007 (Porter, C. 27 November, 2008). The small mammals believed to be present in Western Labrador include: Bog lemming (*Synaptomys borealis*), Ungava lemming (*Dicrostonyx hudsonius*), Red-backed vole (*Clethrionomys gapperi*), Heather vole (*Phenacomys intermedus*), Meadow vole (*Microtus pennsylvanicus*), and Masked shrew (*Sorex cinereus*). Jumping mice (unknown species) were trapped in the Schefferville area in 2007 and 2008 at two sites: near water and an open area (Millien, V. 2 Dec 2008).

4.2.3 Avifauna

AECOM conducted a forest avifauna survey at the Project site in 2008.

4.2.3.1 Methods

To aid in the field investigations and recorded observations, the following reports and websites were reviewed to gain a better understanding of the Project area:

- 2008. New Millennium Capital Group, Paul F. Wilkinson and Associates Inc. – Project Registration, Direct Shipping Ore Project. 2008;
- Wild Species Canada- webpage;
- Ministry of Natural Resources, 2000. Significant Wildlife Habitat: Technical Guide; and
- NatureServe Global Conservation Status Ranks – webpage;
- Atlas of the Breeding Birds of Ontario 2001-2005 (Cadman et al. 2007)

LIM undertook a complete and comprehensive literature review. There are no known publicly available data relevant to this issue that have been published from the LabMag project. Data for the LabMag DSO project was collected from different habitat types than those found in the LIM Project area. LIM did not have access to the LabMag information.

Field investigations followed the point-count method advocated by the Canadian Wildlife Service (CWS). For all of the point-counts, the highest level of breeding for each species was recorded. This enabled identification of site specific locations of breeding birds, within the point-count radius.

In order to complete this study, variable proximity locations were chosen. Point-counts were five minutes in duration and consisted of unlimited radius, except where adjacent count circles overlapped. All point-counts were conducted in conditions considered acceptable for proper data gathering (i.e., no rain, light winds, and good visibility). The spacing and frequency of point-counts within the study area were determined by the following factors: size of the study site; topography and line of sight; habitat type and frequency of distinctive habitats; and overall importance of a site to the objectives of the study.

At the Redmond and James Properties, point-counts were spaced at approximately 0.8 km intervals. The number of point-counts for both the large and small sites increased in areas of distinctive habitats. Bird monitoring locations are identified in Figure 4.20.

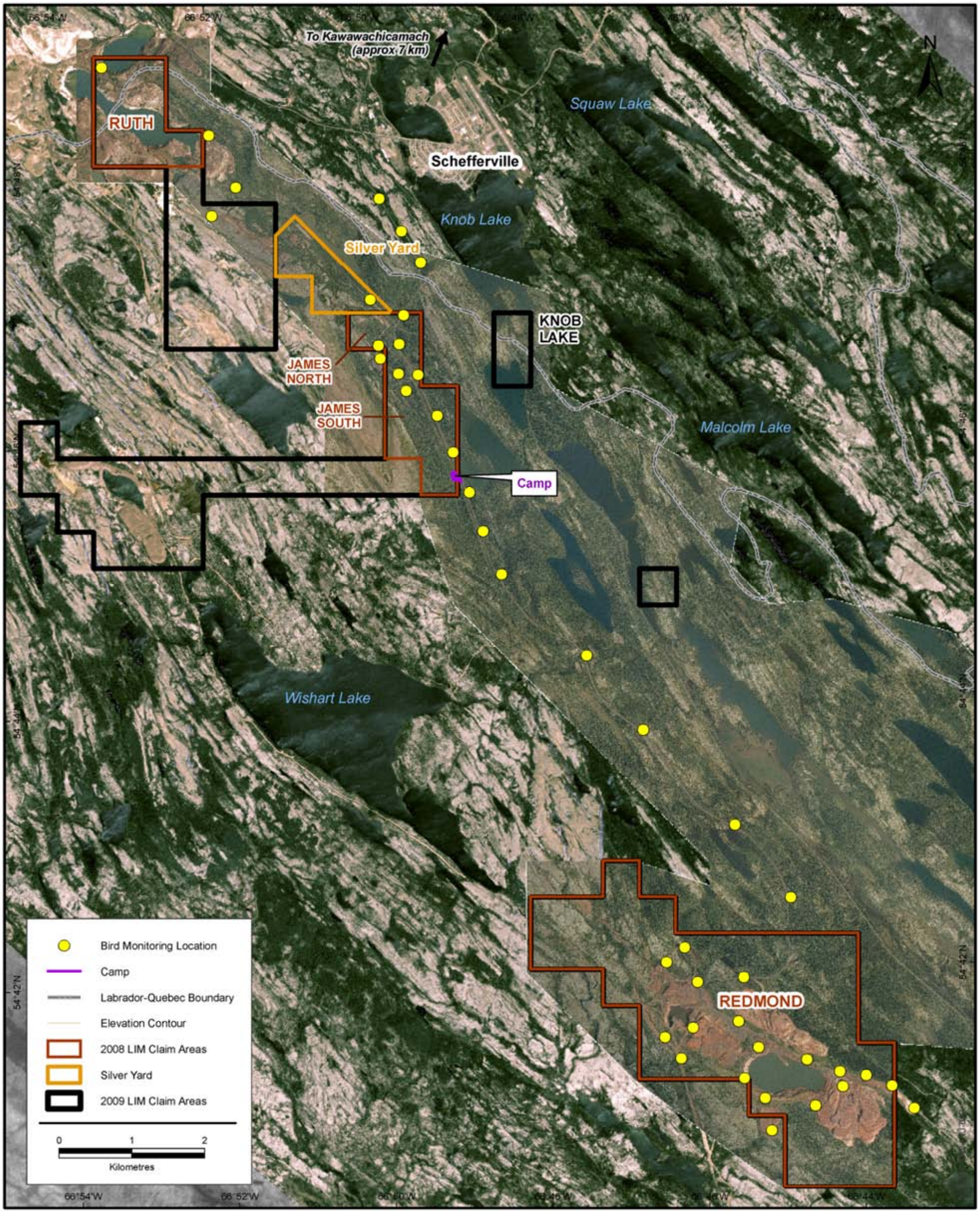


Figure 4.20 Bird Monitoring Locations

4.2.3.2 Results

The following presents the findings from the field investigations completed from July 8-14, 2008. Species observed as possible breeders are listed for each site along with their provincial and global ranks. A complete list of bird species noted can be found in Appendix L. An additional literature review was completed with respect to birds that may be expected to use or migrate through the Schefferville area. The following is a summarized table (Table 4.9) of Breeding and Migratory Birds of Labrador Iron Mines Study Area. For the entire table, refer to Appendix M.

Table 4.9 Breeding and Migratory Birds of Labrador Iron Mines Study Area

Common Name	Scientific Name
Common Loon	*Gavia immer*
Red-throated loon	*Gavia stellata*
Canada Goose	*Branta Canadensis*
Green-winged Teal	*Anas crecca*
Ring-necked Duck	*Aythya collaris*
American Black Duck	*Anas rubripes*
Greater Scaup	*Aythya marila*
White-winged Scoter	*Melanitta fusca*
Common Goldeneye	*Bucephala clangula*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Spruce Grouse	*Falcipennis Canadensis*
Willow Ptarmigan	*Lagopus lagopus*
Semipalmated Plover	*Charadrius semiplamatus*
Greater Yellowlegs	*Tringa melanoleuca*
Solitary Sandpiper	*Tringa solitaria*
Spotted Sandpiper	*Actitis macularia*
Least Sandpiper	*Calidris minutilla*
Short-billed Dowitcher	*Limnodromus griseus*
Wilson's Snipe	*Gallinago delicate*
Herring Gull	*Larus argentatus*
Three-toed Woodpecker	*Picoides tridactylus*
Northern Flicker	*Colaptes auratus*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Alder Flycatcher	*Empidonax alnorum*
Horned Lark	*Eremophila alpestris*
Tree Swallow	*Tachycineta bicolor*
Gray Jay	*Perisoreus Canadensis*
Common Raven	*Corvus corax*
Boreal Chickadee	*Poecile hudsonica*
Winter Wren	*Troglodytes troglodytes*
Ruby-crowned Kinglet	*Regulus calendula*
Gray-cheeked Thrush	*Catharus minimus*

Common Name	Scientific Name
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
American Pipit	*Anthus rubescens*
Tennessee Warbler	*Vermivora peregrine*
Orange-crowned Warbler	*Vermivora celata*
Nashville Warbler	*Vermivora ruficapilla*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronate*
Blackpoll Warbler	*Dendroica striata*
Northern Waterthrush	*Seiurus noveboracensis*
Wilson's Warbler	*Wilsonia pusilla*
American Tree Sparrow	*Spizella arborea*
Lincoln's Sparrow	*Melospiza lincolnii*
Fox Sparrow	*Passerella iliaca*
White-throated Sparrow	*Zonotrichia albicollis*
White-crowned Sparrow	*Zonotrichia leucophrys*
Dark-eyed Junco	*Junco hyemalis*
Rusty Blackbird	*Euphagus carolinus*
Common Redpoll	*Carduelis flammea*
Pine Grosbeak	*Pinicola enucleator*
Pine Siskin	*Carduelis pinus*
White-winged Crossbill	*Loxia leucoptera*

James Property

The James site was surveyed primarily from the edge of the service road. The uniform habitat composition consisted of black spruce (*Picea mariana*), lichen woodland, and also included alder (*Alnus* sp.) thickets along the recently cleared roadsides and power line right-of-ways. The area also contained wet areas near the roads. The western part of this site has steep slopes, with the forest thinning towards the summit.

A total of 31 bird species were observed at 13 separate point-counts, all displaying some indication of breeding. Six of the 31 species were confirmed breeders, with another six species considered as probable breeders. Appendix L provides a description of preferred habitat for each confirmed breeding species. A complete list of observed species is also provided in Appendix L.

The eight most frequently recorded species within the James site, consisted of those associated with spruce forest. The wet and dense nature of vegetation at the James site resulted in a different avifauna community. Of these species, White-throated Sparrow is usually found in moist or bog-like situations and Northern Waterthrush is usually associated with alder thickets adjacent to a wetland.

Silver Yard Property

The Silver Yard is similar to the Redmond site, with numerous service roads encircling the flooded pits of the Ruth and James sites. The service roads, along the north and south orientation, were extensively bordered with alder and willow regeneration. The pit perimeter had minimal to no vegetation cover, while the open water component of the pits provided loafing areas for Herring Gull, however no obvious waterfowl nesting habitat was present.

The south end of this site had more extensive vegetation cover, with some areas consisting of dense spruce, and extensive thicket habitat along the roadsides. The Silver Yard as a whole, is part of a large valley bordered on the east by a talus slope forested at the base, and to the west by another slope covered with spruce at the base, thinning to essentially no forest cover or vegetation near the summit.

A total of 26 species were observed at seven separate point-counts, 25 of them displaying some indication of breeding. The most frequently recorded species at the Silver Yard site, were spruce forest specialists such as Fox Sparrow, Ruby-Crowned Kinglet, and Swainson's Thrush. Also observed in moderate numbers were species favouring regenerative/open habitats, such as White-crowned Sparrow, and Common Redpoll. The widespread occurrence of Common Raven and Herring Gull was directly attributed to the proximity of the Schefferville landfill.

The spruce forest specialists observed east and west of the main service roads, with the forested slopes. Whereas the roadside areas attracted the regenerative specialists, due to the extensive areas of alder and willow present wherever the land had been cleared or disturbed.

Redmond Property

The Redmond site had a wide range of habitat types, largely due to the presence of a former mine and pit operation. The habitats ranged from completely bare ore piles and service roads, to heavily blanketed areas with alder and willow thickets. This area also had a large, flooded pit in the southwest corner of the site.

The undisturbed areas were occupied with mature black spruce at lower elevations, and stunted spruce – lichen along the ridge summits. This site also contained several wetland areas, most notably a large sedge fen enclosed by the former railway turning circle, as well as a lake / fen complex present where the main service road enters the Redmond site. (Note: these wetlands were part of the avifauna survey area but are not within the Project footprint)

A total of 40 species were recorded on 24 separate point-counts, with 39 of the observed species displaying some indication of breeding. Appendix L provides a description of each species preferred habitat along with the level of breeding observed.

The disturbed nature of the Redmond site and variety of vegetative species appeared to have influenced avifaunal diversity compared to more homogeneous sites. It is likely that the regenerative nature of disturbed areas account for some of the increase in diversity.

White-crowned Sparrow, which is often associated with disturbed sites and more open habitats, was the most frequently recorded species. Of the other more frequently recorded species, most are spruce forest specialists, except the Lincoln's Sparrow found occupying the wetter components of the site.

During the May 2009 survey (LIM and NML 2009), Canada Goose (*Branta Canadensis*) were migrating through the area in large numbers. Flocks of 10 to 100 were often observed flying north or loafing on ice or ashkui (an Innu term that refers to areas of permanent or seasonal open water during winter. Over the course of the survey, other migratory avifauna [e.g., American Robin (*Turdus migratorius*), Common Snipe (*Capella gallinago*)] began to appear in Schefferville and increased in abundance in the subsequent days.

National / Provincial Species at Risk

The following bird species of special conservation status were observed.

Rusty Blackbird – one bird was observed on one point, Redmond Site. This species is designated as a COSEWIC Special Concern species, listed ‘vulnerable’ (Schedule C) in Newfoundland and Labrador. Rusty Blackbird usually nests in coniferous forest along the edge of a wetland. There are numerous areas of habitat suitable for this species within the Project area. Displacement of this species is, therefore, not considered to be limiting as any birds of this species would easily relocate to adjacent alternative habitat. This species occurs throughout most forested areas of Labrador (Godfrey 1986; Nature Serve 2007). Rusty Blackbird has undergone a widespread and substantial decline across its range.

Gray-cheeked Thrush is listed as Vulnerable on Schedule C of the *Newfoundland and Labrador Endangered Species Act*. It is associated with coniferous forest that has a dense understory (Lowther et al. 2001, Dalley et al. 2005). In Labrador, this species usually breeds in mature black spruce, white spruce, white spruce, balsam fir, and tamarack (Lowther et al. 2001). Gray-cheeked Thrush was generally found in the Project area, in areas of small spruce, thinly distributed, with an abundance of shrubby groundcovers, often heaths or alder thickets. The species was often found in higher elevations than other thrush species, avoiding the more densely wooded areas in the lowlands. They were most common along the margins of the open habitats, especially where the site transitions from open taiga to spruce, towards the north end. Outside of Labrador, the decline of these species relates more to alteration of habitat and risk of mortality during migration.

Note that the Short-eared Owl, the Common Nighthawk, and the Olive-sided Flycatcher are three other species of conservation status that may occur in the Project area. The Short-eared Owl is listed as a Species of Special Concern on Schedule 3 of the federal *Species at Risk Act* and Vulnerable on Schedule C of the provincial *Endangered Species Act*. Both Common Nighthawk and Olive-sided Flycatcher are designated as threatened by COSEWIC (but have not been listed on SARA). Both of the latter species are at, or near, the northeastern extent of their range in North America (Poulin et al. 1996, Altman and Sallabanks 2000), and have not been observed in the Project area. Consideration of these species will be included in bird monitoring programs to be conducted.

To address potential interaction with nest sites of these and other bird species, an Avifauna Environmental Management Plan (EMP) to address incidental take (the inadvertent disturbance of a nest site) will be completed consistent with the *Migratory Birds Convention Act*. This Avifauna EMP will be prepared and implemented prior to the start of construction. Further mitigation measures to protect nest sites are described in the EPP (Section 8.5), including CWS advice for vegetation clearing.

4.2.3.3 Raptors

Ospreys (*Pandion haliaetus*) were noted throughout the Project area. There are no nest sites noted directly on the James, Silver Yard, or Redmond sites. However, one Osprey nest was noted on the existing transmission line corridor to Menihek less than 150 m from the active roadway connecting the James and Redmond Properties. This nest has been active for the past several years, with young being fledged successfully, as noted by LIM employees working in the area. Two adults were noted during the counts on the James Property. At Silver Yard, one adult was noted on one point-count. Standard mitigation measures regarding construction and operation related activities for active Osprey nests are to avoid such areas by at least 200 m.

A Bald Eagle (*Haliaetus leucocephalus*) has been noted within the Project area during field work. This species has been observed flying over Bean Lake and has only been noted in the vicinity of the James Property. No nest locations have been identified for this species in the general vicinity of the Project area. One 3rd-year immature was also observed along Bean Lake. An adult Bald Eagle was observed during the May 2009 survey (LIM and NML 2009), feeding on the carcass of a caribou killed by a wolf on Menihek Lake. This species is locally uncommon but increasing (Brown, pers. comm., June 2005).

4.2.3.4 Migratory Species

A review of various birding guides (Sibley, 2003 and Peterson, 1980) and the Ontario Breeding Bird Atlas (Cadman et al. 2007) was conducted to identify potential migratory bird species that could be expected to be found or migrate through the Schefferville area. Based on this review, a total of nine species were identified. The Peregrine Falcon was the only identified migratory species that has a federal designation of Special Concern under Schedule 3 of the *Species at Risk Act* and Vulnerable under the provincial *Endangered Species Act*.

There will be non-significant effects to the potential migration of the Peregrine Falcon during the operation of the Schefferville Area Iron Ore Mine based on several factors:

- operations will occur within valley bottoms and thus there will be no interactions with ridges that could be used by migratory falcons;
- the mine will not operate during the winter. Spring migration should be 80% complete prior to the annual start up of operations;
- fall migration will take place during operational activities and thus there is potential for avoidance behaviour (e.g., migrating birds would avoid the area); and,
- habitat for successful migration is not limiting in the Schefferville area, as there are various ridgelines outside the Project area that can provide for successful migration, if migration does occur in this area (i.e., resting and feeding areas).

4.2.4 Fish and Fish Habitat

AECOM conducted fish surveys at the Project site in 2007 and 2008.

4.2.4.1 Methods

Surveys were conducted to characterize fish habitat and fish species present in the study area (i.e., the lakes and streams in the Project area as shown in Figure 4.21). Habitat is described using the methods and terms outlined by Sooley et al. (1998) and McCarthy et al. (2007 Draft) and fish sampling was conducted using methods detailed in Sooley et al. (1998).

Qualitative measures undertaken include rod and reel angling and visual observations for fish in lakes, visual determinations for fish species in streams, along with general fish habitat characterization for areas adjacent to the proposed works.

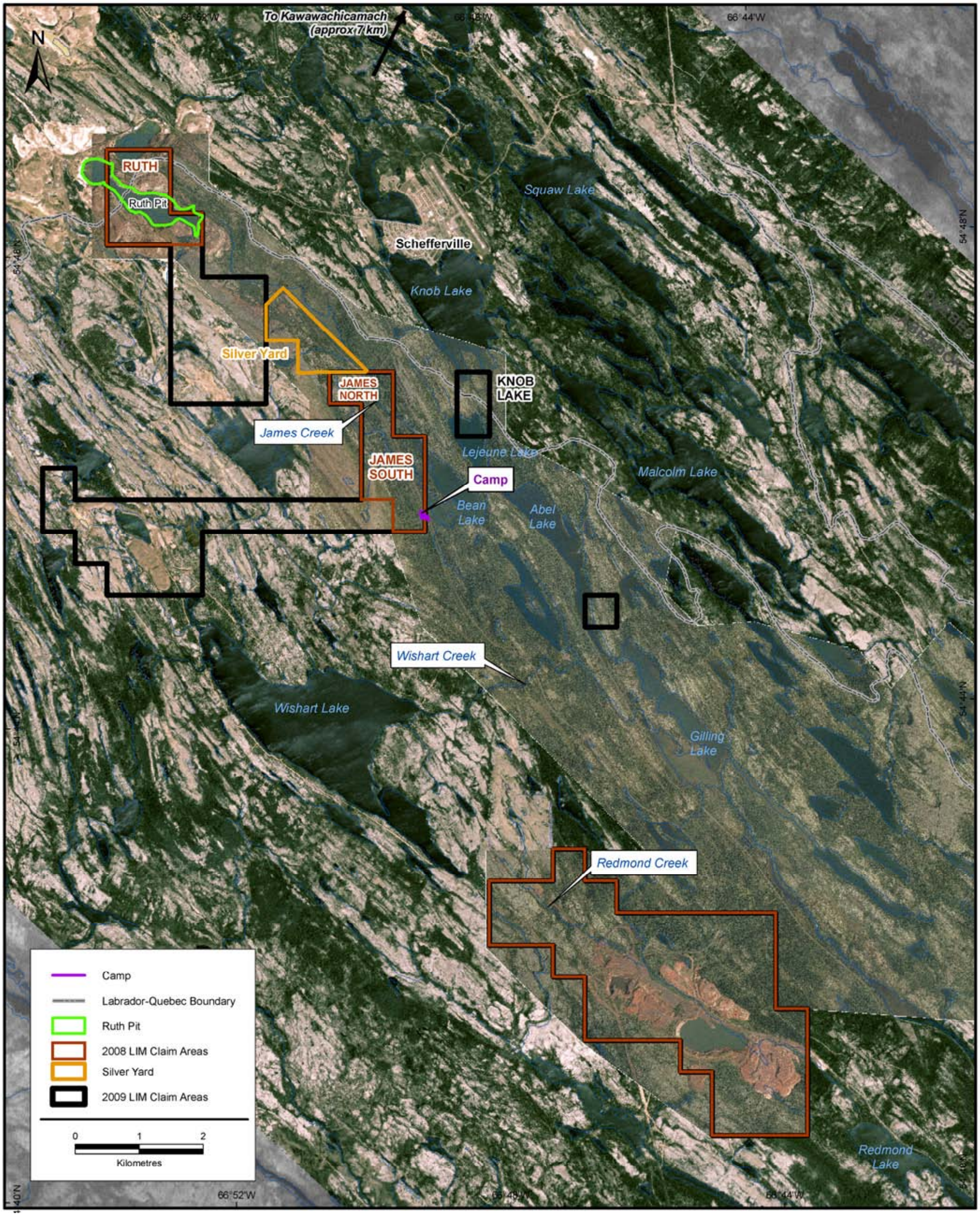


Figure 4.21 Lakes and Streams in the Project Area

4.2.4.2 Assessment Area Boundaries

Spatial and Temporal

The Project boundary includes surface water bodies in the subwatersheds that contain the Project. Temporal Project boundaries are seasonal for construction and operation, as there will be a winter shutdown of mining activities.

The ecological boundaries for the freshwater fish and fish habitat will align closely to the watershed boundaries. The Project lies within a set of subwatersheds that flow to a chain of narrow lakes stretching from the Project area southeast to Astray Lake in the upper Churchill complex of lakes and reservoirs.

Furthest north, the area of the Ruth Pit drains to James Creek, which in turn flows to Slimy Lake and then Bean Lake, east of the James Deposits (Figure 4.21). The outlet from Ruth Pit is a submerged culvert that is located in the southwest portion of the pit. Historical pit wall rock debris has partially blocked the pit-side end of this culvert, and the pit water level is approximately 2 metres above the top of the culvert. Water still flows through the culvert but more by infiltration rather than surface level flow due to the blockage. The discharge end of the culvert is perched approximately 1 m above the James Creek inlet. Water discharging from Ruth Pit is the origin of James Creek, however fish cannot enter Ruth Pit from James Creek because the culvert is perched and is blocked by the coarse rock.

There is also a small unnamed tributary that originates on the James Property that flows into Bean Lake. The flow from Bean Lake continues through Abel Lake, Gilling Lake, to Astray Lake, which are all to the south of the James deposit.

Drainage on the Redmond Property is via Redmond Creek, which flows southeast into Redmond Lake and then on to Astray Lake. Generally, the spatial boundary of the fish and fish habitat study area will be limited to the active mine sites, with limited or no downstream effects.

Administrative and Technical

The regulatory boundaries of the Project fall under provincial and federal jurisdictions. As in other areas of Newfoundland and Labrador, freshwater aquatic resources are regulated by several provincial and federal departments. The *Fisheries Act* is the primary federal legislation governing protection and management of fish and fish habitat in freshwater environments. The Department of Fisheries and Oceans (DFO) holds jurisdiction for fisheries and fish habitat protection in the Province. Similarly, DFO recreational and commercial regulations are in effect for the Project site. Environment Canada has responsibility for Section 36 of the *Fisheries Act,* which regulates the release of deleterious substances whereas DFO is responsible for sedimentation issues.

For the watersheds of the Project site, the Water Resources Division of Environment and Conservation oversee water quality and water quantity pursuant to the *Waters Resources Act* (2002). This *Act* regulates development within 15 m of a waterbody and provides regulations regarding development within wetlands and flood plains. This guidance under the *Water Resources Act* includes the Environment Control (Water and Sewage) Regulations that regulate discharges to a body of water.

Fish habitat on the Project site was assessed using the DFO fish habitat assessment guidelines for assessing lacustrine and riverine habitats. Detailed habitat mapping of the unnamed tributary on the James Property was completed to quantify fish habitat. In other areas of fish and fish habitat not expected to be directly impacted by the proposed mining operations, fish were assessed by qualitative measures that included rod and reel angling and trap netting.

Assessment Area

The Assessment Area for determining Fish and Fish Habitat are those waterbodies that may interact with the Project (Ruth Pit, James Creek, Slimy Lake, Bean Lake, Unnamed Tributary, Redmond Creek, Redmond Lake).

4.2.4.3 Results

Ruth Pit

Gillnetting surveys verified that the Ruth Pit has no sustained fish community, so fish habitat has not been characterized for the flooded pit. These survey results were submitted to DFO, which subsequently confirmed that it does not consider the existing flooded open pits to be fish habitat (Yetman 2008, email communication).

James Creek

James Creek is a small stream that originates from the Ruth Pit, as a result of water seepage from the flooded pit (Figure 4.7). Drainage occurs via a perched culvert, which is collapsed at the inlet end and fish are therefore prevented from entering the flooded pit. The stream section between Ruth Pit and Slimy Lake has an average wetted width of approximately 2.0 m and depths ranging between 0.2 m (riffles) and 0.8 m (pools). The stream section between Slimy Lake and Bean Lake increases to a wetted width of approximately 3.0 m with depths similar to the upstream section. Substrates of the stream consist largely of gravel and cobble, with minimal sediment deposition within main channel. All stream banks were observed as stable, with no erosion evident. Stream gradient was estimated at 2%.

Field surveys confirmed that James Creek contains brook trout (*Salvelinus fontinalis*) and sculpin sp. (*Cottus* spp.). Fish species within Slimy and Bean Lakes include longnose sucker (*Catostomus catostomus*), brook trout, lake whitefish (*Coregonus clupeaformis*), pearl dace (*Margariscus margarita*), white sucker (*Catostomus commersoni*), lake trout (*Salvelinus namaycush*), burbot (*Lota lota)*, sculpin, and spottail shiner (*Notropis hudsonius*). These species have access to James Creek, but only the presence of brook trout and sculpin were confirmed in the sampling program.

Slimy Lake

Slimy Lake has a surface area of approximately 13.8 ha, with a maximum depth of 8 m. Riparian vegetation consisted of alder thicket to the south and west, and sparse black spruce forest to the north and east. Sediments are predominantly fine particulates.

A quantitative fyke netting program (48 hours total) was conducted on Slimy Lake during 2008. This netting effort indicated that the fish community was dominated by longnose sucker (n = 99). Other species captured include: brook trout (20), lake whitefish (4), pearl dace (2), white sucker (1), and lake trout (1). Angling efforts resulted in the capture of six lake trout (1.5 – 2.5 kg) in 2 hours.

Bean Lake

Bean Lake has a surface area of approximately 54.7 ha, with an estimated maximum depth of 15 m. The riparian vegetation consists of black spruce forest along most of the shoreline, with the exception of alder thickets along the north eastern shore along the railway spur bed and also along the James to

Redmond Road, immediately adjacent to Bean Lake on the south western shore. The littoral sediment was dominated by gravel and sand along most of the lake, with the exception of fine sediments being identified at the inlets of James Creek and at the small bay immediately adjacent to the Redmond and James Road. Within the sediments identified near the James Creek inlet, aquatic macrophytes (*Potamogeton* spp.) were evident.

A fyke netting program (72 hours total) completed on Bean Lake during 2008 identified that the fish community is dominated by longnose sucker (n =302). Other species captured include: lake whitefish (90), white sucker (87) pearl dace (39), brook trout (31),) burbot (17), sculpin (3) and spottail shiner (1), and lake trout (1). Angling efforts captured six lake trout (1.5 – 2.5 kg) in 2 hours.

Unnamed Tributary - James Property

Within the James Property, a small first order tributary originates from two artesian sources (James North Spring and James South Spring) (Figure 4.7). James North Spring is located between James North and James South pits. This tributary is approximately 1000 m in length and flows in a south easterly direction and discharges into Bean Lake. Another small spring (James South Spring) originates from the southern end of the James South ore body and flows north easterly to the unnamed tributary, approximately half way between the tributary's origin and Bean Lake

Details of habitat characterization of the unnamed tributary are in a report that is included in Appendix N. The unnamed tributary consisted predominantly of flats and runs. Riffles and glides are also present but true pools were limited in number. The substrate in the riffles and runs is typically cobbles and gravels and in the flats, sand, silt and detritus dominated. In many flat sections however, gravels occurred under the fines, and during the fall 2007 survey, redds that had been excavated down to the gravel were observed in some of these flat sections. Cover for fish in flat sections was dominated by undercut banks and overhanging grasses. In the runs, the dominant cover was typically overhanging alders and willows.

The smaller tributary that flows into the unnamed creek has a mean wetted width of 1.0 m, which has margins choked with watercress, reducing the functional width to 0.5 m.

The approximate areas of available spawning, rearing, migration and adult resident habitat types are 351 m², 1227 m², 0 m² and 5716 m², respectively (See Table 1 in Appendix N).

There appeared to be a pronounced decrease in the volumes of water flowing from the springs during the winter months. Sampling for the James North Spring indicated that flows were markedly reduced, as it took over one minute to fill a 1 L bottle. Attempts to winter sample pool locations along the tributary found the pools were frozen solid to the substrate.

Visual surveys of the unnamed tributary identified brook trout and sculpin. The discharge of this creek into Bean Lake contains a perched culvert with 0.5 m drop, preventing access, by most species in Bean Lake, to this tributary. However, during the spring 2008 sampling program, it was noted the brook trout were swimming upstream from Bean Lake into the tributary; fish were observed jumping into the culvert and successfully moving upstream from the road crossing.

Wishart Creek

Wishart Creek flows east from Wishart Lake for approximately 4.5 km to Gilling Lake. The stream has an average wetted width of 5 to 6 m and depths ranging between 0.2 m (riffles) and 1.5 m (pools) within the vicinity of the existing road crossing. Substrates of the creek consist largely of gravel and cobble, with minimal sediment deposition within main channel. The stream banks were observed as stable, with no erosion evident. Stream gradient ranged between 1.5 to 3%.

Visual surveys of Wishart Creek identified the presence of brook trout and sculpin. Other resident fish species within the Wishart watershed also have access to the creek, but only these two species were confirmed as present.

Redmond Creek

Redmond Creek is a small stream that originates within the Redmond Property, as a result of surface and groundwater flows (Figure 4.13). For example, one source is a large spring located immediately adjacent to the Redmond 1 Pit. The creek also receives a diffuse flow from the area of the road and historic mine works. Observations indicated the channel has an average wetted width of approximately 1.5 m and depths ranging between 0.15 m (riffles) and 0.4 m (pools). The substrates of the creek consist largely of gravel and cobble, with minimal sediment deposition within the main channel. During electrofishing, disturbance of sediments resulted in the resuspension of reddish sediments. Riparian vegetation included a small section lined with alder, but the majority of the creek is adjacent to historic mining waste rock piles within the property boundaries. Stream banks were stable at low flows, but active erosion was noted along some channel sections, as represented by the presence of bare soils.

Electrofishing and qualitative visual surveys of Redmond Creek confirmed the presence of brook trout in the lower section of the creek situated on the Redmond Property. During the spring freshet, longnose sucker and white sucker were reported by a local contact to enter the creek to complete spawning. Other resident fish species within Redmond Lake (~ 2 km downstream from the property) also have access to the creek.

4.2.4.4 Current and Future Fisheries

This region of Labrador and adjacent region in Québec are known for abundant fish resources and the fisheries include recreational fisheries, commercial outfitter operations and a subsistence fishery by aboriginal peoples.

People fish anywhere they can obtain access to good locations. Access is provided by existing roads to old mine areas, exploration areas, and the Menihek hydroelectric facility. Adjacent to the Project site, locals angle brook trout in James Creek near the Silver Yard. Locations on James Creek are accessible by road. Less fishing is conducted on Slimy Lake as there is the perception, and evidence, that this lake was impacted by the past mining activities. All of the other Project areas are more distant from favoured angling streams and lakes.

There are several outfitter operations in the area. The closest outfitting camps are on Astray Lake to the south and Wishart Lake to the west. Most other camps are located in Québec, which are different watersheds. Access to many of the camps is restricted to floatplane and helicopter as the road network is limited.

The subsistence fishery is pursued on both sides of the border with seasonal gillnet fisheries. These focus on the larger lakes as they usually produce larger fish (i.e., lake trout).

4.3 Socio-economic

This section provides information on the existing socio-economic conditions, including demography, community infrastructure and services, and employment and business. The geographic extent of the discussion varies by subject. Most aspects of the socio-economic environment will be examined for the Assessment Area, which includes both western and central Labrador, defined geographically as the Hyron (Labrador West) and Central Labrador (Upper Lake Melville) Economic Zones (Figure 4.22). While all Project activity will occur in Labrador West, the baseline conditions in central Labrador and parts of Québec are included because Project labour, goods and services are also going to be drawn from these areas. The communities of Schefferville, Kawawachikamach and Matimekush are located in Québec in close proximity to the Québec-Labrador border and the Project. All three can be reached by air, through the Schefferville Airport, or by train from Sept-Iles. The Project will make use of accommodation camps, some municipal facilities and the airport, and will employ some workers and services located in these communities.

Baseline information is presented at the provincial, Labrador, and Assessment Area levels as appropriate, with further detail for communities within the Assessment Area provided where necessary. Selected data are also presented for Schefferville and other Québec communities adjacent to the Project site.

4.3.1 Methodology

The baseline data presented in this section were drawn from a wide range of secondary sources including:

- Statistics Canada and other agencies and departments of the Government of Canada;
- Newfoundland and Labrador Statistics Agency and other agencies and departments of the Government of Newfoundland and Labrador; and
- Municipal governments and local and regional authorities and boards.

Not all information is available for the same geographic areas. For instance, census data are available for some communities in the Upper Lake Melville Area (for example, Happy Valley-Goose Bay and North West River, which are located in Census Division 10, Subdivision C), but data for Sheshatshiu and Mud Lake are aggregated and classified as Census Division 10, Subdivision C, SUN. Other data are only available by Economic Zone and not for individual communities. The communities in Labrador West fall under Economic Zone 2 – Hyron Regional Economic Development Corporation and the communities of the Upper Lake Melville Area comprise Economic Zone 3 – Central Labrador Economic Development Board.

In addition to data from the above secondary sources, primary information was collected through personal and telephone interviews with key informants with groups and agencies at the community, regional and provincial levels.

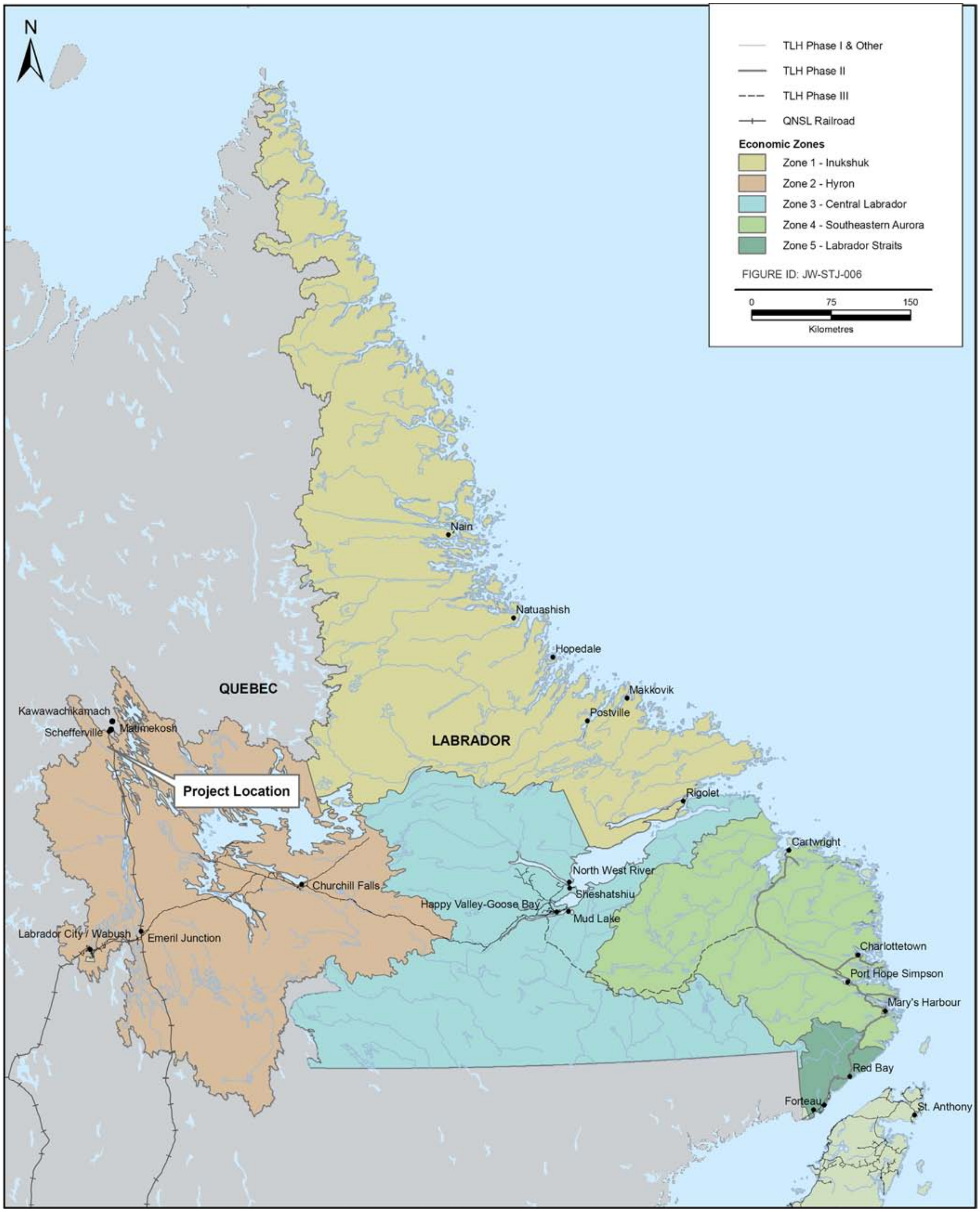


Figure 4.22 Study Area and Economic Zones of Labrador

4.3.2 Demography

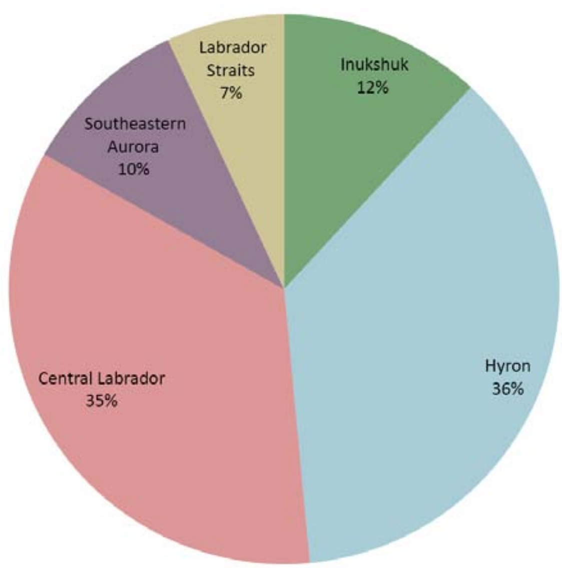
An understanding of the demographic structure and its potential for change without the Project provides a basis for determining Project-related changes. The following discussion focuses on the demography of western and central Labrador and, where relevant, that of Labrador and the Province. There is also an overview of the Québec communities in close proximity to the Project site.

4.3.2.1 Labrador

The 2006 Census reports that there are 26,364 people residing in 32 communities across Labrador, of which 50.7 percent are male and 49.3 percent are female. In 2006, Labrador's population made up 5.2 percent of the provincial total (Statistics Canada 2006). In Labrador and the Province in 2006, the majority of the population was between the ages of 35 and 64 (44.4 and 46.2 percent, respectively) Those aged 15 to 34 represented the smallest portion of the Province's population (6.1 percent), while the 65 plus age group represented the smallest portion of Labrador's population (6.3 percent) (Statistics Canada 2006). Thirty-five percent of the people living in Labrador have Aboriginal ancestry, self-identifying as Innu, Inuit or Métis (Newfoundland and Labrador Department of Labrador and Aboriginal Affairs [NLDLAA] 2006).

Between 1991 and 2006 Labrador's population fell by 13.1 percent, from 30,375 to 26,364. This was slightly greater than the overall provincial decline of 11.1 percent (Statistics Canada 2006).

For the purposes of economic analysis and planning, Newfoundland and Labrador is divided into 20 economic zones, five of which are in Labrador (Figure 4.23). In 2006, the economic zones in Labrador with the largest populations were those that are the focus of concern in this assessment: Hyron, comprised of Labrador City and Wabush, and Central Labrador, which comprises Upper Lake Melville with populations of 9,660 and 9,175, respectively (Figure 4.23). The zone with the smallest population was Zone 5 ('Labrador Straits') with 1,825 people (Newfoundland and Labrador Statistics Agency 2006).

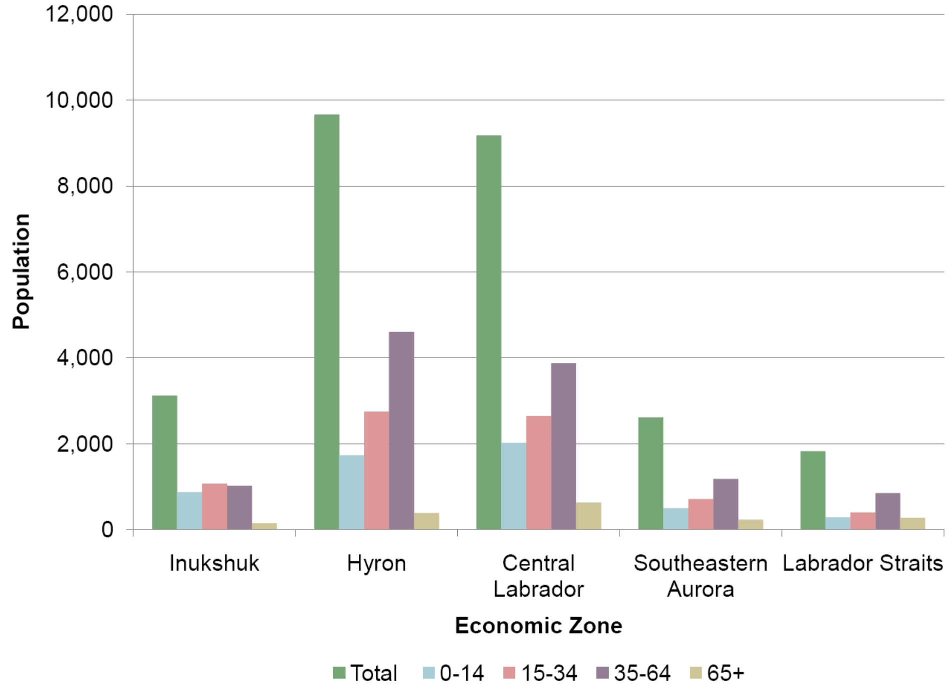


Source: Newfoundland and Labrador Statistics Agency 2006

Figure 4.23 Population by Economic Zone, as a Percentage of Labrador's Population, 2006

The populations of all but one of the economic zones in Labrador decreased between 1991 and 2006 (Newfoundland and Labrador Statistics Agency 2006). The greatest declines occurred in Hyron (Labrador West and Churchill Falls) and Labrador Straits. The population of Hyron fell by 20.8 percent, from 12,200 to 9,660, and Labrador Straits decreased from 2,185 to 1,825 (16.5 percent). Inukshuk (the North Coast of Labrador), however, increased by 4.5 percent from 2,985 to 3,120, but it too has declined between 2001 and 2006.

The age-structure of the populations of the economic zones is illustrated in Figure 4.24. Inukshuk is unique insofar as the proportion of younger people in the 0 to 14 and 15 to 34 categories is much higher than for the other zones (Newfoundland and Labrador Statistics Agency 2006).



Source: Newfoundland and Labrador Statistics Agency 2006

Figure 4.24 Population of Labrador Economic Zones by Age Group, 2006

4.3.2.2 Labrador West

In 2006, the population of Labrador West was 8,979, with the majority living in Labrador City (Table 4.10). The area represents 34.1 percent of Labrador's population with slightly more men (51.6 percent) than women (48.4 percent) (Statistics Canada 2006).

Table 4.10 Population of Labrador West, Upper Lake Melville, Labrador and Province, 2006

	Total Population	Male	Female
Labrador City	7,240	3,740	3,505
Wabush	1,739	895	845
Labrador West Total	**8,979**	**4,635**	**4,350**
Happy Valley-Goose Bay	7,572	3,740	3,835
North West River	492	240	250
Sheshatshiu and Mud Lake (Census Division 10, Subdivision C)	1,112	560	555
Upper Lake Melville Total	**9,176**	**4,540**	**4,640**
Labrador	**26,364**	**13,380**	**12,985**
Province	**505,469**	**245,735**	**259,735**
Source: Statistics Canada 2006			

Compared to other parts of Labrador, a relatively small proportion of the population of Labrador West is identified as Aboriginal. In 1996, Aboriginal people represented only 1.5 percent of the population. However, by 2006, this had increased to 6.6 percent (Statistics Canada 1991; 1996; 2001; 2006). Visible minorities (persons who are identified according to the *Employment Equity Act* as being non-Caucasian in race or non-white in colour, with the exception of Aboriginal people) made up only 1.2 percent of Labrador West population.

4.3.2.3 Upper Lake Melville

With a population of 9,176, Upper Lake Melville has 34.8 percent of the total population of Labrador (Table 4.10) (Statistics Canada 2006). In 2006, there were slightly more women (50.6 percent) than men (49.4 percent) living in the area and 82.5 percent of residents lived in Happy Valley-Goose Bay, the area's largest community.

As in Labrador West, the population of Upper Lake Melville has been in decline. It fell from 10,050 in 1991 to 9,654 in 2001, a decline of 3.9 percent. By 2006, the population had decreased a further 5.0 percent to 9,176, with Happy Valley-Goose Bay and North West River experiencing declines of 12.0 percent and 6.8 percent respectively. However, Census Division 10, Subdivision C (Sheshatshiu and Mud Lake) experienced a population increase of 21.9 percent. It should be noted that Statistics Canada data combine information for Sheshatshiu (approximately 1,050 people) with that for the much smaller community of Mud Lake (approximately 60 people), and few disaggregated data are available.

Sheshatshiu is an Innu community, and many Innu, Inuit and Métis live in Happy Valley-Goose Bay, North West River and Mud Lake. The Aboriginal population of the Upper Lake Melville Area increased from 2,035 to 4,130 between 1991 and 2001 and then decreased to 4,095 in 2006. Most (66.4 percent) Aboriginal people in that area reside in Happy Valley-Goose Bay. Of the 1,112 people in Sheshatshiu and Mud Lake in 2006, 1,035 (93 percent) were Aboriginal. In North West River, 340 (68.7 percent) of the population were Aboriginal, as were 2,720 (35.9 percent) of those in Happy Valley-Goose Bay.

Visible minorities comprised only 0.4 percent of the 2006 population in Upper Lake Melville, all of them living in Happy Valley-Goose Bay (Statistics Canada 2006).

4.3.2.4 Québec Communities

In 2006, there were 1,315 people residing in the four communities near the Project that are located in Eastern Québec (Statistics Canada 2006) (Table 4.11). In contrast with most of Labrador, the population rose in these communities between 2001 and 2006 by 5.8 percent from 1252 in 2001 to 1315 in 2006 (Statistics Canada 2006).

Table 4.11 Population, Eastern Québec Communities, 2001 and 2006

	Kawawachikamach	Matimekush	Lac-John	Schefferville	Total
Population in 2006	569[1]	528	16	202	1315
Population in 2001	540	449	23	240	1252
2001 to 2006 population change (%)	5.37	17.59	-30.43	-15.83	5.03

Source: Statistics Canada 2001, 2006
[1] The total population of Kawawachikamach in March 2008 was 849 (NNK 2008)

The Naskapi Nation of Kawawachikamach is comprised of the Village of Kawawachikamach, approximately 16 kilometres northeast of Schefferville, and a larger uninhabited area to the northeast of the Village. Kawawachikamack is largest community in the area. With a population of 560 people, it contains 43.2 percent of the total population of the Québec communities (Statistics Canada 2006) (Figure 4.25).

In 2006, there were slightly more women (50.88 percent) than men (49.12 percent) living in the area. Of the 570 people in Kawawachikamach, 565 (99 percent) were Aboriginal. The population increased by 5.37 percent from 540 people in 2001 to 569 people in 2006 (Statistics Canada 2006).

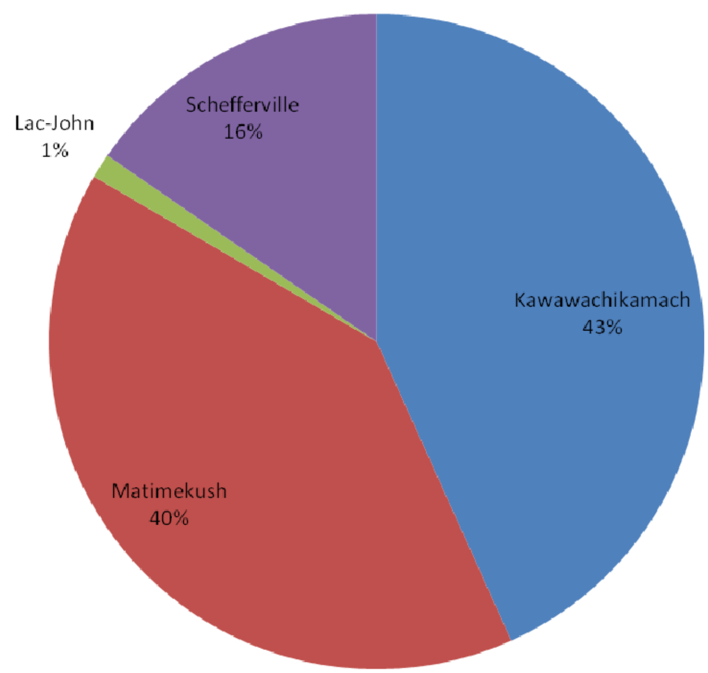


Figure 4.25 Percentage Population of Eastern Québec Communities, 2006

Matimekush Innu community has approximately 544 people (Statistics Canada 2006). It is divided into two territories: the reserve of Matimekush (528 people), on the edge of Pearce Lake adjacent to the Schefferville Municipality; and the reserve of Lac-John (16 people), which is 3.5 kilometres from Matimekosh and the centre of Schefferville. With a population of 528 people, Matimekush contains approximately 40 percent of the total population of the Québec communities (Statistics Canada 2006)

(Figure 4.25). In 2006 there were more women (52.83 percent) than men (47.17 percent) living in the area. Of the 528 people in Matimekosh, 495 (93 percent) were Aboriginal. Between 2001 and 2006, its population saw the largest increase in the Québec communities, growing by approximately 18 percent from 449 people in 2001 to 528 people in 2006 (Statistics Canada 2006).

Lac-John, which is located 3.5 kilometres from Matimekush, will be considered a part of the analysis for Matimekush due to information being suppressed due to confidentially issues. Where disaggregated data exist, Lac-John will be presented separately. It is the smallest of the four Québec communities with 16 people (Statistics Canada 2006). The population has decreased by 30 percent from 23 people in 2001 to 16 people in 2006.

Schefferville is approximately 2 kilometres from Labrador on the north shore of Knob Lake. It was established by IOC in 1954 to support mining operations in the area. The Municipality and Matimekush Reserve are adjacent and closely linked to it. With a population of 202, Schefferville contains approximately 16 percent of the total population of the Québec communities (Statistics Canada 2006) (Figure 4.25). In 2006, there were more men (55 percent) than women (45 percent) living in the area. Of the 202 people in Schefferville, 90 (44.5 percent) were Aboriginal. Between 2001 and 2006, its population decreased by approximately 15 percent from 240 people in 2001 to 202 people in 2006 (Statistics Canada 2006).

4.3.3 Employment and Business

4.3.3.1 The Mining Industry

Mining has provided a valuable foundation and cornerstone for economic development and growth in Labrador West, with a primary focus on iron ore. Large scale mining development projects are generally long term and capital intensive and often result in major economic and employment benefits similar to operations already existing in Labrador West (NLDLAA 2008).

Production mining is the main activity in Labrador West. IOC operates its Carol Lake Mine out of Labrador City, and Wabush Mines operates its Scully Mines from Wabush. The situation has not changed substantially since 1993 in terms of both mines being dependent on the fluctuations in the international market for steel and subsequently iron ore.

The Iron Ore Company of Canada (IOC) began production from the Carol Lake Mine in 1962. IOC is Canada’s largest iron ore pellet producer and operates a mine, concentrator, and pellet plant at Carol Lake, port facilities in Sept-Iles, Québec and a 420-km rail line that links the mine and the port. Total resources at Carol Lake are estimated to be 5.5 billion tonnes. Proven and probable reserves are 1.4 billion tonnes; indicated and referred reserves are 4.1 billion tonnes. Annual mine production at the open pit operation is in the 35 to 38 million tonne range at an average grade of approximately 40 percent total iron. Annual production capacity is 18 million tonnes of concentrate of which 12.5 million tonnes can be pelletized. In 2005 and 2006, IOC shipped a total of 15 million tonnes of iron ore, up 30 percent from 2004 (AMEC Earth and Environmental Ltd and Gardner Pinfold 2008).

IOC announced a $500 million expansion in March 2008, and a further $300 million expansion in September 2008. However these plans, which would have increased production to 25 million tons per year by 2011, were postponed in December 2008.

Wabush Mines began mining iron ore from the Scully Mine in Labrador in 1965 and now operates a mine and concentrating plant at Wabush and a pellet plant and shipping facilities in Point Noire, Québec. All ore is mined by open pit and sent through the Scully Mine concentrator. The final concentrate is transported 443 kilometres by rail to the port at Pointe Noire for pelletizing and shipment. The majority of ore is loaded onto ships bound for the Canadian and US Great Lakes region while the remainder is loaded for the US East Coast, Europe and more recently China. In 2005, Wabush Mines shipped five million tonnes of concentrate, up almost 29 percent from 2004. In 2006 it shipped 4.2 million tonnes, a drop of 17.9 percent from the previous year. In 2006 it spent more than $18 million on capital projects (AMEC Earth and Environmental Ltd and Gardner Pinfold 2008). However, in December 2008, Wabush Mines cut its production target for 2009 in half, and announced it was eliminating 160 jobs in February 2009. Other materials of interest in Labrador West are aggregate, nickel, gold and graphite (AMEC Earth and Environmental Ltd and Gardner Pinfold 2008).

4.3.3.2 Employment and Labour Force

Labrador

In general, the employment situation in Labrador, prior to the current economic downturn, was better than in the rest of the Province, and the situation in Labrador West is better than Upper Lake Melville. Participation rates were higher, unemployment rates were lower, and the average annual income was higher in Labrador West in 2006 (Table 4.12).

Table 4.12 Labour Force Characteristics, Labrador, 2006

	Labrador City	Wabush	Total Labrador West	Upper Lake Melville	Labrador	Province
Total Population, 15 years and older	5,935	1,460	7,395	7,045	20,815	422,385
Labour Force	4,325	1,045	5,370	5,105	14,340	248,685
Participation Rate (%)	72.9	71.6	72.3	64.3	63.2	58.9
Unemployment Rate (%)	8.9	8.1	8.5	20.4	24.5	18.6
Median Income, 2005	$30,884	$36,091	$33,488	$24,196	$21,845	$19,573
Source: Statistics Canada 2006						

In 2006, the labour force (i.e., individuals who have, or are seeking employment) of Labrador West consisted of 5,370 individuals (Table 4.12), an increase from 4,395 in 2001. The participation rate, which is the percentage of the work-age population that is working or actively looking for employment, is much higher in Labrador West (72.3 percent in 2006, up from 67.5 percent in 2001) than in the Province (58.9 percent) or Upper Lake Melville (64.3 percent). Between 2001 and 2006, the unemployment rate in Labrador West fell from 9.1 to 8.5 percent.

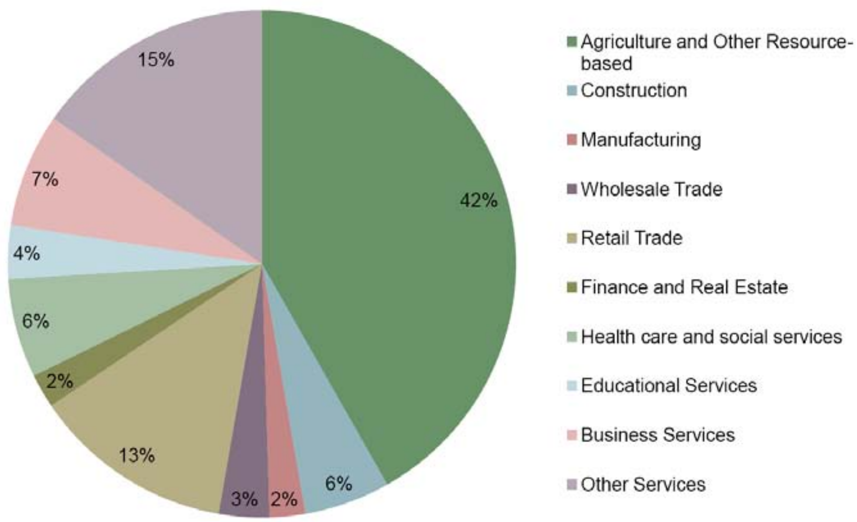
Wages in Labrador West are higher on average than in the rest of the Province. In 2005, the median income from employment for residents of Labrador West averaged $33,488, substantially higher than the provincial figure of $19,573, and the Upper Lake Melville average of $24,196 (Table 4.12) (Statistics Canada 2001; 2006).

The number of individuals in Labrador West receiving employment insurance (EI) benefits decreased by 6.3 percent between 1996 and 2006. During the same period, the number of EI beneficiaries in the Upper Lake Melville decreased by 10.9 percent and the provincial beneficiaries decreased by only 4.7 percent (Table 4.13).

Table 4.13 Beneficiaries of Employment Insurance, Labrador City and Wabush, 2002 to 2006

	1996			2006			*% Change*		
	Labrador West	Upper Lake Melville	Province	Labrador West	Upper Lake Melville	Province	Labrador West	Upper Lake Melville	Province
EI Beneficiaries (Individuals)	1,370	1,605	102,825	1,155	1,430	98,025	*-15.7%*	*-10.9%*	*-4.7%*
EI Incidence (% of labour force)	21.4%	28.8%	39.9%	18.0%	25.5%	35.5%	*-15.9%*	*-11.5%*	*-11.0%*
Source: Newfoundland and Labrador Statistics Agency 2008									

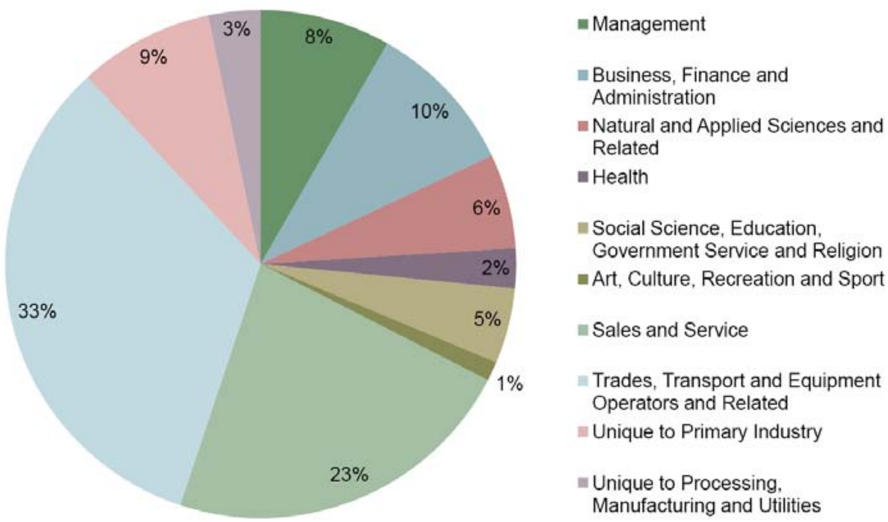
The occupational structure of Labrador is weighted toward goods-producing and seasonal industries. The main source of employment by industrial sector in 2006 was agriculture and other resource-based industries (including mining) which employed 42 percent of the area's population (Figure 4.26). Other services and retail trade employed 15 percent and 13 percent of the population, respectively, while health care and construction each employed 6 percent of the area's residents. Few Labrador West residents worked in wholesale trade (three percent), manufacturing (two percent) or finance and real estate (two percent) (Statistics Canada 2006).



Source: Statistics 2006

Figure 4.26 Labour Force by Industry, Labrador West, 2006

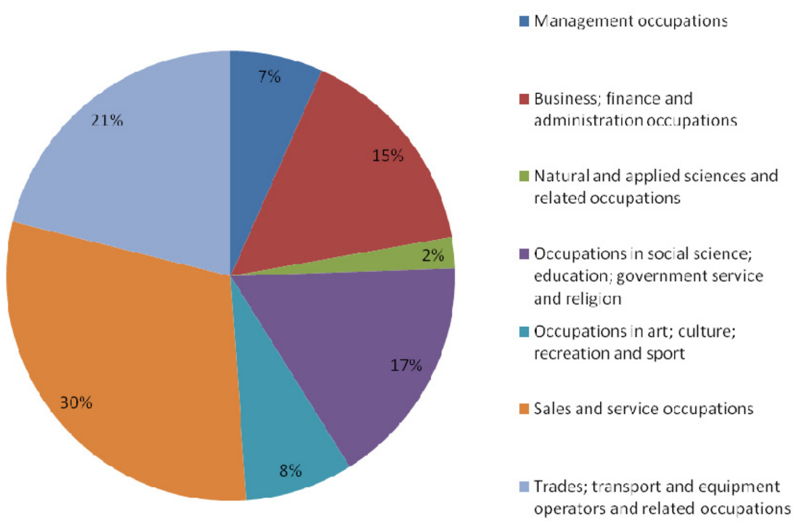
The main occupations of residents of Labrador City and Wabush are trades, transport and equipment operation (33 percent) and sales and service (23 percent) (Figure 4.27). Occupations unique to primary industry and positions in business, finance and administration are held by nine percent of the area's population (Statistics Canada 2006).



Source: Statistics 2006

Figure 4.27 Labour Force by Occupation, Labrador West, 2006

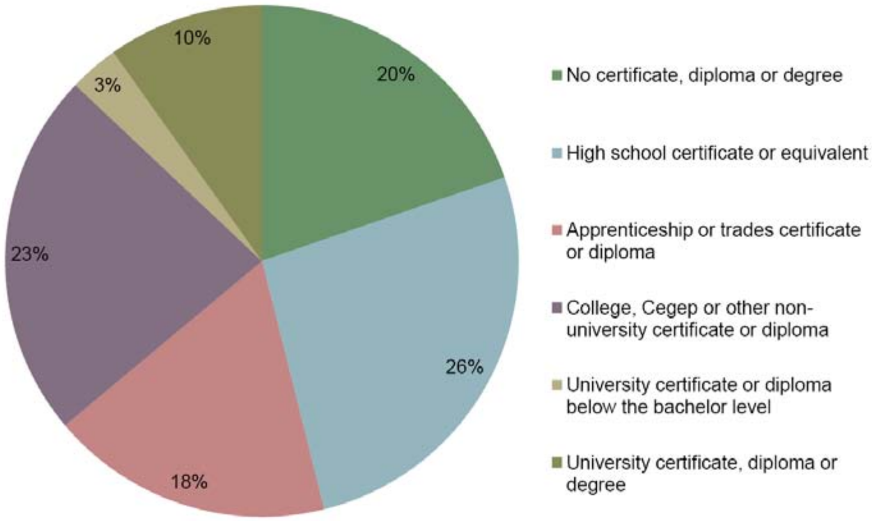
The main occupations of residents of Kawawachikush, Matimekush and Schefferville are sales and services (30 percent), and trades, transport and equipment operation (21 percent) (Figure 4.28). (Statistics Canada 2006).



Source Statistics Canada 2006

Figure 4.28 Employment by Industry Residents of Kawawachikush, Matimekush and Schefferville

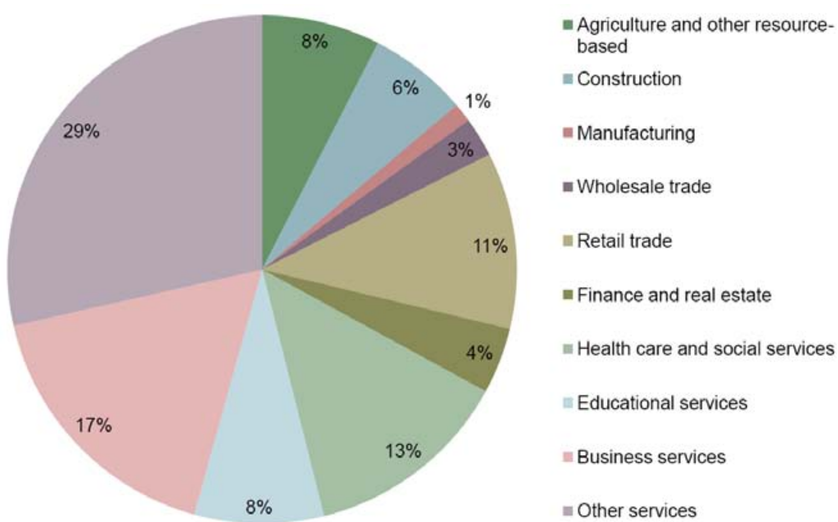
In Labrador West, approximately half of the population (54 percent) has some form of post-secondary training, while only 20 percent have less than a high school education (Figure 4.28). Thirteen percent of Labrador West residents have a university degree, and an additional 23 percent hold a post-secondary certificate or diploma. In Upper Lake Melville ten percent of the population holds a university degree, and 33 percent have not completed a high school education (Figure 4.28; Statistics Canada 2006).



Source: Statistics 2006

Figure 4.29 Education Level, Labrador West, 2006

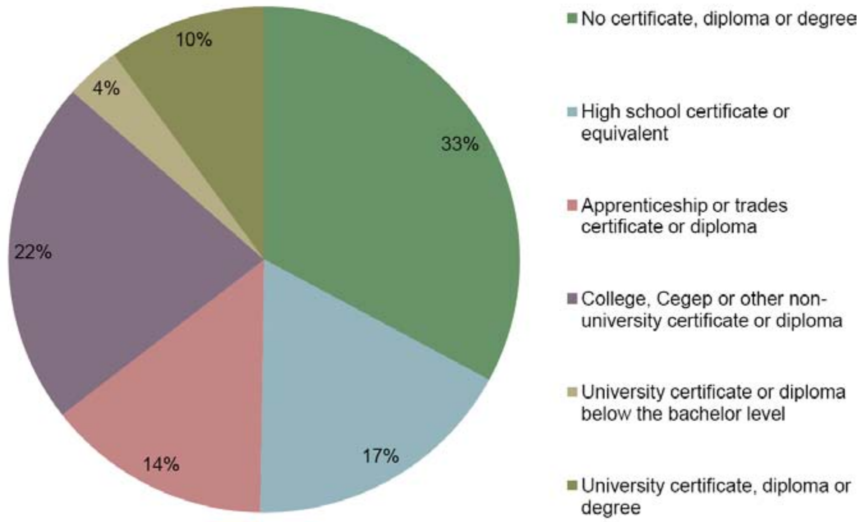
In 2006, 5,035 people aged 15 and over were employed in Upper Lake Melville. The main sources of employment, by industry (Figure 4.29), were Business Services, which employed 860 people, Health Care and Social Services (660), Retail Trade (565) and Other Services (1,435). There were few people employed in Finance and Real Estate (280), Wholesale Trade (125) or Manufacturing (60). The main occupations of Upper Lake Melville Area residents were Sales and Service (1,420), Trade, Transport, and Equipment Operation (970), and Business, Finance and Administration (875) (Statistics Canada 2006).



Source: Statistics 2006

Figure 4.30 Employment by Industry, Upper Lake Melville, 2006

In Upper Lake Melville ten percent of the population holds a university degree, and 33 percent have not completed a high school education (Figure 4.30).



Source: Statistics 2006

Figure 4.31 Education Level, Upper Lake Melville, 2006

Eastern Quebec

In the Eastern Québec communities (Kawawachikamach, Matimekush, and Schefferville), the 2006 labour force consisted of 855 people (Table 4.14). The participation rate is lower for the Eastern Québec towns (35.6 percent) when compared to Labrador West (72.3 percent) (Table 4.14). The unemployment rate for Eastern Québec is also higher at 19.4 percent compared to Labrador West, which is approximately nine percent (Table 4.14). Wages in Eastern Québec ($10,648) were also lower on average when compared to Labrador West ($33,488) (Table 4.14).

Table 4.14 Labour Force Characteristics, Eastern Québec and Comparison to Labrador West, 2006

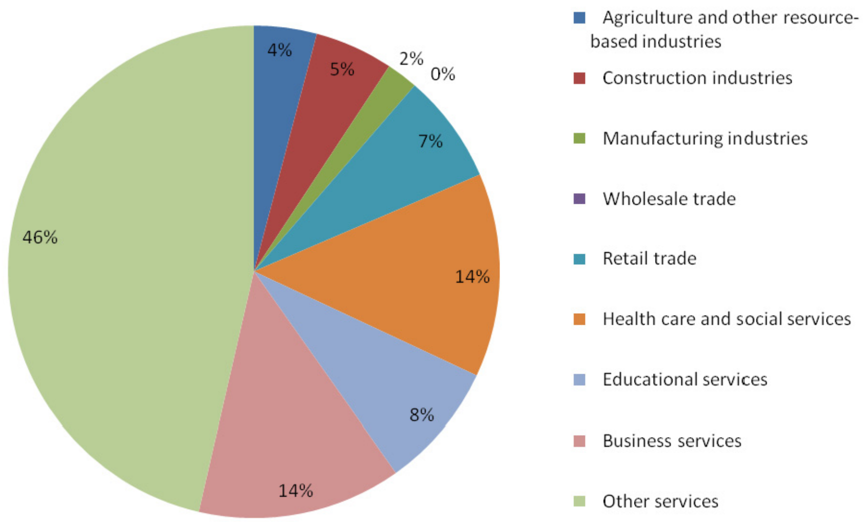
	Kawawachikamach	Matimekush	Schefferville	Québec Total	Labrador West Total
Total Population, 15 years and Older	360[1]	335	160	855	7,395
Labour Force	170	200	120	490	5,370
Participation Rate (%)	47.2	59.7	75	35.6	72.3
Unemployment Rate (%)	20.6	37.5	12.5	19.4	8.5
Median Income, 2005	$12,768	$8,528	$0.00[2]	$10,648	$33,488

Source: Statistics Canada 2006

[1]Kawawachikamach workforce was 512 in 2008 (NNK 2008)

[2] Data is suppressed. Statistics Canada suppresses income data in census areas with populations less than 250 persons, or where the number of private households is less than 40. All suppressed data and associated averages, medians and standard errors of average income are replaced with zeros, but are included in the appropriate higher-level aggregate subtotals and totals. This practice has been adopted to protect the confidentiality of individual respondents' personal information.

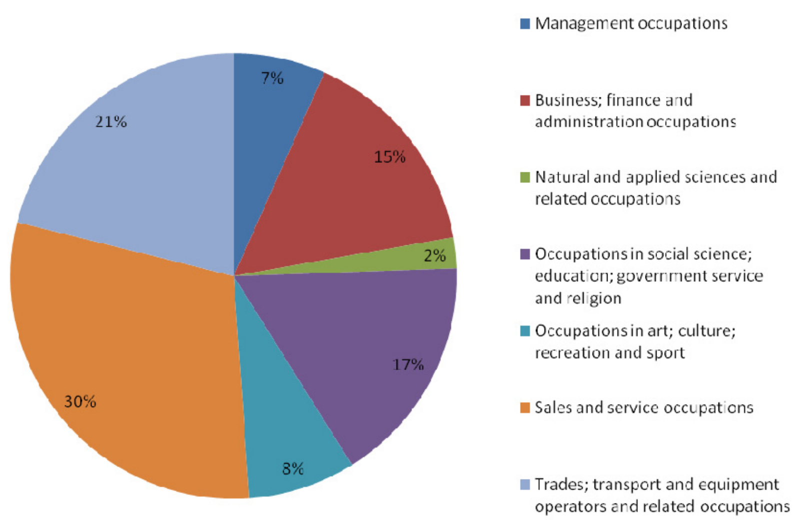
The occupational structure of Eastern Québec is weighted to other services. The main source of employment by industrial sector in 2006 was other services which employed 46 percent of the area's population (Figure 4.31). Health care and social services and business services employed 14 percent of the population, each, while education, retail trade and construction each employed eight, seven and five percent of the area's residents respectively. Few Eastern Québec residents worked in agriculture and other resource based industries (four percent), or manufacturing (two percent).



Source Statistics Canada 2006

Figure 4.32 Labour Force by Industry, Eastern Québec, 2006

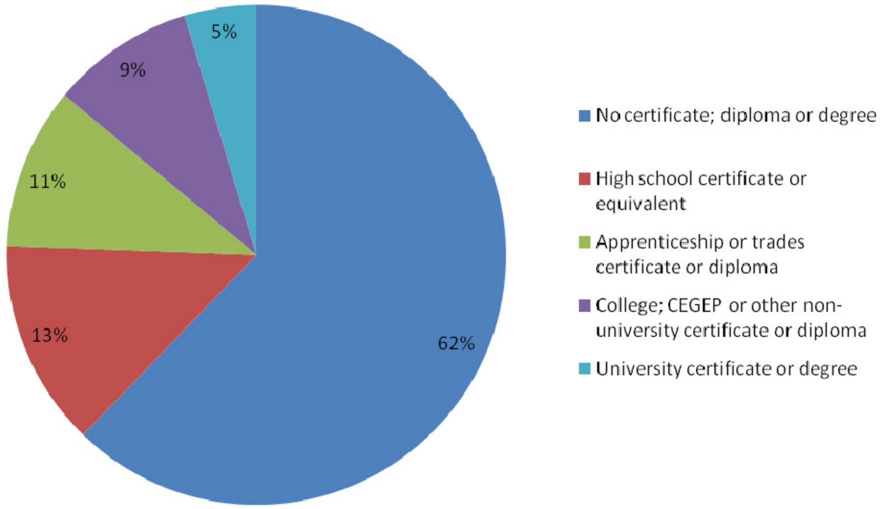
The main occupations of residents of Kawawachikush, Matimekush and Schefferville are sales and services (30 percent), and trades, transport and equipment operation (21 percent) (Figure 4.32) (Statistics Canada 2006).



Source Statistics Canada 2006

Figure 4.33 Labour Force by Occupation, Eastern Québec, 2006

In the Québec communities, over half of the population (62 percent) has less than a high school education, while approximately 30 percent has some form of post secondary education (Figure 4.33). Five percent of the Eastern Québec residents have a university degree, and an additional 20 percent hold a post-secondary certificate or diploma (Figure 4.33).



Source Statistics Canada 2006

Figure 4.34 Education Level, Eastern Québec, 2006

4.3.3.3 Business

Western Labrador

The business community of Labrador West includes 311 companies, approximately two percent of all businesses in the Province (Statistics Canada Business Register). Most of them have one to four employees (Table 4.15). These businesses, categorized by North American Industrial Classification System (NAICS) Industry Code, are presented in Table 4.16.

Table 4.15 Number of Businesses by Employment Size, Hyron Region, 2006

Number of Employees	Number of Businesses
1-4	139
5-19	121
20-99	43
Total	311
Source: Statistics Canada Business Register	

Table 4.16 Number of Businesses by Industry, Hyron Region, 2006

Industry Code	Number of Businesses
Agriculture, Forestry, Fishing and Hunting	X
Mining and Oil and Gas Extraction	6
Utilities	X
Construction	21
Manufacturing	7
Wholesale Trade	25
Retail Trade	64
Transportation and Warehousing	17
Information and Cultural Industries	5
Finance and Insurance	7
Real Estate and Rental Leasing	16
Professional, Scientific and Technical Services	10

Industry Code	Number of Businesses
Management of Companies and Enterprises	X
Administrative and Support, Waste Mgmt, and Remediation Services	16
Educational Services	X
Health Care and Social Assistance	26
Arts, Entertainment and Recreation	8
Accommodation and Food Services	27
Other Services (Except Public Admin.)	45
Public Admin	4
Total	**311**
Note: x = data not available Source: Economics and Statistics Branch (Newfoundland and Labrador Statistics Agency) http://www.stats.gov.nl.ca/Statistics/Trade/PDF/BR_Zone_NAICS_2006.pdf	

The major employers in Labrador West include IOC, which employs more than 2,000 individuals in Labrador City and Sept-Îles, Wabush Mines, with 300 to 400 employees, and the provincial government, including healthcare workers, education employees, and other government employees (B. Jerrett pers. comm.).

Upper Lake Melville

Upper Lake Melville is the government service centre for Labrador. Offices of many provincial and federal government departments are located and staffed in Happy Valley-Goose Bay. Regional governments and Aboriginal groups also provide opportunities for employment in the area. The main employers and number of employees for each are listed in Table 4.17.

Table 4.17 Major Employers and Number of Employees, Upper Lake Melville

Employer	Number of Employees
Regional Agencies	
Labrador-Grenfell Regional Integrated Health Authority	370
Labrador School Board and six public schools	192
College of the North Atlantic	125
Regional Governments and Aboriginal Groups	
Sheshatshiu Innu First Nation and Social Services	214
Town of Happy Valley-Goose Bay	51 permanent and 30 seasonal
Nunatsiavut Government	53
Labrador Métis Nation	12 permanent and 4 seasonal
Private Employers	
SERCO	350-400 full-time and seasonal
Vale Inco	250
Woodward's Group of Companies	200 full-time and seasonal
NorthMart and affiliated businesses	130
Terrington Consumers Co-operative	47
Labrador Friendship Centre	32 permanent and 40 seasonal
Source: CLEDB 2006.	

Historically, the main employer and most important driver of the economy in Upper Lake Melville has been 5 Wing Goose Bay, the military base. Currently, it employs approximately 400 civilians and 100 military personnel and in 2006-07, total wages and salaries were estimated at $14.9 million (AMEC Earth and Environmental Ltd. and Gardner Pinfold 2008). The largest employer associated with the base is SERCO, providing base operation services, including maintenance and catering. SERCO employs approximately 350 of the 400 civilians. Spending by those employed in base-related activities has also had beneficial employment multiplier effects on the local retail sector (CLEDB 2006).

As of 2006, there were 329 businesses in Upper Lake Melville (Table 4.18), representing 35.8 percent of businesses in Labrador. The majority of businesses in the Upper Lake Melville Area (145) were small, with one to four employees. There were 42 businesses with 20 to 99 employees (Newfoundland and Labrador Statistics Agency 2007a).

Table 4.18 Number of Businesses, Upper Lake Melville, 2006

Industry	Number of Businesses
Agriculture, Forestry, Fishing and Hunting	x
Mining and Oil and Gas Extraction	-
Utilities	-
Construction	40
Manufacturing	9
Wholesale Trade	10
Retail Trade	77
Transportation and Warehousing	14
Information and Cultural Industries	x
Finance and Insurance	6
Real Estate, Rental and Leasing	15
Professional, Scientific and Technical	16
Management of Companies and Enterprises	x
Administrative and Support, Waste Management and Remediation	9
Educational Services	6
Health Care and Social Assistance	50
Arts, Entertainment and Recreation	10
Accommodation and Food Services	34
Other Services	28
Public Administration	5
Source: Newfoundland and Labrador Statistics Agency 2007a Note: x = data not available	

The majority of businesses in the area fall into the in the same five sectors as for the Province and Labrador as a whole, with construction firms ranking third by number (Table 4.18). At least a quarter of all local firms are self-described as tourism businesses (CLEDB 2007).

Québec Communities

Retail businesses in Schefferville include the Northern Store, which employees 16 people on a part-time and full-time basis providing food, alcohol and general merchandise, as well as Duberco, Inc and Radio which both provide fuel services including aircraft and diesel. Both Duberco, Inc. and Radio employ one person full-time and hire up to an additional two seasonal workers. National Automobile Rentals are also located in Schefferville, employing a single person. There is also a hardware store and a convenience store, each with two employees, in Schefferville.

Within Kawawachikamach, the majority of businesses are owned, either wholly or through joint-ventures, by members of the Naskapi Nation or the Naskapi Band. These businesses include Naskapi Imuun Inc., a wholly-owned Naskapi company responsible for internet services and cellular telephone services, Garage Naskapi Inc. which operates a gas bar, and Kawawachikamach Energy Services Inc., which operates the Menihek Generating Station, manages utility billing to Schefferville region, and maintains the associated transmission lines (NNK 2008).

4.3.3.4 Communities and Services

This section describes the current situation and recent trends with respect to housing, health care, education, recreation, transportation, utilities and security services in Labrador West, Upper Lake Melville and the Eastern Québec communities.

4.3.3.5 Housing

Labrador West

In Labrador City, the number of occupied dwellings increased by 3.2 percent between 1991 and 2006, from 2,695 to 2,780. In 2006, 78.8 percent of these were owned and 21.4 percent were rented. The average value of a home in Labrador City in 2006 was $107,604 and the average monthly rent was $521 (Statistics Canada 2006).

Between 1991 and 2006, the number of occupied private dwellings in Wabush increased from 680 to 690 (1.5 percent). The majority (84.1 percent) was owned and 15.2 percent was rented in 2006. The average value of a home in Wabush was $86,216 in 2006 and average monthly rent was $401 (Statistics Canada 2006).

Upper Lake Melville

The number of occupied private dwellings in the Upper Lake Melville increased from 2,820 in 1991 to 3,130 in 1996, and rose again to 3,180 in 2001. In 2006, the number decreased to 3,130, of which 1,870 (59.7 percent) were owned and 1,145 (36.6 percent) were rented. Most occupied dwellings were in Happy Valley-Goose Bay and most of those were single detached homes (Statistics Canada 2006).

Happy Valley-Goose Bay had 2,725 occupied private dwellings, 59.4 percent of which were owned and 40.1 percent rented. Of the total occupied dwellings, 61.8 percent were single detached homes, 18.2 percent were semi-detached and 5.7 percent were apartments. In 2006 the average value of owned dwellings in Happy Valley-Goose Bay was $133,504 and median monthly rent was $611 (Statistics Canada 2006).

Québec Communities

In total, the Québec communities near the Project site contained 370 occupied dwellings in 2006 (Statistics Canada 2006). Of these, approximately seven percent were owned and 21 percent rented, with the remaining 72 percent being band housing (Statistics Canada 2006).

There is a shortage of housing in Kawawachikamach. The housing stock comprises approximately 154 single-family dwellings, duplexes, apartments, maisonettes, and cottages, including five units constructed in 2007-2008. All of these units are owned by the Naskapi Nation of Kawawachikamach (NNK) and maintained with funds from its operations and maintenance budget. They are allocated on a first-come-first-served basis. The NNK maintains a chronological list of housing requests, and at the close of the 2007-08 fiscal year, there were 96 names on this list, the oldest from January 1997 (NNK 2008).

In 2006, there were 197 private dwellings in Schefferville; however, only 95 were occupied, down from 110 in 2001, a decrease of approximately 14 percent. Of these occupied dwellings, 15 are privately owned with an approximate average value of $54,700, and 60 are rented (Statistics Canada 2001; 2006). Almost half (47 percent) of the dwellings in Schefferville are single-detached houses. The remaining housing consists of semi-detached houses (approximately 32 percent) and small apartment buildings (approximately 21 percent) (Statistics Canada 2006).

In 2006-2007, there were 172 residential units in Matimekosh and 12 in Lac-John (INAC Matimekush/Lac John First Nation 2008).

There are also three hotels with a total of 42 rooms in the Schefferville region (Table 4.19). The Hôtel Royale also offers a 200-person conference hall and 20-person meeting room (S. Fortier pers. comm.).

Table 4.19 Temporary Accommodations in Schefferville, 2008

Hotel	Number of Rooms
Hôtel Auberge	12
Hôtel-Motel Royale	24
Hotel-Bla-Bla	6

4.3.3.6 Healthcare

Labrador West

Facilities and Services

The Captain William Jackman (CWJ) Memorial Hospital, located in Labrador City, is a fully accredited health facility which serves Labrador West. It has 20 beds, six of which are designated long-term care beds for levels three and four nursing care. Fourteen beds are for acute care. Inpatient units provide care to medical, surgical, obstetrical, pediatric, respite, palliative and intensive care patients. Maternity care is provided by family physicians and nurses.

The hospital is served by six family physicians, a general surgeon, and an anaesthesiologist. There are also a number of visiting specialists who come to the hospital on a regular basis (Labrador-Grenfell Health 2007). There are two dentists in the area with one other who visits for two weeks each month (O. Simpson, pers. comm.).

The 2008 provincial budget includes plans to spend $59 million on construction of a new Labrador West Health Centre to replace the CWJ. This is expected to be complete in 2011 (NLDF 2008).

Wabush Medical Clinic

There is a Medical Clinic in Wabush which is staffed by one doctor, who is also the physician for Wabush Mines.

Community Service Programs

Labrador-Grenfell Health has a Child, Youth and Family Services office in Labrador West. It has the mandate to provide child protective intervention services, youth services, adoption services, family and rehabilitative services, community corrections, child care services and residential services (Labrador Grenfell Health 2007).

Mental Health Services are provided at the CWJ. It has two addictions counsellors, one addictions coordinator/officer, 4.5 mental health counsellors as well as the regional mental health and addictions clinical manager. Churchill Falls employs one part time mental health nurse. Wait times for mental health counselling in Labrador City are up to four to six weeks, as position vacancies are a challenge to the department (Aura Environmental Research and Consulting Ltd., 2008).

Shelters

Hope Haven, a shelter and resource facility for women and children escaping domestic abuse, opened in 2004. The building can accommodate up to 225 women and children each year. It was expected to expand with the addition of ten new affordable housing units during the summer of 2008, but plans were put on hold due to construction delays (CBC 2008).

Ambulance Service

Labrador-Grenfell Health operates a provincial air ambulance service out of St. Anthony. In addition, it operates road ambulances, has specialized equipment to facilitate medical evacuation by snowmobile and provides physician/nursing escorts and paramedic services (Labrador-Grenfell Health 2007).

IOC also services Labrador City and surrounding area with an industrial ambulance that serves as a back up to the town's ambulance (A. Johnson, pers. comm.).

Upper Lake Melville

Facilities and Services

There is one hospital in Upper Lake Melville, the Labrador Health Centre in Happy Valley-Goose Bay. The Labrador Health Centre offers full diagnostic and rehabilitative services and it is the referral centre for the community clinics in North West River, Mud Lake and Sheshatshiu. It is equipped with 26 beds and has a 24-hour Emergency Department, as well as out-patient clinics. When fully staffed, the Labrador Health Centre has 12 full-time physicians.

Specialists at the hospital include a general surgeon, an anaesthetist, and an obstetrician and gynecologist. Special clinics offered by the hospital include a well-woman clinic and several clinics offered by visiting specialists (D. Rashleigh, pers. comm.).

There is one long-term care facility in Upper Lake Melville. The Harry L. Paddon Memorial Home in Happy Valley-Goose Bay offers Level 2, 3, and 4 nursing care to residents (T. Dyson, pers. comm.). The Paddon Home has 29 rooms, including seven single-occupancy, 20 double-occupancy, one respite and one special care. A senior citizens' home located on the grounds of the Paddon Home is staffed by registered nurses, licensed practical nurses and personal care attendants on a 24-hour basis. Seniors' care is supplemented by visiting doctors and other services are available from various visiting professionals (Healthy Newfoundland and Labrador ND). The Paddon Home is more than 30 years old and not designed for patients with high care needs. In 2003 a need was identified to construct a new long-term care facility in Happy Valley-Goose Bay (NLDLAA 2006) which is under construction and should be completed in 2009.

Mental health and addictions services are located in the Labrador Health Centre and are staffed by a regional director, an addictions counsellor, an addictions coordinator, four mental health counsellors, an adolescent services coordinator and a community youth network coordinator. The Happy Valley-Goose Bay office is primarily responsible for services in other communities in Labrador, with the exception of Labrador City and Wabush.

Shelters

Libra House, located in Happy Valley-Goose Bay, has 10 beds and provides support programs and safe shelter for women and children in Upper Lake Melville and those from North Coast communities. In Sheshatshiu, the Nukum Munik Shelter provides 24-hour service and is funded by Indian and Northern Affairs Canada, the CMHC, and is sponsored by the Sheshatshiu Innu Band Council. Both shelters are sufficient to meet current demand, but are frequently at capacity.

Public Health

The Public Health Unit in the Labrador Health Centre is responsible for providing health clinics to the public including childbirth education, postnatal, child health and school health. It employs three public health nurses. It also employs a discharge planner and community supports coordinator, a regional home nursing coordinator, and a full-time communicable disease control nurse. A full-time medical officer of health, a regional cervical screening coordinator, a regional health promotion coordinator and a regional director are also on staff. The Public Health Unit is presently recruiting another continuing care nurse due to increasing demands related to acute care services (T. Dyson, pers. comm.). Labrador-Grenfell Health, under the direction of the medical officer of health, also offers a variety of programs that are aimed at health protection. Programs include Environmental Health, Communicable Disease Control, and Health Emergency Management (Labrador-Grenfell Health 2007).

Emergency Services

The Labrador Health Centre in Happy Valley-Goose Bay has an Emergency Department that is open 24 hours a day, seven days a week. On average, the Emergency Room sees 60 clients in a 24-hour period and approximately one-third of these are seen during the day (S. Jesseau, pers. comm.). Labrador-Grenfell Health operates a provincial air ambulance service out of St. Anthony on the Northern Peninsula and the Labrador Health Centre has its own plane in Happy Valley-Goose Bay to move patients to and from the Labrador coast. Labrador-Grenfell Health also operates road ambulances, has specialized equipment to facilitate medical evacuation by snowmobile and provides physician and nursing escorts and paramedic services (Labrador-Grenfell Health 2007).

The Labrador Ambulance Service in Happy Valley-Goose Bay is privately owned and operates two vehicles that service Happy Valley-Goose Bay and Mud Lake (albeit, in the latter case, only once patients have been transported across the river). The Labrador Ambulance Service is staffed by nine emergency response technicians, two of whom are full-time. The Service responded to 743 calls in 2007, up from 685 calls in 2004. Labrador Ambulance Service personnel believe that they could support additional demands (J. Squire, pers. comm.; J. Stacey, pers. comm.).

North West River has one ambulance, which is operated by the Labrador Health Centre, to serve people in North West River and Sheshatshiu. 5-Wing Goose Bay also has an ambulance that responds only to airfield emergencies.

Québec Communities

Since 2001, healthcare and social services in Kawawachikamach have been provided by the Naskapi Local Community Service Centre (CLSC) (Naskapi Nation 2008 – Naskapi Corporate Organizations List; M-S Lapointe, pers. comm.). The CLSC is administered by a board of directors composed mainly of Naskapis, overseen by the Council of the Nation, and jointly funded by Health Canada and the Government of Québec (Naskapi Nation 2008 – Naskapi Corporate Organizations List).

The CLSC employs 18 staff, including six nurses, three part-time physicians and one part-time dentist (Table 4.20). It offers minor emergency services, sampling and diagnostic services, nurse/physician consultation, home care, childhood prevention and promotion services, pharmacological services, pre- and post-natal services, psycho-social services, immunization, medical transportation of patients, and specialist services for dentistry, opthamology, otorhinolaryngology, nutrition, psychology, ergotherapy, and occupational therapy.

Table 4.20 Staff Employed by the Naskapi Local Community Service Centre, 2008

Position	Number of Employees
Nurses, full-time	2 nurses
Nurses, part-time	4 nurses
Physicians, full-time	1
Physicians, part-time	3
Dentists, part-time	1
Social Workers	2
Other, full-time	1 physio-therapist,
Other, part-time	2 Secretarial, 3 Support staff
Source: Marcel Lortie, pers. comm.	

CLSC medical services are provided exclusively to the Naskapi. However, emergency services are provided to people outside of the community, with the cost for such services billed to the Québec provincial government (L.M. Lortie, pers. comm.). The CLSC's medical centre and social services currently operate at capacity, and the CLSC has incurred a deficit each year since 2007. Current staffing levels cannot accommodate the growth of Kawawachikamach, which is expected to see a doubling of population within 15 years (L.M. Lortie, pers. comm.).

Schefferville Aboriginal healthcare and social services have been provided by the Innu Local Community Service Centre (CLSC) (M-S Lapointe, pers. comm.). The CLSC is an incorporated body administered by a board of directors composed mainly of and jointly funded by Health Canada and the Québec provincial government. The Innu CLSC employs 16 staff (Table 4.21). The dispensary provides the following services for the Innu community: minor emergency services; pharmacological services; sampling and diagnostic services; pre- and post-natal services; nurse/physician consultation; psycho-social services; home care; immunization; childhood prevention and promotion services; medical transportation of patients; specialization in diabetes treatment and prevention; and specialist services for dentistry, opthamology, otorhinolaryngology, nutrition, psychology, ergotherapy, and occupational therapy.

Table 4.21 Staff Employed by the Innu Local Community Service Centre, 2008

Position	Number of Employees
Nurses, full-time	2
Nurses, part-time	2
Physicians, full-time	3
Physicians, part-time	1
Dentists, part-time	1 (up for 2 weeks at a time)
Social Workers	2 child protection services
Other, full-time	2 psychologists come up for 2 weeks per month
Other, part-time	3 support staff
Source: Marie-Sylvie Lapointe, pers. comm.	

The Dispensarie de Shefferville provides the non-Aboriginal community with the following health care services: minor emergency services; pharmacological services; sampling and diagnostic services; pre- and post-natal services; nurse/physician consultation; medical transportation of patients; and immunization. The Schefferville CLSC has six staff, including four nurses, one full-time physician and one part-time dentist, but no psychologists or child care workers (Table 4.22).

Table 4.22 Staff Employed by the Schefferville Local Community Service Centre, 2008

Position	Number of Employees
Nurses, full-time	3
Nurses, part-time	1
Physicians, full-time	1 (1 to 2 month full time rotation
Dentists, part-time	1 (up for 2 weeks at a time)
Social Workers	None listed
Source: Helen Littlejohn, pers. comm.	

4.3.3.7 Education

Labrador West

Childcare and Early Childhood Education

The one early child care facility in Labrador West is located in Labrador City. Wee College Childcare Centre accepts children aged 2 to 6 years and can accommodate 32 children on a part-time basis (NLDHCS 2004).

Primary, Elementary and High School

There are four schools in Labrador City and Wabush (Table 4.23). Three are managed by the Labrador School Board and one is managed through the Conseil Scolaire Francophone Provincial de Terre-Neuve-et-Labrador. Between the 2000-01 and 2007-08 school years, the total student enrolment in Labrador West increased by 8.9 percent, from 1,387 to 1,510. During that time, the number of full-time teacher equivalents increased by only 0.3 percent (Newfoundland and Labrador Statistics Agency 2008). The Labrador School Board has had problems with the recruitment and retention of teachers (The Aurora, 2007a).

Table 4.23 Schools, Enrolment and Number of Teachers, Labrador City and Wabush, 2007/08

School	Location	Grades	Enrolment 2007/08[A]	Full-Time Equivalent Teachers 2007/08	Pupil-Teacher Ratio	School Capacity
A.P. Low Primary	Labrador City	K-3	402	24.0	14.7	600[B]
Menihek High	Labrador City	8-12	594	35.5	17.1	800[C]
Centre Educatif L'ENVOL	Labrador City	K-8, 10, 12	31	4.0	7.8	
J. R. Smallwood Middle	Wabush	4-7	485	30.8	15.3	1000[D]

[A] T. Pye pers. comm.
[B] S. Kennedy pers. comm.
[C] L. Simmons pers. comm.
[D] H. Costa pers. comm.

Post-Secondary

Post-secondary education is available in Labrador West through the College of the North Atlantic, which has a campus in Labrador City. Approximately 200 full-time and part-time students are registered there each semester (Table 4.24). An additional 200 students participate in continuing education evening courses (College of the North Atlantic 2008). The Labrador West CNA campus is the only campus in the Province to offer a two-year Mining Technician program and has been designated CNA's Mining Centre of Excellence. In 2007, a millwright and an electrical program began to be offered. In 2008, a welder program was added to the campus' trades offerings.

Table 4.24 Enrolment by Program, College of the North Atlantic, Labrador City Campus, 2008/2009

Trade Program	Number of Seats	Capacity
Welder	15	15
Construction/Industrial Electrician	16	16
Industrial Mechanic (Millwright)	16	16
Mining Technician (1st-year)	33	60
Mining Technician (2nd year)	66	75
Adult Basic Education	18	18
CAS Transfer: College- University	20	60
Engineering Technology (First Year)	5	30
Total Number of Students	**189**	**290**
Source: R. Sawyer pers. comm.		

The Government of Newfoundland and Labrador has allotted $18.1 million to build a new facility for the College of the North Atlantic in Labrador City (Government of Newfoundland and Labrador 2008). The building of the new facility will begin in late spring or early summer 2009 and will be finished in September 2010.

There is one private training institution, RSM Safety Institute, Inc., in Labrador City. It is a subsidiary of RSM Mining Services and offers 40 to 50 occupational health and safety training services for the mining and construction industries. These include Accident Investigation, Forklift Operation and Safety, Excavation and Trenching Safety and Safety for Supervisors. Class sizes at the Institute range from one to 40 participants, depending on the type of course and time of year. Courses are offered on a monthly schedule but are also available on an as-needed basis and typically are no longer than two days. Courses are generally offered in English, and some are offered in French (K. McCarthy, pers. comm.; K. Lee, pers. comm.).

Upper Lake Melville

Primary, Elementary and High School

There are six primary and secondary schools in Upper Lake Melville, including one francophone school (Table 4.25). Four are in Happy Valley-Goose Bay, while North West River, Sheshatshiu and Mud Lake each have one. Kindergarten through Grade 12 is offered in all of the communities except Mud Lake, which provides only Kindergarten through Grade 9 (Our Labrador 2004). The schools in the area have a total enrolment of 1,901 and the physical capacity to accommodate 2,340 students (Table 4.25).

Table 4.25 Student Populations, Primary and Secondary Schools, 2006/2007

School	Location	Grades	Service Areas	Number of Registered Students	Physical Capacity of School	Number of Full-time Equivalent Teachers
Peacock Primary	Happy Valley-Goose Bay	K-3	Happy Valley-Goose Bay	394	500	25
Queen of Peace Middle School	Happy Valley-Goose Bay	4-7	Happy Valley-Goose Bay	425	525	29
Mealy Mountain Collegiate	Happy Valley-Goose Bay	8-12	Upper Lake Melville Area	594	700	36
Lake Melville School	North West River	K-12	North West River and Sheshatshiu	118	200	11
Mud Lake School	Mud Lake	K-9	Mud Lake	4	15[A]	1
Peenamin Mackenzie School	Sheshatshiu	K-12	Sheshatshiu	351	400	34.5
École Boréale de Goose Bay	Happy Valley-Goose Bay	K-12	Happy Valley-Goose Bay and Sheshatshiu	15	N/A	3
Total				**1,901**	**2,340**	**139.5**

Note:
[A] The capacity of the school is 15 students, depending on the number of grades being taught in a given academic year.
Source: Newfoundland and Labrador Statistics Agency 2008.

The 2007 provincial budget includes $4 million to construct a new school in Sheshatshiu and $1.3 million to replace the francophone school in Happy Valley-Goose Bay (NLDF 2007).

Post-Secondary

Each year, the Happy Valley-Goose Bay campus of the CNA admits approximately 300 full-time students in a variety of programs, including Adult Basic Education, Automotive Service Technician and Office Administration (Table 4.26).

The CNA has recently expanded its Happy Valley-Goose Bay campus by adding six classrooms and a new library. The Labrador Institute is also co-located on the CNA campus. These changes will allow CNA to accommodate 200 additional students and will add to its overall service capacity to the Upper Lake Melville area (W. Montague, pers. comm.).

Table 4.26 College of the North Atlantic, Enrolment by Program, Happy Valley-Goose Bay Campus, 2005/2006

Program	Number of Students
Adult Basic Education	51
Office Administration	12
Office Administration (Executive)	10
Computer Support Specialist	5
Early Childhood Education	10
Millwright/Industrial Mechanic	16
Welding	15

Program	Number of Students
Automotive Service Technician	16
Heavy Duty Equipment Technician	17
Carpentry	10
Construction/Industrial Electrical	14
Integrated Nursing Access	17
Comprehensive Arts and Sciences: Transition [A]	31
Comprehensive Arts and Sciences: College University Transfer	32
Orientation to Trades and Technology	15
Total [B]	**271**

Source: S. Cochrane, pers. comm.
Notes:
[A] This program is for students that graduate from high school but may not have the requirements to get into a program
[B] These do not include figures for Adult Basic Education for the coastal Learning Centres, other contract programs, or advanced trades training.

Québec Communities

The Sachidun Childcare Centre in Kawawachikamach has Naskapi as its operational language and delivers the Aboriginal Head Start program. Funded by Health Canada, it prepares Aboriginal children for school by meeting their emotional, social, nutritional, and psychological needs (NNK 2008). The Centre is administered by a Board of Directors and employed more than 15 individuals, including six permanent educators, during 2007-08 (NNK 2008). It is presently operating at its capacity of 26 children, including two spaces reserved for emergency cases referred by Social Services (NNK 2008; M. Mameanskum pers. comm.).

The Garderie Matimekush daycare is located in Schefferville within the reserve of the Matimekush/Lac John Nation and currently provides places for 26 Innu children, which is its legal capacity. The Garderie employs five early childhood educators and two support staff.

Two schools, both managed by the Central Québec School Board, serve the Québec communities (Table 4.27).

Table 4.27 Schools, Enrolment and Number of Teachers, Eastern Québec, 2007/08

School	Location	Grades	Enrolment 2007/08	Full-Time Equivalent Teachers 2007/08	Pupil-Teacher Ratio
Jimmy Sandy Memorial School	Kawawachikamach	K-11	238	23.0	10.34
École Kanatamat Tahitipetetamunu	Schefferville	K-11	130	23	5.7

Table 4.28 Staff Employed by Jimmy Sandy Memorial School, Kawawachikamach, 2008

Position	Number of Employees
Teachers	23
Guidance Counsellor	1
Librarian	1
Liaison Officer	2
School Administration	6
Bus Transportation	2
Janitorial	2
Total	37

There are 238 students attending the school, providing an average of 10.34 students per teacher. The school also employs a special education teacher (NNK 2007: 92-93). The Government of Québec has approved further funding for the Adult Education Programme, which will facilitate the addition of more adult education resources (NNK 2007: 92).

Matimekush/Lac-John is served by a single K-11 school, École Kanatamat Tahitipetetamunu, in Schefferville (Table 4.29). During the 2007/08 academic year its enrollment was 130, an increase from 115 students in 2006/07 (C. Basque pers. comm.; INAC 2008 – Matimekush/Lac John First Nation). The school has 23 teachers, with a student-teacher ratio of 5.7:1 (Table 4.28). There is also a resource specialist, an administrator serving as Principal and Vice-Principal, a secretary, and two psychologists. The Principal has stated that the school structure could accommodate up to an additional 50 students (C. Basque pers. comm.).

Almost all of the École Kanatamat Tahitipetetamunu students are Innu; only two are non-Aboriginal. The languages of instruction are French and Innu, in keeping with the mandates of the provincial education authority (C. Basque, pers. comm.). The school currently has 30 adolescents who have dropped out without achieving Secondary 3 (M. Beaudoin, pers. comm.).

Table 4.29 Staff Employed by École Kanatamat Tahitipetetamunu, Schefferville, 2008

Position	Number of Employees
Teachers	23
Resource Specialist	1
Psychologists	2
Secretary	1
Principal/Vice-Principal	1
Bus Transportation	1
Janitorial	1
Total	30

4.3.3.8 Recreation

Labrador West

There are a number of indoor recreational facilities in Labrador City and Wabush. The Labrador City Arena is a gathering point for recreation in Labrador City. The building can accommodate 1,800 people and it has one rink which hosts large tournaments, games and activities. It has five dressing rooms, a meeting room and is also home of the Polaris Figure Skating Club and Labrador West Minor Hockey Association. Wabush also has an arena that is used by the Wabush Figure Skating Club, Labrador West Minor Hockey, Recreational and Olympic Hockey (Labrador West 2008). Other indoor recreational facilities in Labrador City and Wabush include the Carol Lake Curling Club and the Mike Adam Recreation Complex.

Outdoor activities are also popular in Labrador West as it has a number of walking trails, softball fields, soccer pitches and Labrador's only 18-hole golf course. The Jean Lake recreational area in Wabush is used extensively by local organizations for their outings. Outdoor sport clubs in the area include the Menihek Nordic Ski club and the White Wolf Snowmobile Club (Labrador West 2008).

Upper Lake Melville

Happy Valley-Goose Bay has indoor and outdoor recreation facilities. NLDTCR operates the Labrador Training Centre in the town which houses the only swimming pool in Eastern Labrador, a gymnasium which is used for numerous community activities, a fitness room, and a judo room. Other sport facilities in Happy Valley-Goose Bay include a 1,000 seat arena, soccer and softball fields operated by the Town Council and four school gymnasiums (DND 2008). The Amaruk Golf and Sports Club operates a nine-hole golf course in the Summer.

5 Wing Goose Bay also has recreational facilities, including a full-scale gymnasium, an exercise room, two squash courts, a fully equipped weight room and two sauna baths. Other recreation facilities administered by the Base include a 10-bay auto hobby shop, a wood hobby shop and a softball field. Cultural recreation opportunities have also been increased with the development of a new theatre located adjacent to the new high school.

Québec Communities

The Kawawachikmach Recreation Facility provides an indoor pool (supervised), supervised indoor gym, and a snack bar. It provides employment to 13 staff including one recreation and sports coordinator, one manager, two lifeguards (two trainees), four games room attendants, and two janitors.

The community centre (NNK 2007) provides space for clubs to meet, community feasts and gatherings, family reunions, dances and fundraising activities. The centre has a multi-purpose room, a community library, a youth centre with couches, pool table, ping-pong table, big-screen television, a stereo and board and electronic games and three public-use computers with Internet access. It provides employment to 14 staff.

Other recreation facilities in the Kawawachikmach area include an open area hockey rink, basketball court and softball field.

The only recreation facility in Schefferville is an arena that is paid for by the Town and the Nation Innu Matimekush-Lac John. It provides ice hockey and skating on the indoor rink, with a snack bar and change rooms, and employs a recreation director and a support/maintenance person.

4.3.3.9 Transportation

Labrador West

Roads

The Trans Labrador Highway (TLH) is the primary public road in Labrador. Phase I of the TLH (Route 500) runs between Labrador West and Happy Valley-Goose Bay. In Labrador West it connects with Québec Route 389, which runs 570 kilometres north from Baie-Comeau to the Québec-Labrador border. This section of the TLH is a two-lane gravel highway between Labrador City and Happy Valley-Goose Bay. It has a service level of “A” (free-flowing traffic), with a capacity to carry 1,000 vehicles per hour. Currently, the highway carries 200 vehicles per day (D. Tee, pers. comm.).

The 2007-08 provincial budget allocated $15 million to commence hard-surfacing of Phase I of the TLH. In June 2007, tenders were issued to widen three sections of road in preparation for hard-surfacing, including a section in Labrador West and a section from Churchill Falls to the Churchill Falls Airport. Crews managed to widen 37 kilometres of road and complete 1.8 kilometres of hard-surfacing by March 31, 2008 (NLDTW 2008).

Airport

Labrador City and Wabush are serviced by the Wabush Airport, which is located within 5 kilometres of each town's centre. A number of air carriers operate scheduled flights, including Air Labrador, Air Canada Jazz and Provincial Airlines Ltd. (Labrador West 2008). The paved runway strip is 1948 m in length.

In 2006, Wabush Airport reported the highest percentage gain in airport passenger movements (16 percent) mainly due to a rise in mining activity. Between 2006 and 2007, the number of passenger movements at the airport in Labrador West increased by 6.2 percent, from 67,180 to 71,344 (NLDTCR 2007).

Railway

IOC operates the 420-km Québec North Shore and Labrador Railway (QNS&L), which IOC built to move iron ore to Sept-Îles. It also provides regularly scheduled, year-round, passenger service (NLDTW 2006). In 2005, Tshiuetin Rail Transportation Inc. (TRH) acquired the northern section of the QNS&L Railway line (the Menihek Subdivision), which runs between Emeril Junction, situated on the Trans Labrador Highway, 63 kilometres from Labrador West, and Schefferville, Québec. TRH now operates this portion of the rail line for passenger and freight rail services (Labrador West 2008).

Upper Lake Melville

Roads

The local road system in Upper Lake Melville links Happy Valley-Goose Bay with North West River and Sheshatshiu. Mud Lake is not accessible by road but can be reached by boat in summer and by snowmobile in winter. The roads in Happy Valley-Goose Bay are paved, as are some in North West River, but those in Sheshatshiu are not.

Construction on Phase III of the TLH, a 280-km section connecting Cartwright Junction and Happy Valley-Goose Bay, is scheduled to be completed in 2009. As a result of these road improvements, established trucking companies may face increased competition from other companies moving into the area (AMEC Earth and Environmental Ltd. and Gardner Pinfold 2008).

Ports

The Port of Goose Bay is on the western end of Lake Melville in an area known as Terrington Basin and has two industrial docks. Infrastructure includes storage sheds, asphalt and fuel tanks and a transshipment warehouse. There is also a substantial area of laydown space. There is a large area of land within easy access of these docks that could be converted to suit a variety of industrial needs.

Terrington Basin cannot handle large freight or passenger vessels and would require significant dredging for expansion of services (CLEDB 2006). The dock receives three to four oil tankers each year and one freighter every two weeks between mid-June and mid-November, which is the current operating season (D. Tee, pers. comm.).

Airports

Both civilian and military aircraft use the Goose Bay Airport, at 5 Wing Goose Bay. Operated by the Goose Bay Airport Corporation, it is one of the largest airports in eastern Canada. A number of air carriers operate scheduled flights, including Air Labrador, Air Canada Jazz and Provincial Airlines Ltd.

(which operates Innu Mikun Airlines), as well as Universal Helicopters and Canadian Helicopters (NLDTW 2006).

The airport has two runways, 3,367 m and 2,920 m in length, both capable of handling large aircraft. DND spent approximately $20 million on resurfacing and concrete replacement during the summer of 2006. The airport terminal was constructed in 1972 and has a design capacity of 32,000 people per year, but it is now handling more than three times this capacity. The number of passengers flying into the Goose Bay Airport in 2003 was 83,430 and in 2005, the number increased to 104,612, an increase of 15.1 percent. However, in 2006, only 94,422 passenger movements were recorded for the Goose Bay Airport, a decrease of 9.7 percent from 2005. They increased again in 2007 by 1.6 percent to 95,921 (NLDTCR 2007).

The Goose Bay Airport Corporation has hired a design and engineering firm to complete the plans for an improved and expanded terminal facility at its current location. Construction of the new terminal will begin in April 2009 and should be completed by the fall of 2010. The new facility will be able to accommodate an annual flow of 100,000 passengers, with further expansion capabilities incorporated into the design (G. Price, pers. comm.).

Québec Communities

Schefferville has an 8 km municipal road network, including access roads to such transport infrastructure as the airport and railway station. A municipal road also connects to the provincial highway, giving access to the community of Kawawachikmach. The municipal limits also contain approximately 200 kilometres of former mining roads constructed by IOC. These are on government land and give access to resources mostly in Labrador. They also lead to the resort area of Squaw Lake, Chatal Lake and Maryjo Lake. The municipality has no obligation to maintain these access roads (M. Beaudion, pers. comm.).

Several companies fly into Schefferville Airport, including Air Saguenay, Aviation Québec, Air Labrador and Air Inuit. The airport has a 1500 m runway, and employs four people. It is owned by Transport Canada and managed by the Societe aeroportuaire de Schefferville, representing the Naskapi Nation of Kawawachikamach, the Municipality of Schefferville and the Innu Nation of Matimekosh Lac-John (M. Beaudion, pers. comm.)

Schefferville is also served by the Menihek subdivision of the Québec North Shore and Labrador Railway, which delivers most of the freight that comes into the community, because there are no roads linking it to external communities.

4.3.3.10 Water, Sewer, Solid Waste, Power and Communications

Labrador West

Water

Beverly Lake, which is located northeast of Labrador City, is the Town’s only municipal water supply.

The municipal water supply in Wabush comes from Ouananiche Lake, which is located south of the town. The Town of Wabush has a grid distribution network which services approximately 700 households and businesses (Labrador West 2008).

Sewer

The Town of Labrador City maintains two separate primary Sewage Treatment Plants and three sewage lift stations (Labrador West 2008).

The Town of Wabush maintains one primary Sewage Treatment Plant. The town is in the process of upgrading the plant to better serve the residents of Wabush.

Solid Waste

The garbage from both towns is currently sent to an incinerator, however, in accordance with the Province's waste management plan it is scheduled to close by December 21, 2008. A study was commissioned in early 2008 to determine whether Labrador should develop one super-site to accommodate all of the garbage from Labrador West and Labrador East. In the meantime, the Labrador West regional waste management committee is considering setting up a temporary landfill at an old dump site (Morrissey 2008).

Power and Communications

Power is provided to Labrador West by Newfoundland and Labrador Hydro. Labrador City and Wabush are equipped with technological and telecommunications infrastructure with advanced fibre optic cables throughout communities and industrial sites. Internet service is provided to the communities by Sympatico and CRRS (Labrador West 2008).

Upper Lake Melville

Water

Happy Valley-Goose Bay, North West River and Sheshatshiu have piped water systems, while Mud Lake has ground wells that are fed by seepage from the Churchill River. Happy Valley-Goose Bay receives its water from two sources: the Water Treatment Plant and Spring Gulch, each of which provide 50 percent of the water to the town (Town of Happy Valley-Goose Bay 2001). The water system can support a population of about 12,000 people, but is currently serving only approximately 9,150 (S. Normore, pers. comm.).

Sewer

Happy Valley-Goose Bay and North West River have piped sewage systems that serve all dwellings. Most houses in Sheshatshiu and Mud Lake have septic systems. (S. Normore, pers. comm.)

Solid Waste

The landfill in Happy Valley-Goose Bay (3 kilometres north of Goose Bay Airport) has the capacity to last another 12 to 15 years at current use levels. Sheshatshiu and North West River have their own garbage collection services, but use the landfill in Happy Valley-Goose Bay. This may change in the future as the provincial government is in the process of setting up regional landfill sites (S. Normore, pers. comm.).

Power and Communications

Newfoundland and Labrador Hydro provides electricity to all communities in Upper Lake Melville with power generated at Churchill Falls. The communities of Mud Lake, North West River and Sheshatshiu are all part of the Happy Valley-Goose Bay interconnected service area. Aliant Telecom (Aliant) provides telephone service to Labrador through a microwave radio network.

Québec Communities

Waste Disposal

The present landfill opened in 1997 and services the three communities of Kawawachikamach, Lac-John and Schefferville. The lifespan of the landfill was originally 21 years although due to an absence of a waste management plan for discarded electrical appliances and other scrap metals, the life span has been reduced to approximately 15 years. Under Québec legislation, waste materials generated outside Québec cannot be disposed of in a landfill in Québec. Consequently, mining companies operating in Labrador have to have their own management plan for the disposal of all waste material including vehicles, tires of all size and scrap metals (M. Beaudoin. pers. comm.).

Water Supply and Sewage

In Schefferville, drinking water is taken from Lac Knob which lies within the municipal boundary. The chlorination and pumping station is gravity fed, with water being distributed to the community at large via waterlines that serve both Schefferville and the Matimekosh reserve. The sewer and water systems were both originally installed in 1955. A physico-chemical wastewater treatment system was installed in 1999.

In Kawawachikamach, water is supplied to households from two community wells with a pump station, while sewage is pumped to a community septic tank and lagoon.

4.3.3.11 Police and Emergency Response Services

Labrador West

Police services are provided to Labrador City and Wabush by the Royal Newfoundland Constabulary (RNC). In 2007, there were 22 police officers in Labrador West, 18 of whom were male and four of whom were female (Statistics Canada 2007).

The Labrador City Fire Department provides fire protection services to that community and answers an average of 60 calls each year (Labrador West 2008). The Town of Wabush operates a volunteer fire department consisting of 28 firefighters. They protect the residents of Wabush and offer backup to the Town of Labrador City. This department also provides services to Wabush Mines and the Wabush Airport.

Upper Lake Melville

The Royal Canadian Mounted Police (RCMP) is responsible for policing Upper Lake Melville and other parts of Labrador, with the exception of Labrador West. The Labrador District RCMP Headquarters in Happy Valley-Goose Bay has a staff of three. The Happy Valley-Goose Bay detachment is staffed by a Sergeant, two Corporals, 11 General Duty Constables, a District Support Services member, two General Investigation Section (GIS) Investigators and a Community Constable. Sheshatshiu is policed by the RCMP with consultation with and input from the community (RCMP 2008).

There are three fire departments in Upper Lake Melville. There is a municipal department in Happy Valley-Goose Bay with 34 firefighters, 30 of whom are volunteers and four of whom are full-time firefighters (D. Webber, pers. comm.).

5-Wing Goose Bay also has a fire department operated by DND and staffed by 39 paid firefighters. It provides 24-hour crash and emergency rescue services and general fire protection services for the Base.

Québec Communities

As for other remote areas of Québec, police services are ensured by the Surete du Québec through an outpost station. Of the four positions allocated for Schefferville, there are usually only two full-time police officers at the station considering assignments, training and vacation benefits. Upon request, they provide support to the native police forces of NIMLJ and Kawawachikmach (M. Beaudoin, pers. comm.).

For Schefferville and Matimekush-Lac John, policing is provided by the Surete du Québec, with an agreement to co-ordinate with the Naskapi police of Kawawachikamach when necessary. There are five employees including one support worker, three officers on patrol with one exchange person. At least two of the officers are available specifically to provide police services for the Innu reserve. For Kawawachikamach, policing is provided by the Naskapi Police Force. It has nine employees, including a director, an assistant director, five full-time officers, and a secretary/janitor.

For Schefferville and the Nation Innu Matimekush-Lac John, fire services are administered by the Town of Schefferville (Boudreau, pers. comm. and Securite Publique Québec website). There is a part-time fire chief as well as 15 volunteer firefighters. In Kawawachikamach, the Fire Department provides fire suppression and rescue, fire prevention and public fire safety education. It employs a full-time fire chief, one deputy fire chief, three team captains and 11 volunteer firefighters.

All ambulance services for Schefferville, Innu Matimekush-Lac John reserve and Kawawachikamach are handled by Ambulance Porlier, which provides continual coverage via dispatch for ambulance services throughout Eastern Québec. It employs three dispatchers and on-call drivers using two ambulances on rotation.

4.3.3.12 Local Government

Labrador West

Both Labrador City and Wabush are municipalities, each with a mayor and a town council.

Upper Lake Melville

Happy Valley-Goose Bay is an incorporated municipality administered by a mayor, town council and town manager. Mud Lake, 5 kilometres east of Happy Valley-Goose Bay, is a small unincorporated community of around 60 residents administered by a volunteer Local Improvement Committee.

North West River is 33 kilometres northeast of Happy Valley-Goose Bay. It is an incorporated municipality administered by a mayor, town council and town manager or clerk.

Sheshatshiu is approximately 25 kilometres northeast of Happy Valley-Goose Bay and adjacent to the settlement of North West River. It is an Innu community which acquired Federal Reserve status in 2006 and is administered by a Band Council.

Québec Communities

The Innu Nation community of Matimekush-Lac John is governed by an elected Band Council consisting of a Chief and Councillors. The community of Kawawachikamach is administered by the

Band Council, consisting of an elected Chief and Councillors. Schefferville is part of the regional county municipality of Caniapiscau; the regional county municipality seat is Fermont.

4.4 Data Availability and Gaps

The data and information used to describe the existing environmental conditions in the Project area and to inform the environmental effects assessment were obtained by a combination of literature searches and reviews of previous studies, on-site data collection and fieldwork by the Project team, and interviews with experts and local contacts. In general, the information gathered for this assessment is adequate for the purpose of assessing environmental effects and their significance according to the EIS Guidelines as set out by the Government of Newfoundland and Labrador. Environmental issues and controls associated with the proposed Project are well understood due to the knowledge accumulated from the previous mining operations at the site as well as the proposed use of proven mine technology and design. Residual environmental effects can therefore be predicted with a generally high degree of confidence. Additional information gathered during the aerial survey completed in May 2009 (LIM and NML 2009), and subsequent information to be collected (e.g., monitoring of telemetered caribou, genetics analyses) will assist LIM in refining mitigative measures and management plans.

4.5 Future Environment

The following describes the likely future environmental conditions in the proposed Project area if the Project did not proceed. This information is provided to help distinguish Project-related environmental effects from environmental change due to natural and/or other anthropogenic processes and trends in the Project area.

No substantial changes are expected to occur in the Project area with respect to the existing biophysical environment as a result of natural processes. The Project area has been heavily disturbed by past mining operations (up to 50 percent of the landscape on the James North and James South sites, and up to 90 percent of the landscape disturbed on the Redmond site). Without the Project, this landscape would continue to be a heavily disturbed site with flooded abandoned mine pits, a former rail bed, turning yards and stockpiles of mine waste and uneconomical ore materials. The area has remained heavily disturbed since mining on the site halted in 1982, and it is expected that landscape conditions would remain heavily disturbed in the absence of the Project. Given the reclamation plans (revegetation of the site, grading, removal of infrastructure, etc.), the future environment without the Project could actually contain a more heavily-disturbed landscape than if the Project were to go forward through and including land reclamation.

Some wildlife species in the Project area are subject to natural cycles and will likely undergo some natural changes over the designated time period in the absence of the Project. In the absence of the Project, it is expected that present caribou population trends will continue. Air quality in the area is generally good, and in the absence of the Project, air quality could be expected to remain generally the same, perhaps with some marginal improvements resulting from improved air quality regulations and controls in other parts of Canada and the United States that provide some long-range transport of airborne contaminants to the Project area. The effects of climate change on the Project area (as described in Section 7.7.1) will likely result in changes to the existing environment whether or not the Project goes forward.

Without the Project, current trends in the region's socio-economic environment will continue. The populations of the local area communities will continue to decrease (in the absence of other influences or projects), as has been the trend in recent years.

The construction and expansion of other projects in the region are expected to continue with or without the Project. The environmental effects analyses presented in Chapter 7 of this EIS include consideration of the likely future condition of the environment as a result of these other activities in assessing and evaluating cumulative environmental effects.

4.1.4 Hydrology

This section describes the existing hydrological conditions at the James and Redmond properties. Relevant details are summarized in the subsections below with additional details, including field work and hydrological assessment details, presented in Appendix J. The impacts to the existing hydrological regime by the proposed Project, as described in Chapter 3, are presented in Chapter 7.

In general, the drainage systems in the study area are strongly influenced by the underlying geology. Streams and lakes tend to be oriented northwest/southeast to match the strike of the bedrock units. Watershed boundaries are generally quite clearly defined by exposed bedrock ridges that run in a northwest/southeast direction.

4.1.4.1 James Property

The James Property is located at the base of an eastern slope of a prominent northwest/southeast trending bedrock ridge. Bean Lake is located to the east and is the closest lake to the James Property (Figure 4.7).

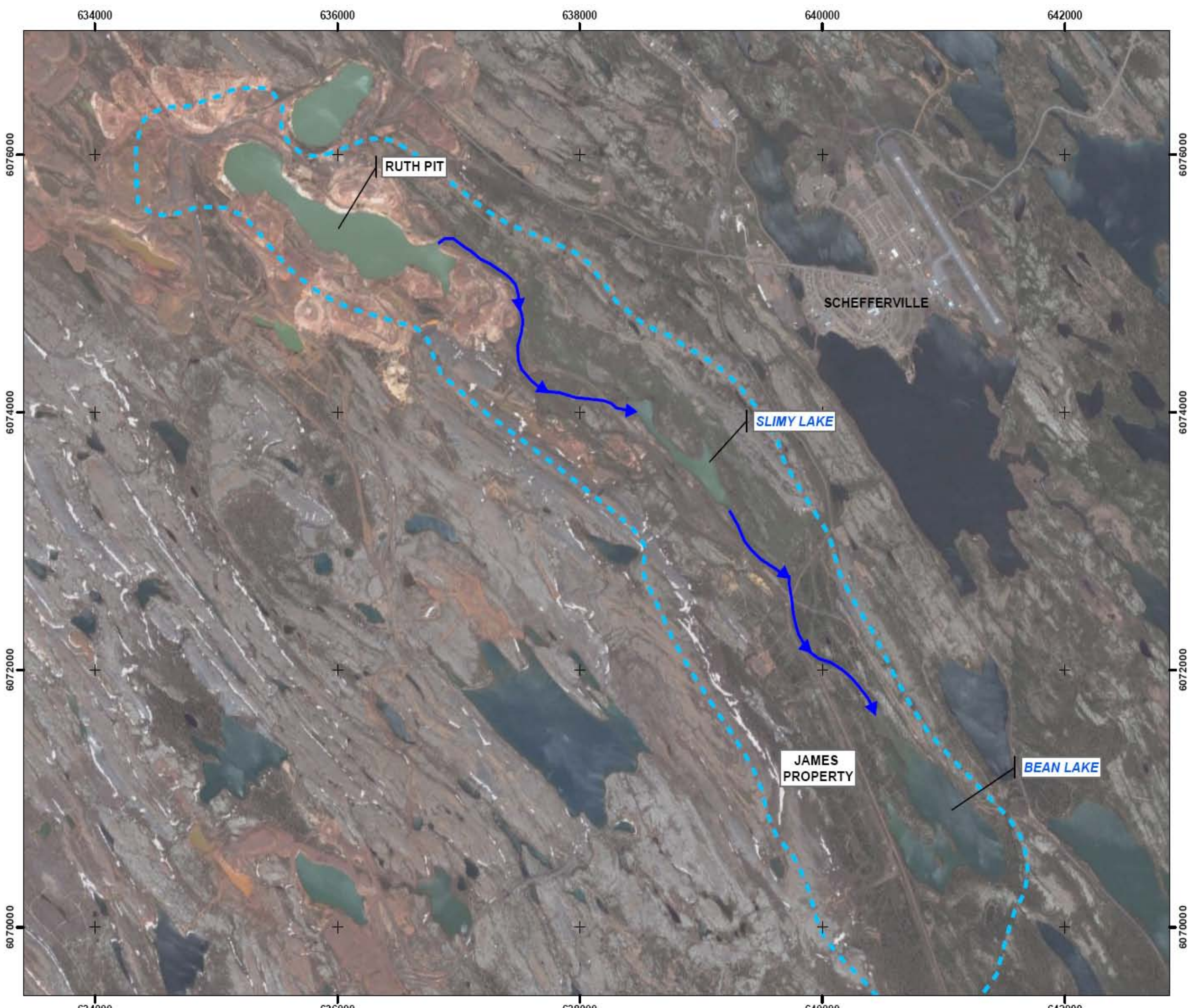


Figure 4.7 James Creek/Bean Lake Drainage Area

Bean Lake is fed primarily by James Creek which enters the lake at its northern-most point. James Creek originates at the Ruth Pit via a submerged/blocked culvert that is located along the east side and towards the south end of the pit. James Creek flows southeast past the south end of Ruth Pit into Slimy Lake, then flows out of Slimy Lake continuing southeast to Bean Lake.

There are two springs on the James Property that form an unnamed tributary that flows directly into Bean Lake. These springs (and tributary) figure prominently in the hydrological assessment of the James Property and to the water balance of the system.

Bean Lake discharges from the southeast and flows into a stream that discharges from Lejeune Lake.

Hydrological measurements were collected in 2008 using stream gauges and groundwater monitoring wells installed and monitored by WESA at appropriate locations across the James Property. WESA also completed an assessment of these measurements and other pertinent data and details of this assessment are presented in Appendix J. A summary of the relevant findings of the assessment is presented below.

James Creek/Bean Lake Water Balance

The measured combined inflows to Bean Lake (surface and groundwater) and the combined outflows (surface water flow and evaporation) are presented in Table 4.5 and Figures 4.8 and 4.9.

Table 4.5 Combined Inflows and Outflows to Bean Lake (needs some formatting)

Inflow and Outflow	June m^3/min	Sep m^3/min
SG4 (Un-named tributary)	2.4	1.2
SG8 (James Creek inlet to Bean Lake)	42.1	46.6
XS-1-N	0.4	0.4
XS-2-S	2.2	2.2
Groundwater Discharge	18.9	18.9
Total Inflow	**66.0**	**69.3**
SG5 (outlet from Bean Lake)	61.0	54.4
Evaporation	0.8	0.8
Total Outflow	**61.8**	**55.2**
Difference	4.2	14.1
Percent Difference	6.6	23

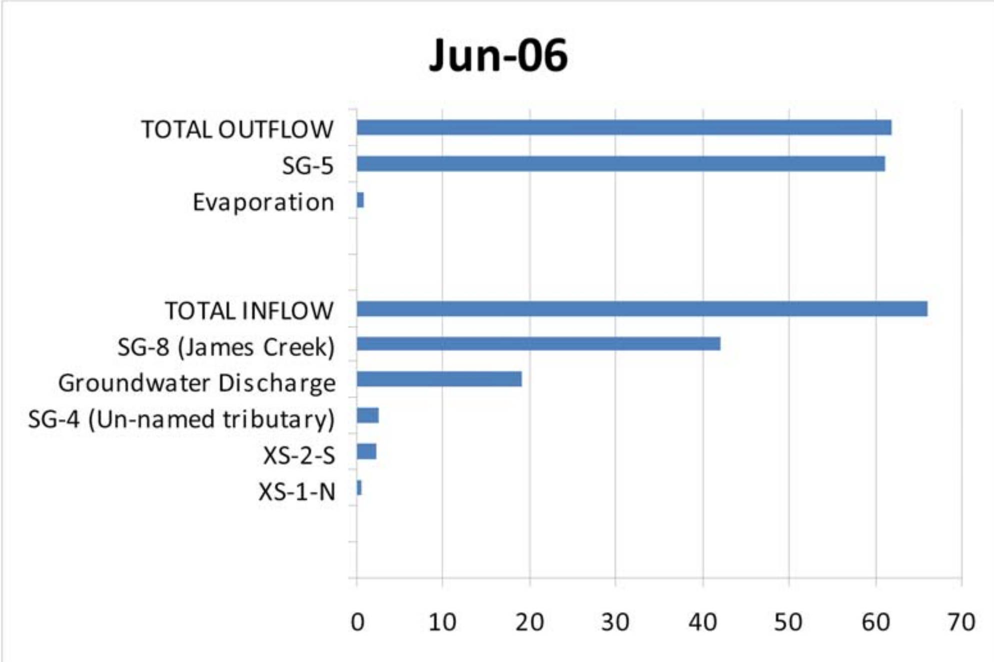


Figure 4.8 Components of the Water Balance for June 6, 2008

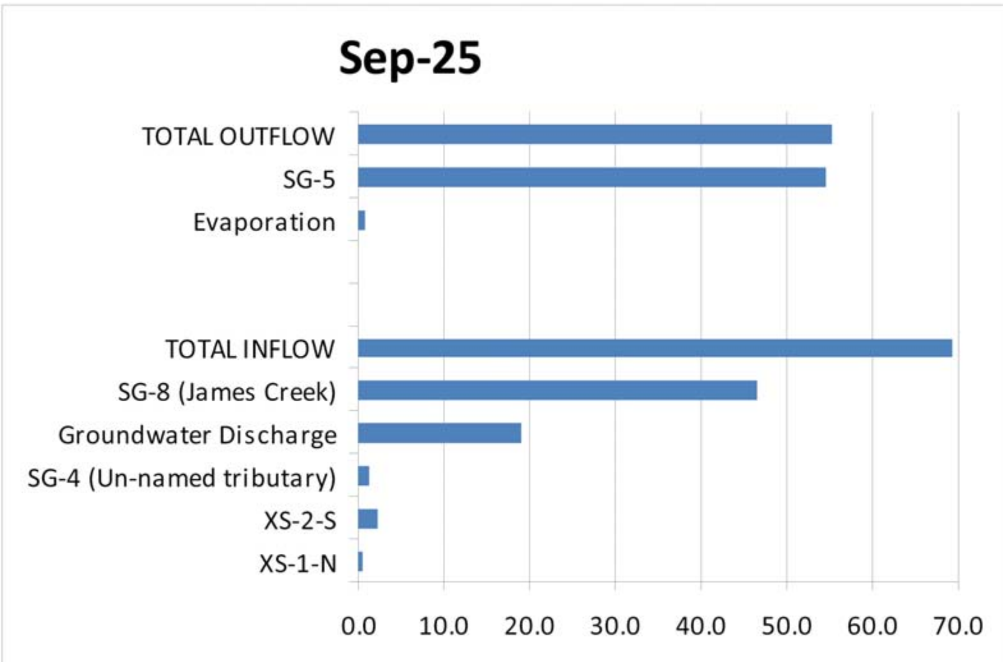


Figure 4.9 Components of the Water Balance for September 25, 2008

The difference between the total inflow and outflow amounts is assumed to represent the cumulative error in the measurements and estimations that make up the components of the water balance. The June values balance closely while the balance for September is not as close. The total inflow values to Bean Lake were consistent between the June and September 2008 measurement periods. The component with the greatest unknown degree of accuracy is the groundwater flux, because the cross-sectional area of flow was determined based on an estimate of the width and depth of the groundwater zone that discharges to Bean Lake, and the zone may differ from the estimate. More wells closer to the lake would be required before a more precise groundwater flux estimate could be developed; however, this is not considered to be necessary at this time because flow estimates were sufficiently accurate for assessment purposes. The outflow estimate from Bean Lake was lower in September than in June; it is possible that the groundwater discharge to Bean Lake decreased over the course of the summer and/or that water from the lake was lost to groundwater later in the season.

Overall, the June and September water balance ‘snapshots’ were quite similar: the flows were similar, and the relative contributions of the various components in the balance were similar. They are therefore considered to be representative of the entire ice-free season.

Summary of James Property Hydrology

The hydrological measurements collected for the James Property watershed have been very useful in gaining a general understanding of the water balance for the region as well as more specific details for the proposed James North and South open pit developments. Based on the assessment conducted by WESA, the collected data provides much more useful and representative information than the alternative method of estimating runoff obtained from published runoff rates for Labrador due to the impacts from the existing pits and natural springs in the area. For example, when the monthly cumulative flow measurements for the Bean Lake inlet and outlet locations were compared to the monthly runoff values that were estimated using published runoff rates for the closest available station (Station 03LE002, The Hydrology of Labrador, 1997), it was determined that the flow measurements were approximately double what would be predicted using the runoff rates and the watershed area. The difference in this determination is related to the flow from Ruth Pit and the two natural springs which were captured in WESA’s assessment.

The hydrology and hydrogeology of the James Property has distinctive characteristics because of the influence of the two groundwater springs. The approach that was taken to assess the water balance focused on these springs and the groundwater/surface water interactions at the James Property and the overall water balance of Bean Lake.

Data was collected from the main surface water inputs to Bean Lake and the outlet from Bean Lake from early June until October 2008. Prior to this period, during the preceding winter months, snow and ice pack studies were conducted and observations of surface water feature conditions in winter were conducted and recorded to provide full seasonal data. The results of the flow monitoring during 2008 indicate that the ranges of flows at most of the stream gauge locations were low during the June to October 2008 monitoring period. It is also noted that the period of seasonal runoff in Labrador occurs from May to August, with June generally contributing the most runoff of any month through the year (NLDEC 1997).

Stream flow measurements over the spring/summer/fall of 2008 appear to represent seasonally above average flow conditions and the flow rates drop substantially during the winter months. Longer term monitoring will be undertaken in the future to confirm these conditions.

Figure 4.10 shows a plot of the flow at the Bean Lake outlet monitoring station over the course of the 2008 monitoring period. Also shown on this graph are the precipitation events over that time frame (obtained from Schefferville weather station). A direct correlation can be seen between precipitation events and increased flow, with a delay of approximately one day as a result of the attenuative effect of Bean Lake.

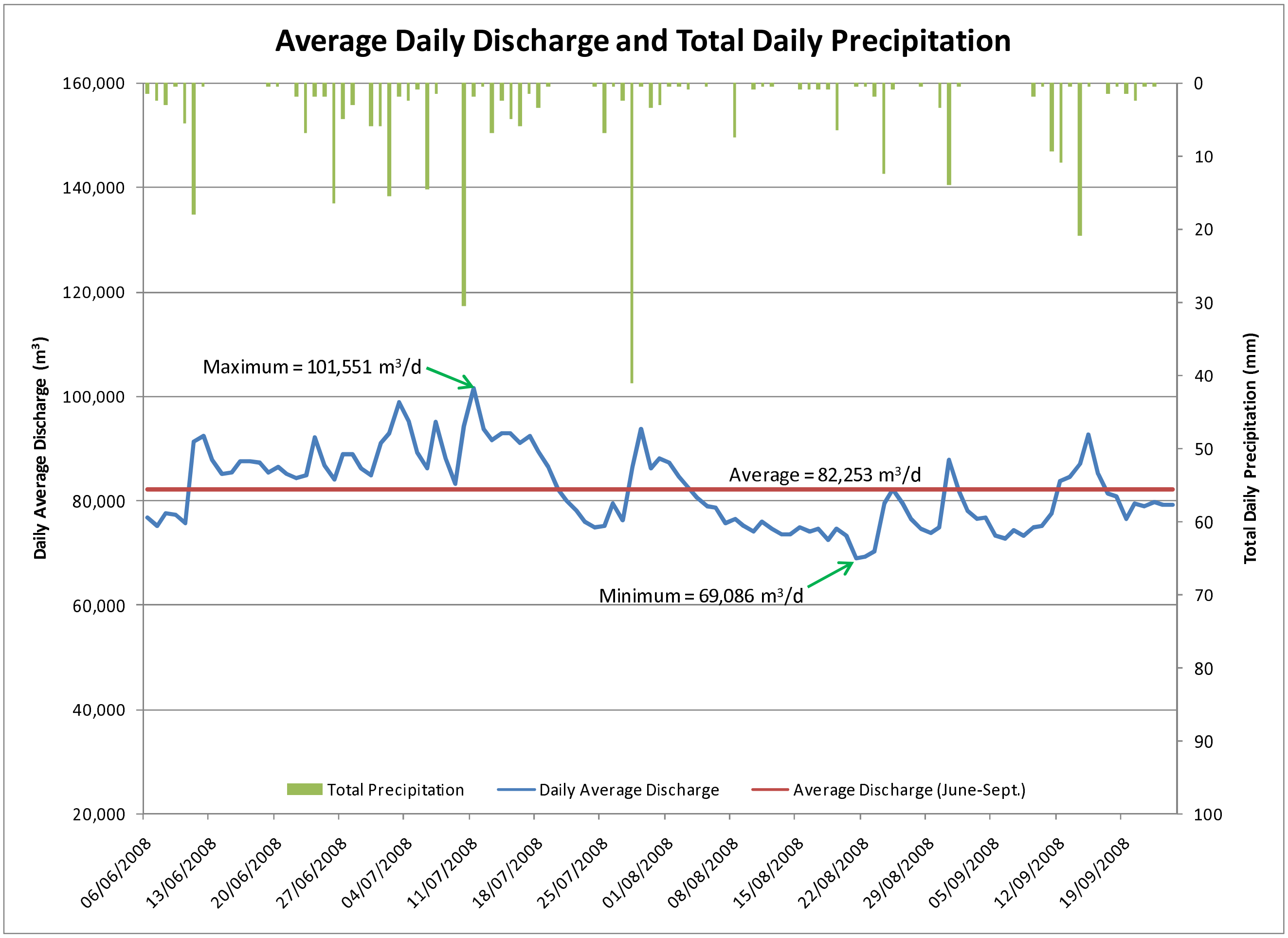


Figure 4.10 Average Daily Discharge from Bean Lake Outlet and Total Daily Precipitation

4.1.4.2 Redmond Property

Open pit mining was conducted at the Redmond property by IOC until the early 1980s in the Redmond 1 and Redmond 2 open pits. Both of these pits have filled with groundwater and surface water over the years since mining occurred. Other than the surface water in the two open pits, the main surface water feature at the Redmond Property is a small stream that starts in a pond northeast of the former railway turnaround area north of the Redmond 2 pit and flows southeast past the north side of the Redmond 1 pit and eventually discharges into Redmond Lake (Figure 4.11, “Redmond Pit” is IOC Redmond 1).

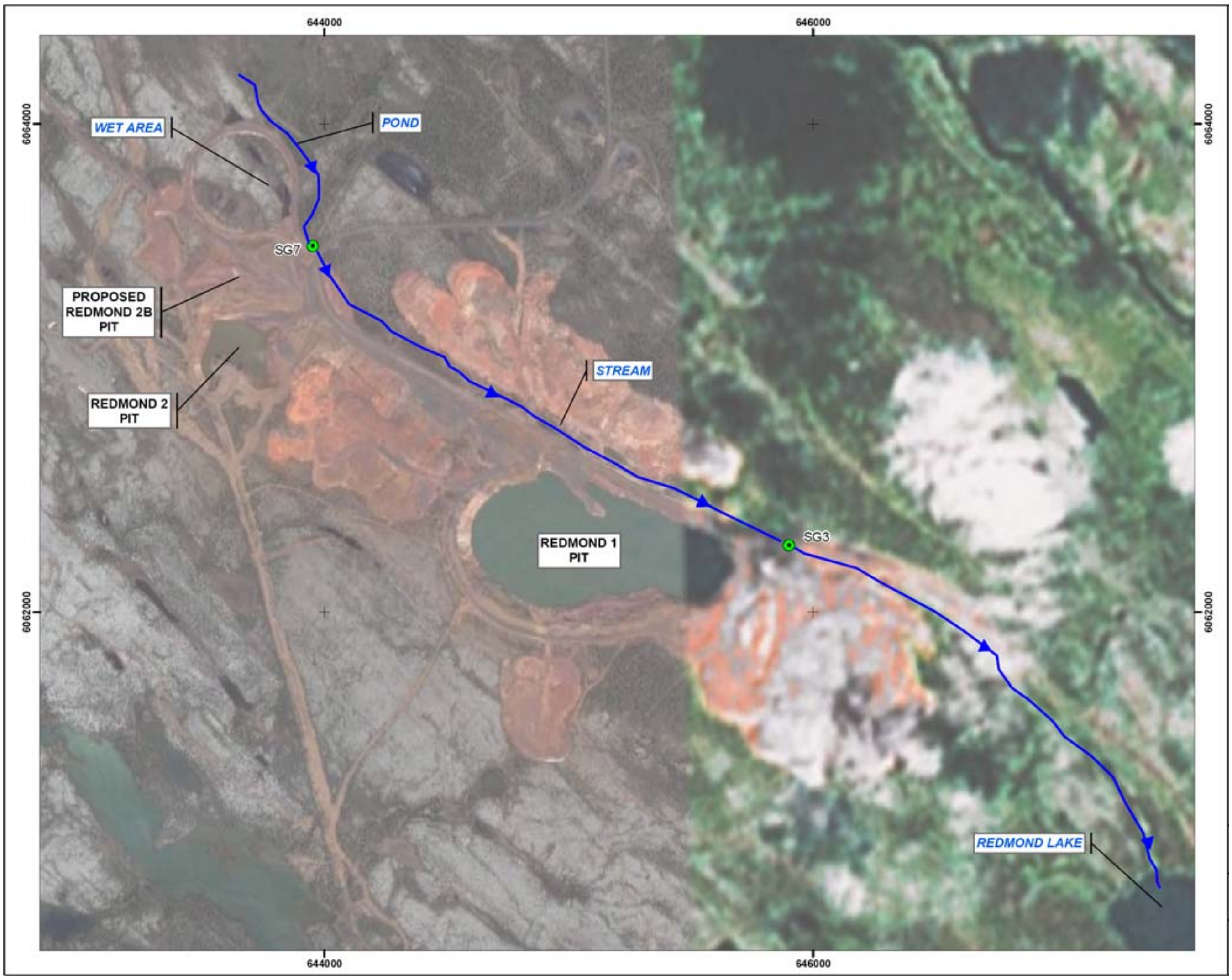


Figure 4.11 Redmond Property Drainage Area

The proposed Redmond 2B pit will be located immediately to the northwest of the existing Redmond 2 pit. Runoff from this area flows to the north and northeast toward the wetland in the former railway turnaround area. There is a wetland community located north of the proposed Redmond 2B pit within the turnabout area, outside of the development limits. This wetland is considered a fen wetland type according to the Canadian Wetland Classification System and receives water through a combination of precipitation, overland flow and groundwater inputs. The railway turnabout structure acts as a barrier to water and flow to and from this wetland is significantly restricted. This can be seen through the conformed ‘circle’ shape of the wetland vegetation, as physically defined by the turnabout. There is a stream that originates east and outside of the turnabout area which flows to Redmond Lake. The drainage area to this stream is largely from vegetation communities to the northeast of the turnabout and a spring north of Redmond 1 to the north. Water from Redmond 1 pit is thought to be the source of the spring via subsurface flow. There is no surface flow connection between Redmond 1 and any streams/ponds or Redmond 2 and any streams/pond, and there is no intention to dewater the Redmond 1 pit or to discharge water to Redmond 1 pit as part of this project.

Hydrological measurements were collected in 2008 using stream gauges and groundwater monitoring wells installed and monitored by WESA at appropriate locations across the Redmond Property. WESA also completed an assessment of these measurements and other pertinent data and details of this assessment are presented in Appendix J. A summary of the relevant findings of the assessment are presented below.

Summary of the Redmond Property Hydrology

The hydrology of the Redmond Property is described in terms of the contributions made by surface water and groundwater discharge. Flows were examined in early spring, mid-summer and fall.

Details of the flow measurements collected in the one stream located on the Redmond Property are provided in Appendix J. Stream flow measurements over the spring/summer/fall of 2008 appear to represent seasonally above average flow conditions and the flow rates drop substantially during the winter months. Longer term monitoring will be undertaken in the future to confirm these conditions.

Groundwater in the wells located within the proposed future Redmond 2B pit footprint was encountered at a depth of approximately 25 metres below ground surface, at an elevation of approximately 530 m asl. Groundwater in the shallower wells located north of the proposed pit was encountered at depths ranging from approximately four to seven metres below ground surface, at elevations ranging between approximately 526 and 528 m asl. The ground surface north of the proposed pit area is currently approximately 20 metres lower than in the pit area, so this is why groundwater is so much shallower there. Groundwater is estimated to flow to the north.

4.1.5 Ambient Water Quality

4.1.5.1 Groundwater Quality

Well Installation and Sampling Methodology

A total of 27 groundwater monitoring wells were installed at eight well nest locations at the James Property and six wells at three well nest locations were installed at the Redmond Property (Figure 4.12 and Figure 4.13).

Samples were collected in laboratory supplied bottles. Filtered and unfiltered samples were collected for dissolved and total metals analyses. The filtered samples were filtered in the field using in-line 0.45 micron dedicated water filters. The samples were shipped to ALS Laboratory Group in Kitchener, Ontario where they underwent analyses for metals and general chemistry.

Groundwater samples were also collected from the pumping wells during the two pumping tests that were conducted at the James Property. These samples were collected using submersible pumps.

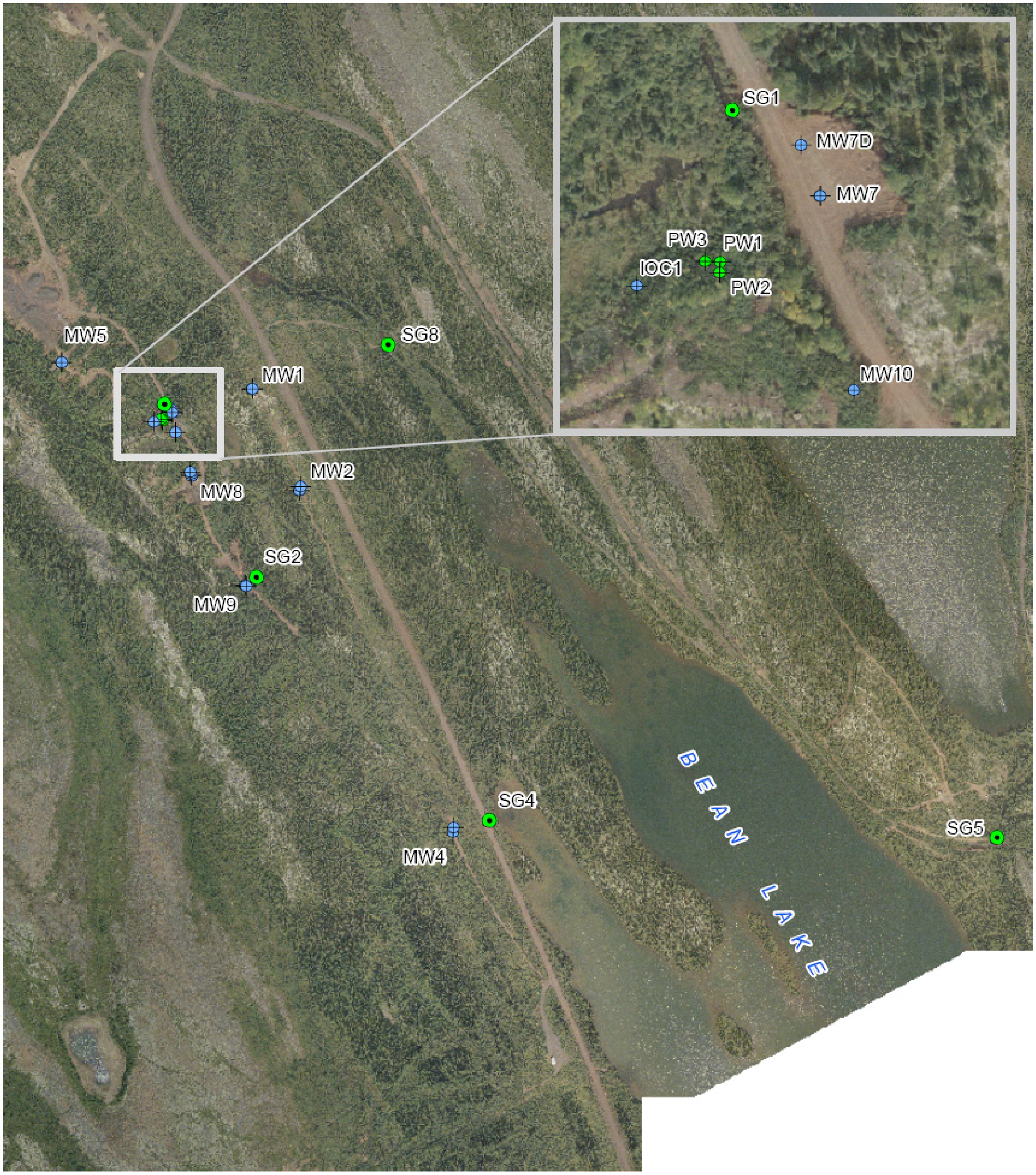


Figure 4.12 James Property Monitoring Wells and Stream Gauges Locations

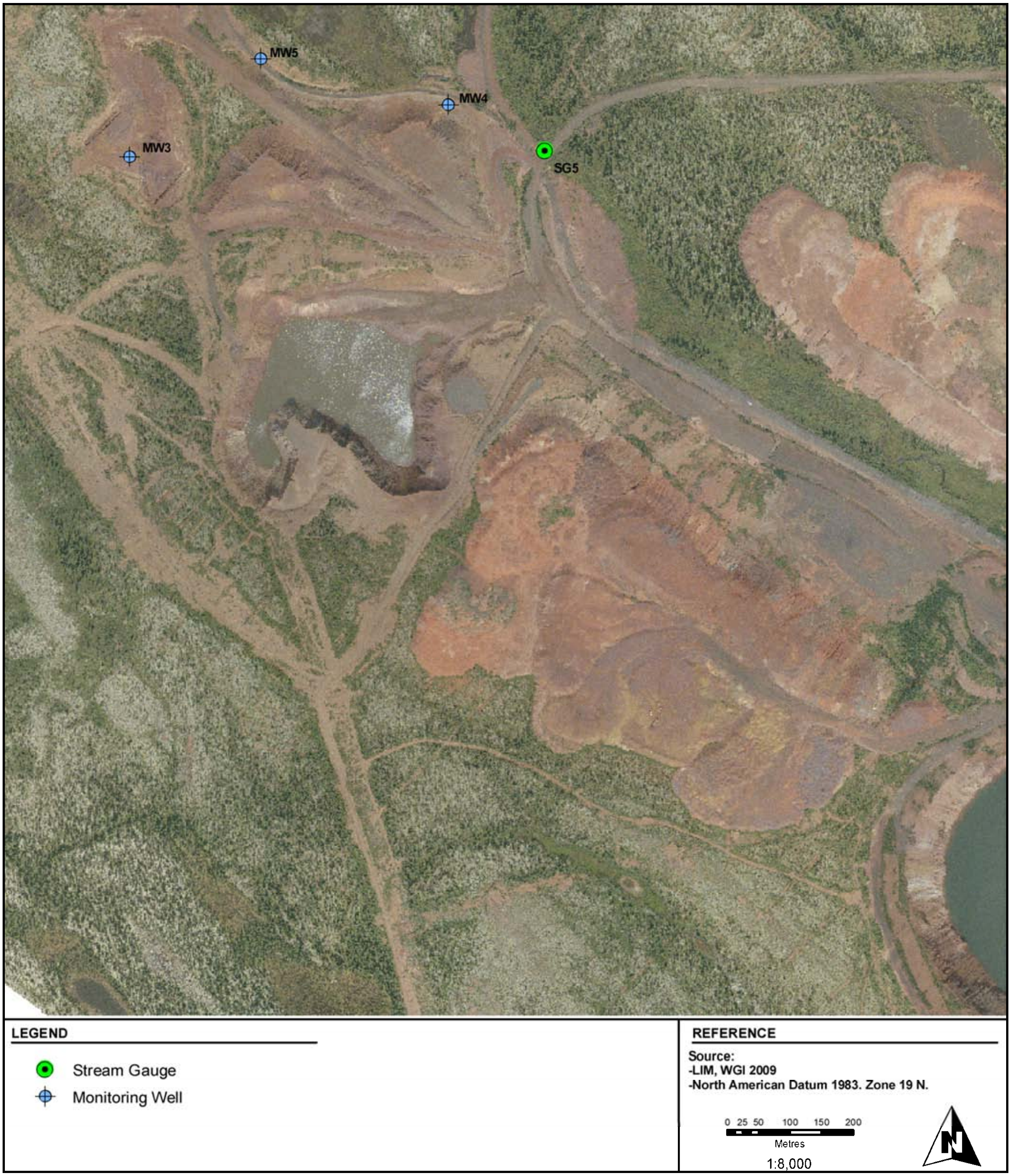


Figure 4.13 Redmond Property Monitoring Wells

Results

James Property

The groundwater chemistry results for the James Property wells have been summarized in Appendix I. For the unfiltered samples, the Total Suspended Solids (TSS) concentrations ranged from 270 to 67000 mg/L and the Total Dissolved Solids (TDS) concentrations ranged between <20 and 1800 mg/L. The water is quite soft, ranging from 8 to 78 mg/L as CaCO3. As there are no CWQG for dissolved metals, the dissolved metals sample results have been discussed in context of the total metal guidelines presented in the CWQG.

The TSS concentrations from the groundwater monitoring wells and pumping test wells were higher than the TSS limits listed in Environmental Control of Water and Sewage Regulations, 2003. The water quality from the perimeter dewatering wells will be much lower in TSS after the full scale wells have been developed. LIM acknowledges that this water will have to meet the required Provincial and Federal effluent limits prior to discharge to the environment. In this case the filters will be the first stage of water treatment followed by discharge to a settling pond which will be designed to retain the water/effluent for sufficient time to settle any remaining suspended solids, and then allow direct discharge to the environment under the appropriate regulatory criteria.

Total Metals

The total iron results for the unfiltered samples ranged between <0.05 and 130 mg/L. The only other metals that were consistently detected in the unfiltered samples were aluminum (range of <0.01 and 61.9 mg/L), cobalt (<0.005 to 0.08 mg/L), copper (<0.001 to 0.08 mg/L), manganese (range of 0.002 to 37.4 mg/L), titanium (<0.002 and 0.3 mg/L), vanadium (range of <0.001 and 0.07 mg/L) and zinc (0.007 and 0.77 mg/L). The results were compared to the Canadian Water Quality Guidelines for Freshwater Aquatic Life (CWQG). At most well locations, total iron exceeded the CWQG of 0.3 mg/L, copper exceeded the CWQG of 0.002 mg/L, and zinc exceeded the CWQG of 0.03 mg/L.

Dissolved Metals

The dissolved iron results were all below detection limit with the exception of wells JA-MW5C (0.48 mg/L) and JA-MW7B (0.08 mg/L). The aluminum results were below detection limit except at well JA-MW1-A1 (0.08 mg/L), copper ranged from <0.001 mg/L to 0.004 mg/L, manganese ranged from 0.001 to 0.101 mg/L, and zinc ranged between 0.003 and 0.123 mg/L. Dissolved iron did not exceed the CWQG at any well locations at the James Property. Dissolved copper exceeded the CWQG of 0.002 mg/L in 11 of the 30 groundwater samples collected from monitoring wells at the James Property. Dissolved zinc exceeded the CWQG of 0.03 in 8 of the 30 samples collected from the monitoring wells. The dissolved metals results were consistently considerably lower than the total metals results.

Pumping Wells Water Chemistry

Pumping tests were conducted on pumping wells that were installed southeast of the James North Spring. Water quality from the pumping wells is considered to be more representative of water quality to be expected initially from the dewatering system than individual monitoring well results because the pumping wells draw water from a larger portion of the aquifer than do individual monitoring wells. Total and dissolved metals and general chemistry samples were collected from the pumping wells.

The groundwater chemistry results for the pumping tests that were conducted at the James Property were generally similar to the average groundwater monitoring well with respect to parameters detected and their concentrations. The total iron concentrations in the water from the pumping wells ranged from <0.05 to 1.8 mg/L, the total copper concentrations were between <0.001 and 0.017 mg/L, and the total zinc concentrations were between 0.01 and 0.039 mg/L. The water from the pumping wells did not contain detectable dissolved iron or copper. The dissolved zinc concentrations in the pumped water ranged from 0.004 to 0.007 mg/L, and were well below the CWQG of 0.03 mg/L.

The water purged and sampled from each monitoring well and pumped from the pumping wells during the pumping test was brownish red in colour. This reddish colour in the water was present over the duration of the pumping tests. Discussions with a former IOC employee who was involved with dewatering work when IOC was operating mines in the Schefferville area have revealed that water from the IOC dewatering wells would commonly be red when the dewatering wells were first installed and started pumping, but that the water would normally clear up after several weeks of pumping (D. Hindy, pers. com.). It is possible that this will also occur with dewatering of the proposed future James and Redmond 2B pits.

Redmond Property

The groundwater chemistry results for the monitoring wells installed at the Redmond property can be found in Appendix I. TSS results for the unfiltered samples ranged between 11000 and 27000 mg/L. TDS results ranged from 30 to 450 mg/L. The hardness levels ranged between 14 and 65 mg/L (CaCO3).

The TSS concentrations from the groundwater monitoring wells and pumping test wells were higher than the TSS limits listed in Environmental Control of Water and Sewage Regulations, 2003. The water quality from the perimeter dewatering wells will be much lower in TSS after the full scale wells have been developed. This water will be discharged to and held within the Redmond 2 Pit, and therefore, no treatment will be required.

Total Metals

The total iron results ranged from <0.05 to 212 mg/L. Aluminum ranged between <0.01 and 43.8 mg/L. The results for cobalt were between <0.0005 and 0.232 mg/L. Copper ranged from <0.001 to 0.38 mg/L. The manganese concentrations were between 0.005 and 45.7 mg/L, and zinc ranged between 0.018 and 1.14 mg/L. At most well locations, total iron exceeded the CWQG of 0.3 mg/L, copper exceeded the CWQG of 0.002 mg/L, and zinc exceeded the CWQG of 0.03 mg/L.

Dissolved iron was only detected at one well (Red-MW3B at 0.07 mg/L). Aluminum was detected only at RED-MW3A and 3B (0.02 and 0.07 mg/L respectively), manganese ranged from <0.001 to 0.017 mg/L, and the zinc concentrations were between 0.004 to 0.083 mg/L.

Dissolved Metals

The dissolved metals concentrations in the wells at Redmond were consistently lower than the total metals concentrations. The concentrations of TSS and total and dissolved metals tended to be higher in water collected from groundwater monitoring wells at Redmond than at the James monitoring wells.

4.1.5.2 Surface Water Quality

Surface water sampling followed the protocols outline in Environment Canada’s Metal Mining Guidance Document for Aquatic Environmental Effects Monitoring, June 2002

Results of surface water samples collected by AECOM in the Redmond and James properties in 2007 and 2008 (Appendix I) were compared with the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG, FWAL) and the Guidelines for Canadian Drinking Water Quality (GCDWQ). In general, the results for the Redmond property (Appendix I), James property (Appendix I), and offsite areas adjacent to James were consistent with the good water quality reported by LIM from baseline data collected seasonally since 2005.

James Property

Sampling sites for the James deposit (Figure 4.14) are situated as follows:

- JP1: In James Creek, located under the main road to Redmond Property;
- JP5: Located adjacent to Silver Yard on James Creek. Also located upstream of JP1;
- JP 2: James Creek prior to discharge into Bean Lake;
- JP3: Unnamed tributary. Culvert at the road at southern edge of James property;
- JP4: Spring that discharges to JP3; and,
- JP6: Spring that merges with JP4 and discharges to JP3.

Of the 19 surface samples collected on the James property, all were within the applicable referenced guidelines with the following summarized exceptions.

JP4, JP5

Zinc concentrations in surface water samples collected in late winter, 2008, at JP4 and JP5 sites exceeded CWQG, FWAL guideline of 30 ug/L. These variances suggest a seasonal variability, e.g., zinc concentrations were elevated in March and April 2008 at sites JP4 and JP5 in comparison to 2007 values, which were below the applicable guidelines.

Offsite Upgradient Samples

In addition to the samples listed above, additional samples were collected offsite at upgradient locations to observe nearby background concentrations near but off of LIM's James property. The following summarizes the sampling locations (Figure 4.14):

- Slimy 1: Spring adjacent to Slimy Lake, Located 1.5 km upstream from JP5 and is headwater lake for James Creek;
- Slimy Lake: adjacent to the Silver Yard area;
- Bean L. Out: Outlet for Bean Lake and encompasses the entire watershed for the James and Silver Yard locations;
- Bean: Located in Bean Lake adjacent to James property;
- Ruth Out: Origin of James Creek and located approximately 4 km upstream from JP5; and
- Ruth Pit: Surface water samples from proposed processing water supply and reject line from Silver Yard Benefaction area.

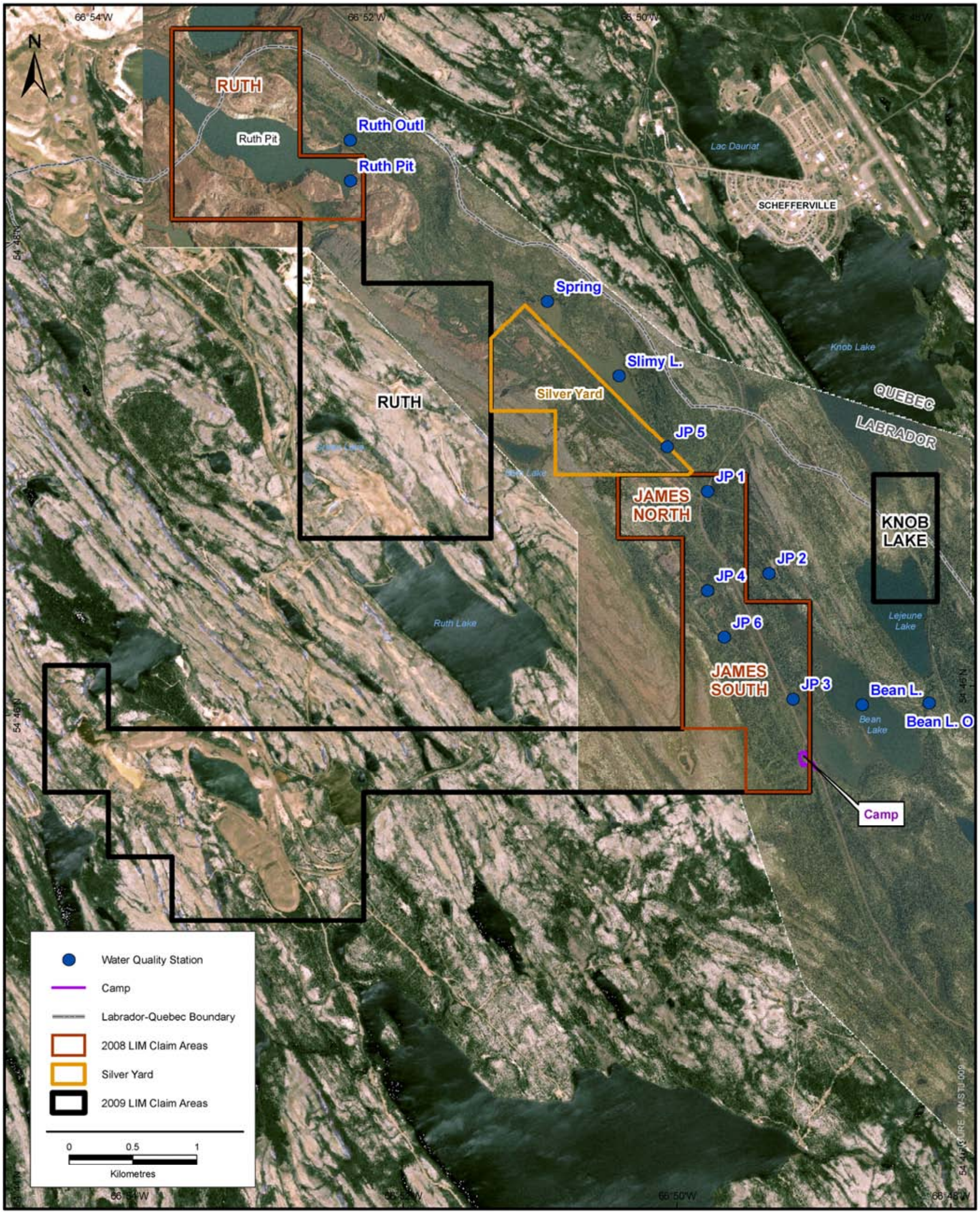


Figure 4.14 Surface Water Sampling Stations, James

The following summarizes the exceedances of the applicable guidelines at the offsite sampling locations:

- Slimy 1 and Bean.

Zinc concentrations in surface water samples collected in late winter, 2008, at Slimy 1 and Bean Lake sites exceeded CWQG, FWAL guideline of 30 ug/L. The spring at Slimy appears to indicate bedrock mineral characteristics, with exceedances for aluminum and manganese also being noted. Aluminum concentrations return to acceptable levels before station JP5, but zinc and manganese remained elevated until Bean Lake. Variances based on continual monitoring of Bean Lake suggest there is a seasonal variability, but Slimy 1 spring appears to maintain a higher level of zinc than other surface water features associated with the Project. This type of seasonality has been observed and reported (Wetzel 1983 and Goldman 1994).

Redmond Property

Screening results from sampling of the Redmond Property in 2005 and 2006 indicated that surface water quality is very good: pH approximately neutral, alkalinity and hardness were very low, electrical conductivity was also very low (11 – 36 µS/cm), with TDS very low (5 – 18 ppm), as well.

For the five samples locations on the Redmond property (Figure 4.15), a total of 20 surface water quality samples have been collected since April 2006. Of these samples, all surface water results generally meet CWQG, FWAL and the GCDWQ, with the exceptions described below.

RP2

The pH value of 6.46 recorded in the pit in April 2007 was marginally below 6.5, the CWQG, FWAL pH guideline value. Of a total of ten samples, the remaining nine pH recorded values were all within the applicable pH range. It is noted that the lab report provides pH to two decimal points as compared to the CWQG, FWAL, which reports to one decimal place. In consideration of this, the result is approximately the same as the lower end of the acceptable CWQG, FWAL range. Water in the pit is dilute with a total dissolved solids value of 12 mg/L and alkalinity results less than the detection limit of 5 mg/L.

RP3, RP4, RP5

Iron and manganese results in April and March 2007 and 2008 at RP3, RP4 and RP5 were elevated up to 60 times the GCDWQ and CWQG, FWAL. In September, these results return to within acceptable guidelines. Therefore, this pattern suggests a seasonally dependent variation consistent with anoxic conditions that frequently develop under ice cover in late winter in small shallow ponds in many shield locations. Based on general limnological documentation, iron in sediments has been observed to go back into solution under anoxic conditions to levels even more elevated than those observed here. Under ice free conditions, iron and manganese rapidly oxidize and precipitate, leaving iron concentrations in water well within GCDWQ guideline of 300 ug/L. This is observed in the September sampling episodes. For example, iron concentrations of 5800 ug/L at RP4 in April 2007 were reduced to 70 ug/L in September of the same year. Similarly, manganese concentrations at RP3 of 780 ug/L observed in March 2007 were reduced to 10 ug/L in September, well below the GCDWQ guideline of 50 ug/L.

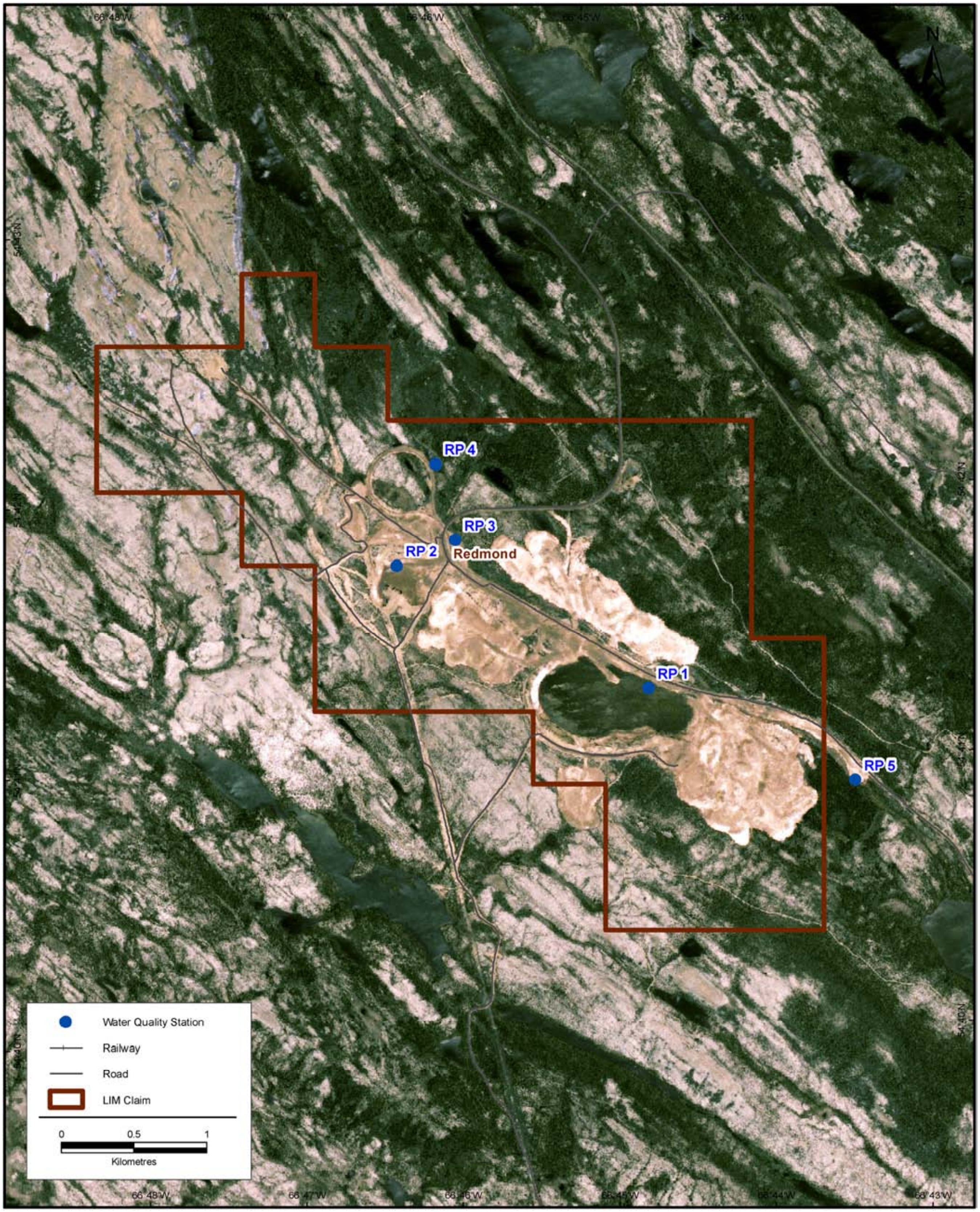


Figure 4.15 Surface Water Sampling Stations, Redmond

RP3 and RP4

Colour, an aesthetic parameter, was reported at RP3 at levels at or exceeding the GCDWQ guideline during the April and September 2007 sampling episodes. This location, at the culvert, could not be accessed during the Spring 2008 sampling program.

Colour at RP4 exceeded the GCDWQ guideline in April 2008, but was within acceptable limits in April 2007 and September 2007.

These exceedances also appear to be associated with seasonal variation.

RP5

It should also be noted that a total zinc concentration of 153 ug/L was noted for RP5 in March 2008. The dissolved zinc value for the same sample was reported as <3 ug/L. This was the first sample collected at this location and additional samples, as well as duplicates, will be collected seasonally to verify the viability of the total zinc result.

Manganese was also noted at 111 ug/L, exceeding the GCDWQ guideline of 50 ug/L. It should be noted the JP5 is in an exposed area conveying flows over historic stockpile of low grade iron ore.

4.2 Biological Environment

4.2.1 Wetlands and Flora

4.2.1.1 Description of Study Area

James North and James South Properties

Approximately 50 percent of this area has been disturbed due to past mining activities. Two pits are planned at James North and James South that will be established on either side of a spring that divides the two properties.

Silver Yard

The proposed beneficiation area is to be situated at the Silver Yard, located north of the James North property. Although the former rail spur lines have been removed, linear infrastructure (roads and the spur rail bed) are still present and in good condition. The Project includes the re-establishment of the railway spur along the existing rail spur bed, the placement of a semi-mobile washer and crusher, stockpile areas and a loading area to facilitate transport of ore via rail cars.

Redmond Property

More than 90 percent of the Redmond property has been disturbed by past mining activities. Abandoned and flooded pits, a former rail line turnaround, a rail bed, and historic rock stockpiles are present on the property.

4.2.1.2 Methods

Field Sampling

Detailed investigations of the existing on-site natural vegetation communities for all three sites included a comprehensive plant species inventory as well as a description of site and soil conditions.

Vegetation Inventory

Twenty-nine detailed ecological plots were established in the James, Redmond and Silver Yard areas to describe vegetation within the four sites. Plots were located within areas of varying species composition and were described using a combination of aerial photograph interpretation, satellite imagery interpretation, soil profile examinations and multilayer (canopy, sub-canopy, groundcover) vegetation inventories. Soil pits approximately 30-50 cm (depending on geological conditions) were excavated to examine soil profiles at each plot. A vegetation inventory examined a $10m^2$ area around the soil pit. The abundance of individual plant species along with their location within the flora strata was noted.

Vegetation communities were classified and delineated utilizing the following systems: The Canadian Wetland Classification System (National Wetlands Working Group, 1997) and The Canadian Vegetation Classification System (National Vegetation Working Group, 1990).

A hand-held global positioning system (GPS) was used to record the location of all the plots. Representative photographs were taken at each site.

4.2.1.3 Results

Appendix K presents a floral species list for each vegetation community delineated and representative photographs of each ecological plot.

Climate and Ecological Site Context

The Schefferville region is situated within the Labrador Uplands Ecoprovince, Smallwood Reservoir-Michikamau Ecoregion. The region has a continental, subarctic climate with cool, short summers and long, severe, cold winters.

Black spruce (*Picea mariana*) is the dominant tree species. White spruce (*Picea glauca*) and tamarack (*Larix laricina*) also occur. Open stands of lichen-spruce woodland with an understory of feathermoss are dominant. The general aspect of the region is that of a rolling plain with numerous lakes and isolated rugged hills composed of Achaean granites, gneisses and acidic intrusives that occur about 150 m above the general landscape. Humo-Ferric Podzolic soils are dominant with major inclusions of Ferro-Humic Podzols, Mesisols, and Organic Cryosols.

James Property

The James site is situated within a valley between two parallel ridges trending northwest to southeast. Former mining operations for this property ceased in 1982. Since then, disturbed areas have been left to re-vegetate resulting in alternating communities of spruce forest and birch/alder/spruce forest particularly along the northeastern flank of the most southwesterly ridge.

Seven upland and one wetland vegetation community were observed within the James property. Vegetation is typical of the varying land classes encountered in the area. The predominant tree species is black spruce, white spruce, and tamarack with various mixed stands of birch (Betula spp.). Ground vegetation is consistent with the typical biophysical land classes associated with spruce-moss, spruce-shrub and open lichen forests. The shrub layer consists mostly of birch (*Betula pumila*), willow (*Salix* spp.) and alder (*Alnus* spp.). Some sedge-dominant wetland pockets (fens) also occur where surface drainage is poor.

The following describes the vegetation communities on the James Property:

- **Intermediate, closed deciduous shrub stand dominated by birch species** - is one of the major vegetation communities within the study area. It covers the gentle to moderately steep slopes of the ridges, as well as the lower parts of the slopes. The community is dominated 80 percent by shrub species including dwarf birch and green alder (*Alnus viridis ssp. crispa*). Tree cover is sparse and consists of black spruce. Ground cover, comprised mainly of bunchberry (*Cornus canadensis*), with some mosses and lichens, is also sparse covering approximately 5 percent of the ground. This vegetation community is not located within the Project footprint.
- **Intermediate, open deciduous tree stand dominated by black spruce** - is located on the low and moderate slopes of the ridges and dominated by intermediate trees with tall and low shrubs. The tall shrub layer consists of dwarf birch; the low shrub species are lowbush blueberry (*Vaccinium angustifolium*), black crowberry (*Empetrum nigrum*) and redberry (*Vaccinium vitis-idea*). Tree cover is 40 to 60 percent and consists of black spruce (*Picea mariana*). Groundcover is sparse (5 percent), dominated by aster (Aster sp.) and willowherb (*Epilobium* sp.). This vegetation community is partially within the Project footprint.
- **Intermediate, open deciduous stand dominated by birch species** - is an example of the regeneration of previous forest harvesting, which occurred approximately 25 to 30 years ago. The tree cover is approximately 40 percent and consists of mountain paper birch (*Betula papyrifera*), resin birch (*Betula glandulosa*) and black spruce. The high shrub layer includes dwarf birch and green Alder (Alnus viridis ssp. crispa); the low shrub species are Labrador tea (*Ledum groenlandicum*), lowbush blueberry, bog bilberry (*Vaccinium uliginosum*), black crowberry and redberry. Groundcover is sparse to non-existent. This community is partially within the Project footprint.
- **Tall, closed deciduous shrub stand dominated by green alder** - is typical along the access roads and distributed in narrow strips (3-5 m in width). This vegetation is also associated with recently (5 to 7 years) disturbed areas such as exposed till. The community is dominated strictly by green alder. The tree cover is sparse (5 percent) and consists of black spruce and mountain paper birch. The ground cover consists of bare ground and rocks. This community is partially within the Project footprint.
- **Tall, closed coniferous forest dominated by black spruce with mosses** – occurs at lower parts of the slopes with limited drainage. The community is dominated by 70% tree cover, including black spruce (90 percent of tree cover) and white spruce (10 percent of tree cover). Shrub cover is 10 percent and consists of birch, Labrador tea, lowbush blueberry, bog bilberry and black crowberry. Groundcover is relatively dense (25 to 30 percent) and dominated by bunchberry, twinflower (*Linnaea borealis*) and wood cranesbill (*Geranium sylvaticum*). This community is within the Project footprint.
- **Tall, open coniferous forest dominated by black spruce with birch associates** – is prevalent on drier parts of lower and medium gentle slopes with better drainage. This community is dominated by tree and shrub species. Tree cover is 50 percent and includes black spruce and white spruce. Shrub cover on the plot is about 40 to 50 percent and the dominant plants are dwarf birch, Labrador tea, black crowberry, lowbush blueberry and bog bilberry. Ground cover is sparse and dominated by bunchberry. This community is partially within the Project footprint.
- **Open, nonvascular lichen stand** – occurs along the highest points of the ridges. It is dominated by lichen species and exposed rock. This community is outside the Project footprint.

The following describes the two specific fen wetlands of low, closed herb grammoid stands dominated by sedge species:

- **Low, closed herb graminoid stand dominated by sedge species** – is a fen that can be characterized as moderately rich with slightly higher concentrations of dissolved minerals and dominated by sedges and brown moss. Sedge species dominate the sub-stratum (95 percent) and willow/berry bearing shrubs constitute the low-lying canopy on elevated hummocks. Tree cover is less than 5 percent and consists of stunted spruce and tamarack trees on hummocks. Organic soils occur up to 30 centimetres deep consisting of slightly decomposed roots of sedges, grass and moss. Dominant species include water sedge (Carex aquatilis); willow shrubs (Salix sp.), buckbean (Menyanthes trifoliata), leatherleaf (Chamaedaphne calyculata), redberry (Vaccinium vitis-idea) and black crowberry (Empetrum nigrum.). This community is within the Project footprint.
- **Low, closed herb graminoid stand dominated by sedge species** – is a fen located in a local depression that receives most of the water from direct precipitation and runoff from the slopes. The fen has an outflow stream on the west side. Sedge species dominate the sub-stratum and Sphagnum mosses constitute the ground cover. Shrub cover is less than 5 percent and consists of three species of willow (Salix sp.). Organic soils are up to 20 centimetres deep consisting of slightly decomposed roots of sedges and leaves. Sedge species are predominated by water sedge (Carex aquatilis); wildflower species include buckbean (Menyanthes trifoliata) and silverweed (Potentilla palustris). The vegetation community is within the Project footprint.

Silver Yard

The Silver Yard property is similar to the Redmond site as it has numerous service roads. The service roads, with a north-south orientation, are extensively bordered with alder and willow regeneration. The Silver Yard is within a large valley bordered on the east by a talus slope forested at the base, and to the west, by another slope heavily covered with spruce at the base thinning to almost no vegetation near the summit.

The following describes the vegetation communities identified for the Silver Yard:

- **Low, closed deciduous shrub stand dominated by birch species** - is dominated by shrub species (80 to 90 percent cover) that include dwarf birch and Labrador tea. Tree cover is sparse and consists of black spruce. Groundcover is also sparse (5 to 10 percent), dominated by bunchberry. The site has a north-easterly aspect and a slope of 9° (20 percent). This community is partially within the Project footprint.
- **Intermediate, closed deciduous shrub stand dominated by alder species** – is prevalent on recently disturbed exposed till surfaces and is dominated by green alder. Other shrubs include dwarf birch, bog bilberry willows. The tree cover is sparse (<5 percent) and consists of black spruce. The ground cover is sparse and consists of grasses (<5 percent) and mosses and lichens. Bare ground and rocks occur over approximately 50 percent of the plot. This community is partially within the Project footprint
- **Intermediate, closed deciduous shrub stand dominated by birch species** – is located along the western lakeshore of Slimy Lake and is dominated by shrub species. These include dwarf birch, willow and skunk currant (*Ribes glandulosum*). Trees are absent. Ground cover is approximately 40 percent and it is dominated by horsetail (*Equisetum sp.*), Aster (*Aster sp.*) and yarrow (*Achillea millefolium*). This community is partially within the Project footprint.

Redmond Property

The Redmond site has a wide range of habitat types, largely due to the presence of former mine and pit operation. The habitats range from completely bare ore piles and service roads, to heavily blanketed areas with alder and willow thickets. This area also has a large, flooded pit in the southwest corner of the site. The undisturbed areas are mostly mature black spruce at lower elevations, with stunted spruce – lichen stands along the ridge summits.

The following describes the vegetation communities identified for the Redmond Property:

- **Low, sparse deciduous shrub stand dominated by crowberry with lichen patches** - is the main vegetation community that is widely distributed on the top of ridges. It covers approximately 100 percent of this area along with the lichen-shrub dominated stands. There is approximately 60 to 70 percent exposed bedrock that includes granite/gneiss. Low-lying shrub species cover approximately 15 percent of the area and consist of black crowberry, bog bilberry, dwarf birch, net-veined willow (*Salix reticulata*), and redberry. Lichen species represent 10 percent of vegetative cover in this community. This community is partially within the Project footprint.
- **Low, open deciduous shrub stand dominated by crowberry and lichen species** – is located on steeper slopes and hilltops. The community is dominated by lichen species and shrubs. Lichen species include coral lichen (*Cladina stellaria*) and reindeer lichen (*Cladina rangiferina*). Total cover of lichens is 95 to 100 percent. The shrub canopy is dominated by black crowberry, dwarf birch, Labrador tea and redberry. This community is partially within the Project footprint.
- **Intermediate, closed deciduous shrub stand dominated by green alder and a variety of herbaceous plants** – is located in the narrow valley between two hills. The community is dominated by shrub species. Total shrub cover is 90 percent. Species observed include green alder, dwarf birch, willow and skunk currant. Groundcover is approximately 15 percent and is dominated by bunchberry, wood cranesbill, aster and violet. The dominant moss species is red-stemmed feathermoss (*Pleurozium schreberi*). This community is partially within the Project footprint
- **Intermediate, open deciduous shrub stand dominated by birch and sphagnum moss** – is located in a depression that collects water to form a fen that is flat to slightly concave. Sedge species dominate the sub-stratum (75 to 80 percent) and sphagnum mosses constitute 95 percent the ground layer. The dominant species of sedge is beaked sedge (*Carex rostrata*); wildflower species include buckbean (*Menyanthes trifoliata*). Shrub cover is about 30 percent and consists of dwarf birch and two species of willow (*Salix s*p.). Organic soils up to 20 centimetres deep consist of slightly decomposed sphagnum moss. This community is outside the Project footprint.
- **Tall, open coniferous tree stand dominated by tamarack, polytrichum and sphagnum moss** – is situated on the edge of the fen (described above) and forms the transition zone between the slopes and the bottom of the depression. This community is dominated by shrubs and trees. The tree species include black spruce and tamarack. The shrub canopy is dominated by dwarf birch, Labrador tea, bog bilberry and bog rosemary (*Andromeda polifolia*). Moss cover is dense and consists of haircap moss (*Polytrichum* sp.) and sphagnum moss (*Sphagnum* sp.). Ground cover is sparse (5 percent), with bunchberry, willow herb (*Epilobium* sp.) and grasses. This community is outside the Project footprint.
- **Tall, closed coniferous tree stand dominated by white spruce** - is dominated by shrubs and trees. The tree layer is entirely white spruce while the shrub layer is dominated by dwarf birch, Labrador tea and lowbush blueberry. Moss and lichen cover are relatively dense and consist of red-stemmed feathermoss and star-tipped reindeer lichen (*Cladina stellaris*). Groundcover is sparse, and dominated by bunchberry and grasses. This community is outside the Project footprint.

- **Low, closed herbaceous graminoid stand dominated by sedge species** – is a fen located between the access road and the stream on the riparian zone of the stream. Sedge and grass species dominate the sub-stratum (90 percent) and willow shrubs constitute the canopy. Moss cover represents less than 10 percent of the plot. Open water constitutes 10 to 15 percent of the plot. Organic soils occur up to 20 cm deep consisting of slightly decomposed roots of sedges, grass and silty clay (from the road). This community is outside the Project footprint.
- **Northern Ribbed Fen** – is located in the narrow valley between the ridges. This community is dominated by low shrubs and sphagnum mosses. The tree species include stunted forms of black spruce and tamarack. The shrub canopy is dominated by leatherleaf (*Chamaedaphne calyculata*), cloudberry (*Rubus chamaemorus*), dwarf birch and Labrador tea. The sphagnum cover is dense. The wildflower species include buckbean. Organic soils occur up to 50 centimetres deep consisting of black to dark brown peat. This community is outside the Project footprint.
- **Northern Ribbed Fen** – hollow/shallow pools – Sedge species dominate the sub-stratum (10 to 60 percent). The rest of the site consists of open water. Wildflower species include buckbean, cottongrass (*Eriophorum* sp.), leatherleaf and three-leaved false soloman's seal (*Maianthemum trifolium*). Organic soils up to 40 centimetres deep consist of highly decomposed sphagnum moss. This community is outside the Project footprint.

Rare Plant Species

Based on recent fieldwork conducted by AECOM and a search of the Atlantic Canada Conservation Data Centre (AC CDC) database, there are no known occurrences of plant species listed under the federal *Species at Risk Act* or the *Provincial Endangered Species Act* within the Project footprint.

4.2.1.4 Wetlands

Wetland communities within the study area have been classified according to the Canadian Wetland Classification System (National Wetlands Working Group, 1997). The corresponding Vegetation Classification (National Vegetation Working Group, 1990) designation has also been described in Section 4.2.1.3.

Wetland communities within the study area generally occur within depressions or along the foot of surrounding ridges. Wetland communities have also been observed along the road network, lakes and watercourses. All wetland communities within the subject properties are comprised of either fen or swamp forms. Fens are peatlands with fluctuating water tables. The waters in fens are rich in dissolved minerals and are dominated by moderately decomposed sedge and brown moss peats of variable thicknesses. A swamp is a treed or tall shrub (also called thicket) dominated wetland that is influenced by minerotrophic groundwater, either on mineral or organic soils. The essential features of the swamp class are the dominance of tall woody vegetation, generally over 30% cover and the wood-rich peat laid down by this vegetation. Table 4.6 below lists all the wetland communities observed within the James, Silver Yards and Redmond properties.

Table 4.6 Wetland Communities observed within James, Silver Yard and Redmond Properties

Color	Map Unit*	Community Designation	Community Location
Fen Wetland	16	Low, closed herbaceous sedge stand**	
	16a	Basin Fen	Occurs within topographically confined basins isolated from inflow/outflow streams. Three ecological plots were conducted for this community within the James and Redmond properties.
	16b	Stream Fen	Occurs along the banks of permanent /semi-permanent streams that are low gradient and slow moving. One ecological plot within the Redmond property was conducted for this community.
	16c	Floating Fen	Occurs adjacent to ponds or lakes. The peat surface is generally less than 0.5 m above water level. Dominant species were noted within this wetland type. A combination of cranberry, buckbean and leatherleaf species occur within this community.
	16d	Northern Ribbed Fen	Occurs within elongated hollows and contains a series of parallel ridges. One ecological plot was conducted within the Redmond property for this community.
Swamp Wetland	17	Riparian Swamp	
	17a	Intermediate, sparse tamarack evergreen stand with willows	Occurs along fen communities and contains tamarack and willow species. Dominant species were noted within this wetland type
	17b	Tall, open tamarack, black spruce, evergreen stand with sphagnum moss	Occurs in low lying areas within water conveyance along fen communities. One ecological plot was conducted for this community within the Redmond Property.
	17c	Tall, closed black spruce evergreen stand with sphagnum moss	Occurs in low lying areas within water conveyance along fen communities. One ecological plot was conducted for this community within the James Property.

James Property

There are nine wetlands (totalling 6.906 ha) within the 64.5 ha James Property, with only approximately 0.5 ha within the actual proposed mining footprint. A map of wetland locations on the James Property is provided in Figure 4.16.

The following wetland communities were observed within the James property:

- Low, closed herb graminoid stand dominated by sedge species: Basin Fen;
- Low, closed herb graminoid stand dominated by sedge species: Stream Fen;
- Riparian Swamp: Intermediate, sparse tamarack evergreen stand with willows; and
- Riparian Swamp: Tall, closed evergreen tree stand dominated by black spruce with mosses.

Silver Yard Area

There are no wetlands identified within the Silver Yard footprint area.

Redmond Property

Within the Redmond property, there are 14 wetlands comprising 38.5 ha, however, there are no wetlands within the proposed mining footprint. The following wetland communities were observed within the Redmond property:

- Low, closed herb graminoid stand dominated by sedge species: Basin Fen;
- Low, closed herb graminoid stand dominated by sedge species: Floating Fen;
- Low, closed herb graminoid stand dominated by sedge species: Stream Fen;
- Low, closed herb graminoid stand dominated by sedge species: Northern Ribbed Fen;
- Riparian Swamp: Intermediate, sparse tamarack evergreen stand with willows;
- Riparian Swamp: Tall, open tamarack black spruce, evergreen stand with sphagnum moss; and
- Riparian Swamp: Tall, closed black spruce evergreen stand with sphagnum moss.

The wetlands discussed in the Avifauna section (Section 4.2.3) are outside of the proposed development footprint area for the Redmond property. Wetlands were classified as per the Canadian Wetland Classification System.

Where feasible, wetlands will be avoided. Effects on the wetlands outside the Project footprint will be avoided or minimized through the implementation of the EPP (Section 8.5) and ongoing environmental planning.

Wetland Evaluation

The Wetland Evaluation Guide developed by the North American Wetlands Conservation Council (Canada) produced in 1992 was used as a guideline to assess the true ecosystem value of the potentially affected wetlands. Approximately 0.5 ha of wetland will be disturbed within the zone of influence (i.e., mining footprint) at the James Property. The location of all wetlands (Jc, Je and Jf) within the James property footprint is presented in Figure 4.16. Table 4. 7 presents the form, area and relative position to the mining footprint for all wetlands within the James Property.

To assess the ecosystem value of these affected wetland areas, their functions or capabilities need to be understood. Wetland functions provide many benefits to society and are defined as the capabilities of wetland environments to provide goods and services including basic life-support systems.

All of the affected wetland areas are similar in size and contain similar habitat composition (e.g., they are all sedge dominant basin fens). Therefore, this wetland evaluation will be utilized for all three wetland systems.

Table 4.7 Wetlands within James Property

Label*	Type	Total Area (ha)	Area within Foot Print
Ja	Stream Fen	0.8	
Jb	Intermediate, sparse tamarack evergreen stand with willows	0.8	
Jc	Basin Fen Intermediate, sparse tamarack evergreen stand with willows	0.2 0.15	0.2
Jd	Basin Fen	0.12	
Je	Basin Fen	0.14	0.14
Jf	Basin Fen	0.16	0.16
Jg	Stream Fen	0.95	
Jh	Stream Fen Intermediate, sparse tamarack evergreen stand with willows Tall, closed black spruce evergreen stand with sphagnum moss	1.2 1 1.3	
Ji	Floating Fen	0.086	
	Total area for James Property	64.5 ha	
	Total wetland area for James Property	6.906 ha	
	Total wetland area within footprint	0.49 ha	
	Percent of James Property comprised of wetland	10.70%	
	Percent of James Property wetland area within footprint	7.1%	

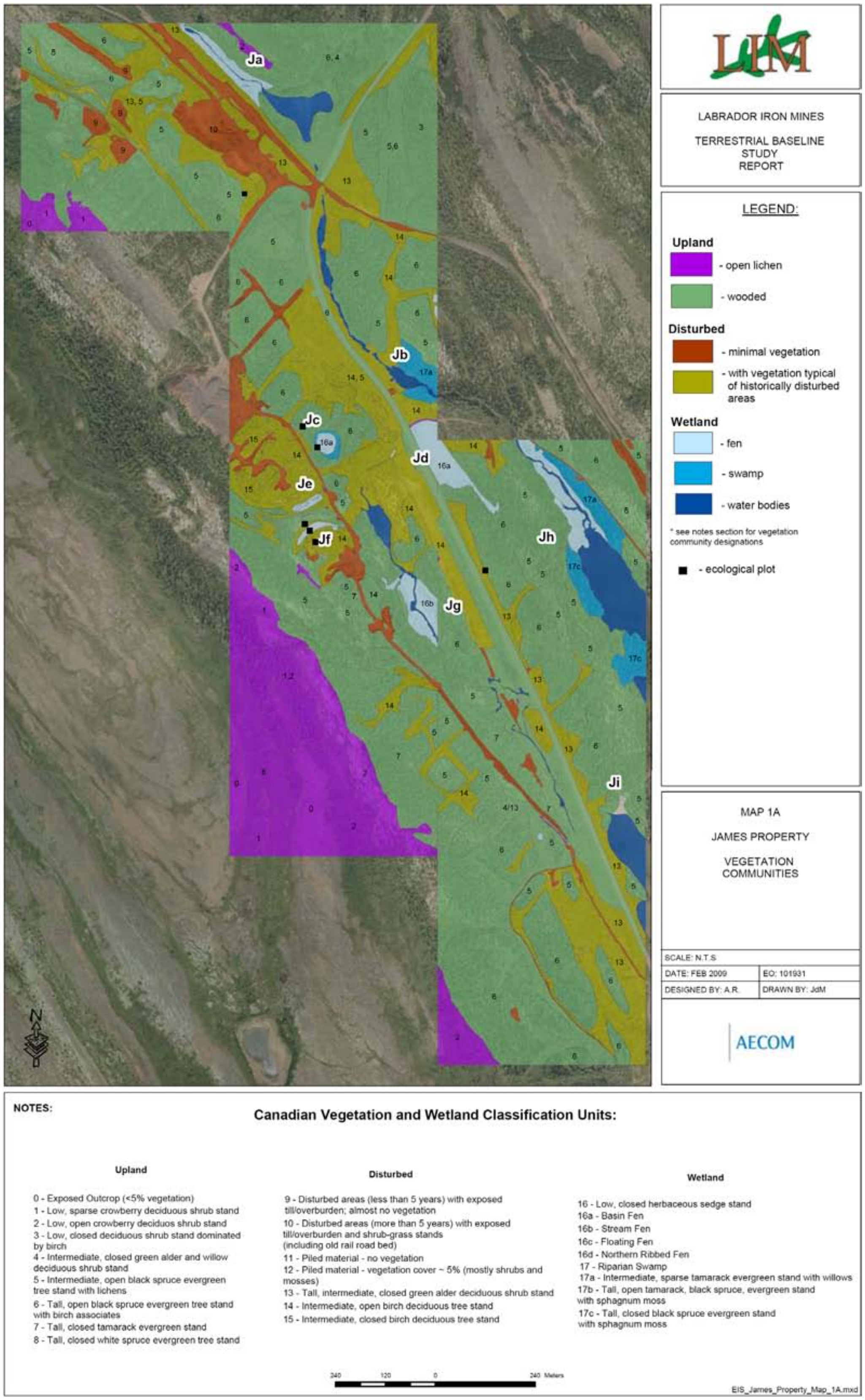


Figure 4.16 Wetlands Map, James Property

Potential wetland functions, as adapted in the Wetland Evaluation Guide, are:

- **Regulation/ Absorption** – climate regulation via methane and carbon dioxide release/storage, absorption of toxic substances and heavy metals, stabilization of biosphere processes, water storage and cleansing;
- **Ecosystem Health** – nutrient cycling, food chain support, habitat, biomass storage, genetic and biological diversity;
- **Science/Information** – specimens for research, zoos, botanical gardens, representative and unique ecosystems;
- **Aesthetic/Recreational** – non-consumptive uses such as viewing, photography, bird watching, hiking and swimming;
- **Cultural/Psychological** – wetland uses may be part of community traditions, religious or cultural uses, future (option) opportunities;
- **Subsistence Production** – natural production of game birds, fish, plants (e.g., berries, rushes, wild rice); and
- **Commercial Production** – production of foods (e.g., fish, crops), fibre (e.g., wood, straw), soil supplements (e.g., peat).

The major functions that the wetland systems are capable of within the James property mining footprint include: water storage and habitat for resident wildlife. However, these attributes are not considered significant since all wetland systems are less than 0.2 ha in size and receive water inputs only during rain events and snow melt. They also have low biodiversity where wetland systems are made up of one vegetation type; sedge dominant basin fen. This provides habitat for resident bird species and amphibians, but considering that this habitat type occurs elsewhere, no major impact to these species is anticipated.

Photograph 1 – view of wetland system "Jf"

Photograph 2 – view of wetland system "Jc"

Given the location of the wetlands within the proposed James Property mining footprint, scientific study, aesthetic/recreational, cultural/psychological and subsistence/commercial production function values are very low to non-existent. The contribution of the wetlands to the remaining functions of regulation/absorption and ecosystem health are also considered low due to their small size (all are less than 0.2 ha) and similarity of habitats to other wetlands in the region.

4.0 ENVIRONMENTAL SETTING

4.1 Physical Environment

4.1.1 Climate

The Project area has a sub-arctic continental taiga climate with severe winters based on 30-year Canadian Climate Normal data obtained from Environment Canada for the Schefferville Airport (1971-2000) (Environment Canada 2008).

4.1.1.1 Temperature

A summary of the daily average, daily maximum and daily minimum temperatures on a monthly basis over the period 1971 to 2000 is presented in Table 4.1. The annual average temperature is -5.3ºC.

Table 4.1 Summary of Average Temperature Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Daily Average (ºC)	-24.1	-22.6	-16	-7.3	1.2	8.5	12.4	11.2	5.4	-1.7	-9.8	-20.6	-5.3
Daily Maximum (ºC)	-19	-16.9	-9.8	-1.5	6	13.7	17.2	15.8	8.9	1.3	-6.1	-15.9	-0.5
Daily Minimum (ºC)	-29.2	-28.1	-22.2	-13.1	-3.6	3.3	7.6	6.5	1.7	-4.6	-13.5	-25.2	-10

4.1.1.2 Precipitation

A summary of the monthly average rainfall, snowfall, total precipitation (as equivalent rainfall based on a conversion factor for snowfall to equivalent rainfall of 0.1) and average snow depth on a monthly basis over the period 1971 to 2000 is presented in Table 4.2. The annual average total precipitation for the area is about 823 millimetres (mm).

Table 4.2 Summary of Average Precipitation Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	0.2	0.2	1.6	8.4	27.7	65.4	106.8	82.8	85.3	24.4	4.5	0.9	408.1
Snowfall (cm)	57.4	42.6	56.6	54.8	22.9	8	0.5	1.7	12.7	57.2	70.7	55.4	440.5
Precipitation (mm)	53.2	38.7	53.3	61.4	52.1	73.7	107.2	84.5	98.4	80.5	69.4	50.7	822.9
Average Snow Depth (cm)	62	70	71	69	18	0	0	0	0	7	26	49	31

4.1.1.3 Wind Speed and Direction

Climate normal data with respect to wind speed and directionality is presented in Table 4.3. The annual average wind speed for the area is about 17 km/h and the most frequent wind direction, on an annual basis, is from the north-west.

Table 4.3 Summary of Wind Data

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Speed (km/h)	16.4	16.8	17.4	16.5	16	16.2	15.1	15.6	16.9	17.8	17.3	16	16.5
Most Frequent Direction	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
Maximum Hourly Speed (km/h)	85	97	83	77	66	97	65	61	80	89	84	80	80
Maximum Gust Speed (km/h)	134	148	148	130	101	126	103	117	137	137	142	153	131
Direction of Maximum Gust	W	W	SW	W	W	W	W	W	SW	SW	SW	SW	SW
Days with Winds ≥ 52 km/h	.7	1.4	1.9	1.1	0.9	0.4	0.6	0.4	0.8	1.1	1.8	2.1	13.9
Days with Winds ≥ 63 km/h	0.7	0.5	0.4	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.3	0.6	3.3

4.1.2 Air Quality

An Air Quality Technical Study (Appendix H) was conducted following accepted methodologies to establish existing (baseline) conditions, estimate emissions from the Project and predict the maximum downwind concentrations of the pertinent air contaminants. The methodologies and predictions are summarized in the following sections.

The key components of the Air Quality Technical Study are:

- Existing (Baseline) Conditions – On-site monitoring was conducted to measure and characterize the baseline ambient air quality in the region;
- Emissions Inventory – Maximum emission rates from the Project were estimated based on conceptual engineering design information and published sources of emission factors; and
- Air Quality Modeling – The emission rates in the exhaust and dust plumes were modelled to predict the maximum ground-level concentrations (GLC) due to Project emissions.

In this EIS, the potential environmental effects due to Project-related air contaminant emissions are assessed on the bases of these analyses. Although air quality is not considered a values environmental component or VEC in this assessment, a screening-level analysis considering the potential environmental effects of a change in ambient air quality due to Project-related emissions is provided in Section 4.1.2.2 below.

Emissions estimates and dispersion modeling were used to quantitatively assess the potential change in air quality due to substantive Project-related emissions during operation. The emissions occurring during construction are expected to be less than those occurring during operation.

4.1.2.1 Existing Conditions

An ambient air quality monitoring program was conducted between September and November 2008, specifically monitoring total particulate levels in the area of the Silver Yard. Air samples were obtained during the 2008 field ore crushing and sampling program on a six day schedule. Samples were obtained both on days when ore was being crushed as well as on days when operations were inactive. Results from the program indicated most samples had particulate levels that were below the laboratory detection limit of 0.3 mg, suggesting that the air quality in the region is well within acceptable standards. The highest particulate level sampled was 0.4 mg (28 $\mu g/m^3$), much lower than the NL standard of 120 $\mu g/m^3$. The detailed results of the ambient monitoring program undertaken between September and November 2008 are provided in the Air Quality Technical Study, submitted under separate cover and provided in Appendix H.

A search of the National Air Pollution Surveillance (NAPS) Network data records indicated that there were limited data available to determine background air quality for other air contaminants in the vicinity of the proposed operations (Environment Canada 2008). The nearest available sources of ambient air quality monitoring data are Goose Bay and Labrador City, both of which are more than 200 km from the site location.

For the purposes of air quality dispersion modeling, conservative background air quality estimates were provided by the Provincial Department of Environment and Conservation (Lawrence 2008). The background values considered in the modeling assessment are provided in Appendix H.

4.1.2.2 Emissions Inventory

Emissions of air contaminants from Project-related activities were considered for both the construction (Section 3.2.6) and operation phases (Section 3.3.2). Emissions were estimated for all substantive potential sources based on available literature and preliminary engineering design information. A detailed description of Project emissions estimates, including quantitative estimates and calculation methodologies, are provided in the Air Quality Technical Study, submitted under separate cover, and provided in Appendix H.

For construction, emissions are expected from fuel combustion in road vehicles and non-road equipment (including temporary diesel generators at the workers camp); as well as fugitive particulate matter from railway track installation, rail bed grubbing, clearing/grubbing for the site services area, and the erection of buildings. Project-related emissions during peak construction are expected to be substantively less than emissions during operation.

For operation, emissions are expected from fuel combustion, fugitive dust (particulate matter), standing losses from storage tanks, and on-site vehicle traffic at the primary processing facility. In addition, combustion and fugitive dust emissions are expected to occur due to ore hauling from the mine sites to the processing area, and ore mining activities.

4.1.2.3 Air Quality Modeling Methodology

Air quality dispersion modeling was performed to predict maximum ground-level concentration (GLC) from substantive Project emissions and quantitatively assess potential environmental effects. After consultation with Newfoundland and Labrador Department of Environment and Conservation (NLDEC), the California Puff (CALPUFF) modeling system was chosen (TRC Companies, Inc. 2007). The following subsections provide an overview of the modeling methodology. More details on the model used, inputs, assumptions, and model parameterization are provided in Appendix H.

Model Description

The core components of the CALPUFF modeling system consist of a meteorological model (CALMET), and a transport and dispersion model (CALPUFF).

The CALMET meteorological model is used to provide the meteorological data necessary to initialize the CALPUFF dispersion model. This model is initialized with terrain and land use data describing the region of interest, as well as meteorological input from potentially numerous sources. Various user-defined parameters control both how the input meteorological data is interpolated to the grid, as well as which internal algorithms are applied to these input fields. Output from the CALMET model includes hourly temperature and wind fields on a user-specified three-dimensional domain as well as additional two-dimensional variables used by the CALPUFF dispersion model.

The Department of Environment reviewed and requested changes be made to the CALMET input file for this Project during pre-consultation (November 18, 2008). All these required changes were addressed at that time. However, upon further review of the CALMET inputs, it appears there was a typo in the input file. The time zone for Schefferville was entered as UTC – 4:00 when it should have been UTC – 5:00. All other time zone inputs into CALMET were correctly defined. While this shift may cause the predicted values to change slightly on an hour-by-hour basis, when considered over a five-year period, the CALPUFF maximum predicted concentrations are not expected to change substantively. Therefore, it is not anticipated that the alteration of this CALMET parameter would change the overall non-significance conclusions of the effects analysis.

CALPUFF is a non-steady-state Gaussian puff dispersion model capable of simulating the effects of time and space-varying meteorological conditions on pollutant contaminant transport, transformation, and removal. This model requires time-variant two- and three-dimensional meteorological data output from a model such as CALMET, as well as information regarding the relative location and nature of the sources to be modelled for the application. Output from the CALPUFF model includes ground-level concentrations of the species considered, as well as dry and wet deposition fluxes.

Model Selection

CALPUFF was selected primarily because of its superior ability to characterize atmospheric dispersion in areas with complex, non-steady state meteorological conditions (NLDEC 2006). Atmospheric conditions in the region fit this criterion: areas with complex terrain in the study area create high variability in winds and turbulence. The model has specialized algorithms to deal with calm wind speed conditions and characterize dispersion in regions of complex terrain.

Dispersion Modeling Methodology

Dispersion modeling was used to investigate potential changes in air quality during the operation phase only. Emissions during the construction phase were assessed indirectly by considering the predicted maximum GLC during operation as a worst-case envelope.

The emission sources considered in the dispersion modeling included all substantive sources located at the primary processing during operation such as:

- combustion emissions from fuel oil boilers (note that based on updated design, these units are no longer required) and diesel generators (continuous power); and,
- particulate matter emissions due to crushing, loading/dumping, wind erosion, and dust from conveyors.

To consider a variety of worst-case meteorological events in the dispersion modeling, a five-year simulation period spanning 2002-2006 was selected. As Project operations are expected to cease during the winter months, emissions were not modelled from November to March. Model results were used to help quantitatively assess potential environmental effects due to Project emissions of NO_X, SO_2, CO, PM, PM_{10}, and $PM_{2.5}$. For each source modelled, emissions and other source characteristics were estimated based on preliminary design information and available literature.

As mentioned above, the baseline ambient concentrations considered in the modeling were provided by the NLDEC and are expected to conservatively estimate existing conditions in the region.

The most recent versions of the CALMET (v6.326) and CALPUFF (v6.262) models were used, as requested by the NLDEC.

Dispersion modeling was conducted to predict maximum GLC, which were added to the background concentrations and compared to the relevant air quality standards. A nested grid of receptors covering the Study Area was designed in accordance with the Newfoundland and Labrador Guidance for Plume Dispersion Modeling (NLDEC 2006) to find the maximum off-property GLC occurring over the five year period. In addition, maximum GLC were predicted at discrete sensitive receptors representing cabins, residences, and recreational areas. Figure 4.1 shows the locations of the sensitive receptors relative to the area where Project activities will occur. For all simulations, the model inputs and parameters were selected after consultation with the NLDEC (Lawrence 2008).

For the operation phase, emissions due to standing losses from storage tanks at the primary processing area are not expected to be substantive as the contents will have relatively low vapour pressures (diesel and heavy oil). Similarly, emissions due to on-site vehicle traffic are not expected to be substantive relative to the other combustion and fugitive dust sources in the primary processing area. As these sources are expected to represent only a small fraction of the total emissions from the primary processing facility, neither of the sources was included in the modeling simulations.

Emissions due to fuel combustion and fugitive dust from trucks hauling ore from the deposits to the processing area during operation were also not considered in the modeling. Although fugitive dust emissions will occur due to vehicle traffic along the road, the majority of the fugitive dust will remain in lowest 1-2 meters above ground level and settle within a few hundred meters of the road (DRI 1999). The haul route is an existing dirt road, and although traffic along the route is expected to increase with Project activities, no more than five trucks are expected to pass in a given hour. As such, while changes in air quality may occur due to fugitive dust emissions during certain meteorological conditions when trucks pass, these events will be localized and short in duration.

Emissions due to blasting and on-site traffic at the mine site locations during operation are not expected to cause substantive changes in air quality as they will be emitted inside a pit, mechanical methods will be used where possible, and the distances from the site to the nearest sensitive receptors are relatively far (more than 1.5 km). Therefore, these emissions were excluded from further modeling.

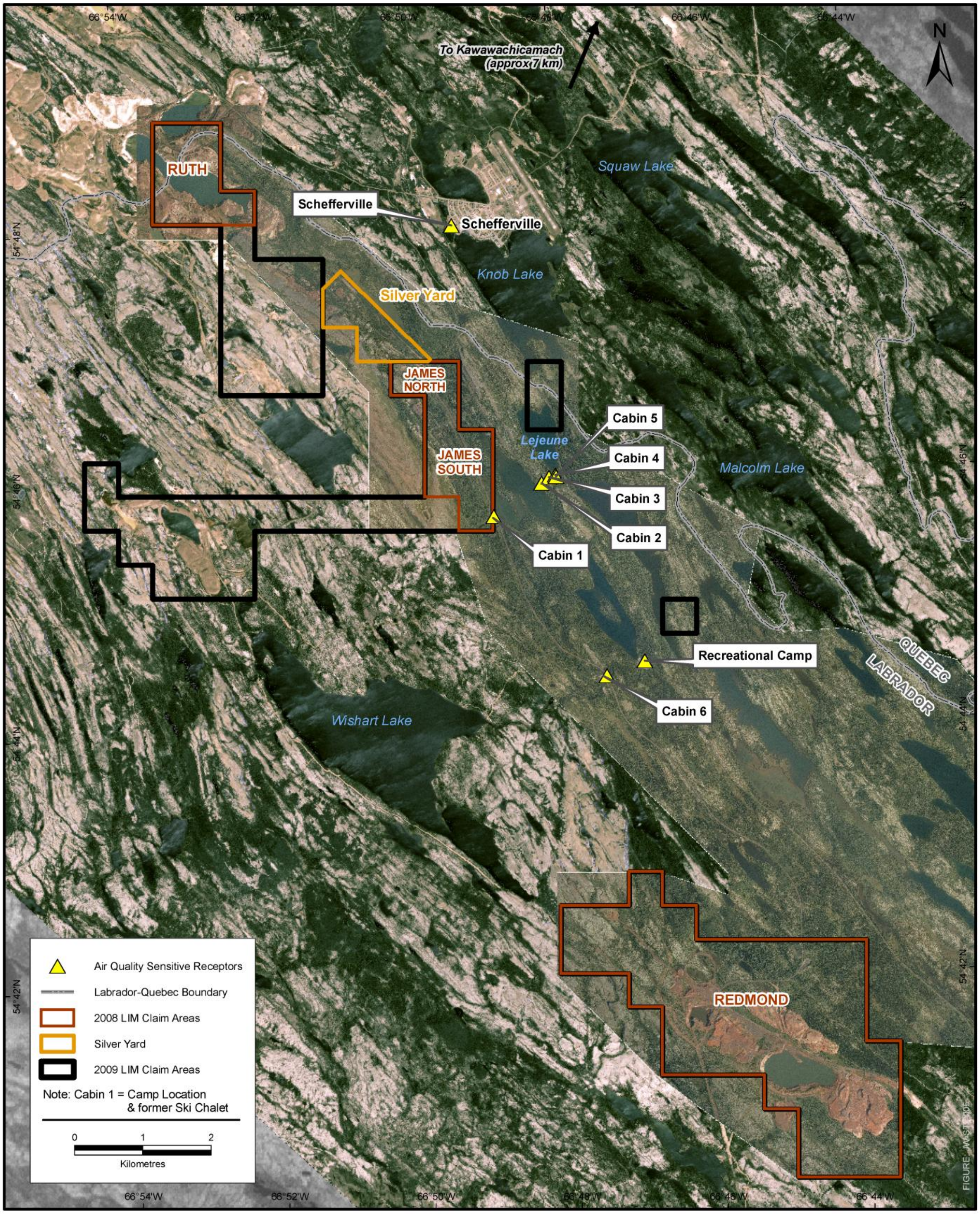


Figure 4.1 Sensitive Receptor Locations

Emissions from the diesel locomotive used for transporting ore from the beneficiation area during operation are not expected to cause substantive changes in air quality as such emissions will be intermittent (one trip per day) and short-term in duration. Therefore, these emissions were not included in the modeling assessment.

As the diesel generators installed at the worker's camp will be operated in standby mode, any emissions from these units will be intermittent, short-term in duration and negligible compared to other emissions occurring during operation. Therefore, these emissions were excluded from further modeling.

4.1.2.4 Air Quality Modeling Results

Modeling was conducted over all applicable averaging periods, and maximum predicted GLC were compared with applicable regulatory standards. Estimates for background ambient air contaminant concentrations were added to the model predictions to characterize maximum potential changes in air quality. The results of the dispersion modeling assessment are presented in Appendix H.

The maximum predicted concentrations in Appendix H show that during certain rare meteorological conditions, exceedances of the regulatory standards for NO_2, TSP, PM_{10}, and $PM_{2.5}$ could potentially occur near the property line of the facility (within 150 meters of the facility). These higher predicted values are due to emissions from the diesel generators (NO_2) and from fugitive dust sources at the primary processing facility (TSP, PM_{10}, and $PM_{2.5}$). Over the five-year modeling period and including ambient background concentrations, there were 73 predicted exceedances of the 24-hr PM standard, 131 predicted exceedances of the 24-hr PM_{10} standard, 42 exceedances of the 24-hr $PM_{2.5}$ standard, and 1 predicted exceedance of the 1-hr NO_2 standard. The predicted exceedances of NO_2 occur approximately 130 m from the property line (thus not near any residences) and are primarily due to emissions from the diesel generator stacks. The predicted exceedances of particulate matter are primarily due to fugitive dust sources, such as ore loading and storage pile erosion. No exceedances of the regulatory standards for SO_2 or CO were predicted. All predicted GLC near cabins, residences, and recreational areas are well below the regulatory standards. As well, more details are provided in the Air Quality Technical Study, provided under separate cover.

It should be noted that the emissions estimates used as input to the dispersion modeling were based on conservative assumptions and published emissions factors, and do not take into account potential mitigative measures to reduce fugitive dust at the facility. Based on the final design of the facility, mitigative measures will be put in place to minimize emissions and resultant fugitive dust near property limits. These measures, as described in Section 8.1 of the EIS, will include wet suppression of roads and storage piles to minimize fugitive dust. With such mitigation measures in place, fugitive dust emissions (and resultant off-property PM concentrations) would be reduced to below ambient air quality standards LIM will implement mitigation measures efficiently and effectively to ensure that no significant adverse environmental effects occur due to Project-related emissions during operation. Follow-up ambient air monitoring (as discussed in Section 8.3 of the EIS) will confirm Project-related emissions during construction and operation for additional mitigation development and implementation, if appropriate. This approach (mitigation and follow-up monitoring) is a preferable option, and therefore re-modeling of the conservative and theoretical fugitive dust emission from the Project is not required. Furthermore, all model-predicted values represent a conservative worst-case estimate of potential downwind concentrations during adverse meteorological conditions (considering five years of meteorological data).

Contour plots of the predicted maximum ground-level concentrations (including winter months) are shown for NO_2 (1 hr averaging period), and TSP (24 hr averaging period) in Figures 4.2 and 4.3, respectively. The plots show that, as mentioned above, the region of the predicted exceedances is limited to a small area near the property line and more than 1.5 km from any of the sensitive receptor locations. The maximum predicted concentrations at the two sensitive receptor locations nearest to the primary processing facility (Schefferville, Private Cabin) are presented in Appendix H. As mentioned above, the predicted GLC near cabins, residences, and recreational areas are well below the regulatory standards.

Section 5 of the Air Pollution Control Regulations does not apply to the boiler stack or the baghouse stack because the emissions are below the prescribed limits. Based on the methodology used in the emissions inventory and the dispersion modeling, SO_2 and PM emissions from the boiler stack were conservatively estimated to be 5.3 tonnes and 1.3 tonnes respectively, while the PM emissions from the baghouse were estimated to be 6.7 tonnes. These are all below the 20 tonne per year limit described in Section 5 of the Air Pollution Control Regulations. Note that based on updated design information, the boilers are no longer required. However, to be conservative, the potential contributions of these sources are still considered in the air quality assessment.

4.1.2.5 Potential Changes in Air Quality due to Project Activities

The Project activities during construction and operation may result in emissions of air contaminants to the atmosphere. These emissions have the potential to cause adverse environmental effects via a change in ambient air quality. In the following sections, the significance of these potential environmental effects is rated for both operation and construction.

Operation

Emissions estimates for the Project during operation were developed for all potentially substantive sources using the list of potential sources provided in the guidelines as a basis. Where emission sources identified in the guideline were found to be not substantive or not applicable, emissions were not estimated. All source screening and emissions estimates were based on preliminary data for the Project. The potentially substantive emission sources during operation can be broadly grouped as either combustion emissions or fugitive dust emissions. Emissions were estimated for numerous non-negligible sources including boilers (note that based on updated design, these units are not required), generators, on-site vehicles, ore loading, ore crushing, stockpile erosion, and on-site conveyor systems. The final emissions inventory (with more detailed estimates and methodology) is provided in the Air Quality Technical Study which is submitted under separate cover and provided in Appendix H. The emission sources during operation can be categorized into three groups:

- emissions from the primary processing facility;
- emissions due to trucks hauling ore from the mines to the processing area; and,
- emissions due to blasting and on-site traffic at the mine site locations.

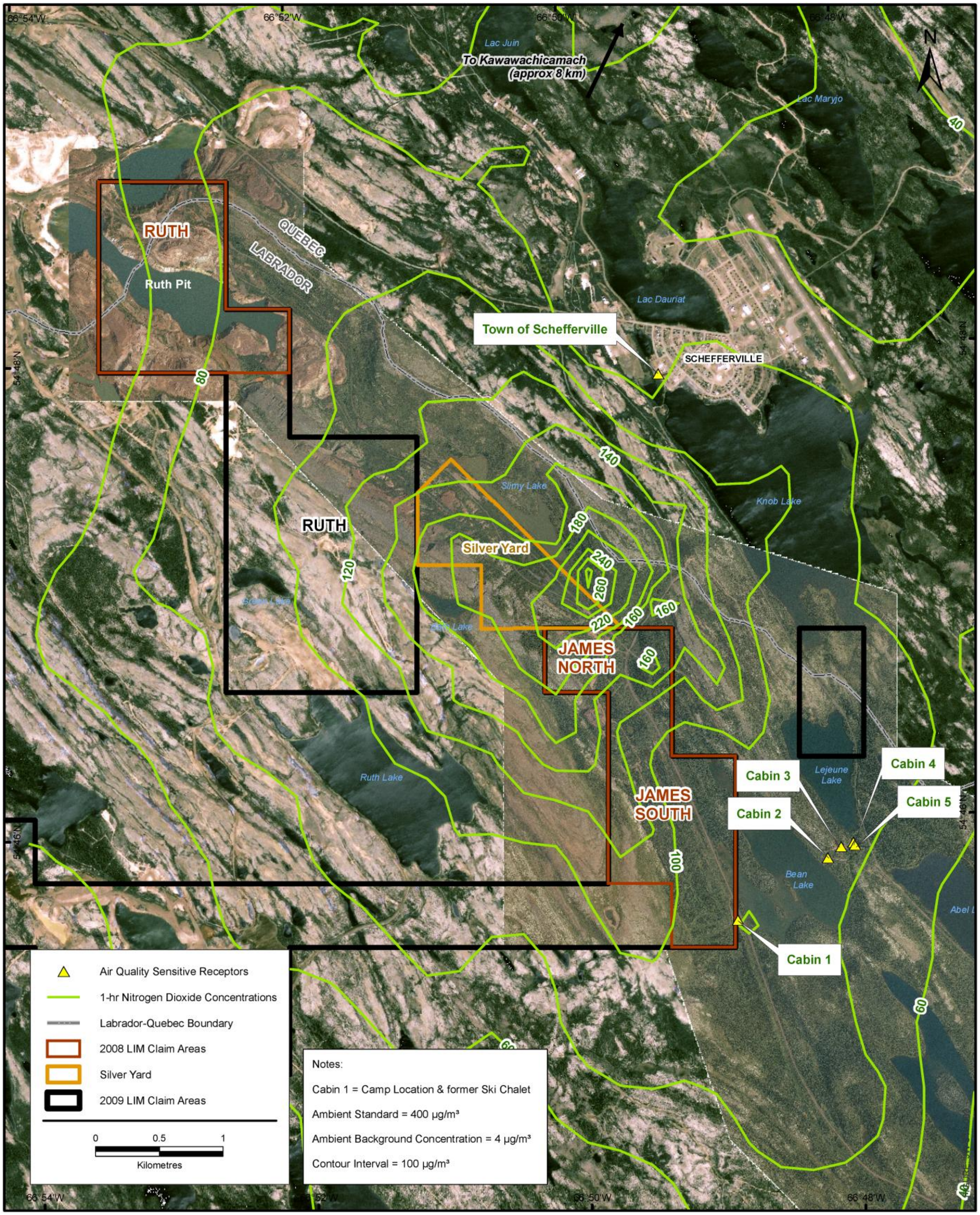


Figure 4.2 Maximum Predicted 1-hr NO_X Ground-level Concentrations

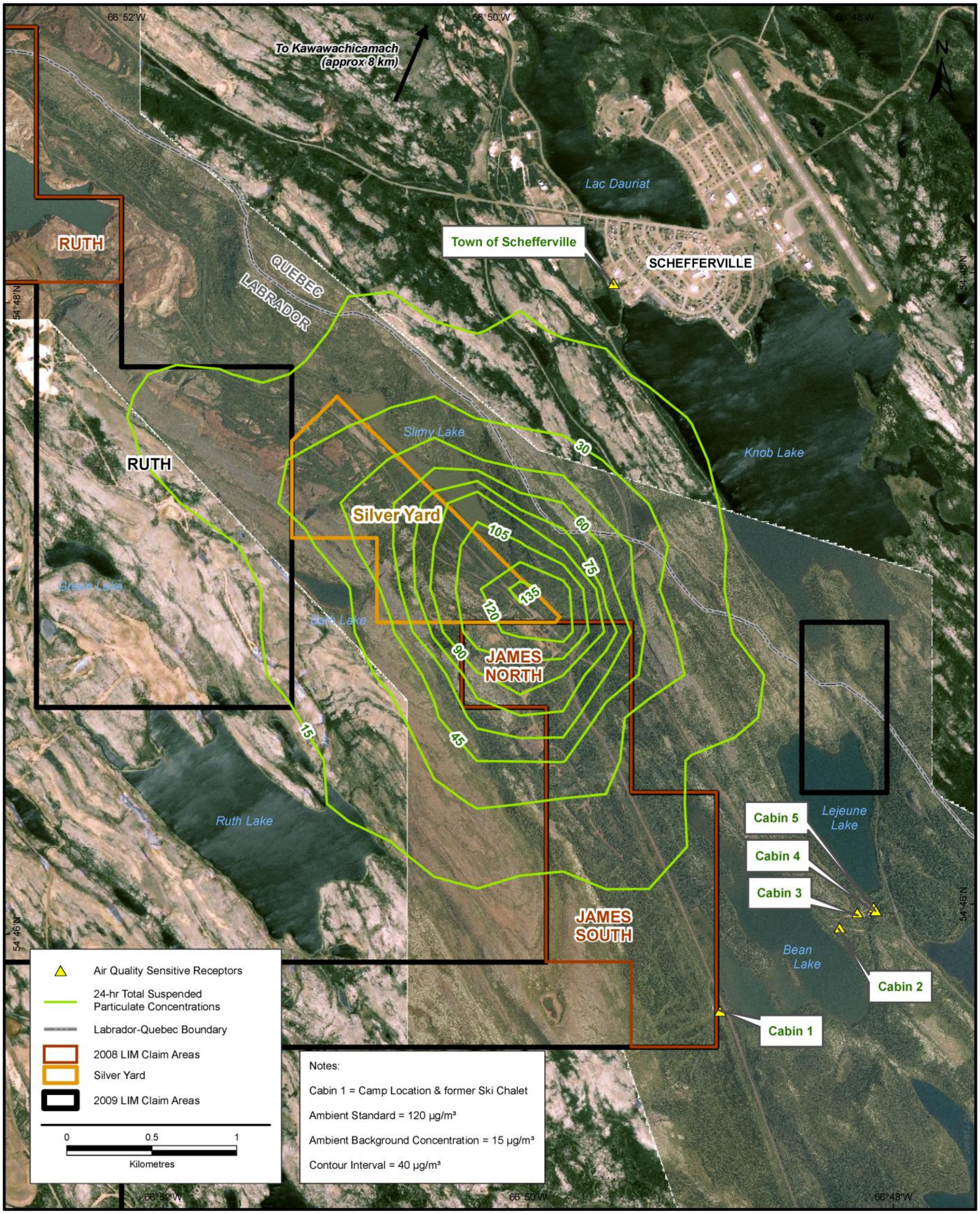


Figure 4.3 Maximum Predicted 24-hr TSP Ground-level Concentrations

As shown in the dispersion modeling of emissions from the primary processing facility presented above, although there may be exceedances of regulatory standards at locations near the property line during adverse meteorological conditions, these higher values are limited to within 150 m of the property line. As this region is far from any of the sensitive receptor locations, it is unlikely that prolonged human exposure to air contaminant concentrations at these levels will occur. Therefore, as the predicted exceedances represent worst-case meteorological conditions, are limited in spatial extent, and are short-term in duration, no substantive changes in air quality are expected due to emissions from the primary processing facility.

Although fugitive dust emissions will occur due to vehicle traffic along the road during operations, the majority of the fugitive dust will remain in lowest 1-2 meters above ground level and settle within a few hundred meters of the road (DRI 1999). The haul route is an existing dirt road, and although traffic along the route is expected to increase with Project activities, no more than five trucks are expected to pass in a given hour. As such, while some dusting of vegetation may occur due to vehicle traffic during certain meteorological conditions, no substantive environmental effects are expected due to such emissions as they will be localized in extent and short-term in duration.

Emissions due to blasting and on-site traffic at the mine site locations are not expected to cause substantive environmental effects as will be emitted inside a pit and the transport distances to the nearest sensitive receptors are relatively far (greater than 1.5 km).

Emissions from the diesel locomotive used for transporting ore from the beneficiation area are not expected to cause substantive environmental effects as these emissions will be intermittent (one trip per day) and short-term in duration.

Similarly, emissions from the standby diesel generators installed at the worker's camp will be intermittent, short-term in duration, and negligible relative to other emissions during operation. Therefore, such emissions are not expected to cause substantive environmental effects.

Therefore, no significant adverse environmental effects due to Project-related emissions are anticipated during operation.

Construction

As outlined in Section 3.2.6, emissions to the atmosphere may occur during construction activities such as railway track installation, rail bed grubbing, clearing/grubbing for site services area, and the erection of buildings at the primary processing facility location. Fuel combustion and fugitive dust from the movement of soil and vehicles are expected to contribute most substantively to emissions during this phase. In addition, combustion emissions are expected from the temporary diesel generators installed at the worker's camp.

As the emissions occurring during construction are expected to be fractionally small compared to those occurring during operation, the potential effects to air quality during this Phase can be assessed indirectly by considering the model-predicted concentrations using the operation phase as a worst-case envelope. Since no significant adverse environmental effects are anticipated due to a change in air quality during operation, it follows the same conclusion will apply for construction.

Therefore, no significant adverse environmental effects due to Project-related emissions are anticipated during construction.

Summary

Based on the above rationales, the environmental effect of a change in air quality due to emissions from Project-related activities, through all phases, is rated not significant.

4.1.3 Landscape

4.1.3.1 Regional Geology

At least 45 hematite-goethite ore deposits have been discovered in an area 20 km wide that extends 100 km northwest of Astray Lake, referred to as the Knob Lake Iron Range, which consists of tightly folded and faulted iron-formation. The iron deposits occur in deformed segments of iron-formation, and the ore content of single deposits varies from one million to more than 50 million tonnes.

The Knob Lake properties are located on the western margin of the Labrador Trough adjacent to Archean basement gneisses. The Labrador Trough, known as the Labrador-Québec Fold Belt, extends for more than 1,000 km along the eastern margin of the Superior craton from Ungava Bay to Lake Pletipi, Québec. The belt is about 100 km wide in its central part and narrows considerably to the north and south.

The western half of the Labrador Trough can be divided into three sections based on changes in lithology and metamorphism (North, Central and South). The Trough is comprised of a sequence of Proterozoic sedimentary rocks including iron formation, volcanic rocks and mafic intrusions known as the Kaniapiskau Supergroup (Gross, 1968). The Kaniapiskau Supergroup consists of the Knob Lake Group in the western part of the Trough and the Doublet Group, which is primarily volcanic, in the eastern part.

The Central or Knob Lake Range section extends for 550 km south from the Koksoak River to the Grenville Front located 30 km north of Wabush Lake. The principal iron formation unit, the Sokoman Formation, forms a continuous stratigraphic unit that thickens and thins from sub-basin to sub-basin throughout the fold belt.

The southern part of the Trough is crossed by the Grenville Front. Trough rocks in the Grenville Province to the south are highly metamorphosed and complexly folded, which has caused recrystallization of both iron oxides and silica in the primary iron formation to meta-taconites.

Geological conditions throughout the central division of the Labrador Trough are generally similar to those in the Knob Lake Range.

A geological map of the Project area is shown in Figure 4.4.

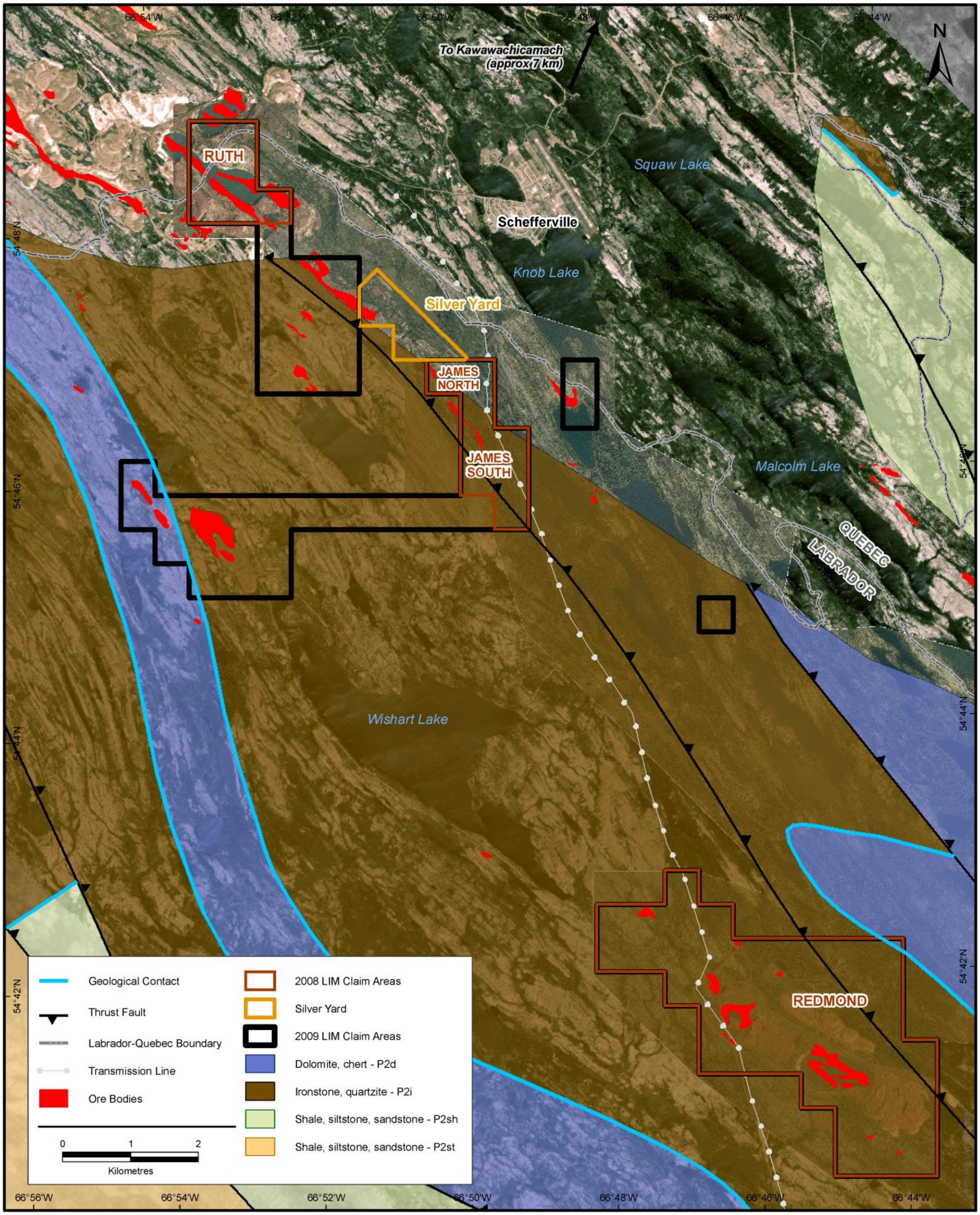


Figure 4.4 Geological Map (Project Area)

4.1.3.2 Knob Lake Range Geology

The general stratigraphy of the Knob Lake area is representative of most of the range, except that the Denault dolomite and Fleming Formation (described below) are not uniformly distributed. The Knob Lake Range occupies an area 100 km long by 8 km wide. The sedimentary rocks including the cherty iron formation of this area are weakly metamorphosed to greenschist facies. In the structurally complex areas, leaching and secondary enrichment have produced earthy textured iron deposits. Unaltered banded magnetite iron formation (taconite) occurs as gently dipping beds west of Schefferville in the Howells River deposits.

Most of the secondary earthy textured iron deposits occur in canoe-shaped synclines with some as tabular bodies. In the western part of the Knob Range, the iron formation dips gently eastward over the Archean basement rocks for about 10 km to the east, then forms an imbricate fault structure with bands of iron formation.

Subsequent supergene processes converted some of the iron formations into high-grade ores, preferentially in synclinal depressions and/or down-faulted blocks. Original sedimentary textures are commonly preserved by selected leaching and replacement of the original deposits. Jumbled breccias of enriched ore and altered iron formations, locally called rubble ores, are also present.

The stratigraphy of the Schefferville area is represented by the following formations.

Attikamagen Formation. It consists of argillaceous material that is thinly bedded, fine grained, greyish green, dark grey to black, or reddish grey. Calcareous or arenaceous lenses occur locally interbedded with the argillite and slate, and lenses of chert are common.

Denault Formation. The Denault Formation consists primarily of dolomite being more clastic at its base and cherty at its top. Leached and altered beds near the iron deposits are rubbly, brown or cream coloured.

Fleming Formation. It occurs a few kilometres southwest of Knob Lake and only above dolomite beds of the Denault Formation. It consists of rectangular fragments of chert and quartz within a matrix of fine chert.

Wishart Formation. The Wishart Formation is a sandstone formation (quartzite and arkose) cemented by quartz and minor amounts of hematite and other iron oxides. It is well differentiated from the iron ore bearing overlaying formations by its texture and color.

Ruth Formation. It is a black, grey-green or maroon ferruginous slate, 3 to 36 metres thick. This thinly banded material contains lenses of black chert and various amounts of iron ore.

Sokoman Formation. More than 80 percent of the ore in the Knob Lake Range occurs within this formation. Lithologically, the iron formation varies in detail in different parts of the range and the thickness of individual members is not consistent.

A thinly bedded, slatey facies at the base of the formation consists largely of fine chert with an abundance of iron silicates and disseminated magnetite and siderite. Fresh surfaces are grey to olive green, and weathered surfaces brownish yellow to bright orange. Thin-banded oxide facies of iron formation occurs above the silicate-carbonate facies in nearly all parts of the area. The thin (<1.25cm) jasper bands are mostly deep red, but in some places are greenish yellow to grey, and are interbanded with hard, blue layers of fine-grained hematite and a minor magnetite.

The thin jasper beds are located underneath thick massive beds of grey to pinkish chert and beds that are very rich in blue and black iron oxides, and make up most of the Sokoman Formation. The upper part of the Sokoman Formation comprises discontinuous beds of dull green to grey or black massive chert.

Menihek Formation. A thin-banded, grey to black argillaceous slate conformably overlies the Sokoman Formation in the Knob Lake area. Thicknesses are unknown since the slate is found in faulted blocks in the main ore zone.

4.1.3.3 Regional Mineralization

The earthy bedded iron deposits are a residually enriched type within the Sokoman iron formation that formed after two periods of intense folding and faulting, followed by the circulation of meteoric waters in the fractured rocks. The enrichment process was caused largely by leaching and the loss of silica, resulting in a strong increase in porosity. This produced a friable, granular and earthy-textured iron ore. The siderite and silica minerals were altered to hydrated oxides of goethite and limonite. The second stage of enrichment included the addition of secondary iron and manganese which appear to have moved in solution and filled pore spaces with limonite-goethite. Secondary manganese minerals, i.e., pyrolusite and manganite, form veinlets and vuggy pockets. The types of iron ores developed in the deposits are directly related to the original mineral facies. The predominant blue granular ore was formed from the oxide facies of the middle iron formation. The yellowish-brown ore, composed of limonite-goethite, formed from the carbonate-silicate facies, and the red painty hematite ore originated from mixed facies in the argillaceous slaty members. The overall ratio of blue to yellow to red ore is approximately 70:15:15. The proportion of each varies widely within the deposits.

Only the direct shipping ore is considered beneficial to produce lumps and sinter feed and will be part of the resources for the LIM Project. The direct shipping ore was classified by IOC in six categories based on their chemical, mineralogical and textural compositions. This classification is still used in the evaluation of the mineralization. The following ore categories and other mineralization categories not part of the potential economic mineralization, are:

- High Non-Bessemer (HNB);
- Lean Non Bessemer (LNB);
- High Silica (HiSiO2) (waste); and
- Treat Rock (TRX) (waste but previously stockpiled for possible later treatment).

The blue ores, which are composed mainly of the minerals hematite and martite, are generally coarse grained and friable. They are usually found in the middle section of the iron formation.

The yellow ores, which are made up of the minerals limonite and goethite, are located in the lower section of the iron formation. These ores have the unfavourable characteristic of retaining high moisture content.

The red ore is predominantly a red earthy hematite. It forms the basal layer that underlies the lower section of the iron formation. Red ore is characterized by its clay and slate-like texture.

Direct shipping ores and lean ores mined in the Schefferville area during the period 1954-1982 amounted to some 150 million tons. Based on the original ore definition of IOC (+50% Fe <18% SiO2 dry basis), approximately 200 million tonnes of iron resources remain in the area, exclusive of magnetite taconite. LIM has acquired rights to approximately 50 percent of this remaining iron resource.

4.1.3.4 Deposit Types

The Labrador Trough contains four main types of iron deposits:

- soft iron ores formed by supergene leaching and enrichment of the weakly metamorphosed cherty iron formation; they are composed mainly of friable fine-grained secondary iron oxides (hematite, goethite, limonite);
- taconites, the fine-grained, weakly metamorphosed iron formations with above average magnetite content and which are also commonly called magnetite iron formation;
- more intensely metamorphosed, coarser-grained iron formations, termed metataconites which contain specular hematite and subordinate amounts of magnetite as the dominant iron minerals; and
- minor occurrences of hard high-grade hematite ore occur southeast of Schefferville at Sawyer Lake, Astray Lake and in some of the Houston deposits.

The Labrador Iron Mountain deposits are composed of iron formations of the Lake Superior-type. The Lake Superior-type iron formation consists of banded sedimentary rocks composed principally of bands of iron oxides, magnetite and hematite within quartz (chert)-rich rock, with variable amounts of silicate, carbonate and sulphide lithofacies. Such iron formations have been the principal sources of iron throughout the world.

The Sokoman iron formation was formed as chemical sediment under varied conditions of oxidation-reduction potential (Eh) and hydrogen ion concentrations (pH) in varied depth of seawater. The resulting irregularly bedded, jasper-bearing, granular, oolite and locally conglomeratic sediments are typical of the predominant oxide facies of the Superior-type iron formations, and the Labrador Trough is the largest example of this type.

The facies changes consist commonly of carbonate, silicate and oxide facies. Typical sulphide facies are poorly developed. The mineralogy of the rocks is related to the change in facies during deposition, which reflects changes from shallow to deep-water environments of sedimentation. In general, the oxide facies are irregularly bedded, and locally conglomeratic, having formed in oxidizing shallow-water conditions. Most carbonate facies show deep-water features, except for the presence of minor amounts of granules. The silicate facies are present in between the oxide and carbonate facies, with some textural features indicating deep-water formation.

Each facies contains typical primary minerals, ranging from siderite, minnesotaite, and magnetite-hematite in the carbonate, silicate and oxide facies, respectively. The most common mineral in the Sokoman Formation is chert, which is closely associated with all facies, although it occurs in minor quantities with the silicate facies. Carbonate and silicate lithofacies are present in varying amounts in the oxide members.

The sediments of the Labrador Trough were initially deposited in a stable basin which was subsequently modified by penecontemporaneous tectonic and volcanic activity. Deposition of the iron formation indicates intraformational erosion, redistribution of sediments, and local contamination by volcanic and related clastic material derived from the volcanic centers in the Dyke-Astray area.

The consolidation of the sediments into cherty banded iron formation is due to diagenesis and low grade metamorphism, which only reached the greenschist rank. The iron may be a product of erosion. It is unlikely that the Nimish volcanism made a significant contribution.

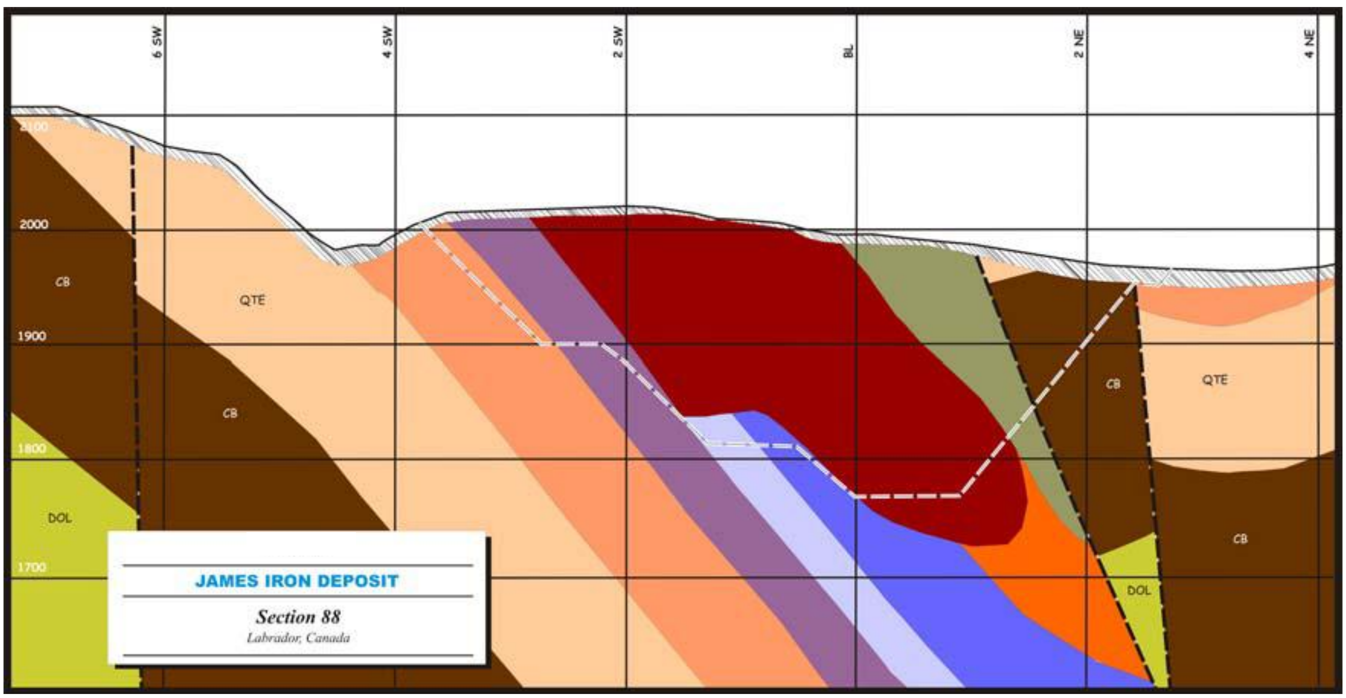
The Project currently involves the James North, James South and Redmond Deposits.

James Deposit

The James deposit is a northeast dipping elongated iron deposit with a direction of N330° in its main axis and it appears to be structurally and stratigraphically controlled. The stratigraphic units recorded in James area go from the Denault Formation to the Menihek Formation. The main volume of the mineralization is developed in the Middle Iron Formation (MIF) and lower portion of the Upper Iron Formation (UIF) both part of the Sokoman Formation.

The iron mineralization in the James deposit consist of thin layers (<10 cm thick) of fine to medium grained steel blue hematite intercalated with minor cherty silica bands <5 cm thick dipping 30° to 45° to the northeast. The James mine mineralization has been affected by strong alteration which removed most of the cementing silica giving it a sandy friable texture.

A typical section developed by IOC is shown in Figure 4.5.



Source: Labrador Iron Mines Limited

Figure 4.5 Generalized Cross Section-James Deposits

Redmond Deposit

The Redmond deposits are developed along a northwest trending synclinal that extends to the south to the Redmond No.1 deposit and to the north to the Wishart mine. The Redmond deposits enclosed in license 016291M are small rounded medium Fe grade mineralized bodies.

4.1.3.5 Geomorphology, Surficial Geology, Soils and Permafrost

There are dominant surficial materials within the area surrounding the Project deposits of drift-poor areas, glacial till and other surficial deposits (undifferentiated), with occasional areas of glaciofluvial deposits.

The till and other surficial deposits (undifferentiated), are predominantly nonstratified, poorly sorted, silty to sandy diamicton, gravel, and sandy gravel, deposited either directly from ice or by meltout during ablation and includes glaciofluvial, glaciolacutrine, marine, and fluvial deposits of either minor areal extent or thin (less than two m) and discontinuous.

The drift-poor areas are described as greater than 80 percent bedrock; including areas of till and other surficial materials generally < 1 m thick and discontinuous.

The glaciofluvial deposits are classified as proglacial or ice contact sand and gravel, forming ice contact fans and deltas, outwash plains and terraces, pitted outwash, crevasse fillings, kames and kame terraces, commonly associated with eskers and including areas of extensive, thick fluvial sediments derived from pre-existing glaciofluvial deposits.

The areas in and surrounding the deposits associated with the Project being predominantly greater than 80 percent bedrock, and a previously mined area, do not possess a high number of identifiable landforms. There is evidence of striae, indicating direction of flow known and unknown, as well as identified eskers (esker ridge; kame or splay deposit) in the area (R.A. Klassen et al. 1992).

Permafrost

There have been observations of permafrost of 120 m in thickness in the Schefferville region (Brown 1979). The Schefferville area has been previously identified as the “tentative southern limit of continuous permafrost”, Jenness (1949), then later as the “approximate southern limit of permafrost”, Thomas (1953). It was later concluded that there were no continuous zones of permafrost in the Labrador-Ungava and boundaries of discontinuous and sporadic zones were specified (Black 1951). An area 160 km north of Schefferville was indicated as the southern limit of discontinuous permafrost and extending to within 80 km of the Gulf of St. Lawrence was the sporadic zone (Pryer 1966).

Permafrost was determined to be more widespread than thought once IOC began mining near Schefferville in 1954. As described by Brown (1979), the southern limit of the discontinuous permafrost zone approximately extends along the 51st parallel of latitude from the southern end of James Bay to the Strait of Belle-Isle, 1500 km to the east (Figure 4.6). The western extremity of the northern limit of the discontinuous zone begins at Hudson Bay in the vicinity of Post-de-la-Baleine, 55oN latitude. The eastern extremity of this zone ends in the vicinity of Hopedale. Schefferville is situated at the northern margin of the permafrost. The permafrost occurs as scattered islands which increase in size and number from south to north. Although permafrost is present within the Fleming-Timmins group of deposits, 25 km northwest of Schefferville (Garg 1982), permafrost has not been identified within the current project area.

Various studies on permafrost refer to vegetation and snow cover as having correlation with permafrost presence and thickness. Snow depth and density changes with relief, weather and vegetation (Thom 1969). Thom suggests thick permafrost (up to 60 m) is likely in areas where snow cover is less than 0.4 m during the winter months of January and February.

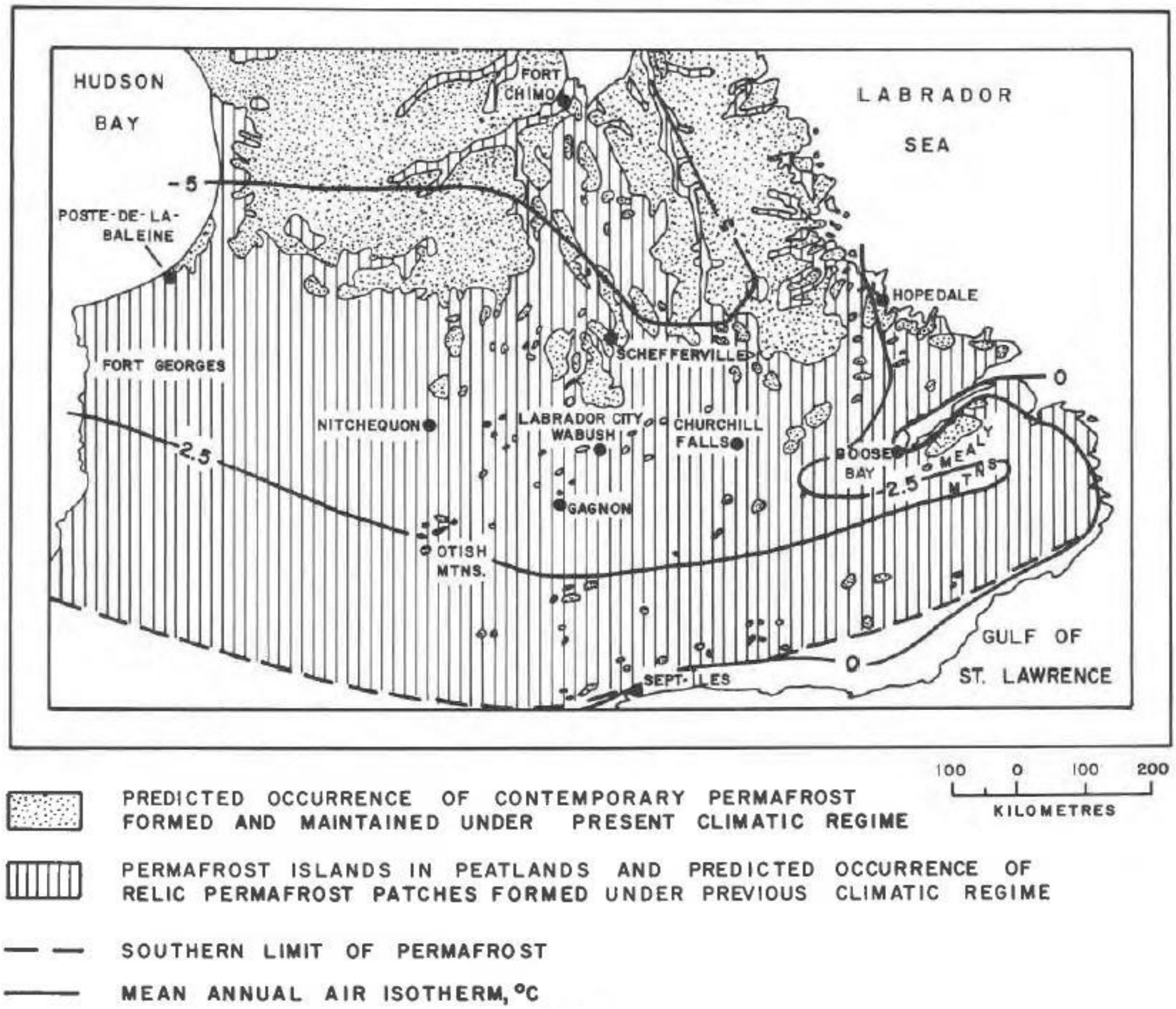


Figure 4.6 Permafrost Distribution in Nouveau-Québec and Labrador (Source Brown, 1979)

Research on permafrost distribution at numerous sites in the Schefferville area has been conducted by Nicholson (February 1978). Two sites north of the Project included Timmins 4 and Fleming 7, at an elevation of 700 m, between 1973 and 1975. It was determined that deep permafrost underlies areas of high elevation, which were exposed and vegetation cover consisted of tundra. The permafrost ranged from 60 to 100 m in depth, and entirely unfrozen areas occurred in valleys on the edge of these sites. No permafrost was present on less exposed and low-lying wood covered ground surfaces (Nicholson and Lewis 1976). Permafrost is expected to be absent beneath water bodies in the area that are so deep they do not freeze solid during winter, due to the water bodies' ability to produce higher ground temperatures. Permafrost is not expected to occur within 30 m from permanently covered shoreline (Nicholson February 1978).

Permafrost has not been observed in the Project Area and therefore it is not anticipated that permafrost will interfere with mining at the James and Redmond deposit areas.

4.1.3.6 Acid Rock Drainage

Based on the geology associated with iron ore deposits and specifically the deposits associated with the James and Redmond Properties that form the Project, the geological materials to be excavated, exposed and processed during mining of the James and Redmond deposits have low to no potential for Acid Rock Drainage (ARD). However, due diligence requires that ARD potential for any new mine site be fully evaluated and LIM is committed to ensuring the long term chemical stability of the Project through all stages of the mine life.

To date, sufficient historical and baseline data, as well as current laboratory test work, exists to suggest that ARD potential is extremely low for this Project. The following sections summarize the available data and the ongoing test work that will be completed.

Historical and Baseline Water Quality

Exploration and mining activities have occurred at the Project site dating back to the 1950s. IOC excavated large open pits and stockpiled considerable waste rock, low grade ore and other materials around the site. These materials have been exposed to both water and air (both required conditions for acid generation from rock) for decades and to date there is no evidence of poor or deteriorating water quality (lowered pH, elevated metals) in the flooded pits, stockpile drainage areas, or the surrounding natural water bodies.

Water quality monitoring on and around the James and Redmond Properties completed by AECOM in 2007 and 2008 (see Appendix I) indicates generally good water quality with pH ranging from 6.5 to 8.5 and normal metal concentrations.

ARD Sampling and Testing Program

A phased ARD sampling and testing program has been initiated to investigate and confirm the ARD potential for all geological materials (ore and waste) to be exposed at this site. To date, preliminary ‘static’ ARD test work has commenced on geological materials available from LIM’s 2008 sampling (trenching and boreholes) program.

The results of the acid base accounting test work completed to date are compiled in Table 4.4. These samples contain very low concentrations of sulphur and the NP/AP ratios for these samples tested range from 37 to 44 over seven samples. Based on the static ARD test results available to date, it is not anticipated that any of the ore or waste materials for this Project will be acid generating.

Bulk metals analysis was completed on seven samples by strong acid digestion (4 Acid) for trace metals (ICP-AES and ICP-MS). These results are shown in Table 4.4 and show generally typical element composition with the exception of iron, as would be expected.

Additional ARD test work will be completed as additional samples from LIM’s 2008 sampling (trenching and boreholes) program become available. Additional test work will be designed to provide coverage of all geological materials and spatial extents of the planned mine workings.

Table 4.4 Acid Base Accounting (ABA) Results

Deposit	Sample Method	Material Type	Paste pH (units)	Total Sulphur (%)	Acid Leachable SO_4-S (%)	Sulphide -S (%)	Total Carbon (%)	Carbonate (%)	NP (t $CaCO_3$/ 1000t)	AP (t $CaCO_3$/ 1000t)	Net NP (t $CaCO_3$/ 1000t)	NP/AP Ratio
James	Bulk	HGO	6.98	< 0.005	< 0.1	< 0.01	0.040	0.127	12.5	0.31	12.2	40.3
James	Bulk	LGO	7.10	< 0.005	< 0.1	< 0.01	0.091	0.024	12.5	0.31	12.2	40.3
Redmond 2	Bulk	LGO	7.55	< 0.005	< 0.1	< 0.01	0.048	0.029	13.0	0.31	12.7	41.9
Redmond 2	Bulk	Waste	6.95	< 0.005	< 0.1	< 0.01	0.047	0.119	11.6	0.31	11.3	37.4
Redmond 2B	Bulk	HGO	7.04	< 0.005	< 0.1	< 0.01	0.141	0.228	13.4	0.31	13.1	43.2
Redmond 5	Bulk	HGO	7.41	< 0.005	< 0.1	< 0.01	0.081	0.017	13.7	0.31	13.4	44.2
Ruth	Bulk	Waste	8.03	0.121	0.3	< 0.01	0.026	0.031	12.1	0.31	11.8	39.0

3.0 PROJECT DESCRIPTION

Mining excavations will occur at James North, James South, Redmond 2B and Redmond 5 deposits. The following section describes major project elements and activities that are the subject of this EIS. Beneficiation will take place at the Silver Yard area and a 4.0 km rail spur will be re-established along the existing railbed in Labrador.

3.1 Project Features

The primary features of the Project are the open pits, the beneficiation site at the area known as Silver Yard, the railway spur line re-establishment, a project camp, and the access roads. Other features will include laydown areas and waste rock disposal sites. The Project features are shown on Figure 3.1.

3.1.1 Mineral Licenses

Two Mineral Rights Licenses in 71 claim units issued by the Government of Newfoundland and Labrador registered in the names of Labrador Iron Mines Limited are applicable to this Project. Details of licenses associated with the James and Redmond Deposits are provided in Table 3.1 and 3.2 and Figures 3.2 and 3.3. In addition, a surface lease will be applied for prior to the start of construction for the Silver Yard area.

LIM holds title to these Mineral Rights Licenses subject to the terms of an Agreement dated September 15, 2005 and as subsequently amended between Fonteneau Resources Ltd. and Energold Minerals Ltd. and LIM. These licenses are located in west Labrador covering approximately 1,775 hectares. The Project location and the location of the properties are shown on Figure 2.1.

The proposed development is to be executed in the mineral licenses registered to LIM and/or covered under the above mentioned Agreement, as well as some small areas of adjacent lands where the mineral licenses are registered to a third party, New Millennium Capital Corp. (NML). NML has acknowledged that these jointly held deposits will most likely be mined in accordance with the LIM mining schedule (see NML News Release 08-05, February 5, 2008, Appendix F). LIM is in discussions to negotiate some mutually satisfactory agreement with NML regarding the mining on the NML licenses and anticipates that agreement will be successfully concluded and, as such, the proposed development area covers this larger area.

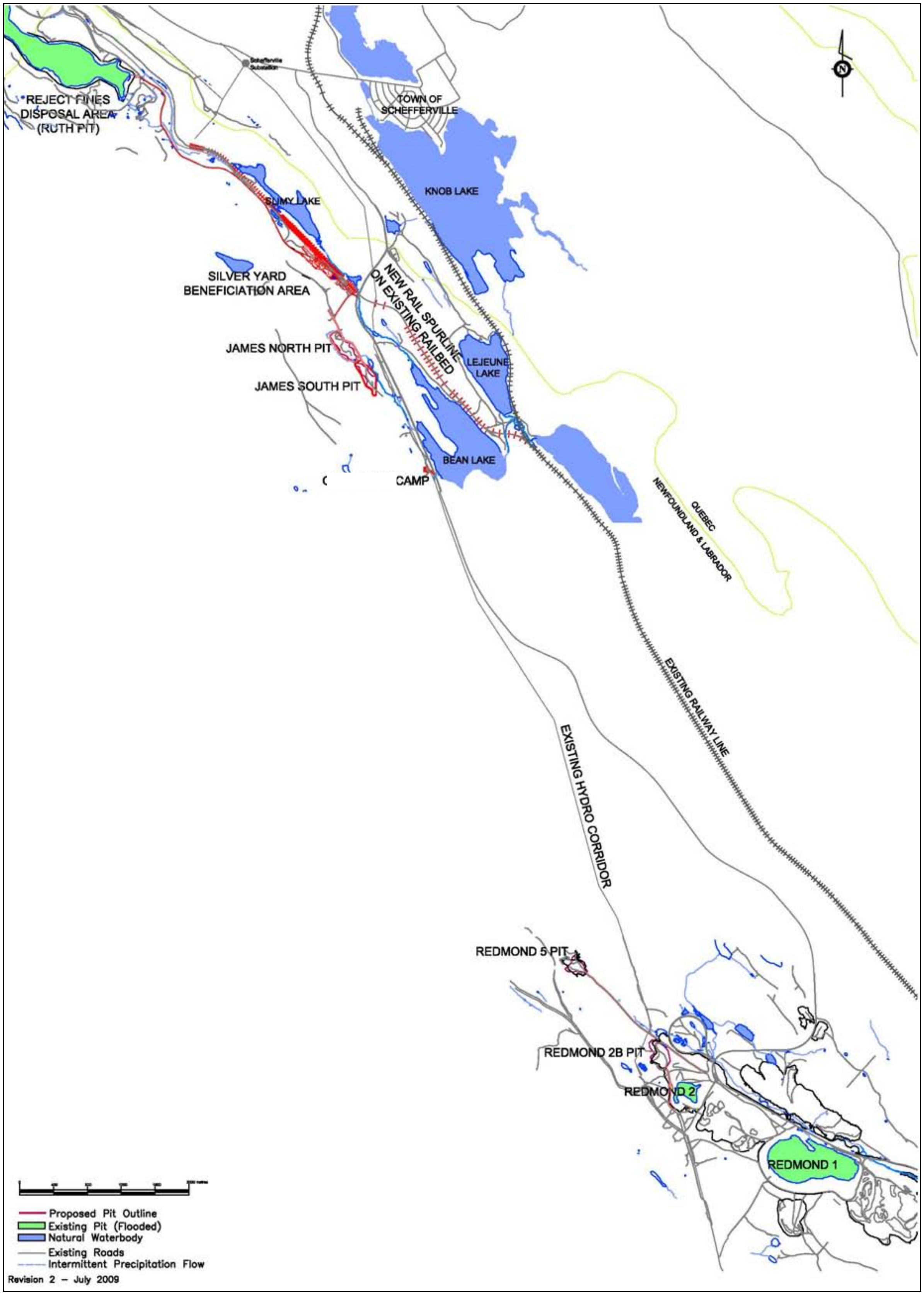


Figure 3.1 Project Features

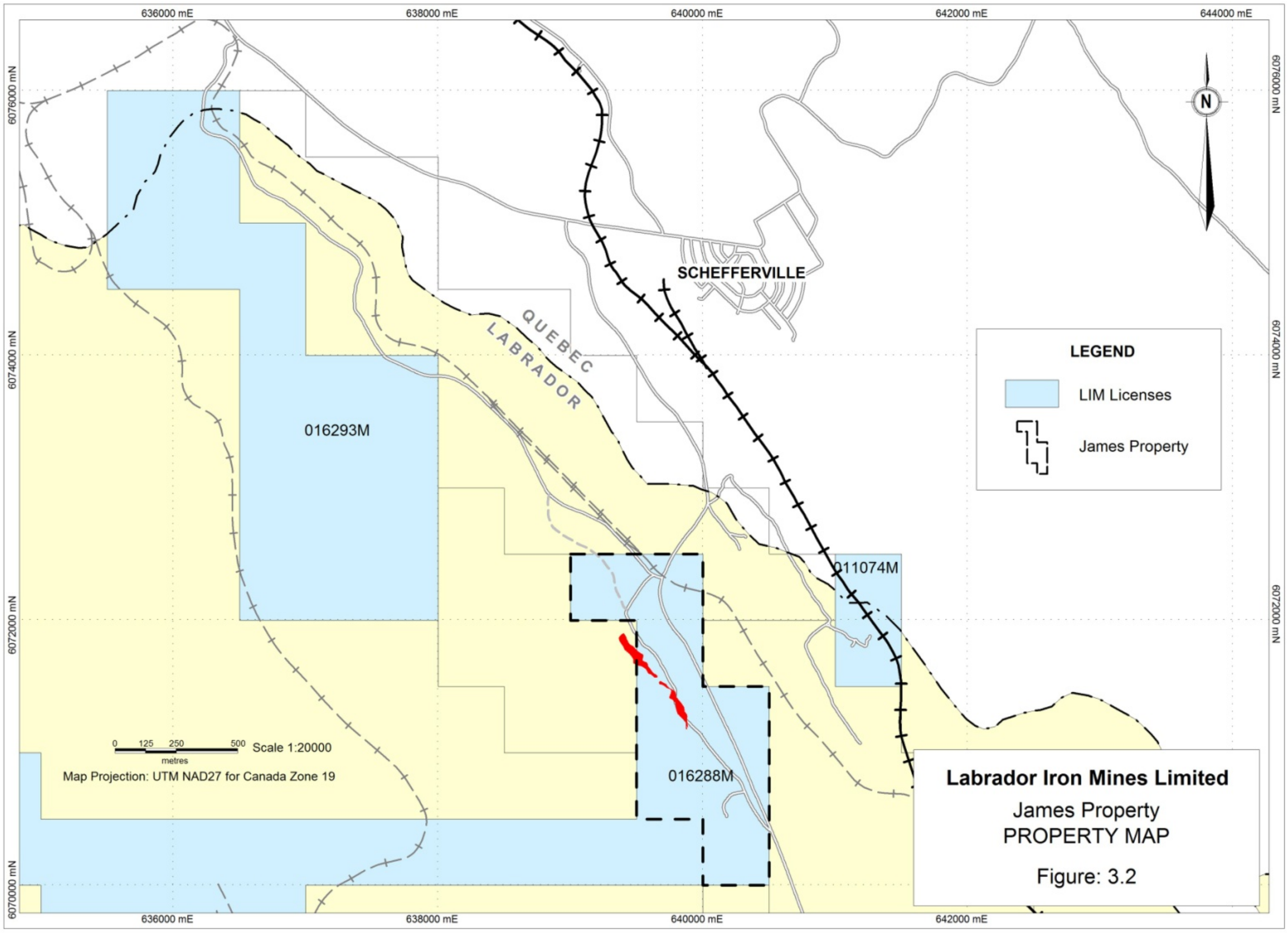


Figure 3.2 Mineral Licenses, James Property

3.1.1.1 James Deposit

The James deposit is located in the NE portion of the license 016288M; which covers an area of 6.75km^2. The license is held by Labrador Iron Mines Limited (Table 3.1). The James ore body is partially covered by the license 016288M, while the north-west end is covered by the license 010593M held by New Millennium Capital Corp. The James property delimited by the dashed line in Figure 3.2 was defined by licenses 010039M and 011231M prior grouping completed on June 1, 2009.

Table 3.1 James Property License

License No.	Holder	Issued	Claims	Extension (km^2)	Comments
016288M	Labrador Iron Mines Limited	Apr 12, 2004	27	6.75	This license replaces 011231M, 010039M, 012890M, 014497M and 014746M as of June 1, 2009
		Total	**27**	**6.75**	

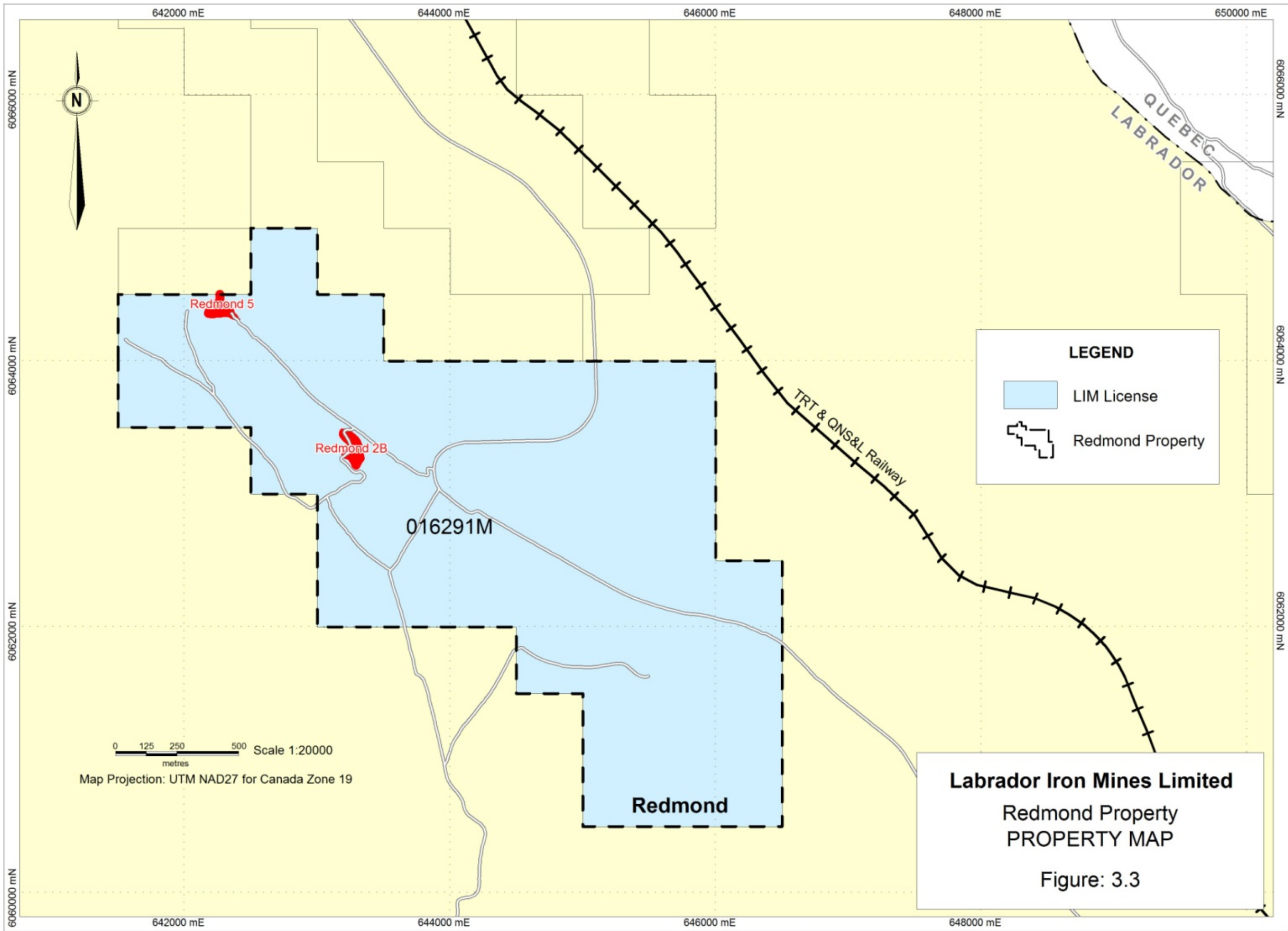


Figure 3.3 Mineral Licenses, Redmond Property

3.1.1.2 Redmond Deposits

The Redmond property comprises one license in 11.0 km^2 held by Labrador Iron Mines Limited (Table 3.2). The ore bodies considered by LIM for exploitation are Redmond 2B and Redmond 5 and both are covered by the license 016291M; however a small portion of the Redmond 5 ore body is covered by the license 013405M held by New Millennium Capital Corp.

Table 3.2 Redmond Property License

Licence No.	Holder	Issued	Claims	Extension (km^2)	Comments
016291M	Labrador Iron Mines Limited	Aug 25, 2005	44	11.0	This license replaces 011201M, 014495M, 014510M, 014512M, 014747M, 014748M and 014749M as of June 1, 2009
		Total	**44**	**11.0**	

3.1.1.3 Engineering Studies

Subsequent to the confirmation exploration program, an engineering study will be prepared. The study will examine the volume and value of the resources, production methods and costs, and the transport of the iron ore for shipment to markets.

Environmental baseline studies have been conducted and are summarized in this EIS. Discussions with rail transport companies and port operators are also being conducted.

3.1.2 Mine and Borrow Pits

3.1.2.1 James and Redmond Mines

Mining will occur at James North, James South, Redmond 2B and Redmond 5 deposits, where approximately 5.8 million tonnes of iron ore resources have been shown in historic documents. In addition to ore, approximately 5 million tonnes of overburden and waste rock will be excavated and disposed or stockpiled over the life of the individual properties. Excavation and transport to the beneficiation area will be done using conventional truck and excavator methods.

The pit designs for the referenced deposits will have overall pit wall angles that will range from 34^{o} in overburden to 55^{o} in competent rock. The face angles will range from 40^{o} in overburden to 70^{o} in competent rock. These angles are based on dewatered/depressurized pit walls and controlled blasting techniques. The excavations will be mined in 10m benches.

The pit haulage roads will be designed at 8 percent grade. All haul roads at the mine sites will be engineered and built to permit the safe travel of all vehicles and in accordance with provincial regulations (CNLR 1145/96). The running surface width of proposed haul roads will be designed to conform to current industry standards.

All pits will occur within the economic boundaries of the referenced deposits. Other minor excavations may be necessary and are discussed in the following sections.

3.1.2.2 Waste Rock Disposal

Waste rock storage areas and low-grade ore stockpiles will be required to support the recovery of saleable product to customers of lump ore and sinter fines ore. These storage areas and stockpiles will be located in close proximity to individual mine entrances/exits and/or the proposed beneficiation facility in order to optimize haulage distances and potential future stockpile recovery costs. In all cases, waste removal and stockpiling decisions will be made on the basis of environmental protection considerations, overall mining costs, iron ore marketability and the total quantity of material to be moved to access and produce the final products.

Other factors influencing the proposed location of waste rock storage areas include:

- location of ore bodies and potential exploration targets;
- topography to minimize storage area footprint;
- water drainage and proximity to watercourses; and,
- visual exposure to public roads and housing/ cottages.

Where applicable, waste rock storage areas will be built up in lifts to limit the overall dumping height. While this will increase haul distance, it will stabilize the waste rock and minimize the risk of the storage area edge slumping.

Due to the very low probability of the presence of sulphide minerals in the waste rock and uneconomic mineralized zones (Section 4.1.3), waste rock storage sites should not need to be contoured or capped with clay to control any acidic runoff.

The proposed locations for the necessary waste rock storage and low-grade ore stockpiles are indicated on the respective mine drawings (Figure 3.4 and Figure 3.5). The waste rock disposal plan for the James mining area includes an option of storing the waste rock in an existing V-shaped valley and to a site east of the James North pit and south of the James South pit. The footprint for the waste rock storage and low-grade stockpiles at the James North and South sites requires an area of approximately 11.8 ha and 7.8 ha respectively. The slopes of the waste rock storage areas and stockpiles will be 1.5:1 and the average height for the quoted footprint is 15 m. In-pit disposal will be utilized wherever feasible.

The waste rock disposal plan for the Redmond deposits includes a combination of the use of the existing mined-out Redmond 2 pit, on-land stockpile area, and in-pit disposal wherever feasible. This will reduce the requirement for additional disturbance due to waste rock storage. There may be some new disturbance required for low-grade stockpiles. The use of existing stockpiles will be investigated and if shown to be economical will be the preferred method.

Waste rock and overburden will be stockpiled and contoured in a manner that conforms to provincial guidelines and regulations. These materials will be managed to limit the possibility of suspended solids being introduced into site drainage or adjacent waterbodies. Overburden will be used during site reclamation to support vegetation.

3.1.2.3 Minor Excavations and Borrow Pits

Additional minor excavations may be required to support ongoing mining activities. These excavations will include small borrow pits, quarries and side-hill cuts associated with the construction and maintenance of access roads, mine haulage roads, sumps and settling ponds, and railway spur line construction.

In recognition of regulatory requirements, any new excavations outside of approved mining leases for James North, James South, Redmond 2B and Redmond 5 deposits, will be subject to Newfoundland and Labrador regulatory and licensing processes, prior to the commencement of field activity. Where possible, LIM will attempt to make use of previously excavated quarries and borrow pits that were excavated in the past by IOC in order to prevent new ground disturbances. A number of such small pits exist along the road to the north of Silver Yard area and to the south of Silver Yard area near the previously mined area of Redmond (Figure 3.6).

Due to local climatic conditions in the proposed mining area, accumulations of water from natural rainfall and snowmelt will create a need for the excavation and/or construction of runoff water containment and sedimentation control structures. Such structures will insure that necessary discharge of accumulated surface water will meet current environmental standards.

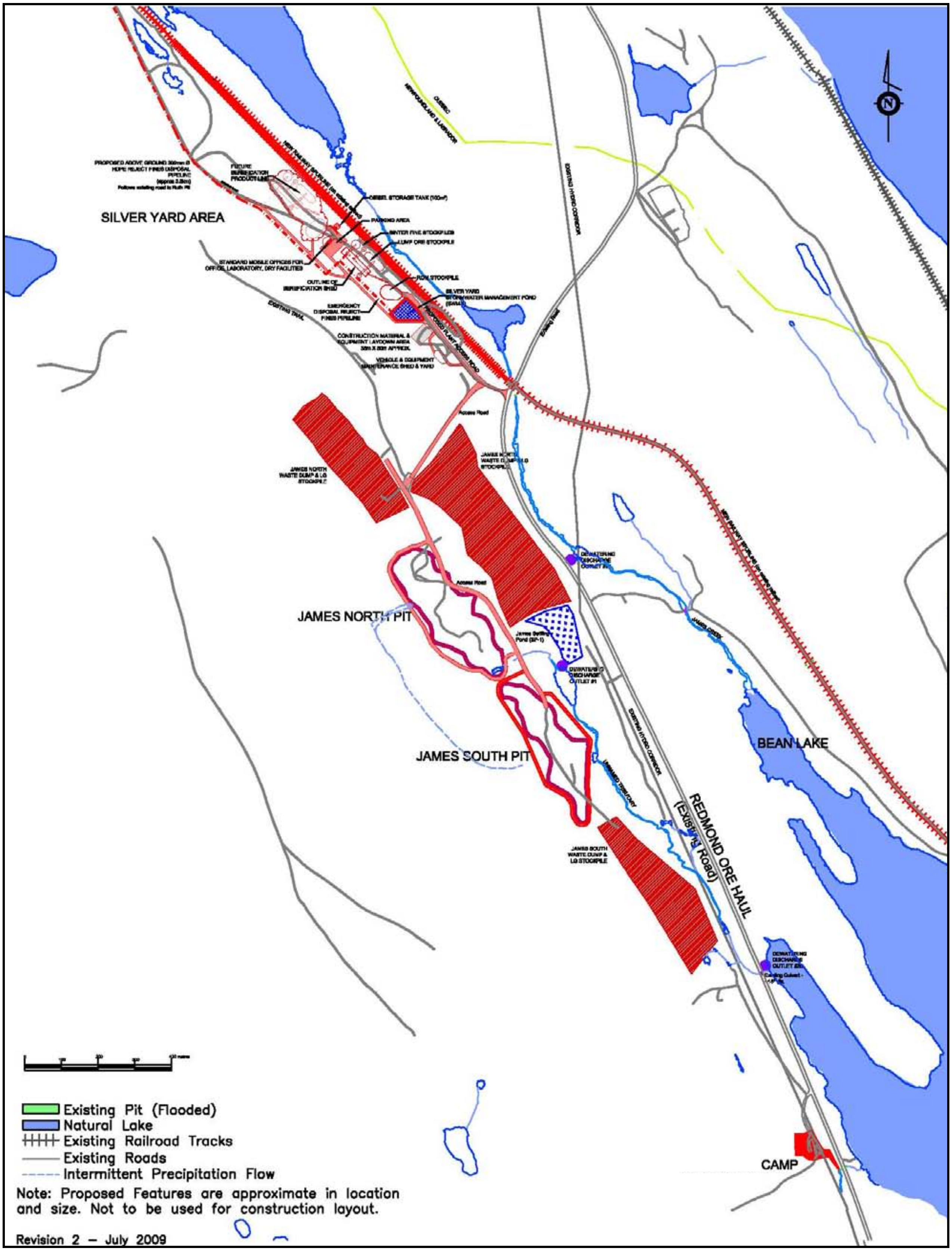


Figure 3.4 James and Silver Yard Infrastructure

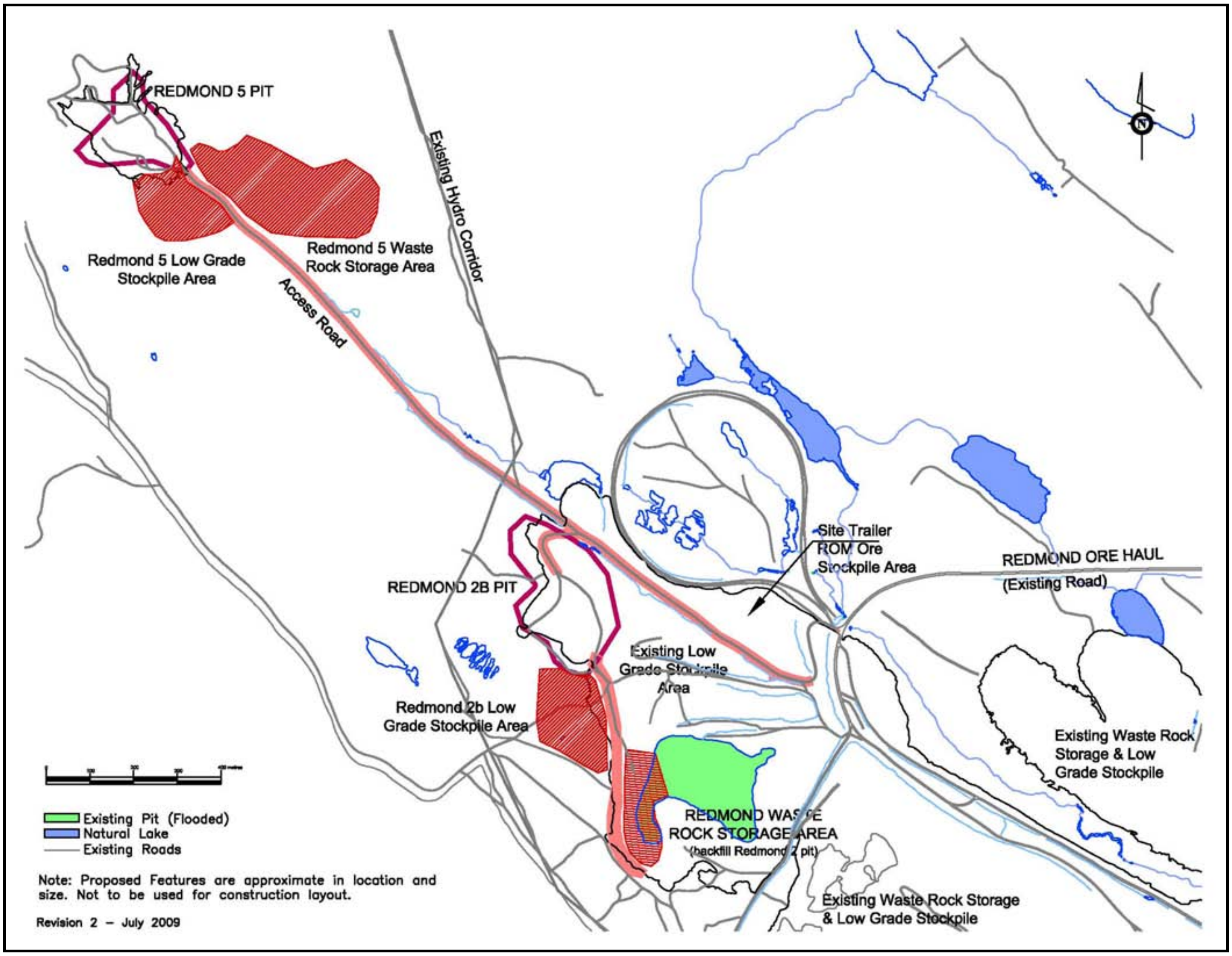


Figure 3.5 Redmond Infrastructure

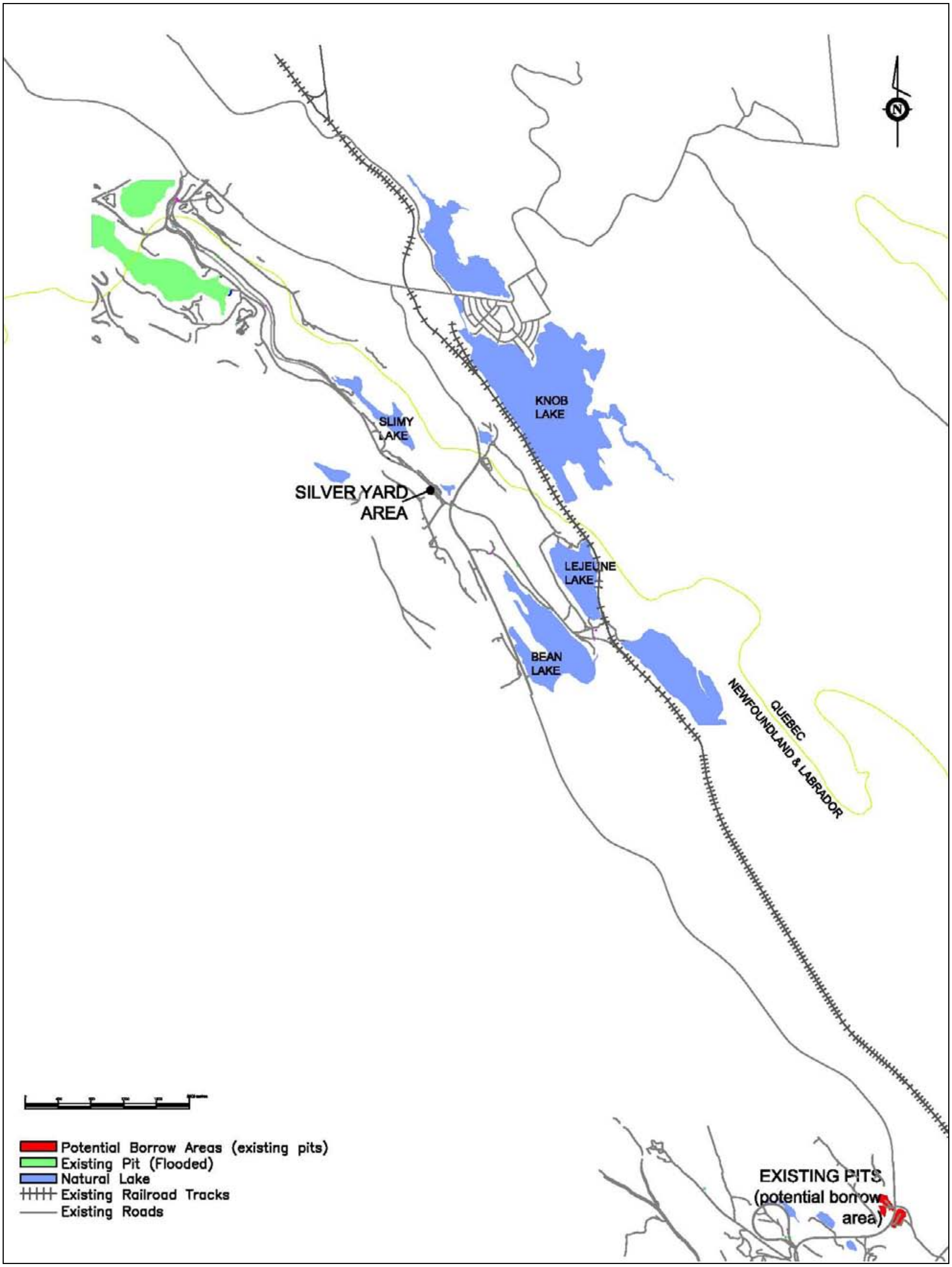


Figure 3.6 Existing Pits (Potential Borrow Areas)

Contractors may require borrow material for the construction of the spur line. The total number of borrow pits and amount of borrow material required for the Project has not been determined, as the quantity of material required depends on detailed design. However, as there are existing borrow pits in the nearby area, it is unlikely that additional borrow pits will need to be developed.

Vegetation will be cleared from the area and organic material stockpiled for use in site rehabilitation. Provincial environmental legislation and regulations will be applied during borrow area development, as well as a progressive restoration plan for the site, prior to decommissioning. Specific details on establishing, using and rehabilitating borrow pits will be outlined in the EPP.

3.1.3 Mine Infrastructure

All iron ore production from the James and Redmond properties will be beneficiated at the Silver Yard Area. Figure 3.4 illustrates the proposed infrastructure at the Silver Yard Beneficiation Area and includes the following:

- Beneficiation Area, which includes the Beneficiation Building, Primary Mobile Crushing Plant, various conveyors, Product Stockpiles;
- Water Supply Tank and Pump building module;
- Electrical building module, mobile diesel generators, and transformer;
- Diesel storage tanks and fuelling dispensing station for mobile equipment;
- Vehicle and Equipment Maintenance Shed;
- Standard mobile offices;
- Parking area;
- Raw Ore Stockpile Area;
- Stockyard and railcar loading area;
- Reject fines disposal pipeline;
- Stormwater Management Pond (SWM-1); and
- Security fencing and/or signage.

The infrastructure at the James Mining Area includes the following and is illustrated in Figure 3.4:

- James North Pit and associated haulage roads;
- James South Pit and associated haulage roads;
- James Low Grade and Waste Rock stockpile areas;
- James Settling Pond facility (SP-1)

The infrastructure at the Redmond Mining Area includes the following and is illustrated in Figure 3.5:

- Redmond 2b Pit and associated haulage roads;
- Redmond 5 Pit and associated haulage roads;
- Redmond 2b Low Grade Stockpile;
- Redmond 5 Low Grade Stockpile;

- Redmond Raw Ore Stockpile Area; and
- Redmond Site office trailer.

3.1.3.1 Beneficiation Buildings and Process

The building and contents will be semi mobile and modular to fit with the Project's long term plans. The beneficiation buildings will house the equipment needed for the beneficiation process. These include tumbling scrubber, secondary crushing equipment, primary screening equipment, secondary screening equipment, crane and various chutes, conveyors, and pumps. The beneficiation plant is designed to operate on average 7 to 8 months per year. This process description is illustrated in Figure 3.7. Details of the process flow and equipment is provided in Appendix G.

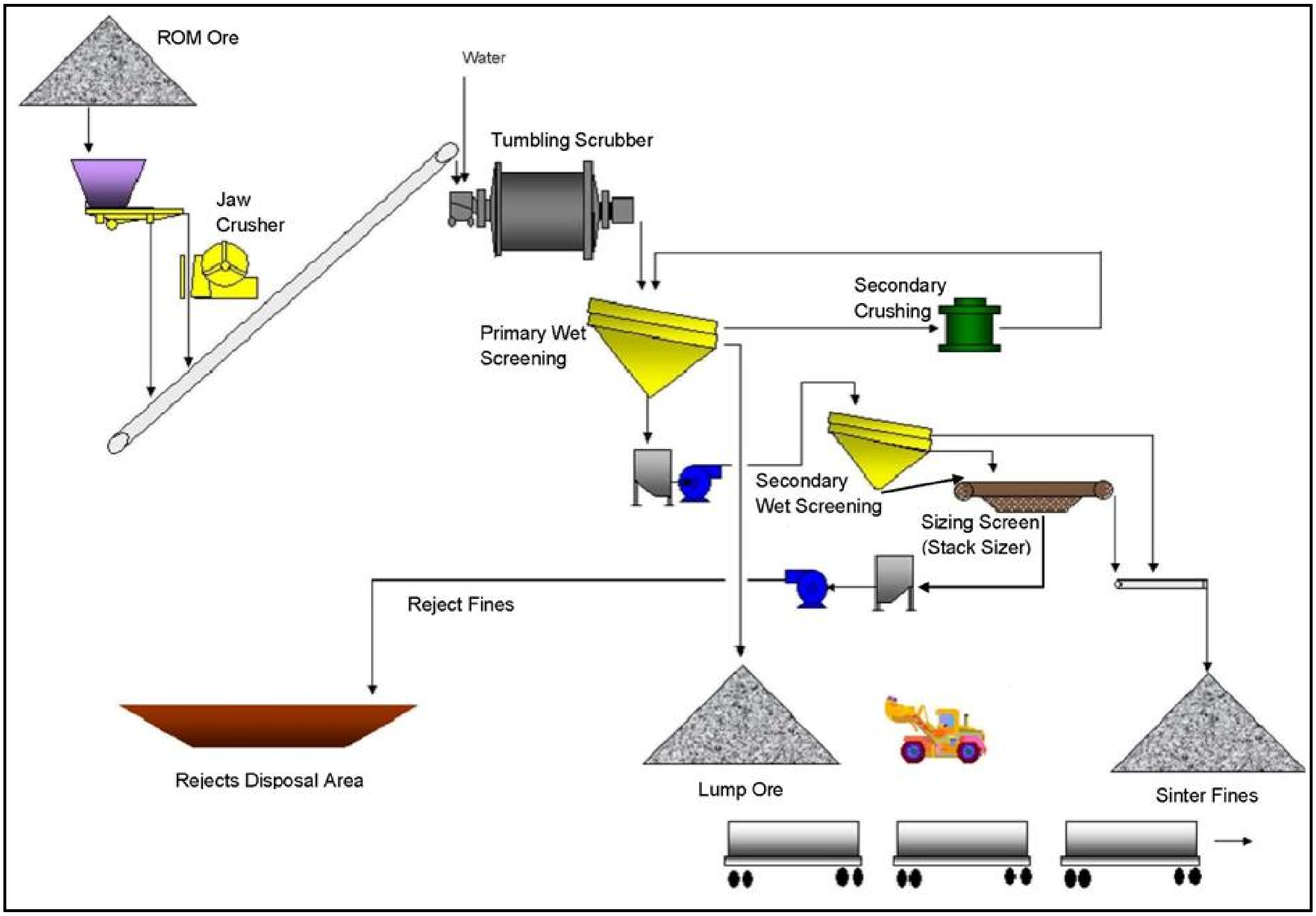


Figure 3.7 Overall Beneficiation Process Flow Diagram

Other buildings at the Beneficiation area include: mine dry, site offices and analysis laboratory, which will be standard mobile trailers/modular units; maintenance shed, which will be a sprung type structure; and warehouse facilities, which will be housed within containers.

3.1.3.2 Other Infrastructure

The other infrastructure that will be located at the Silver Yard Area include fuel storage tanks, mobile diesel generators, transformer, laydown areas, and process water pump building.

3.1.3.3 Fuel Storage

Fuel storage in Newfoundland and Labrador is regulated by the Storage and Handling of Gasoline and Associated Products Regulations, 2003. A Certificate of Approval for a fuel storage system must be obtained from the Department of Government Services and Lands. Fuel caches in remote areas of Newfoundland and Labrador should abide by the Environmental Guidelines for Fuel Cache Operations as stipulated by the Department of Environment and Labour.

Transportation, storage, and use of fuels at the Project site will be conducted in compliance with all relevant laws, standards and regulations. Before transporting or storing fuel at the Project site, contracted fuel suppliers will be required to provide a copy of a fuel spill contingency plan acceptable to LIM. LIM and its contractors are required to ensure that fuel and other hazardous materials are handled by persons who are trained and qualified in handling these materials, in accordance with government laws and regulations.

A 100 m^3 Diesel Oil Storage Tank and Diesel Vehicle Refueling Tank Truck will be used for fuel supply on site. The diesel fuel will be transported by rail to Silver Yard prior to being transferred to the above ground storage tank. The storage tank is of single wall design with a retention lined dike. The tank foundation is to be made of compacted sand and includes a geomembrane that covers the entire dike area. The dike retention volume will be able to retain at least 110 percent of the tank volume. The diesel vehicle refuelling tank truck will carry the diesel from the bulk storage tank to the equipment diesel day tanks. Any water rejected from the tanks will be directed into a closed circuit oil/water separator. The effluents from the oil/water separator will be disposed of as per environmental standards. The oil/water separator will require approval by Government Services Canada (GSC). Used and collected oil will be delivered to a licensed used oil collector.

These storage tanks will be designed according to API 650. Large storage tanks will be provided with one manhole on the side wall near the bottom level. One additional manhole will be provided on the roof of the tank for closed tanks. Drums of fuel oil, if required at the site, will be tightly sealed to prevent corrosion and rust and will be placed within appropriate secondary containment.

3.1.3.4 Electrical Power Supply

The Menihek Power Plant, owned and operated by Newfoundland and Labrador Hydro, is located 32 km southeast from Silver Yard and is the only provider of electric power to the area. The plant was built to support iron ore mining and services in Schefferville. The plant contains two 5 MW Westinghouse generators and one 12 MW unit. The main substation is close to Silver Yard lowering the voltage of distribution to Schefferville town.

The existing transmission corridor runs across and adjacent to the Redmond and James properties as well as the Silver Yard area. Refer to Figure 3.1 for locations. The expected peak demand load from the beneficiation process is currently estimated at 1500kW and total connected load is 3000kW. The expected peak demand load from the dewatering is currently estimated at 2000kW and total connected load is 3000kW.

The initial phase of the Electrical Supply Plan will have power generated by up to four mobile diesel generators located at Silver Yard. These generators will be continuous duty, 750 kW, 60 Hz, and 600 V and placed on concrete pads. A mobile generator will also be required at the field trailer at Redmond. Up to four additional 900kW mobile generators will be located nearby the dewatering wells at the

James site. An aerial transmission line at 4160V will distribute the power to each pump at the James Site. Local starters will control each individual pump.

As soon as it is possible, the second phase of the Electrical Supply Plan will be initiated. This phase involves drawing hydro-electric power from the existing regional power grid. A substation will be required and it is expected to be located near the Silver Yard area.

3.1.3.5 Water Supply

The Project's proposed water supply plan is shown in Figure 3.8. The figure shows existing and proposed flow rates.

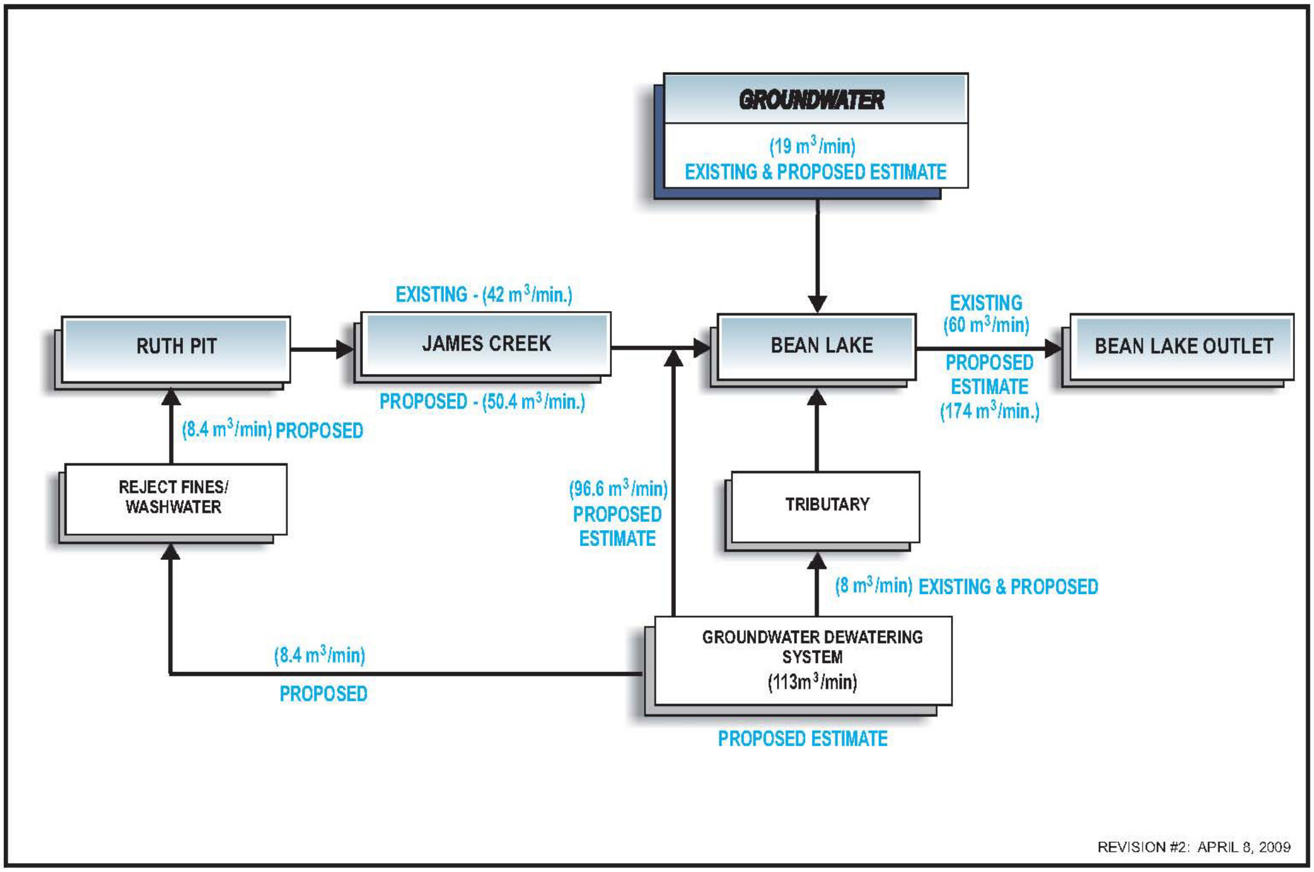


Figure 3.8 Preliminary Water Balance

Potable Water

Potable water will be required at the beneficiation building, various site office trailers at Silver Yard, and at the site trailer at Redmond. Initially, it is anticipated that potable water will be tanked to the site and/or bottled water will be transported to the Project. The water will be stored in the potable water distribution system. It is also recognized that existing ground water testing has shown that the water may be of suitable quality upon completion of well development and so it is possible that groundwater may be considered at some point in the future. If so, testing and use of groundwater for potable water use will be taken in accordance with applicable regulations and permit requirements. Testing of the potable water quality will be conducted regularly in accordance with provincial requirements. Potable water at the Redmond site trailer will be provided by bottled water.

Wash Water

Water for use in the beneficiation process will be sourced locally from within the Project area. Groundwater sourced from the dewatering system and not used to supplement the flow in the unnamed tributary may be diverted to the Process Water Tank at a current estimated flow rate of up to 8.4 m^3/min (2,187,000 m^3/year).

Although there will be some water loss in the washing process due to absorption by the ore, it is not possible to quantify this loss. Therefore, as a conservative measure it is assumed that all the used wash water will be pumped to Ruth Pit. Therefore, the estimated rate of wash water is 8.4 cu.m./min and the rate of flow to Ruth Pit is estimated at 8.4 cu.m./min.

The wash water will be transported to Ruth Pit by an aboveground pipeline that will follow an existing gravel road from the Sliver Yard Area to Ruth Pit. The location of the discharge end of the wash water fines pipeline into Ruth Pit will be chosen to maximize the retention time of the water in Ruth Pit. Given the size of Ruth Pit, it is anticipated that some storage will occur depending on seasonal and environmental conditions, etc.; however, using a conservative approach, it is assumed that the additional discharge of water from Ruth Pit will be equal to the discharge rate of wash water into Ruth Pit.

Further details of the impacts of the proposed flows on James Creek and Bean Lake are presented under Section 4 and Section 7.

Fire Water Supply

The fire protection systems design is based on good engineering practice, using National Fire Protection Association (NFPA) standards, IBC and IFC to provide appropriate life and loss protection. The fire protection system is based on the understanding that the beneficiation shed structures and lining are non-combustible and are providing easy exit on all sides.

The scope of fire protection involves: conveyors and material handling, beneficiation shed, utilities, and administrative, laboratory and dry facility trailers. The equipment and buildings will be protected by portable fire extinguishers.

Silver Yard Stormwater Management Pond (SWM-1)

The Silver Yard Stormwater Pond (SWM-1) will serve three functions:

- The primary function of the Pond will be to collect and treat stormwater from the beneficiation plant area.
- The secondary function of the Pond will be to receive the flush of water from the regular maintenance of the pumping/pipeline system. In order to complete regular Plant and/or pipeline maintenance (approximately once a week), the reject fines discharge pipeline to Ruth Pit will be flushed with clean water to push all reject fines wash water in the system to Ruth Pit. Once the pipeline is flushed and contains only clear water, the water will either be left in the pipe (typical for Plant maintenance under warm ambient temperatures) or the water will be released from the pipeline (as required for pump and pipeline maintenance or plant maintenance during freezing ambient conditions). The pipeline cannot be pumped dry; therefore, in order to clear the pipeline of water, it must be released to drain via gravity. The lowpoint on the line is the Silver Yard Stormwater Pond and this clean water will be released into this pond prior to discharge to the environment. Discharge to the SWM-1 will consist of clear water and will not require significant retention time in the pond.

- The third function of the pond will be to receive the emergency discharge from the pipeline during a power or pumping failure. The Beneficiation Plant will be interrupted during this event and therefore the volume of effluent discharge to the pond should only be the volume of effluent in the pipeline. In this case, the effluent discharged into the pond will be the same quality as the effluent being deposited in Ruth Pit except that due to the decrease in pumping pressure and therefore pipeline velocities, some larger fines particles will settle in the pipeline and not be discharged with the effluent.

In a general risk analysis, the probability of pipeline/pumping malfunction is typically low. In the case of the Silver Yard- Ruth Pit pipeline, the risk of malfunction is associated with freezing conditions and with the continuity of pumping operations. Therefore, there is no backup pipeline proposed for the Project. The pumping system will include a backup pump and backup power source. In the case of failure of either, the operation of the Beneficiation Plant will be interrupted and the pipeline will be automatically drained to the Silver Yard Stormwater Pond.

The Silver Yard stormwater pond will be designed as a multi-cell settling system to treat each of these effluent flows, to accommodate the varying effluent flows, and to ensure that release of the water/effluent to the environment (James Creek and the unnamed tributary) will meet the discharge requirements under the Certificates of Approval and MMER. This multi-cell design will also ensure maximum retention time and allow pond maintenance operations (removal and disposal of reject fines) to be carried out while the pond is still being used. Pumping the emergency discharge back to Ruth Pit is technically and economically impractical.

A detailed design of Silver Yard Stormwater Pond, which will integrate all effluent treatment requirements hydraulic design and controls to ensure discharge water quality to James Creek in compliance with all regulatory requirements, will be provided at the permitting stage (Development Plan as required under the *Newfoundland and Labrador Mining Act* and reviewed by Water Resources).

3.1.4 Supporting Infrastructure

It is not anticipated that any permanent structures will be erected for the mining and beneficiation operations at the Silver Yard area, although some temporary stores and workshops will be established. As this will be a beneficiation site, a workshop and warehouse will be established, as well as a small fuelling station nearby. A portable office and lunchroom facility will also be set up, which will include services such as washrooms and a first aid room. All of the buildings, including foundations if required, will be removed upon completion of operations. General services and infrastructures will be shared with the contractor.

3.1.4.1 Laboratory

It is planned to establish an on-site mobile laboratory in a portable modular building at the Silver Yard area. The laboratory will include a sample preparation section with a drier, crushers, screens, pulverisers and rifle splitters and an analytical lab section for daily ore control and exploration samples analysis. It is anticipated that the analytical methods used will be fusion (lithium metaborate) followed by XRF spectrometry.

3.1.4.2 Workshop

A maintenance/workshop shed (sprung type structure on concrete pad) and maintenance yard will be provided to conduct routine maintenance and non-major repairs for the mine and beneficiation operations. The building will be equipped with the necessary tools and equipment to maintain the mobile fleet. It is expected that the workshop would be equipped with compressed air and related tools, tire changing equipment, and hydraulic hose preparation. A closed-circuit wash bay and oil-water separator will be developed within the concrete-floored Maintenance Building and collected material will be pumped out on a routine basis for disposal by a licensed and experienced contractor at an approved facility. There will be no discharge of this into the surrounding environment. Solvents may be used for parts cleaning and if so, will be properly stored and disposed of in accordance with applicable regulations.

It is anticipated that onsite storage of small retail-size quantities of hydraulic oils and other materials may be required for the limited mine vehicle/equipment maintenance. In addition, diesel storage associated with local or emergency back-up power generation may be required. Petroleum/oil/lubricant (POL) transport, storage, use and disposal will be conducted in accordance with applicable legislation and all workers will be trained in the appropriate Environmental, Health & Safety (EHS) approach to working with these materials. Spill kits will be available at key locations on site and workers will be trained in their use and other emergency response procedures.

It is anticipated that major repairs would be conducted elsewhere at the contractor's discretion.

3.1.4.3 Warehouse

The warehouse will contain critical components for the vibrating screens and ware parts for crushers and conveyors. The contractor may want to store tires, filters, retail quantities of lubricants/oils and brake parts for trucks and drill steel, bits and parts for drill rigs.

3.1.4.4 Explosives Storage and Mixing Facilities

Iron ore extraction will be conducted by a Labrador-based mining contractor. Mining methods will be left to the Contractor's discretion. Mechanical methods will be used, where possible, to break up the rock. The contractor may also require the occasional use of explosives. The contractor will be responsible for complying with the required permit and/or approvals under the Natural Resources Canada Explosive Regulatory Division. The Contractor will ensure that blasting will follow all provincial regulations, including the Occupational Health and Safety Regulation, under the *Newfoundland and Labrador Occupational Health and Safety Act* 1165 and the Mine Safety of Workers under Newfoundland and Labrador Regulation 1145/96. The Contractor will hire experienced/licensed blasters.

3.1.4.5 Communication

All mining equipment and mine vehicles will be equipped with two-way radio system. This radio system will be available within the beneficiation building, maintenance building, and offices. A transmitter/receiver station including antenna tower and housing for radio communication equipment may be required. The location of the tower would be selected to optimize communication transmissions between the James – Redmond – Silver Yard sites.

Telephone and internet services would be provided through satellite services.

3.1.4.6 Camp

Camp accommodations will be constructed for workers at a previously developed former ski hill lodge location in Labrador. The camp will have an overall footprint of approximately 7,000 sq. m. and will be located on the site of a former ski hill and lodge (Figure 3.9, Also referred to in Air Quality sections as “Cabin 1”). The site for the camp was previously cleared and developed for facilities associated with the ski hill, and an abandoned ski lodge (also referred to as “Cabin 1”) remains on the site. Camp structures will consist of mobile to semi-mobile pre-fabricated modular trailers and will accommodate approximately 60 workers seasonally, from approximately April to November on an annual basis. The construction and operation of the camp will utilize NL workers, materials, goods, and services where possible.

The proposed dormitories will be comprised of single rooms and will include an adequate number of rooms for the number of people on-site at any given time. Men and women’s accommodations will be separate and the women’s accommodations will be situated near the Women’s Sanitary and Dry Trailers. The camp will include a kitchen (with catering), dining room, laundry facilities, and a recreation area. The recreation facilities may include such features as a pool table, television lounge, exercise equipment, and access to outdoor recreation. The camp will also have wireless internet and telecommunications access.

Initially, up to two diesel generators (125 and 175 kw) will be used as a temporary power source for the camp until electricity can be connected from the nearby grid. Grid access is nearby and no significant construction is anticipated to facilitate the grid connection. Minimal quantities of generator fuel will be temporarily stored in a double-walled storage tank in accordance with applicable regulations until the permanent grid connection is in place (Figure 3.9).

Gensets, installed outdoors (including trailer mounted), will be equipped with noise attenuating enclosures providing a combustion exhaust muffler, air supply silencer(s) and air exhaust silencer(s).

Water requirements for the seasonally operated camp are anticipated to be supplied from a nearby groundwater well. Sanitary waste at the camp will be collected and treated using a domestic wastewater treatment system that uses a Rotating Biological Contactor (RBC) form of aeration. This system produces minimal sludge, which will be removed at an estimated rate of once per operating season and disposed of at an NL-approved facility by a licensed contractor. Surface water drainage, consisting of site drainage and the RBC system, will be contained and directed to a settling pond downgradient of the camp. Proposed locations of these features are shown in Figure 3.9.

Any domestic waste will be collected on-site and delivered to an experienced Labrador-based contractor and placed in a landfill facility in Labrador West, in accordance with applicable regulations. Food storage and handling will be conducted in accordance with applicable regulations and any organic waste generated will be stored in animal-proof containers prior to offsite disposal in NL. Where and when possible, a Reduction, Reuse and Recycling policy, will be implemented to minimize waste generation at the camp.

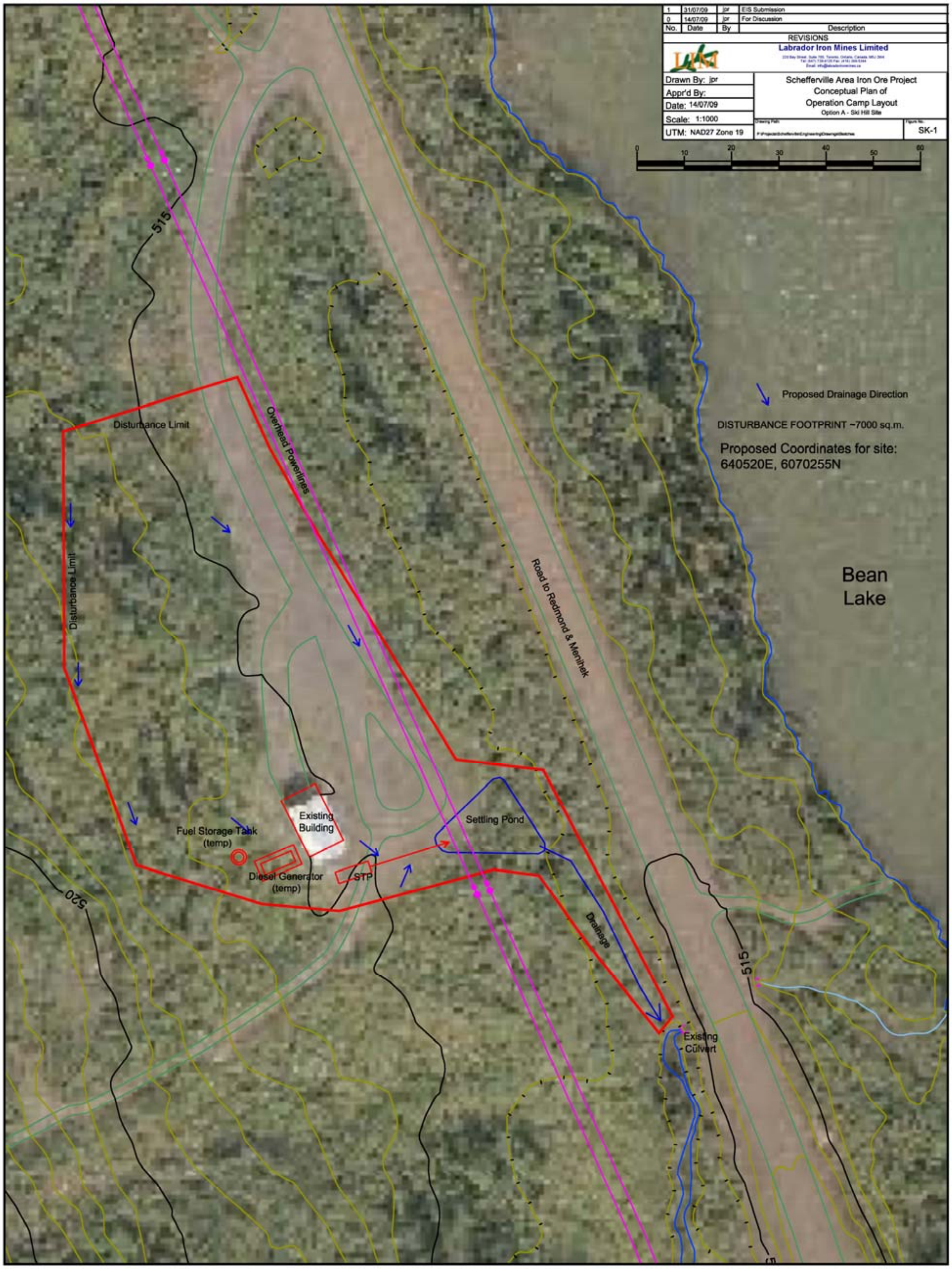


Figure 3.9 Camp

3.1.4.7 Site Access

Primary access to the James mineral deposit is by an existing gravel road which is located approximately one km southwest of the Silver Yard area. The James property straddles an existing road connecting Silver Yard with the Redmond property, and continues to the Menihek hydroelectric dam, where the road is terminated. The existing roads are in reasonable condition and may require brushing to improve visibility and grading to establish road surface.

The access roads will require proper signage. The signage will include posted speed limits, stop signs at intersections, and caution signs about the co-use of mine and public traffic. Adequate numbers of signs will be posted in all local languages.

Within the pit designs, the access roads will be limited to only mine personnel. The haulage roads will be designed and built to permit the safe travel of all of the vehicles in regular service by following accepted industry standards and following Section 27 of the Mines Safety of Workers Regulations.

Although all of LIM's properties are located in the Province of Newfoundland and Labrador, they will utilize, to some extent, present connecting roads and possibly some of the services available from the town of Schefferville and the surrounding communities.

3.1.4.8 Lighting

All buildings will include sufficient perimeter lighting with outdoor fixtures. Exterior lighting will be timer or photocell controlled. Lighting will also be provided at doorways and overhead doors. There will be no street lighting on any access roads. Portable lighting plants and lights on mobile equipment will be used within the pit areas to illuminate working areas.

3.1.4.9 Railway Infrastructure

In order to deliver product, LIM must transport by rail, approximately 568 km to the port of Sept Îles for further shipping by marine transport. LIM will operate a short spur line linking the Silver Yard with the existing rail system. The existing rail system includes:

- a 208 km link from Schefferville to Emeril Junction (near Ross Bay Junction) that is owned and operated by Tshiuetin Rail Transportation Inc.(TSH), a company jointly owned the Innu Nation of Matimekush-Lac John, the Naskapi Nation of Kawawachikamach, and the Innu Takuaikan Uashat mak Mani-Utenam;
- the 360 kilometres of rail from Ross Bay Junction to Sept Îles that is operated by Québec North Shore and Lab Railway (QNS&L) a wholly owned subsidiary of the Iron Ore Company of Canada (IOC); and
- at Sept Îles, the rail link from Arnaud Junction to Pointe-Noire that is operated by Arnaud Railways, (AR), a wholly owned subsidiary of Wabush Mines.

A new Labrador Iron Mines Holdings Limited subsidiary company, LabRail, has been incorporated under the laws of Canada which could operate the railway at the mine site and coordinate LIM's rail transportation to the marine terminal in Sept Îles. Initially, LabRail could own or lease and operate the rail loading facilities and all associated rail infrastructure, rolling stock and power.

Arrangements will need to be entered into with other railroad companies regarding access and transport requirements over the various rights of way between Silver Yard and the Port. It is possible that these arrangements could also include other potential commercial and mining operations wishing to utilize some or the entire transport route. This rail facility will be available for use by other companies and will improve the commercial viability along and in close proximity to it. LabRail will cooperate in any future mineral development by others in the facility use and, if necessary, in the realignment of the line.

Existing and proposed railway infrastructure is detailed in Figures 3.10 and 3.11.

3.1.4.10 Infrastructure

A 4.0 km spur line previously operated and abandoned by IOC will be restored for use by LabRail. Including sidings to the spur line, 7,800 m of new track will be laid. The infrastructure components include:

- ballast - the existing railbed and most of the necessary ballast are already in place and some grading and levelling will be done in preparation to the laying the track. Some additional ballast will be required;
- culverts - all necessary culverts are in place and require no immediate maintenance;
- ties;
- rails;
- turnouts and switches;
- bumping posts and derail; and
- other track material (OTM) - spikes, rail anchors, tie plates and joint bars, track bolts, nuts and spring washers.

The new track and associated infrastructure will be installed in conformance with the latest edition of the American Railway Engineering and maintenance-of-way Association (AREMA) recommended practices.

There may also be a split platform static railway scale and scale house, to weigh the loaded ore cars.

3.1.4.11 Rolling Stock

LabRail will operate with sufficient power units and rolling stock to meet the operational needs of the Project. The numbers of locomotives and ore cars will be initially determined on the start-up operations (i.e., the first year production level), and by the outcome of ongoing negotiations on railway operation). Locomotives will be SD40-2 type diesel locomotives or similar and the rolling stock will be 40-foot gondola iron ore cars with a nominal capacity of 93 tonnes of ore.

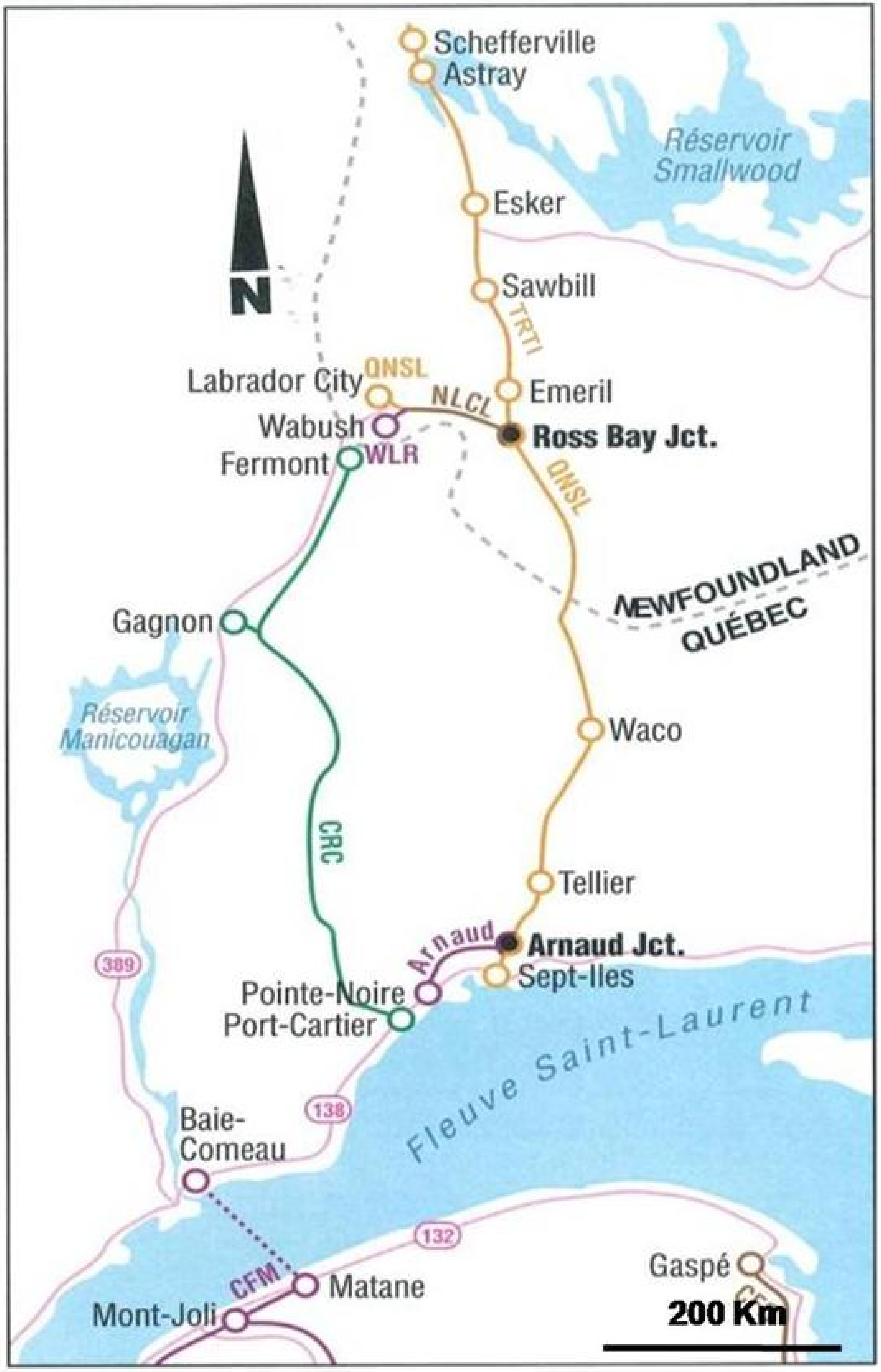


Figure 3.10 Existing Railway Infrastructure

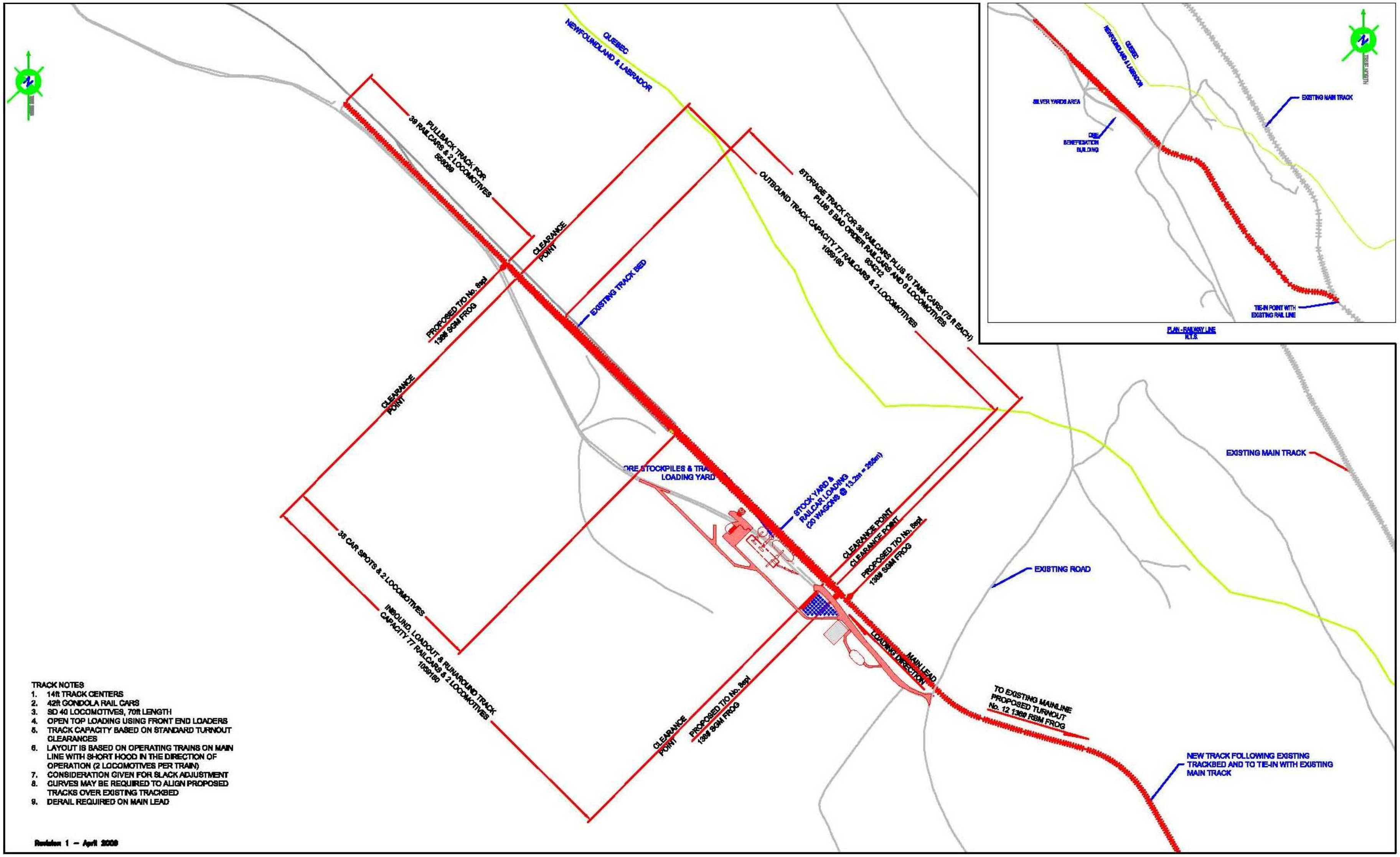


Figure 3.11 Proposed Railway Infrastructure

3.1.4.12 Storage, Loading, and Shipping

After beneficiation, saleable products will be stockpiled at the Silver Yard site and loaded into ore cars with a front end loader. The loaded cars will be hauled by LabRail to the main line and then hauled to Emeril Junction. The cars will be hauled from Emeril Junction to Sept Iles by QNS&L.

The initial operation of the Project is scheduled to produce 1,500,000 tonnes of ore in the first year through a haulage season of approximately 7 to 8 months per year.

3.1.4.13 Regulatory Framework

LabRail will operate entirely within Labrador and as such will be regulated under the provincial *Rail Service Act* 1993. The regulatory provision of this act is that the railway construction and operation must be approved by the Lieutenant-Governor in Council (Cabinet). Cabinet would then assign additional regulatory function to one or more government departments such as the Department of Transportation and Works.

As LabRail will only operate within the Province of Newfoundland and Labrador, it will therefore not, at least initially, be required to be designated as a Common Carrier under the provisions of the *Canada Transportation Act* 1996. Nevertheless LabRail will agree that it will operate as if it were a common carrier for the purposes of ensuring that other potential users of LabRail track and facilities will be granted a suitable level of service.

3.1.5 Surface Water Management

3.1.5.1 James North and James South Deposits

There are two surface water features within the James North and James South properties:

- James Creek flows along the eastern edge of the sites; and
- An unnamed tributary which originates from a spring situated between the James North and James South mine pits areas flows southeast into Bean Lake. The spring is located approximately 30 m west of the existing road crossing.

Surface water features of relevance on and in the immediate vicinity of the James Property include Bean Lake (east of site), James Creek (which flows from east of Ruth Pit to Bean Lake), and several springs that originate on the James property and form an unnamed tributary that flows southeast from the site to Bean Lake. Details regarding flows and water balances for these features are presented in Section 4.1.4. The locations of the two springs at the James deposit (James North and James South Springs) are such that they will likely be affected by pit dewatering, and since they are the source of water for the unnamed tributary, it is also likely that the unnamed tributary will be affected unless mitigation measures are put in place. A mitigation strategy to deal with this is outlined in detail in Sections 4.1.4 and 7.3, but in summary, it will involve diverting a portion of the pit groundwater dewatering water (after settling) to the unnamed tributary to make up for the water lost from the springs. The source of the springs is groundwater and the source of the pit dewatering water will be groundwater, therefore, the mitigation strategy involves using the same source of water as is currently supplying the tributary.

Surface water collected in in-pit sumps within the James North and James South pits will be pumped to the nearby James Settling Pond area and managed separately from the groundwater dewatering system water at Settling Pond Area SP1. It is currently anticipated that this area would include two settling ponds, one for the pit water management and one for groundwater dewatering management. The ponds will be engineered to ensure that in-pit dewatering and well dewatering effluent will be of suitable quality for discharge to the environment.

Further details of water management at the James North and James South properties are provided under Section 3.3.5.

3.1.5.2 Redmond Deposit

The Redmond deposit area contains isolated ponds and pits, primarily created from past mine workings. There are currently flooded abandoned mine pits on-site. There are natural small waterbodies present and a small stream is located approximately 5 km from the proposed mine operation. The stream flows in a southeasterly direction through existing abandoned ore stock piles towards Redmond Lake.

The main surface water features in the vicinity of the proposed Redmond 2B pit are a wetland/pond area located north of the proposed pit which serves as a source for a stream that runs southeast past the north side of Redmond 1 Pit and ultimately discharges into Redmond Lake. Details regarding flows in this stream are presented in Section 4.1.4. A groundwater discharge appears to be the main source of water discharging from the wetland at the headwater of this stream.

Other surface water features of note include the now flooded Redmond 1 and Redmond 2 pits, located southeast of the proposed Redmond 2B pit. The groundwater water table at Redmond 2 is approximately 25 m below ground surface in the proposed Redmond 2B pit area. Therefore, pit dewatering may be required after the first year of mining to lower the water table in the immediate vicinity of the pit to allow mining to occur to the base depth of the proposed pit. Further discussion of the Redmond dewatering program is presented in Sections 4.1.4 and 7.3.

Surface water collected from pit dewatering activities within the Redmond 2b and 5 pits will be pumped to the existing Redmond 2 pit. Further details of the water management activities for the Redmond 2b and Redmond 5 pits are presented under Section 3.3.5.

3.1.5.3 Silver Yard

The surface drainage water from the catchment area of the beneficiation plant will be diverted to the Silver Yard Stormwater Management Pond (SWM-1), before release into the environment. The reject fines disposal pipeline and beneficiation plant emergency drainage is also located at that pond. Details of the SWM-1 pond were presented earlier under Section 3.1.3.5.

3.1.6 Clearance and Condemnation Work

Investigations of the old IOC stockpiles have shown that preferred stockpile locations were near pits and loadout areas which were underlain by rocks that were not part of the Sokoman Iron Formation. If there was no such convenient location then stockpiles would be placed on top of the iron formation, if it were to be found uneconomic (by their standards).

3.1.6.1 Redmond 2b

Geological mapping indicates that there is a band of Wishart quartzite running northwest to southeast on the west side of the Redmond 2B deposit and this was supported in the drill holes from LIM's 2008 drill program. The area to the west would be small, with the Menihek power lines being approximately 150 m away. This western location would offer an area that is approximately 150 x 200 m.

The area to the north would be quite small, being hemmed in by the pit itself, the Menihek power lines and the Redmond 5 access road.

There is an existing waste rock storage pile immediately to the east of the deposit that could also be considered for stockpiling. This area is underlain by rock units other than the Iron Formation.

An existing waste rock and low-grade ore stockpile is located between the Redmond 2b deposit and the existing Redmond 2 pit. Drill holes from LIM's 2008 drill program indicate that these stockpiles are located on top of Wishart Quartzite (waste). This pile could be enlarged.

The area immediately to the west of this low-grade stockpile (and still between the 2 and 2B deposits) is an area that should be considered for future exploration and not covered over. The potential for exploration in this area was deduced from the apparent ore material in the NW wall of the Redmond 2 pit.

In addition, the mined out Redmond 2 pit could be backfilled with waste rock.

3.1.6.2 Redmond 5

The geology map shows that there is a barren northwest to southeast trending band of Wishart quartzite immediately to the east of the deposit and additional mapping will be conducted in order to determine its coverage.

There is a broad band of Iron Formation to the west of the Redmond 5 deposit which is still open for exploration and could have some potential for economic mineralization.

3.1.6.3 James North

The proposed James North waste rock storage area appears to be on top of uneconomic Fleming Formation (chert breccias), Denault Formation (dolomite) and Wishart formation (quartzite) all of which have been mapped immediately to the east of the proposed pit. This information is from IOC Geology Maps and Wardles 1982 Geology Map of the area. In addition to the geological mapping, IOC 1:40 feet scale cross sections covering the proposed area supports the uneconomic or absence of mineralization and suggests a suitable place for stockpiling. Mapping and possibly trenching/drilling could further expand this area to the north.

3.1.6.4 James South

The proposed area for the James South waste rock storage area is underlain by the Sokoman Iron Formation, which within this area is considered to be uneconomical, and is southeast along strike of the James Deposit.

There is an area south of the proposed James South pit that has a potential economic interest and as such has been avoided in the footprint for the James South Waste Rock Storage and Low-grade Stockpile area.

3.1.7 Waste Management

The objectives of waste management are to prevent, minimize, and mitigate the impact of the waste materials on the environment. The plan is to control the on-site management and final disposal of wastes during the construction and operation phases. Where and when possible, a Reduction, Reuse and Recycling policy, will be implemented to minimize waste generation.

3.1.7.1 Wastewater and Sewage

Wastewater and sewage collection will be required at the Silver Yard area, at the Redmond site, and at the work camp. At the Redmond site, washroom facilities will be provided within a mobile trailer unit. Wastewater and sewage will be handled by holding tanks and transported to the Silver Yard wastewater treatment module.

As indicated in Section 3.1.4.6, sanitary waste at the camp will be collected and treated using a domestic wastewater treatment system that employs biological oxidation of wasterwater using a rotating biological contactor (RBC) form of aeration. This system produces minimal sludge, which will be removed at an estimated rate of once per operating season and disposed of at an NL-approved facility by a licensed contractor.

At the Silver Yard area, wastewater and sewage will be handled and treated by a similar system as that proposed for the camp. Grey water is sterilized before its final discharge at the outlet of the wastewater treatment module. It is proposed that sterilization of grey water will be by means of UV disinfection in the waste water's last section of the treatment system. After sterilization, this water will be transferred to Ruth Pit.

During the construction phase and until the sewage treatment is operational, wastewater and sewage will be collected in holding tanks, emptied by vacuum truck and disposed of at a licensed facility. All management will be conducted in accordance with applicable regulations.

3.1.7.2 Domestic and Solid Waste Disposal

There is no on-site landfill proposed for the Project. It is planned that garbage and litter will be collected on-site and delivered to an experienced Labrador-based contractor and placed in a landfill facility in Labrador West, in accordance with applicable regulations. Any food or organic garbage onsite will be held in animal-proof containers to prevent attracting bear, birds, and other wildlife.

No wastes will be deposited in or near watercourses or wetlands. A recycling program is being considered for the area and LIM will support and participate in this initiative, where possible.

3.1.7.3 Hazardous Waste

It is not expected that the mine will generate large quantities of hazardous waste. Should any hazardous wastes be generated, they will be stored, transported, and disposed of according to federal and provincial waste disposal regulations.

LIM will require contractors to follow provincial waste diversion regulations or policies, including provincial programs for beverage containers, tires and waste oil and other petroleum products. Discarded tires will be handled according to the requirements of the provincial tire recycling program established by the Waste Management Regulations and used oil will be collected for recycling or reuse according to the Used Oil Control Regulations. In addition, any scrap metals will be taken to a scrap metal recycling operation.

3.1.7.4 Beneficiation Plant Waste Effluent

The production of the “direct shipping” ore requires only a simple process of crushing, screening, and washing. Effluent originating from the beneficiation area will contain rock fines but will have no chemical constituents. Current mine plans anticipate that the washwater will be directed into existing mine pits to settle out solids. For the properties addressed in this study, the existing pit to which the washwater will be directed is the existing Ruth Pit.

Although the Ruth Pit outflow is the start of James Creek, environmental baseline information, including a preliminary aquatic habitat assessment, confirms that the abandoned pit has no surface connectivity to existing fish habitat. The outlet at Ruth Pit is a submerged culvert that is located in the southwest portion of the pit. Historical pit wall rock debris has partially blocked the pit-side end of the culvert, and the pit water level is approximately 2 m above the top of the culvert. Water still flows through the culvert but more by infiltration rather than surface level flow due to the blockage. However, the discharge end of the culvert is perched approximately 1 m above the James Creek inlet, therefore, fish cannot enter Ruth Pit from James Creek because the culvert is perched and is blocked by coarse rock.

Further to recent discussions with regulators (DFO, February 2008), the 2008 baseline program has provided additional confirmation that the existing pits do not contain self-sustaining fish communities.

LIM is evaluating the existing outlet structure at Ruth Pit and it is anticipated that upgrades to this structure may be required at some point in the future. The details of the upgrades will be developed with the overall detailed design stage of the Project, and final design will be provided as part of the Development Plan and permitting stage. LIM acknowledges that permitting for any upgrades, if required, will be subject to Section 48 of the *Water Resources Act* and that monitoring will be required.

3.1.7.5 Waste Rock

Waste rock will be hauled from the pit and disposed of outside the pit limits at a sufficient distance from the active pit limits, rivers and lakes. The location of the waste rock storage areas has been selected to provide sufficient capacity as close as practical to the source of waste, and on moderate slopes to minimize the risks of failures. Precipitation infiltration and site drainage during construction may result in run-off water containing suspended solids. As a result, stockpile construction and mine design will include prevention and mitigation strategies for control and treatment of the suspended solids, as required (e.g., ditch blocks, filter cloths, settling ponds, etc).

Any off-grade product from the beneficiation process will be hauled to a nearby stockpile location.

3.2 Construction

Construction will comply with all applicable standards and regulations, environmental protection guidelines and regulations. A series of environmental protection measures will also be implemented in accordance with the potential Project effects identified through the environmental assessment process (Chapter 7). An Environmental Protection Plan (EPP) will be prepared for each construction phase. An outline of an EPP is contained within this document.

The Contractor's field engineer will ensure that all construction activities comply with the EPP and all regulations, permits, approvals and authorizations. An Environmental Coordinator will provide technical support to the Contractor's field engineer, as well as perform environmental inspections and liaise with regulatory agencies.

3.2.1 Project Schedule

Subject to approval, construction is scheduled to start in 2009. The Project areas are already partially pre-stripped and a limited amount of iron ore product could be readily developed for shipment on a limited basis using the existing railway (Section 3.1.4.9).

The Estimated Production schedule is shown in the following Table 3.3.

Table 3.3 Estimated Production Schedule

	Tonnes of Product by Year				
Deposit Area	**2010**	**2011**	**2012**	**2013**	**2014**
James	1,000,000	1,000,000	1,000,000	750,000	500,000
Redmond	500,000	500,000	250,000	250,000	100,000
Total	1,500,000	1,500,000	1,250,000	1,000,000	600,000

The life of the Project is five years. A Project schedule is shown in Figure 3.12.

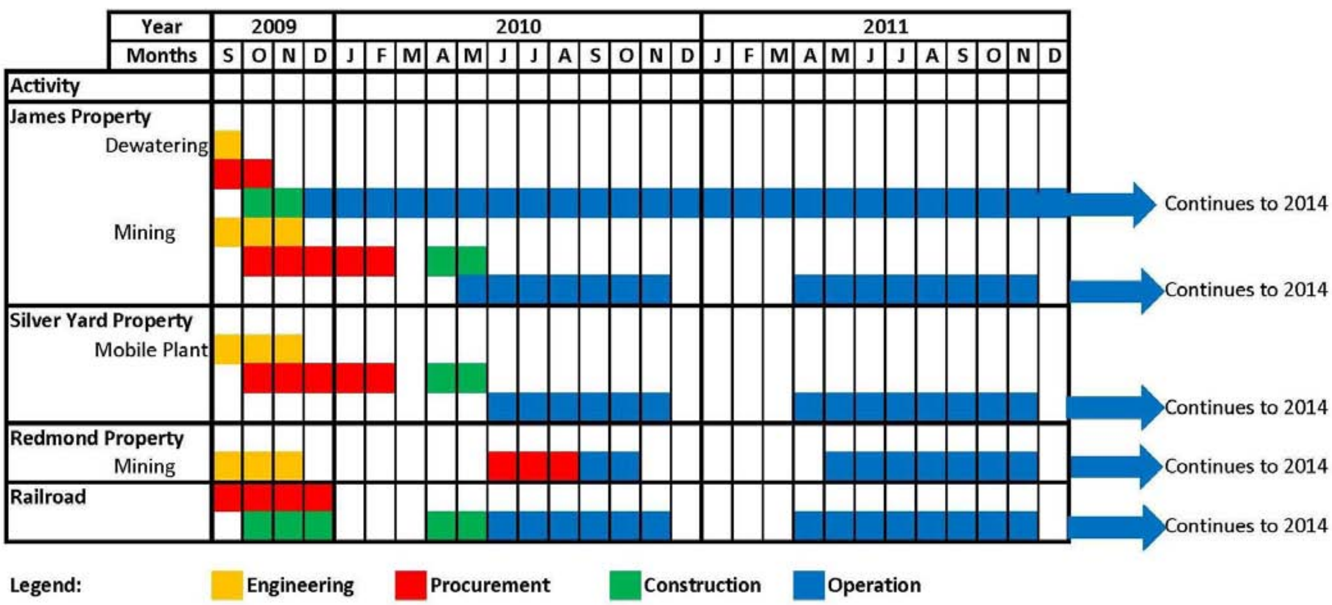


Figure 3.12 Project Schedule

3.2.2 Site Preparation

3.2.2.1 Clearing

Trees and shrubs will be cleared with chain saws or other hand-held equipment. Mechanical clearing methods may be used in areas where terrain disturbance will not cause topsoil loss or sedimentation of watercourses and waterbodies.

Vegetation clearing (e.g., trees and shrubs) will be required in advance of some access road construction, building construction, pit development, and other site preparation activities. Refer to Figures 3.13 and 3.14 for extent of area. Current environmental studies have not identified the presence of merchantable timber within the areas of clearing. Prior to site clearing, migratory bird nests will be identified and appropriate buffers applied. Any trees that are large enough will be salvaged and cut for firewood and/or put through a chipper. Available organic material will be used to help revegetate areas in the future. The remaining trees will be burnt or mulched.

All work will be carried out following all applicable government legislation including the *Forestry Act* and *Cutting of Timber Regulations*.

3.2.2.2 Grubbing and Debris Disposal

Grubbing of the organic vegetation mat and/or the upper soil horizons will be limited to that necessary to meet the Project engineering requirements. Topsoil and organic materials will be stockpiled and used in site rehabilitation.

A minimum 15 m buffer zone of undisturbed natural vegetation will be maintained between watercourses and areas of grubbing activity. If specific site conditions require modification to the buffer zone, this will be undertaken in consultation with the DFO Area Habitat Biologist. Any work within the 15 m buffer of a water body showing on a 1:50,000 scale map will also need a permit from the Department of Environment and Conservation, Water Resources Management Division.

Following release from the environmental assessment process, and once all the required government permits have been received, the construction phase would be initialized. General construction will employ best practices, incorporating and following the guidelines provided in “Environmental Guidelines for Construction and Mineral Exploration Companies” and LIM’s site and task-specific EPP.

3.2.2.3 Pre-Stripping

Grubbing of the organic vegetation and/or the upper soil horizons will be kept to the minimum but is necessary within the Project footprint. Erosion control techniques and devices will be used to stabilize easily eroded areas. Topsoil and overburden will be stored in separate stockpiles for later use in reclamation activities.

Any unsuitable material will be placed in an approved stockpile area. Runoff of sediment-laden water during grubbing will be minimized by using measures such as settling ponds, ditch blocks, interception ditches and filter fabrics. Erosion control measures such as rip-rap, filter fabrics, drainage channels, and gravel or wood chip mulches will be implemented, as appropriate, in areas prone to soil loss. Erosion and Sediment Control measures will be installed in accordance with manufacturer’s recommendations. These features may include, but are not limited to, silt fencing, sediment control ponds, and gabion blankets. All work will be in accordance with the “Environmental Guidelines for Construction and Mineral Exploration Companies” and LIM’s site and task-specific EPP.

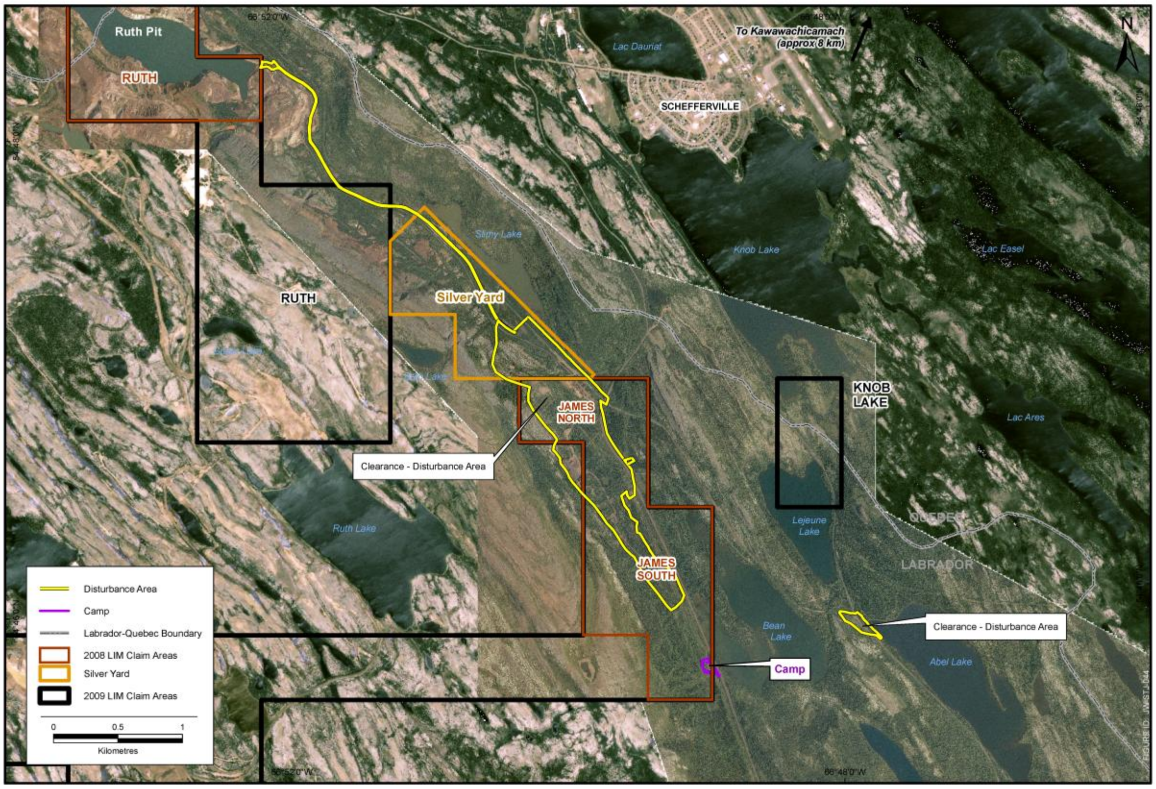


Figure 3.13 Extent of Vegetation Clearing, James

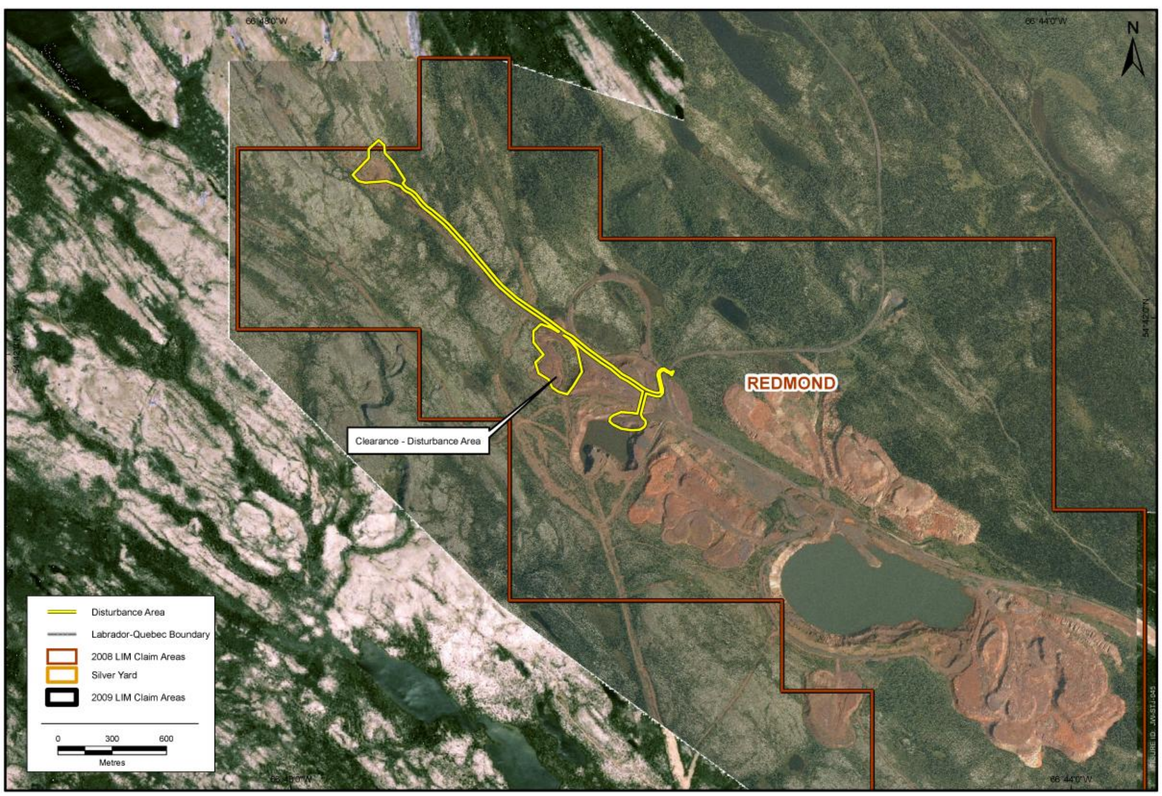


Figure 3.14 Extent of Vegetation Clearing, Redmond

3.2.2.4 Site Preparation Activities for Beneficiation Plant and Railroad Facilities at Silver Yard

The Silver Yard area is the location of the railway marshalling yard previously operated by IOC. With minor exceptions, the original railway subgrade and track ballast remains in place although the steel tracks were removed sometime after IOC terminated its mining operations in 1982. The LIM beneficiation plant will be located in the Silver Yard area and related disturbance of the natural environment will be managed to limit the overall size of the facilities footprint. Structures will include the beneficiation building itself, along with related support infrastructure such as finished product stockpiles, run-of-mine ore stockpiles, laydown yards, office facilities, plant access roads, the railroad marshalling yards and associated ore car loading facilities. Further details of the infrastructure are provided in Section 3.1.4.

Excavated volumes have been utilized to backfill areas required for ore stockpile pads, the rail car loading area, site access roads, etc. When cut and fill volumes are balanced, a total of only 15,000 cubic meters will need to be borrowed (from James deposit area). That is, there will be no net surplus of excavated material from the Silver Yard site preparation.

Topsoil material salvaged from the Silver Yard site preparation will be stockpiled around the site for future reclamation purposes. These areas will be seeded to provide stability to the stockpile.

The James Property requires clearing and grubbing within the waste rock storage and low-grade stockpile footprints and pit footprints. The Redmond Property requires minimal clearing and grubbing within the possible low-grade stockpile and waste rock dump storage footprints. No clearing and grubbing is required for the waste rock dump storage option. Stripping within the pit footprints has already been done by IOC during previous mining operations. Suitable reclamation material from the clearing and grubbing will be stockpiled in strategic locations for future reclamation purposes.

3.2.3 Construction Infrastructure and Activities

Construction within the Project area will involve the following activities:

- transporting equipment, construction materials and related supplies to construction sites, including transporting, storing and handling hazardous materials, fuels, lubricants and explosives;
- establishing and operating laydown areas;
- excavating, including disposing of excess waste rock and overburden
- establishing and operating borrow pits, including identifying sources of borrow material;
- railway construction;
- activities in and around watercourses;
- erection of buildings for wash plant, maintenance shop, and other buildings (offices, lab, camp, etc.). Note that these buildings will be of temporary/portable structure complying with appropriate building codes, etc.; and
- site rehabilitation and environmental monitoring.

Power supply during the construction phase will be by diesel generators and will be supplied by the contractors conducting the work.

It is anticipated that there will be no blasting required for any of the construction activities.

There are no upgrades planned for the haul road to Redmond, with the exception of minor maintenance. Material will sourced from the James and Redmond waste rock.

During the construction phase, excavations will occur in the following areas: primary crusher, settling and stormwater management pond. The expected vehicle types during construction include dozers, graders, rear-dump trucks, hydraulic shovels, boom trucks, and pick-up trucks. The expected hours for equipment use during construction range from 300 hours to 2,000 hours.

Construction activities are expected to be conducted on both day shift and night shifts.

3.2.3.1 Construction Yard Areas

A construction trailer yard has been provided for in the site layout design. The yard covers an area of approximately 75 m x 50 m. The yard will include a number of standard mobile trailers and a gravel parking area for 50 vehicles. Adjacent to this yard will be a construction material and equipment lay down yard. The lay down yard will be approximately 75 m x 50 m. These yards are more than 50 m from any natural waterbody. These yards will remain after construction and be used as additional lay down areas for the operational phase.

3.2.3.2 Truck Routes

Road traffic during construction will include deliveries of material from the nearby train station. Materials will include steel, concrete, and equipment. Vehicles and equipment will follow established routes when travelling to or from the site. All entrances and exits to the site will be designed so that incoming and outgoing vehicles may merge safely with other traffic, and oversized modules will be provided with escorts as required. A traffic control plan will be created for the Project. Hazardous materials will be transported and stored as required by the supplier's Material Safety Data Sheets (MSDS).

3.2.3.3 Sources of Aggregate

The aggregate required for the concrete will be sourced locally. All other aggregates required for the construction will be taken from the excavation material on-site or from waste rock at the mine.

The waste rock from the James and Redmond sites will generally be acceptable for use in road building and maintenance. The onsite mobile crushing plant would be used to create acceptable crushed material.

As indicated in Section 3.1.3, there are existing excavations in close proximity to the Project that are identified as sources of acceptable material.

3.2.4 Pit Dewatering

3.2.4.1 James Property

The water drawn from the proposed dewatering wells around the James pit is estimated to be discharged at a rate up to 113 m^3/min (SNC 2008). This flow rate is based on early calculations and limited data and is considered to be very conservative. Currently, it is proposed to have dual filters at the dewatering pump outlets with one dual filter per two pumps. These filters will treat the groundwater by removing the sediment prior to discharging to the natural environment. A settling pond (Settling Pond Area SP1) will also be constructed to provide additional settling/retention time, as required.

A small quantity of water will be discharged to the unnamed tributary and the remaining majority of water will be directed to the Silver Yard for use in the beneficiation process, discharged to Bean Lake, and/or via James Creek. The preferred location for the large quantity outlet will be designed during the detailed design phase.

The settled (removal of suspended solids by settling/filtering) pit dewatering water, which will be discharged to the south portion of James Creek near where the creek discharges into Bean Lake. Measures will be put in place to minimize any potential erosion or hydraulic effects from this discharge. The stream bed is rocky in this area so erosion is not likely, however the flow will be discharged over a diffuser bed before entering the creek as an additional erosion control measure.

Further discussions on dewatering activities are presented in Section 3.3.5.

3.2.4.2 Redmond Property

Pit dewatering water from the Redmond 2B and 5 pits will be pumped to the historical Redmond 2 pit for suspended solids settling. Note that Redmond 2 Pit is not connected by surface flow to any outside water bodies and it is planned to maintain this hydraulic isolation during operations. Dewatering rates for Redmond 2B and 5 have not been determined yet. Additional design details, including but not limited to dewatering rates, retention times, flow rates, and hydraulic controls, will be provided at the permitting stage.

Further discussions on dewatering activities are presented in Section 3.3.5.

3.2.5 Housing and Transportation

The great majority of operations workers will commute to and from the mine site on a rotational basis, alternating between periods of work, during which they will live in LIM provided camp accommodations and periods living in their home communities. The camp will include a kitchen (with catering), dining room, laundry facilities, and a recreation area. The recreation facilities may include such features as a pool table, television lounge, exercise equipment, and access to outdoor recreation. The camp will also have wireless internet and telecommunications access. An estimated 60 workers are anticipated to use the camp at any one time from approximately April to November on an annual basis during operations. Workers will be transported to and from the work site by buses/vans/pickup trucks.

3.2.6 Predicted Construction Emissions

As discussed in Section 3.2, construction activities at the site will include railway track installation, railbed grubbing, the clearing/grubbing for site services area, and the erection of buildings. All construction activities would occur in the short-term and potential emissions would be generated from tail pipe emissions from vehicles and combustion emissions from diesel generators (i.e., combustion emissions such as nitrogen oxides (NO_X), carbon monoxide (CO), and sulphur dioxide (SO_2)), and from fugitive dust (i.e., particulate matter (PM)) due to earth moving activities and vehicle traffic.

Heavy construction activities at the site will include erecting the crushing facility, the placement of the required generators and tanks, and the installation of conveying systems and rail lines. Emissions during construction are expected to occur intermittently over the duration of the construction period as opposed to emissions during operation, which will occur continuously. Also, the amount of fugitive dust emitted due to operational activities (crushing, ore loading/unloading, conveying, and stockpile erosion) will be greater than those observed during construction activities. Therefore, the maximum emissions during operation provide a conservative envelope for those occurring during construction.

Fugitive dust emissions during construction can occur due to land clearing, ground excavation, and equipment traffic on site.

Generally, fugitive dust emissions are:

- proportional to the disturbed land area and the level of construction activity;
- limited to periods of the day and week when the construction activities take place; and,
- vary substantially from day to day with varying meteorological conditions.

Fugitive dust emissions during construction are expected to be localized in extent, limited in duration, and smaller in magnitude than those occurring during operation. Fugitive dust emissions can be minimized by considering mitigation measures such as dust suppressants (e.g., water) on vehicle haul routes, tire washes, operational controls, and other control measures such as landscaping screens.

Emissions due to fossil fuel combustion are also expected to occur during construction in the beneficiation area through the use of diesel generators and as tail pipe emissions from on-site traffic. As is the case for the fugitive dust releases, emissions including NO_X, CO, PM, and SO_2 are expected to be localized in extent, smaller in magnitude, and will occur for shorter durations than the potential emissions during operation. Further details on emissions occurring during construction are provided in Appendix H

3.2.7 Site Rehabilitation and Monitoring

LIM is committed to progressive site rehabilitation during the construction and operation phases of the Project. Progressive rehabilitation is defined as rehabilitation completed, where possible or practical, throughout the mine development, construction and operation stages, prior to closure. This includes activities that contribute to the rehabilitation effort that would otherwise be carried out at mine closure.

All aspects of mine development including mine design, infrastructure location and design, and operations planning have and will be conducted with full consideration of available progressive rehabilitation opportunities and closure rehabilitation requirements. Baseline environmental studies conducted prior to site construction works will continue, or be refined as required, through the mine development and construction stage. The Project has been planned and designed to minimize the disturbed area of the site, to incorporate areas disturbed by previous mining activities where possible, and to minimize the environmental impact prior to mine operations.

A comprehensive environmental monitoring program will be conducted as part of the mine development and this data will be utilized to evaluate the progressive rehabilitation program on an ongoing basis.

3.2.8 Employment

Occupations during the construction phase, including NOC-2006 codes, are presented in Table 3.4. Certain management positions will be required throughout construction. Others will only be required on-site for limited periods (between about 2 days and 4 weeks on site). Given the small numbers of trades-persons involved, it may be difficult to employ apprentices for some trades in the journeyperson to apprentice ratios determined in accordance with the provincial general conditions concerning apprenticeship. However, LIM will strive to maintain the journeyperson to apprentice rations where possible.

Detailed information on project employment is provided in the NL Benefits Plan, which was developed in consultation with Natural Resources and other departments (Appendix D).

Table 3.4 Construction Phase Employment

Position	Number	NOC
Site Manager	1	0711
Clerk	1	1441
Lead Foreman	1	0721
Surveyor	1	2254
Equipment Operator – heavy	4	7421
Equipment Operator – light	3	7421
Truck Drivers	3	7411
Labourers-specialized	2	7611
Labourers	6	7612
Carpenter	2	7215
Welders	2	7265
Electricians	1	7241
Electrical Helper	1	7611
Crane Operator	1	7371
Boilermakers	1	7262
Ironworkers - steel reinforcement	1	7264
Ironworkers - steel reinforcement-helper	1	7611
Cement Finisher	2	7282
Structural Steel Workers	2	7263
Structural Steel Worker – apprentice	1	7611
Pipe Fitters	2	7252
Pipe Fitter-helper	1	7611
Total - Construction	**40**	

3.2.9 Goods and Services

The construction phase of the Project will see the procurement of goods and services, most of which are available in Newfoundland and Labrador. They include:

- earthworks;
- site construction;
- buildings construction;
- camp supply;
- plant construction;
- mine preliminary works and overburden stripping;
- fuel and refuelling services;
- welding and machining goods and services;
- land surveying;
- catering services

- vehicle rental;
- blasting;
- pipe-laying;
- road construction;
- electrical and mechanical contracting;
- miscellaneous tools and small equipment;
- heavy equipment rental (cranes, excavators, loaders);
- independent environmental monitoring; and
- air transportation.

LIM will ensure that construction management, engineering, procurement and project service activities for the construction phase of the Project shall, to the greatest extent possible, be carried out in the Province. LIM recognizes the existence of significant construction, fabrication and assembly infrastructure within the Province and will encourage utilization of such infrastructure. Specifically, LIM will require that potential contractors bid work on the basis of utilizing qualified, competitive provincial suppliers of construction, fabrication and assembly services, where available. All major construction and supply contracts will be advertised within the Province and potential provincial based contractors and suppliers will be given every opportunity to provide competitive quotations.

3.2.10 Newfoundland and Labrador Benefits Strategy

As is detailed in its Benefits Policy (Section 2.2.3), LIM understands the importance of the Project to the people of the Province of Newfoundland and Labrador and is committed to the delivery of associated benefits, including education, training, and economic development, to the existing communities in Labrador. LIM is also committed to the principles of local procurement of supplies and services.

Consistent with this Policy, LIM will ensure residents of and companies based in the Province receive full and fair opportunity and first consideration for employment and business respectively, where practically and commercially achievable on a competitive basis and in accordance with the IBA entered into with the Innu Nation of Labrador.

In implementing the Benefits Plan, LIM will:

- Communicate all material Project labour, contracts, goods and services requirements on its website and in newspapers in the Province, and especially in Labrador, and require its contractors to comply with this policy;
- Establish targets for Project employment and for goods and services procurement, for both project construction and mine operations. The targets will represent minimum levels of participation by residents of the Province in Project employment and for business opportunities for Newfoundland and Labrador companies in Project activity and the Company commits to achieve or exceed these targets. Residents of Newfoundland and Labrador, at point of hire,, will be determined according to the principles established in *The Elections Act*, SNL 1992, CE-3.1 as being "ordinarily resident."
- Include a copy of this Benefits Plan in all Project calls for expressions of interest, requests for proposals or contracts, and require that its contractors do the same.

- Require that prospective contractors indicate in bids how they would address the requirements of this Plan.
- Monitor Project employment and the supply of goods and services and, on a quarterly basis, prepare concise reports assessing actual outcomes relative to the Benefits targets.
- Provide copies of the above-noted quarterly employment and business reports to the Department of Human Resources, Labour and Employment and to the Department of Natural Resources in a timely manner, and be available to discuss these reports, including LIM's level of success in meeting targets, and appropriate responses.
- Review and, as necessary, revise LIM's benefits procedures and initiatives to ensure that LIM's commitments under this Benefits Plan, including the attainment of minimum targets, have been achieved.

Project employment and contracting are discussed in Section 7.4. This section also discusses the nature, scale and duration of employment and business opportunities. Given the small numbers of trades-persons involved, it may be difficult to employ apprentices for some trades in the journeyperson to apprentice ratios determined in accordance with the provincial general conditions concerning apprenticeship. However, LIM will strive to maintain the journeyperson to apprentice rations where possible.

More detailed information on employment the nature of employment opportunities has been incorporated in the NL Benefits Plan (Appendix D), developed in consultation with Natural Resources and other departments. This includes plans for liaising with relevant groups and agencies, criteria for ensuring full and fair access to Project-related opportunities, and descriptions of the timing and nature of employment opportunities that will flow from the Project. A Women's Employment Plan has also been developed in consultation with the Women's Policy Office for submission independent of the EIS, and has also been provided in an appendix to the EIS (Appendix D).

3.3 Operation and Maintenance

3.3.1 Operation and Maintenance Activities

The operation schedule will likely begin towards the end of April of each year and continue through to mid November, operating 24 hours per day. All operation and maintenance activities will be undertaken through separate contractors.

3.3.1.1 Excavation

The product will initially be excavated at 3,000 t/day per deposit site. It is anticipated that excavation will be conducted with the following types of mobile equipment:

- Komatsu WA600 loader (or equivalent); and,
- Komatsu PC800, PC750, PC400 type excavators (or equivalent).

3.3.1.2 Haulage

James ore and waste will be hauled with Komatsu HD605 type off-highway trucks or equivalent. Redmond waste will be hauled with the same type of truck. Redmond ore will be hauled from the pit by Komatsu HD605 type off-highway trucks (or equivalent) and stockpiled outside the pit. The raw ore will be reclaimed with a wheel loader or shovel and loaded into road trains (currently 45T) and hauled to the beneficiation area.

3.3.1.3 Drilling and Blasting

Drilling will occur for both ore quality control and for blasting purposes. Based on historic experience in the area, the drill pattern size for blasting is expected to be a 7.5 – 9 m square pattern. Blasting at James and Redmond will be episodic as the deposits are softer in nature and may be excavated without much blasting, although provisions for blasting will be available. It is planned that blasting will initially be done with packaged/cartridge type explosives. Table 3.5 depicts the expected equipment types and numbers:

Table 3.5 Equipment Types and Numbers

Equipment Type	Number of Units				
	Year 1	Year 2	Year 3	Year 4	Year 5
Wheel Loader	2	2	2	2	1
Mine Truck (Off-highway)	4	6	6	6	3
Track Dozer	1	2	2	2	1
Motor Grader	1	1	1	1	1
Haulage Truck	0	0	10	15	5
Blaster Truck	1	1	1	1	1
Explosive Truck	1	1	1	1	1
Pick Up Trucks	5	5	5	5	3
Fuel/Lube Truck	1	1	1	1	1
Drill Rig	1	1	1	1	1
Water Truck	1	1	1	1	1

3.3.1.4 Processing

The processing or beneficiation activities were presented in Section 3.3.1.4.

3.3.1.5 Product Export

The finished products of Lump Ore and Sinter Fines ore will be exported to markets likely outside of Canada.

3.3.1.6 Rock Fines Disposal

As presented in detail in earlier sections, the reject fines from the beneficiation process will be directed by pumping to Ruth Pit (see Section 3.1.9).

3.3.1.7 Maintenance Activities

A maintenance shed (sprung type structure on concrete pad) and maintenance yard will be provided to conduct routine maintenance for the mine and beneficiation operations. The building will be equipped with the necessary tools and equipment to maintain the mobile fleet. The building will have a concrete foundation and closed-circuit wash bay and an oil-water separator, which will be emptied by a licensed contractor on a routine basis and managed in accordance with applicable regulations. Small retail quantities of solvents may be used for parts cleaning and if so, will be properly contained, stored and disposed of accordingly. There will be no discharges to the environment.

It is expected that major repairs will be conducted off site at a location left to the Contractor's discretion.

3.3.2 Predicted Operational Emissions

Potential emissions during operation are expected to be similar to those described in Section 3.2.6 for construction and include the products of combustion, such as NO_X, CO, PM and SO_2, from diesel generators and onsite traffic, and fugitive dust from ore loading/unloading, crushing, and stockpile erosion.

Emission estimates for the Project during operation were developed for all potentially substantive sources using the list of potential sources provided in the EIS Guidelines as a basis. Where emission sources indentified in the guidelines were found to be not substantive or not applicable, emissions were not estimated. All source and emissions estimates were based on preliminary design data for the Project. The potential emission sources during operation can be broadly grouped as either combustion emissions of fugitive dust emissions. Emissions were estimated for numerous non-negligible sources including generators, on-site vehicles, ore loading, ore crushing, stockpile erosion, and on-site conveyor systems.

The following subsections provide a qualitative overview of the anticipated emissions during operation. More details on Project emissions during operation (including, where applicable, detailed estimates and calculation methodology) is provided in Appendix H.

3.3.2.1 Emissions from Beneficiation Facility

Products of Combustion

Diesel generators will be used initially on-site on a continuous basis to provide power for the on-site equipment until the second phase of the electrical power supply is implemented. Emissions from combustion arise from the burning of fuel and are dependent on fuel flow rate, fuel type, combustion equipment and the efficiency of pollution control devices. The primary products from combustion include NO_X, SO_2, CO, and PM, which include both visible and non-visible emissions. Nitrogen oxide formation can be directly related to the high pressures and temperatures observed during the combustion process. Other emissions, including various hydrocarbons, CO, and PM, are primarily the result of incomplete combustion.

Standard techniques were used to estimate emissions which included using design specifications for the generators, along with accompanying emissions factors from the U.S. EPA, to estimate potential emissions due to diesel combustion.

Fugitive Dust

Fugitive dust emissions at the site will occur from several different sources during operation. Potential sources include ore loading/unloading, ore crushing, stockpile erosion and dust from conveyor systems around the site. Potential fugitive dust emissions at the site were estimated using emissions factors from the U.S. EPA AP-42 guidance documents.

Fugitive dust emissions from loading and unloading operations depend on the parameters of the storage pile being disturbed. Emissions due to stockpile wind erosion are highly dependent on local wind speeds and precipitation levels at the site, along with the type of material and its erosion potential. Larger aggregate material will have a tendency to form stable stockpiles, while finer material will erode over time.

Emissions from ore crushing and conveying depend on the amount of material being treated as well as the controls in place. Emissions control from the crushing operation at the site includes the use of a dust control system which will limit emissions from the main beneficiation area. Emissions from conveyors were estimated with no controls; however, covered conveyors may also be used to limit fugitive dust emissions during transport to and from the various storage piles at the site.

On-Site Traffic

Potential emissions from on-site traffic sources may include tail-pipe emissions due to fossil fuel combustion and fugitive dust. Emissions from combustion arise from the burning of fuel and are dependent on fuel flow rate, fuel type, combustion equipment and the efficiency of pollution control devices. The primary products from combustion include NO_X, SO_2, CO, and PM. Fugitive dust emissions due to on-site traffic would be proportional to the amount of property disturbed and the frequency of disturbance. Neither the tail-pipe emissions nor the fugitive dust emissions from on-site traffic are considered substantive compared to the other activities occurring at the facility during operation.

Locomotive Emissions

Combustion emissions are expected from the diesel locomotive used for transporting ore from the beneficiation area. Similar to on-site traffic emissions, emissions from combustion arise from the burning of fuel and are dependent on fuel flow rate, fuel type, and the type of combustion equipment. The primary products from combustion include NO_X, SO_2, CO, and PM.

Due to the infrequent nature of the source at the site (one trip is expected per day), emissions from the locomotives used on-site are not considered substantive compared to the other activities occurring at the facility during operation.

3.3.2.2 Emissions from Ore Hauling from Mine Site to Beneficiation Area

Emissions from the ore hauling activities are similar to the potential emissions due to on-site traffic as discussed above. Potential emissions may include tail-pipe emissions due to fossil fuel combustion and fugitive dust emissions.

Dust emissions would occur along the haul routes between the James or Redmond mine areas and the beneficiation area. These are all existing dirt roads and would be prone to dust emissions from any type of vehicle traffic. When a vehicle travels along an unpaved road, the vehicle's wheels travelling on the road generate dust which is then lifted and exposed to passing winds.

Emissions due to ore hauling were estimated using standard techniques including equations found in the U.S. EPA's AP-42 guidance documents. Fugitive dust emission estimates varied from 221 – 325 kg/day for the one km hauling route between the James deposit and the beneficiation area and 2869 – 4225 kg/day for the thirteen km hauling route between the Redmond deposit and the beneficiation area.

Particulate matter emissions from the ore hauling trucks travelling on a small on-property section of roadway (approximately 250 m) were estimated for input into the air dispersion model.

3.3.2.3 Emissions from Mining

Potential emissions due to the mining operations at the James and Redmond deposits include fugitive dust from loading and blasting operations and combustion gases from vehicles.

Fugitive dust emissions from loading operations depend on the condition of the storage piles being disturbed. When freshly processed material is loaded onto a pile, there is a greater potential of fine particulate emissions. Over time, as the pile is weathered, or if the material has high moisture content, potential emissions will be greatly reduced. Other factors influencing fugitive dust emissions during loading and unloading include the frequency of the operation and the local meteorological conditions, including wind speed, humidity, precipitation, and temperature.

The removal of ore and surrounding waste rock involves drilling and blasting. A dust cloud is produced during blasting. Due to the nature of open pit mining, the dust cloud will partially be retained in the pit, although some portion of it will rise out into the local surroundings. However, it should be noted that the elevated levels of particulate matter will be limited in spatial extent and short lived, as the majority of the fugitive dust will settle within a short distance (i.e., contained within the pit).

3.3.3 Operation Discharges

Disposal and treatment of discharges is presented in Sections 3.1.7 and 3.3.5.

3.3.4 Chemical Storage/Management

The beneficiation process does not require the use of any chemicals or reagents. XRF with lithium metaborate as a flux to produce glass disk will be used for Ore Control. Procedures for safe and appropriate handling will be developed using WHMIS and MSDS and in accordance with applicable regulations.

3.3.5 Water Management

3.3.5.1 James North and James South Property

During operations, the water management activities for the James North and James South properties are anticipated to include a combination of perimeter pit dewatering wells and in pit sumps. The water collected from these activities will be pumped to the nearby James Settling Pond area (SP-1) and managed separately. It is currently anticipated that this area would include two settling ponds, one for the pit water management and another for the groundwater dewatering management.

It is anticipated that water collected from the in-pit sumps and/or dewatering wells may require monitoring for such parameters as TSS, ammonia, and metals such as iron, copper, and zinc.

The main source of nitrogen and ammonia in mine waste waters is from nitrogen components in explosives that can be present in mine blast residues. When a blast is completely detonated, there are no blast residues. Therefore, the objective of reducing the amount of ammonia and nitrate levels in the mine waste water from blasting activities would be to implement actions that contribute to the complete detonation of a blast and reduce the amount of undetonated explosives. This can be achieved by:

- Controlling explosive losses through storage, spillage, and handling controls. Bulk ANFO and bulk emulsions can be spilled during storage, transfer, and loading. It is LIM's plan to initially use packaged explosives (and not bulk explosives) for their periodic blasting requirements. The use of the packaged explosives is expected to reduce the amount of explosive spillage to handling and loading practices.

- Implementing engineered blasting practices that minimize to the extent possible, the amount of blasting material used and residue produced. These practices include, but are not limited to, the drill pattern design, explosive type and load, initiation method, delay timing, stemming heights, stemming material, burden and spacing sizing.

Additional discussion of approaches LIM has reviewed to reduce the potential of ammonia and nitrates in water is presented in Appendix T, *Methods to Control Ammonia and Nitrate Levels in Mine Waste Water*.

A properly designed, operated, and maintained settling pond is considered to represent best practicable technology for treating mine wastewater. The in-pit sumps, which are the first stage of mine waste water collection, could offer an initial pre-settling and retention time depending on the capacity of the sump.

The settling ponds will be engineered to ensure that in-pit dewatering and well dewatering effluent will be of suitable quality for discharge to environment. As a contingency, a temporary pump/pipeline system will be available to convey the effluent from these ponds to the Beneficiation area to be used for washing or it will be pumped to Ruth Pit via the ore wash water pipeline. If the water is used in the beneficiation process then it will reduce the amount of process water required. The wash water pipeline will be designed to accommodate this additional flow if required.

The water drawn from the proposed dewatering wells around the James North and James South pits has been estimated at a discharge rate of up to 113 m^3/min (SNC 2008). This flow rate is based on early calculations and limited data and is considered to be very conservative.

The results of the samples collected from the groundwater monitoring wells and during the pumping tests in 2008 at the James property indicate that the low levels of metals detected in the groundwater samples were associated with the suspended solids, and the filtered metals results were low. Observations made during the groundwater sampling and pumping were that initially the sampled water would be turbid and red but in less than 24 hours the suspended solids in the water tended to settle and the water cleared up. According to a former IOC engineer involved in dewatering operations at nearby historic mining operations, the water from the IOC dewatering wells generally cleared up within a week or so of pumping, after the wells had become well developed. No existing pits will be dewatered prior to mining (D. Hindy, pers. comm..).

Currently, it is proposed to have dual filters at the dewatering pump outlets with one dual filter per two pumps. These filters will treat the groundwater by removing the sediment prior to discharging to the natural environment. Directing the filtered dewatering water to the settling pond at SP1 will also provide additional settling/retention time, as required. Based on surface water quality monitoring results to date it is likely that the water from the perimeter dewatering wells will clear up over time as the wells become highly developed. This will lead to a further improvement in water quality.

From the James Settling Pond area (SP1), the collected and treated water will be discharged to the environment. A small quantity of water will be discharged to the unnamed tributary as part of a mitigation strategy, while the remaining majority of water will be discharged to Bean Lake and/or via James Creek. The preferred location for the large quantity outlet will be designed during the detailed design phase as part of the permitting stage.

The estimated wash water use rate in the beneficiation process is up to approximately 8.4 m^3/min, the source of which could be diverted from the pit dewatering volume. The water required to make up water potentially lost from the springs feeding the unnamed tributary can also be diverted from the pit dewatering volume. The net effect of this is that more water will be sent to Bean Lake (as a result of groundwater pumping) than currently flows into Bean Lake from surface water and groundwater inputs. Sections 4.1.4 and 7.3 provide information on the capability of Bean Lake to accommodate this additional flow without major hydraulic effects.

3.3.5.2 Redmond Property

During operations, water management activities at Redmond 2b and Redmond 5 are anticipated to include a combination of in-pit sumps and perimeter dewatering wells. Pit dewatering from the Redmond 2B and 5 pits will be pumped to the historical Redmond 2 pit for suspended solids settling.

Hydrogeological work conducted in 2008 determined that the depth of ground water is approximately 25 m below ground surface in the pit area at Redmond 2b. Although Redmond 5 pit will likely require some degree of dewatering, based on existing hydrogeological and other baseline data, the extent of the dewatering requirements for this pit are anticipated to be minor compared to other pits because this pit is higher in elevation and there are no surface water bodies nearby. It is expected that the depth to the water table will be relatively deep at this location (approximately 30 to 40 m below ground).

The subsurface hydraulic conditions suggest that dewatering rates should be significantly lower than at James pits. Based on the hydrological and mining details currently known, the historical Redmond 2 pit will be able to accommodate the dewatering water from Redmond 2b and Redmond 5.

Redmond 2 pit, which currently has no surface connectivity to nearby surface water bodies, will therefore be used as a settling pond for pit dewatering from the proposed Redmond 2b and Redmond 5 open pits. It will also be a waste rock storage area for some portion of the waste rock from Redmond 2b and Redmond 5. It is planned to maintain the non-connectivity of Redmond 2 to nearby surface water bodies. In order to maintain this hydraulic isolation at Redmond 2, the water level in Redmond 2 will be monitored during operations and once the water level reaches a pre-determined level, waste rock disposal from the proposed pits into Redmond 2 will cease and be stockpiled in other locations. In this manner, no overflow will occur.

3.3.5.3 Wash Water

Water requirements are modest, with the beneficiation process water (wash water) being drawn from groundwater wells. The water balance flows were estimated from similar process plants. The flows in the water balance are typical for average conditions for a wash plant producing 2 Mtpy of direct shipping product. The reject fines slurry concentration was assumed to be 21 percent by weight. There will be a number of pumps required, which will maintain a distribution of water within the beneficiation process and have enough capacity to allow for surge conditions such as plant start-up or line flushing.

Fresh clear water will be required for gland water use, potable water, fire water and miscellaneous users. Occasionally the process water reservoir may have a deficit of water which will have to be made up of fresh water. However the overall average water balance does not require fresh water for process water make-up. Fresh water will be supplied from similar groundwater wells. Water for dust suppression will come from beneficiation plant fresh water.

3.3.5.4 Sanitary (Non-Potable) Water System

Storage and management/disposal of sanitary wastewater and greywater will be conducted in accordance with applicable legislation. Wastewater and sewage will be handled and treated by biological oxidation of wastewater using a rotating biological contactor as form of aeration. Grey water is sterilized by means of UV disinfection in the waste water's last section of the treatment, before its final discharge at the outlet of the wastewater treatment module. After sterilization, grey water from the beneficiation area will be directed to Ruth Pit. Testing of sterilized water will be conducted routinely to ensure effective operation of the system.

It is estimated that the flow rate from the sanitary water systems at Silver Yard and at the camp will be a combined 17,000 L/day.

3.3.5.5 Potable Water

Potable water will be required at the beneficiation building, various site office trailers at Silver Yard, and at the site trailer at Redmond. Initially potable water will be tanked to the site and/or bottled water will be transported to the Project area. Existing ground water testing has shown that the water is of suitable quality, and therefore, groundwater use for drinking water may be considered at a future date. Testing of the potable water quality will be conducted regularly. Potable water at the Redmond site trailer will be provided by bottled water.

3.3.5.6 Dewatering Water

Dewatering at the James deposit will be conducted using a combination of perimeter dewatering wells and in-pit sumps. The water from the in-pit sumps will be directed to a settling pond separate from the perimeter well water settling pond at the SP1 settling pond area. The Redmond dewatering system is planned to consist of perimeter wells and in-pit sumps which will direct water to an historical pit, Redmond 2, which has undergone confirmation of the absence of permanent fish habitat and which is hydraulically isolated from any nearby surface water features.

Details are presented under Section 3.3.5.1.

3.3.6 Progressive Rehabilitation

Once the mines advance from the development stage to the operational stage, progressive rehabilitation activities can commence. Progressive rehabilitation is defined as rehabilitation completed, where possible or practical, throughout the mine operation stage, prior to closure. This includes activities that contribute to the rehabilitation effort that would otherwise be carried out at mine closure. Progressive rehabilitation opportunities identified for this Project include:

- Rehabilitation of any construction-related buildings and laydown areas;
- Rehabilitation of the Waste Rock Storage stockpiles;
- Development and implementation of an integrated Waste Management Plan;
- Rehabilitation, if required, of exploration drilling sites;
- Re-vegetation studies; and
- Some backfilling of selected existing open pit areas left by previous mining operations.

A comprehensive environmental monitoring program will be conducted as part of the mining operations and this data will be utilized to evaluate the progressive rehabilitation program on an ongoing basis. Additional studies, such as revegetation trials, will be conducted over the operational phase of the mine which will be integrated into ongoing progressive rehabilitation activities and will be used in the development of the final closure rehabilitation design.

Part of the rehabilitation and closure activities conducted during mine operations will include scheduled review and updates of the Rehabilitation and Closure Plan, as required. These scheduled reviews will incorporate any new or revised data gained from operating experience, progressive rehabilitation activities, environmental monitoring, and rehabilitation-related operational studies.

3.3.7 Employment

The Project operation phase employment by occupation, including NOC-2006 code, is presented in Table 3.6. It is expected that most workers will generally be employed on a four weeks on and two week off schedule. With the exception of the owner management positions, which will be full-time office positions, these personnel will be employed on a full-time seasonal basis.

Table 3.6 Operation Phase Employment

Positions	Number	NOC Code
Mine Operations		
Mine Operation Foreman	1	8221
Foreman	3	8221
Drill Operator	3	7372
Blaster	2	7372
Blaster Helper	1	8411
Loader Operator	3	7421
Haulage Truck Operator	9	7411
Dozer Operator	3	7421
Grader Operator	3	7421
Sampler	3	8614
Subtotal	31	
Mine Engineering		
Mine Engineer	2	2143
Mine Technician	1	2212
Surveyor	2	2254
Draftsman CAD	1	2253
Subtotal	6	
Beneficiation Operation		
Plant Manager	1	0721
Process Technician	1	2243
Chemical Technician (Lab)	3	2211
Labourer	1	7612
Administrative Assistant	1	1441
Warehouse Person	3	1472
Maintenance Foreman	1	7211
Utility Crew (pipeline, pumps, etc.)	1	7442
Primary Crusher Operator	6	9411
Secondary Crusher Operator	3	9411
Secondary Crusher Helper	2	9611
Belt Filter & Load-out Operator	6	9411

Positions	Number	NOC Code
Mechanic	2	7312
Mechanic Helper	1	7612
Safety/First Aid personnel	3	3234
Electrician/Instrumentation	2	7241
Locomotive Engineers	3	7361
Brakemen	3	7362
Yard Workers	3	7432
Subtotal	46	
Owner Management		
General Manager	1	0721
Geologist	3	2113
Environmental Technician	1	2231
Clerk	1	1441
Mine Engineer	1	2143
Innu Liaison	1	4212
Labrador offices	3	
Subtotal	11	
Contractor Management		
Site Manager	1	0711
Secretary	1	1241
Bookkeeper/Accountant	1	1231
Camp Operations	12	
Subtotal	15	
TOTAL - OPERATION	**109**	

Given the small numbers of trades-persons involved, it may be difficult to employ apprentices for some trades in the journeyperson to apprentice ratios determined in accordance with the provincial general conditions concerning apprenticeship. However, LIM will strive to maintain the journeyperson to apprentice rations where possible.

Additional information on employment during operation is provided in the NL Benefits Plan, which was developed in consultation with Natural Resources and other departments (Appendix D).

3.3.8 Goods and Services

Mine operations will require a wide range of goods and services, the majority of which are available in Newfoundland and Labrador. A review of local capabilities indicates that the following will be available on a commercial basis from within Newfoundland and Labrador:

- fuel and refuelling services;
- welding and machining goods and services;
- catering services and camp management;
- vehicle rental, rail passenger and air transportation services;
- maintenance operations;
- hardware stores miscellaneous tools and small equipment;
- heavy equipment rental (e.g. cranes, excavators and loaders);
- local contracting services (e.g. construction, electrical and mechanical);
- Mine contractors;

- Beneficiation Equipment operation; and
- Power Supply.

Some other goods and services will be available from elsewhere in the Province. Specific targets with respect to procurement of goods and services are provided in the NL Benefits Plan (Appendix D).

3.4 Decommissioning

3.4.1 Closure Rehabilitation

As described in Section 3.2.7, comprehensive environmental monitoring programs will be conducted as part of the mine development and operations and these data will be utilized to evaluate the Rehabilitation and Closure Plan, required under the *Newfoundland and Labrador Mining Act*, on an ongoing basis. Additional studies, such as re-vegetation trials, will be conducted over the operational phase of the mine which will be integrated into ongoing progressive rehabilitation activities and will be used in the development of the final closure rehabilitation design.

Part of the rehabilitation and closure activities conducted during mine operations will include scheduled review and updates of the Rehabilitation and Closure Plan, as required. These scheduled reviews will incorporate any new or revised data gained from operating experience, progressive rehabilitation activities, environmental monitoring, and rehabilitation-related operational studies.

Typically, the final review and update of the Rehabilitation and Closure Plan is conducted approximately one year prior to the cessation of operations. The final review of the Plan will provide the detailed closure rehabilitation design and procedures to fully reclaim the mine site. This Plan will be developed to a contract ready stage and would include Contract Documents and Drawings, as well as, a detailed cost estimate for construction (±15 percent).

Once mine operations have ceased, closure rehabilitation activities will commence as per the ‘final’ Rehabilitation and Closure Plan. Closure rehabilitation will generally include:

- increase in activities associated with rehabilitation of disturbed areas involving replacing overburden and re-vegetation of abandoned areas;
- removal of buildings and structures and clean-up at all work areas (i.e., beneficiation buildings, conveyors, crushing plant, laydown areas, fuel storage areas, open pits, etc.);
- clean-up, removal and proper disposal of all process and potentially hazardous materials;
- water treatment and monitoring for approximately two years;
- rehabilitation of reject fines disposal area’s outflow infrastructure;
- re-establishing surface water drainage patterns in the Silver Yard Area, including re-engineering of existing diversion channels;
- final contouring and re-vegetation of stockpile and waste rock areas;
- water pipelines, dewatering wells, and building foundations will be removed; and
- overall execution of the Rehabilitation and Closure Plan reviewed and approved by the Government of Newfoundland and Labrador.

Additional information on site rehabilitation and closure is presented in Section 8.4 of this document.

REPORT TO	**Labrador Iron Mines Limited** **220 Bay Street** **Suite 700** **Toronto ON M5J 2W4**
FOR	**Schefferville Area Iron Ore Mine** **(Western Labrador)**
ON	**Revised Environmental Impact Statement**

August 2009

EXECUTIVE SUMMARY

Introduction

This Environmental Impact Statement (EIS) has been prepared for the proposed Schefferville Area Iron Ore Mine (Western Labrador) (the Project) in accordance with the *Newfoundland and Labrador Environment Protection Act*, *Environmental Assessment Regulations* and the final *EIS Guidelines* issued on December 9, 2008. This EIS presents information about the Project and the results of its environmental assessment. It was submitted to government in December 2008 and in response to review comments issued by the Minister of Environment and Conservation, received in March 2009, has been revised and resubmitted.

The Project to be developed by Labrador Iron Mines Limited (LIM) will involve the reactivation of two iron ore deposits located in Labrador near Schefferville, Québec. Open pit mines will be developed at James North, James South, Redmond 2B and Redmond 5 deposits. The Project will operate under current regulations, environmental protection standards, and industry best practices and will be smaller than the previous IOC operation (1954 to 1982).

The EIS identifies and addresses the potential environmental effects on communities, economy and business, caribou, and fish and fish habitat. The assessment process also considers Project feasibility, the Project's water budget, and potential effects to air quality.

The EIS has been prepared in accordance with Guidelines issued by the Minister of Environment and Conservation (December 9, 2008) to fulfill provincial environmental assessment requirements and will be used by the Minister of Environment and Conservation, in consultation with Cabinet, to determine whether the Project's environmental effects are acceptable and the Project is to proceed.

Highlights of the Project include:

- the mining of 'direct shipping' iron ore deposits in western Labrador in an area of previous iron ore mining;
- mining will be carried out using conventional open pit mining methods, employing drilling and blasting operations;
- additional small excavations that may be required will include borrow pits, quarries and side-hill cuts associated with the construction and maintenance of access roads, mine haulage roads, sumps and settling ponds, and railway spur line construction;
- ore will be beneficiated by crushing, washing and screening at the Silver Yard in Labrador. No chemicals will be used in the beneficiation;
- the beneficiation building will house a primary crusher, tumbling scrubber, secondary crusher, primary screening equipment, secondary screening equipment, filtration equipment, a crane and various chutes, conveyors, and pumps;
- the Project is planned to operate an average of 7 to 8 months per year;
- the beneficiation building and contents will be semi-mobile and modular to fit with the Project's long-term plans;
- other buildings at the Silver Yard include: mine dry, site offices, laboratory, maintenance shed, warehouse facilities, and a camp nearby;

- subsequent to washing and screening, the reject fines will be deposited in Ruth Pit, which will become a settling pond to remove suspended solids;
- a 4.0 km rail spur line, previously operated and abandoned, will be restored, and a siding track will be laid at the Silver Yard;
- the use of a commute work system and seasonal camp accommodations for most Project workers;
- standard and proven environmental protection procedures will be employed throughout construction, operation, and rehabilitation and closure;
- water management will include: sourcing beneficiation water from pit water and groundwater; depositing resulting washwater in Ruth Pit; diverting clean drainage away from active mine areas; and maintaining flow to fish habitat using clean groundwater
- an environmental management plan regarding the potential disturbance to avifauna nest sites during construction will be submitted to Environment Canada;
- a Development Plan and Rehabilitation and Closure Plan will be submitted to Mines Branch prior to Project initiation;
- the site specific Environmental Protection Plan (EPP) will be submitted to the Minister of Environment and Conservation for approval before any construction on the Project begins
- a Benefits Policy and associated Benefits Plan;
- an Impact and Benefits Agreement with the Innu of Labrador has been signed;
- a Women's Employment Plan has been developed; and,
- operation Plans will be prepared and submitted annually.

Local and Regional benefits include:

- approximately 40 jobs created during construction and approximately 109 during operation;
- 5 years duration of employment;
- between $30 million and $60 million per year in total operating costs, much of which will be accrued to the Province of Newfoundland and Labrador;
- close working with the Innu of Labrador involving them in provision of labour, goods, and services;
- maximum use of qualified mining contractors and other services based elsewhere in the region, such as Labrador City, Wabush and Happy Valley-Goose Bay; and
- LIM is committed to the creation and implementation of employment equity practices to promote recruitment, training, and advancement of qualified visible minorities and women.

Issues Scoping

LIM conducted an extensive issues scoping process in relation to the Project, which included consultation with appropriate regulatory agencies, the public, and Aboriginal groups, in order to identify the potential environmental issues associated with it. The EIS includes consideration of the environmental effects of the proposed Project, including the potential effects of each of its components/phases and any of these predicted environmental effects is also evaluated. Mitigation measures which are technically and economically feasible have been incorporated into Project design and planning and additional VEC-specific mitigation has also been identified and proposed as required and appropriate.

Valued Environmental Components

Valued Environmental Components identified in the Guidelines and discussed in the EIS include Employment and Business, Communities, Fish and Fish Habitat, and Caribou.

Fish and Fish Habitat

The potential effects to fish and fish habitat have been considered and, with diligent application of mitigative and environmental protection measures, the residual and cumulative environmental effects are expected to be not significant under definitions for environmental assessment. LIM will adhere to the following mitigation measures to reduce or eliminate adverse effects on fish and fish habitat:

- vegetated buffer zones;
- sediment and erosion control measures;
- proper wastewater management measures;
- proper solid and liquid waste management measures;
- proper handling of petroleum products (oils, grease, diesel, hydraulic and transmission fluids), which will be stored a minimum of 100 m from any bodies of water and on level terrain and in accordance with applicable regulations;
- implementation of emergency response equipment and training to respond to spills and other unplanned events;
- blasting, when conducted, will be in accordance with applicable provincial and federal regulations to protect surface water features; and
- a no-fishing policy for workers will be implemented to protect local fisheries resources.

Follow-up and monitoring measures that will be applied to ensure compliance with provincial and federal regulations and to verify the impact predictions include:

- water quality monitoring under provincial and federal approvals and regulations;
- Environmental Effects Monitoring (EEM) under provincial and federal approvals and regulations.

Caribou

The Project may affect caribou, which occasionally migrate and/or occupy this area, through changes in habitat availability or effectiveness, changes in movement patterns, and increased mortality through influences affecting predation/poaching/hunting and vehicle collisions. To further document the status of caribou in the Project area, LIM undertook an aerial caribou survey with representatives of the Department of Environment and Conservation Wildlife Division in May 2009, including the documentation of potential caribou habitat, the presence of any caribou or other wildlife within a 50 km radius of the Project area, the collaring of one female caribou, collection of tissue for DNA analysis and ecotype affiliation, if possible, and a collection of measurements. A copy of the supporting document has been submitted to, and reviewed by, the Department of Environment and Conservation Wildlife Division.

In order to mitigate potential effects of the Project on caribou, activities during all phases of the Project will be planned with three main considerations:

- The recently completed caribou survey (May 2009) is considered inconclusive regarding the determination of the ecotype of caribou which were present in the project area. As such, LIM will undertake a caribou mitigation strategy which protects all caribou, including the potential for sedentary caribou to exist, although their presence/absence in the project area is currently unconfirmed. Additional associated survey data, such as outstanding DNA analyses, satellite collar data, and ongoing monitoring are anticipated to be of assistance in the near future in the determination of caribou type. LIM proposes that the mitigation strategy and supporting data be re-assessed at the end of Year 1 of operation for appropriateness and effectiveness including clarification of caribou ecotype;

- In the event that caribou are observed within the Assessment Area or in the vicinity of Project activities, a set of procedures will be incorporated to reduce or eliminate disturbance and encounters with caribou; and
- Any activity that may potentially affect caribou habitat or mortality in some manner will be implemented with appropriate mitigation regardless of whether caribou are actually present.

Specific mitigation measures have been developed for both the woodland and migratory caribou ecotypes, and these mitigation strategies will be implemented in close collaboration with the Provincial Wildlife Division. Details for both mitigation strategies are provided in Section 7.2.5.

Applying the mitigation measures outlined for each caribou ecotype will reduce adverse environmental effects. Thus, residual and cumulative environmental effects on caribou, whether from a migratory herd or a possible woodland herd, are determined to be “not significant”.

Employment and Business

Employment and Business was chosen as a VEC based on public concern that economic benefits accrue to local communities, Labrador and the Province as a whole. This includes benefits to the population and economy as a whole, and to under-represented groups.

It has been determined that the Project will make a contribution to the further economic development of the Province and, in particular, Labrador, by:

- Providing full and fair opportunity and first consideration for the people, employment, businesses and companies of the Province to participate in and benefit from the Project;
- providing local employment and incomes during construction and operation;
- providing local business during construction and operation;
- increasing the capacity and skills of local labour force and businesses; and
- facilitating further mining development by putting in place these new labour and business capabilities and new transportation infrastructure, thereby making existing and new Labrador projects more competitive globally.

These net positive effects will be particularly valued given the recent economic downturn in Labrador West.

No significant adverse residual or cumulative effects are expected on Employment and Business.

LIM will monitor Project employment and expenditures, including the proportions of work going to Labrador, the Innu of Labrador, women and the Province as a whole. This information will be compiled on an annual basis and made available to government upon request. Provisions respecting the employment of women have been specified in the Women’s Employment Plan.

Communities

Communities are another aspect of the socio-economic environment that may be affected by the Project. The communities most likely to be affected are the primary places of residence of the Project labour force: Labrador West, Upper Lake Melville, Schefferville, and Kawawachikamach. The construction, operation, and decommissioning phases of the Project will have negligible adverse short-term direct effects on the communities of Labrador West, Upper Lake Melville, Schefferville, and Kawawachikamach.

The monitoring of demands on community services and infrastructure is the responsibility of the relevant government departments and agencies, as part of their normal planning processes. LIM will assist by liaising with them, as requested, and through the timely provision of information about Project activity and plans.

Conclusion

Significant adverse environmental effects are not predicted in relation to the Project's construction, operation, or decommissioning phases, or as a result of accidental events. The Project is therefore not likely to cause significant adverse environmental effects. A monitoring and follow-up program will be undertaken to assess the accuracy of the effects predictions made in the environmental assessment, and to determine the effectiveness of mitigation measures.

The Project will result in considerable socio-economic benefits accruing to the Province of Newfoundland and in particular Labrador. It will create considerable direct and indirect employment and business opportunities, and contribute substantially to the economy of the local area of Labrador, as well as that of the Province of Newfoundland and Labrador as a whole. LIM is committed to providing full and fair opportunity and first consideration for the people, employment, businesses and companies of the Province to participate in and benefit from the Project.

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1.0 INTRODUCTION

1.1 Project Overview

The Schefferville Area Iron Ore Mine (Western Labrador) (the Project) is being developed by Labrador Iron Mines Limited ("LIM"), which is a wholly owned subsidiary of Labrador Iron Mines Holdings Limited, a public company listed on the Toronto Stock Exchange.

LIM has identified eight separate ore grade deposits located across a 100 km strike length, all in Labrador. The four central deposits are located within 10 km of the location of Silver Yard, Labrador, which is some three km west of Schefferville, Québec.

The Project involves development and mining of 'direct shipping' iron ore deposits in the northwest of western Labrador in an area of previous iron ore mining. High grade hematite iron ore will be mined from a number of identified deposits on sites where similar mining has taken place in the past. Mining will be carried out in a sequential manner using conventional open pit mining methods. When mined, the rock will be beneficiated at a single location in Labrador. The resultant products will include lump ore and sinter fines for direct rail transport to port and shipping to end users in Europe and possibly Asia.

The size of the operation proposed for this Project is small by world-wide iron ore standards and small compared to other iron ore projects carried out elsewhere in the Province and previously in this area. The Project is based on previously developed brownfield sites and this and the small size will ensure that the adverse social and environmental impacts of the Project will be both limited in range and in time.

The Project benefits from and relies upon the significant level of pre-existing infrastructure (open pits, roads, rail beds, etc.) put in place for previous mining operations that were subsequently closed during the 1980s. The existence of these infrastructure facilities, the majority of which are still in sound operational conditions, will ensure that new build facilities, including the camp and semi-portable mobile buildings, will be kept to a minimum with the ensuing reduction in the level of surface and ground water disturbance typically associated with this type of mining operation.

One of the key items of current operational infrastructure is the existing 200 km railroad line between Emeril Junction, Labrador and the town of Schefferville, which has been in continuous use since 1954, carrying iron ore until 1982 and passenger and freight since that time. Only the 4.0 km of track connecting the Silver Yard to the existing rail line requires having track re- laid on an existing bed. As and when required, LIM will be closely involved with others in any necessary upgrade of this track to ensure that the railroad has the capacity and the operational capability to handle all the expected volume of both outbound iron ore as well as inbound freight to meet all end users expectations.

LIM recognizes its responsibilities to a large number of stakeholders particularly those within the Province of Newfoundland and Labrador. Whilst the proximity of the Project location to other parts of Canada outside of the Province will influence aspects of the operational characteristics of the Project, LIM is committed to maximizing the benefits of the Project to the Province and to its peoples consistent with maintaining the financial viability of the Project. LIM also commits to minimizing the impacts of the Project on both the physical and the social environments and will at all times act within or surpass the requirements of the various regulations and guidelines covering these matters. LIM also commits to maintaining an open dialogue with all stakeholders on these matters.

A major component of LIM's commitment will be to ensure that the largest proportion possible of jobs and services are sourced from the communities of Newfoundland and Labrador. LIM has signed an Impact Benefits Agreement (IBA) with the Innu Nation of Labrador. In addition, Memoranda of Understanding have been signed with the Innu Nation of Matimekush-Lac John and the Naskapi Nation of Kawawachikamach and extensive community consultation has been conducted with the nearby communities, as well as communities in western and central Labrador (Labrador City, Wabush, Happy Valley-Goose Bay). These consultations and agreements will ensure a close working relationship with the Innu of Labrador with respect to their involvement in the provision of labour, goods, and services. LIM is also aware of the impacts of the current world-wide economic downturn on communities within the Province, particularly those associated with the resource industries in Labrador West and, in developing the Project, LIM seeks to encourage economic development in this area of Labrador and will provide a full and fair opportunity and first consideration for the people, employment, businesses and companies of the Province to participate in and benefit from the Project.

It is LIM's intention to mine and beneficiate two of the four central deposits, James and Redmond initially. Therefore these two deposits are the subject of this Project and the Environmental Impact Statement (EIS). LIM expects to submit further applications in future years to next develop the Houston and Knob deposits (also part of the central cluster), and then subsequently the more distant deposits.

LIM has selected this phased approach to permit early commencement of production to bring forward the economic benefits of the Project to the Company and to the Province. Secondly, this approach allows LIM to use both the additional knowledge and the financial benefits of the initial phase to permit a thoroughly considered and economically feasible approach to the development of the additional deposits in which LIM holds interests.

Reasoned analysis suggests that attempting to bring all eight deposits located over a 100 km strike distance under a single application would significantly extend the baseline analysis and detailed engineering necessary, with a subsequent increase in the time-frame required, and that in itself would then render the progression to this study phase and hence to a production decision as highly unlikely. LIM considers that this phased approach is consistent with sound economics and good industry practice and is the only viable course of action likely to ensure these deposits are developed for the benefit of all stakeholders.

1.2 The Proponent

The parent company (Labrador Iron Mines Holdings Limited) of the Proponent, Labrador Iron Mines Limited, is an Ontario registered company trading on the TSX Exchange under the symbol of "LIM" and "LIM.WT" and can be contacted at:

Proponent:	Labrador Iron Mines Limited Suite 700-220 Bay Street Toronto, Ontario M5J 2W4 www.labradorironmines.ca

Chairman and Chief Executive Officer: Mr. John Kearney
Director, President and Chief Operating Officer: Mr. Bill Hooley
Phone: (647) 728-4125
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Newfoundland Office: 2 Baird’s Cove
St. John’s, NL
A1C 5M9

Labrador Office: 15 King Crescent
Happy Valley-Goose Bay, NL
A0P 1C0

Environmental Assessment Contacts: Linda Wrong, P. Geo
Vice President, Environment and Permitting
Suite 700-220 Bay Street
Toronto Ontario
M5J-2W4
Telephone: 647-728-4115

1.3 Regulatory Framework

1.3.1 Provincial Environmental Assessment Process

The Project is subject to an environmental assessment that meets the requirements of the Government of Newfoundland and Labrador as outlined under the *Environmental Protection Act*. Following release from the environmental assessment process, the Project will be subject to various environmental approvals and other regulatory requirements.

The Project was registered pursuant to Section 3 of the Newfoundland and Labrador Regulations 54/03, Environmental Assessment Regulations, 2003, under the *Environmental Protection Act*, SNL 2002 Ce-14.2, on May 5, 2008. Following both government and public review, the Minister of Environment and Conservation determined on August 13, 2008 that further environmental assessment (an Environmental Impact Statement (EIS)) was required for the proposed Project. Consistent with Part 10 Environmental Assessment of the *Environmental Protection Act*, the Minister appointed an Environmental Assessment Committee with representation from all relevant provincial and federal government departments and agencies to provide advice on scientific and technical matters related to the proposed undertaking. The Environmental Assessment Committee includes representation from:

- Environmental Assessment Division, Department of Environment and Conservation;
- Water Resources Management Division, Department of Environment and Conservation;
- Pollution Prevention Division, Department of Environment and Conservation;
- Wildlife Division, Department Environment and Conservation;

- Policy Planning and Evaluation Branch, Department of Human Resources, Labour and Employment;
- Strategic Planning Policy Coordination, Department of Natural Resources;
- Policy and Planning, Department of Labrador and Aboriginal Affairs;
- Environmental Protection Branch, Environment Canada; and
- Oceans and Habitat Management Branch, Fisheries and Oceans Canada.

As per Section 53 of the *Environmental Protection Act*, the Environmental Assessment Committee prepared guidelines for the EIS for the Project. These guidelines were also subject to a 40-day public review period, as per Subsection 59(1) of the *Environmental Protection Act*. Public meetings were conducted during this 40 days review period in the communities of Happy Valley-Goose Bay, Labrador City-Wabush and Schefferville. After approval from the Minister of Environment, the guidelines were provided to LIM on December 10, 2008. These guidelines, provided in Appendix A, established the framework for preparing the EIS by outlining the format and information requirements. The EIS was initially submitted to government in December 2008. Regulatory agencies subsequently reviewed the EIS and the Minister of Environment and Conservation requested additional information and clarifications from LIM in March 2009. In response to these comments and requests, this EIS has been revised and resubmitted to government. A Table of Concordance is also provided in Appendix A.

1.3.2 Environmental Authorizations

Following release from the provincial environmental process, the Project will require a number of approvals, permits and authorizations prior to Project initiation. In addition, throughout Project construction and operation, compliance with various standards contained in federal and provincial legislation, regulations and guidelines will be required. LIM will also be required to comply with any other terms and conditions associated with the EIS release. Potential environmental authorizations as they relate specifically to the Project description are discussed in detail in Section 2.4.

1.4 Environmental Impact Statement Purpose

The EIS presents information about the Project and the results of the environmental assessment conducted for the Project. This environmental assessment addresses the potential environmental effects on communities, economy, business, fish and fish habitat, and caribou. The assessment process also considers Project feasibility, the Project's water budget, and potential effects to air quality.

The EIS fulfills provincial environmental assessment requirements and will be used by the Minister of Environment and Conservation, in consultation with Cabinet, to determine whether the Project's environmental effects are acceptable.

1.5 Document Organization

Information on the study team and brief descriptions of each team member's expertise and experience are provided in Appendix B.

The document is organized as follows:

Executive Summary Identifies the Proponent, and provides a synopsis of the Project description, predicted environmental effects, mitigation measures, residual and cumulative environmental effects, and proposed monitoring and follow-up programs. The summary provides an overview of the EIS conclusions and allows the reader to focus immediately on important subjects. Tables of Concordance with the EIS Guidelines and requirements are provided in Appendix A to aid reviewers in ensuring that all requirements have been fulfilled.

Chapter 1 Identifies the Proponent, describes the purpose of the EIS, outlines the regulatory framework for the environmental assessment, and describes the EIS organization.

Chapter 2 Describes all components of the Project including: the Project location and study area; the site history; the purpose of the Project, including rationale and feasibility; alternatives for carrying out the Project; permits, and approvals and authorizations that may be required.

Chapter 3 Includes physical features of the Project; schedule for construction and implementation; details on operation and maintenance; and decommissioning information. The chapter concludes with a discussion of environmental management planning for the Project.

Chapter 4 Describes the existing environment of the Project area including: physical, biological, and socioeconomic. Data availability and gaps, and predicted future environmental conditions in the absence of the Project are also discussed.

Chapter 5 Describes the scope of the assessment, including details on the issue scoping process and the issues and concerns raised during public consultation sessions and other scoping activities. The Valued Environmental Components (VECs), as determined from the EIS Guidelines and the issues scoping exercise, are identified.

Chapter 6 Describes the Aboriginal Consultation that has been conducted to date by LIM, including a listing of issues identified, and where Impact Benefits Agreements or other agreements, such as Memoranda of Understanding have been reached.

Chapter 7 Discusses environmental effects assessment for each VEC, including fish and fish habitat, caribou, employment and business, and communities, and addresses accidental events that could occur.

Chapter 8 Provides information on environmental protection including issues such as VEC-specific mitigation, emergency response/contingency plans, environmental monitoring and follow-up programs, and rehabilitation and environmental protection plans.

Chapter 9 Presents concluding statements regarding the anticipated environmental effects that may result from the Project, a summary of specific mitigation measures and monitoring and follow-up commitments.

Chapter 10 References and personal communications cited in the EIS are provided.

Appendices Supporting materials are provided in the appendices.

1.5.1 Other Related Documentation

A number of documents have been prepared in relation to the Project and previous projects in the area. A bibliography listing of these documents is provided in Appendix C. These documents have either been previously submitted to the Department of Environment and Conservation in relation to previous environmental assessments for the Project, or are available from LIM.

2.0 PROPOSED UNDERTAKING

2.1 The Project

2.1.1 Project Location

The Project is within the Labrador Trough Iron Range. The Project includes the re-activation and development of James North and South, and Redmond 2B and 5 mineral deposits which are located in Western Labrador (Figure 2.1). The James deposits are located approximately one km south of the Silver Yard area. The Redmond deposits are approximately 8 km south of the James deposit. The single beneficiation area, where rock will be crushed and washed will be situated at the Silver Yard area in Labrador. A temporary camp to accommodate workers will be constructed nearby.

The Project has an estimated five-year operational life and is located within an area that has been previously mined and disturbed. The deposits are accessible by existing gravel roads. The James property straddles an existing road to the Redmond property to the south, and continues to the Menihek hydro electric dam, where the road is terminated.

2.1.1.1 Natural Environment

The Project area is situated at the southern edge of the forest tundra (Waterway et al. 1984; Hare 1950; Hustich 1949). The James and Redmond properties contain varied land classes from exposed tundra and exposed bedrock with lichen and scattered trees and shrubs, to low wetland areas (including bogs and fens). Intermediate land classes consist of varied forest types with spruce-moss and spruce-lichen predominating; merchantable timber is not known to occur in the area. Extensive surface disturbance exists on these properties as a result of previous mining. In such areas, alder and other vegetation associated with disturbed areas can occur.

The terrain is comprised of parallel ridges and valleys trending northwest to southeast, with bare rock exposures and barrens. At the James North and James South deposits, approximately 50 percent of the surface area has been disturbed as a result of previous mining activities. The Redmond sites are located to the south of the James' property and extensive past surface disturbance (approximately 90 percent) has occurred, including the presence of flooded abandoned mine pits, a former rail bed, turning yards and stockpiles of mine waste rock and uneconomical ore materials.

2.1.1.2 Existing Site Features

A historical mining pit, the Ruth Pit, will be utilized as a reject fines disposal area for the washwater that originates from the Silver Yard beneficiation area.

There is an existing transmission line that was established during the former operations, and it transmits power from the Menihek Generating Station, now owned by Newfoundland and Labrador Hydro. The regional grid crosses the Redmond property and is located less than 2 km away from the James property along existing roadways.

Existing roads and rail services will be used to access the Project and to transport equipment and materials.

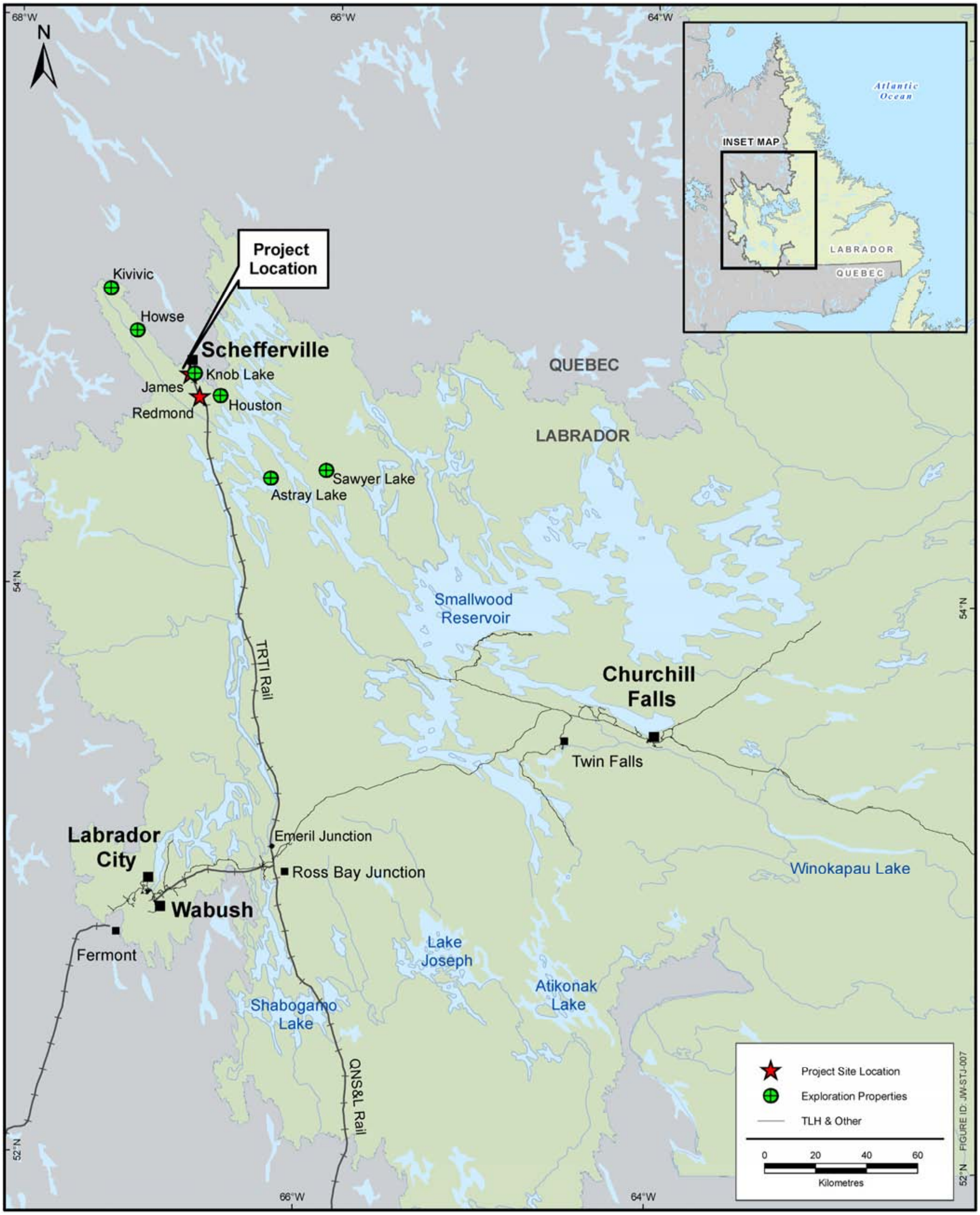

Figure 2.1 Project Location

2.1.2 Site History

Written references to mineral occurrences of the Schefferville area (originally known as Knob Lake) were first included in the diaries of missionary Louis Babel in 1854. Using those references, Albert Peter Low (A.P. Low) of the Canadian Geological Survey (CGS) began detailed mapping of the area in 1892 and continued the work in 1895/96. During that period, Low published a report which highlighted the existence of large iron ore deposits in the area.

Guided by Low's report, the Labrador Mining and Exploration (LME) Company began exploration in the area sometime around 1936. LME was subsequently taken over by Hollinger North Shore Exploration Company (Hollinger), which was later joined by M.A. Hanna Company (M.A. Hanna).

Under the direction of Hollinger and M.A. Hanna, an intensive exploration program was undertaken in the Schefferville area between 1945 and 1949. With the involvement of those two companies and a number of other entities, the Iron Ore Company of Canada (IOC) was officially incorporated in 1949.

During the period between 1950 and 1954, IOC constructed the 568 km rail transportation system between Schefferville and the shipping and receiving port of Sept Iles, Québec, as well as the iron ore processing and maintenance support facilities at the mine site and a power station at Menihek.

Mine workers were originally accommodated in the near-by temporary town of Burnt Creek. Permanent housing and office accommodations were subsequently constructed in the town of Schefferville, following the start of ore production activities. The population of Schefferville subsequently grew to a total of about 4500 persons during the peak mining years. Schefferville mining operations were terminated in November of 1982.

Between 1954 and 1982, mines in the Schefferville area produced in excess of 150 million tons of iron ore for world markets. At the time of closure, an additional resource of approximately 200 million tons of iron ore remained in individual deposits in Labrador, located in proximity to the previously operated mines. These include the James and Redmond deposits on which initial mining or development activities had been undertaken by IOC.

2.1.3 Project Purpose and Rationale

The Project will see the reactivation of two historical mine areas, the James and Redmond properties (the Project), located in Labrador near the Silver Yard area. Although the mine operations will involve the extraction of iron ore, the Project will be smaller than the one that was active from 1954 to 1982 and will operate under current regulations and environmental protection standards and industry best practices.

The purpose of the Project is to satisfy market demand for high-grade direct shipping iron ore products.

The successful start up of LIM's direct shipping iron ore Project will provide positive economic stimulus to the economy of Western and Central Labrador and contribute to long-term economic stability in the area.

In the construction phase, the Project could generate up to 40 jobs, with that number increasing to approximately 109 on an ongoing production basis during operations. The economic impact of such employment and contracting business on the surrounding communities would be positive and lead to the development of other support and service sector jobs in Western and Central Labrador.

Local and regional benefits include:

- construction and operation phase jobs;
- between $30 million and $60 million per year in total operating costs, much of which will be incurred within the Province of Newfoundland and Labrador;
- close working relationship with the Innu of Labrador involving the provision of labour, goods, and services;
- maximum use of qualified mining contractors and other services based elsewhere in the region, such as Labrador City, Wabush and Happy Valley-Goose Bay; and
- commitment by LIM to the creation and implementation of employment equity practices to promote recruitment, training, and advancement of qualified visible minorities and women.

In terms of world-wide mining operations, the Project is modest in size when compared to historical iron ore mining operations in the area, as well as to other existing iron ore mining operations in Labrador. The impact of the Project on these other operations will therefore be equally small. Certainly with the distances involved between LIM's Project and these other mining operations, there will be no direct physical impact.

The most obvious indirect impact will be in the area of availability and employment of suitable personnel. However again, the LIM Project is relatively small and the call on the available pool of skills will be quite limited. In consideration of the current and projected downturn in the economic climate, employment into the LIM Project from throughout Labrador will go some way to mitigating the difficulties being felt in these areas and particularly in Western Labrador.

It is LIM's intention to use contractors to carry out the majority of both the construction and operational aspects of the Project and to source these contractors from within the Province and particularly from within Labrador whenever possible. At present, there appears to be sufficient contracting capacity to meet LIM's requirements without prejudicing the operations of any of the current mining companies. Again the small size of LIM's operations compared to these other operations is a key determinant in this analysis. Additionally, by choosing to use contractors with their noted capability to speedily reduce and expand the size of their operations as circumstances change, LIM is likely to have an even more minimal impact on the future operations of these other companies.

The general supply of services and consumables will also be very limited given both the small size and relative simplicity of the mining and beneficiation processes to be used. Again, it is considered that the addition of the services and consumables into the supply train will have a negligible indirect impact on other end users.

It is therefore concluded that the introduction of the LIM Project will have only a very minor indirect impact on these other operations and will have no impact on their future viability.

As the Project develops, it is expected that LIM will seek and then be granted a number of Mines Leases and Crown Titles on which to carry out the Project. It will be LIM's fundamental intention to develop the mineral resources located within these leases. In those areas wherein the existing Mineral Licenses over which the requested Crown Titles are held by others, it is understood that the mineral license holders' rights retain precedence and, as such, LIM will respect these inherent rights and applicable legislation.

It is possible that some surface use leases will be located over land currently held by others under Mineral Rights Licences. The extent of these surface rights will be limited to the areas required for the efficient operation of the Project and such an arrangement is normal within the Province. Based on a review of regional and local geology, it is not considered that any of these potential areas will be the subject of future exploration and this, in combination with LIM's respect of the rights of Mineral License holders, will therefore not create any direct or indirect impact on the viability of exploration and development activities by other parties.

There will be some direct impact of the Project on the operations of the various railroad facilities that exist in Western Labrador and Québec. Again given the small size of the Project, these are expected to be minimal. This Project, as envisaged within this Study, is expected to generate a maximum of 1.5 million tonnes per annum of iron ore traffic. This compares to some 45 million tonnes per annum that is forecast to be handled through the Port of Sept-Îles, assuming that all announced expansions and new developments do eventually materialize. There appears to be a general measure of knowledge that the capacity of the lower section of this rail transport corridor from Emeril Junction to Sept Isles has a current capacity in the region of 60 million tonnes or as much as 15 million tonnes in excess of this predicted expanded production. The addition of LIM's 1.5 million tonnes per annum into this total production scenario is therefore to be considered as minimal.

The capacity of the upper section of this rail corridor, entirely within the Province, was demonstrated during periods of previous operations, to be in excess of 10 million tons per annum. Currently, there is no iron ore movement on this section and reviews carried out for LIM indicate that the haulage of the forecast Project capacity on this section of the railroad can be readily achieved. It will be necessary to carry out some ongoing upgrades to the rail track to maintain this capacity and these are being addressed with the operators. It is possible that other new mining operations will also wish to use this section of track for iron ore transport. To the best of LIM's knowledge, the confirmation of intent, timing and loadings for these additional operations have not yet been reached. If and when these timings and loadings are confirmed then a review of upgrade work required will be made. Nevertheless, it is predicted that the total volume to be potentially carried on this upper section will be less than that achieved by the previous mining operations in the period 1954 to 1982.

LIM has been holding discussions with railroad and port operators for an extensive period. To date these have resulted in a number of confidential Memoranda of Understanding regarding the supply of such services.

During 2008, LIM reached agreement with the railroad operators TRH and QNSLR, and with port and stevedoring companies, regarding the transport, unloading and storage of its bulk sample products over the railroad lines and port facilities and during 2008 these bulk sample tonnages were transported from the Silver Yard site to port. LIM expects that, subject to completing ongoing commercial negotiations, these arrangements will be extended to cover the periods covered by the Project production scenario.

LIM does note that each of the railroads over which its iron ore products will need to be transported are covered by the application and provisions of the *Canada Transportation Act* 1996, and accordingly the operators are required under the terms of that *Act* to provide a level of service.

LIM continues to be in discussion regarding ongoing port facilities under various Memoranda of Understanding, and expects to conclude successful negotiations with various port operators to provide a sufficient level of stevedoring service in the general Port of Sept-Îles area well before the commencement of commercial production. LIM also expects to extend these agreements to cover the expected life of this Project.

2.2 Environmental Management and Corporate Responsibility Policies

2.2.1 Health & Safety Policy

LIM and its management are committed to conducting operations in a professional manner in pursuit of excellence in business practices and in compliance with all applicable health and safety legislation. LIM has adopted a Health and Safety Policy to express its commitment to its own personnel and its contractor workforce. LIM is further committed to conducting its operations in a manner that delivers maximum health and safety protection of workers as well as the general public.

In support of excellent business practices, LIM will provide positive avenues for dialogue, communication and training and will work in cooperation with employee representatives from health and safety committees, supervisory personnel, workers and contractors to ensure proper understanding and competency to safely and efficiently perform the work. LIM will work in cooperation with government representatives and regulatory agencies on all matters related to health and safety compliance.

Routine monitoring and reporting of health and safety performance will form a key part of LIM stewardship and management systems. Where appropriate and necessary LIM will take proactive corrective action to ensure health and safety objectives are attained in support of the overall corporate plan and related regulatory obligations. LIM will include health and safety performance as an important factor of its management and employee review process and will provide training, resources and staffing so that all employees, contractors and suppliers understand, and are able to conduct their work, in accordance with this Health and Safety Policy.

All LIM executives and their employees and contractors will fulfill their duties and exercise their individual and collective responsibilities in a manner that supports defined health and safety goals and clearly demonstrates compliance with LIM policies, procedures, applicable laws, regulations and industry standards.

2.2.2 Environmental and Social Responsibility Policy

LIM and its management are committed to conducting operations in an environmentally and socially responsible manner. LIM has adopted an Environmental and Social Responsibility Policy to express its commitment to the environment and the local communities in which it works. This commitment to sustainable development is achieved through the undertaking of its programs in a manner which balances environmental, economic, technical, and social issues.

To implement this policy and its commitment to such principles and practices, LIM will apply appropriate pollution prevention principles and environmental risk management practices throughout its activities on its mineral properties.

LIM and its contractors will conduct their work and operate the facilities in compliance with all applicable laws and regulations. In the absence of legislation, LIM will apply professional best management practices to support environmental protection at all sites, minimize risks to human health and the environment, and achieve environmental protection to levels at or above industry standards or best practices. To support the development of responsible environmental laws, policies and regulations, LIM will work cooperatively with the local communities, industry and regulators.

LIM will develop and implement a Rehabilitation and Closure Plan in accordance with the *Newfoundland and Labrador Mining Act* that will advance long-term environmental recovery and provide suitable post-closure land-use incorporating consideration of the long-term vision of local communities. Where possible LIM will encourage economic and educational development in the communities, during Project assessment, development, operation and post-closure and will support initiatives to design and implement operating practices which advance the efficient sourcing and use of materials and energy.

LIM will include environmental performance as an important factor of its management and employee review process and will provide training, resources and staffing so that all employees, contractors and suppliers understand, and are able to conduct their work, in accordance with the Environmental Policy and Social Responsibility. To encourage continual improvement, LIM will conduct routine assessments of the Project to identify areas of non-compliance with the Environmental and Social Responsibility Policy, and create and implement corrective action.

LIM commits to the establishment of effective communications with employees, regulators, stakeholders and communities to address environmental and social concerns in a timely and effective manner.

2.2.3 Benefits Policy

LIM has established a Labrador Iron Mines Limited Newfoundland and Labrador Benefits Policy that will apply to LIM and to all Project contractors and subcontractors, and has developed a Benefits Plan (Appendix D) to implement the Benefits Policy. Labrador Iron Mines understands the importance of the Project to the Province of Newfoundland and Labrador and in line with the principles described in this policy will provide full and fair opportunity and first consideration for the people, businesses and companies of the Province to secure employment and to participate in and benefit from the business opportunities associated with the Project.

Specifically, LIM is committed to:

- the delivery of associated benefits, including employment, education, training and business and economic development to the Province and in particular to Labrador on a full and fair opportunity and first consideration basis;
- the encouragement and assistance of residents of the Province, and in particular of Labrador, to receive the education and training necessary to maximize their opportunities for employment, retention and advancement on the Project;
- the procurement of goods and services from within the Province and, in particular from Labrador, and provincial suppliers will be provided full and fair opportunity and first consideration for the supply of goods and commercial services to the Project on a competitive basis;
- the implementation of policies and practices in connection with the procurement of goods and services for the project that enhance economic and business opportunities in Labrador, including the identification and support of industry businesses that would generate long-term economic benefits to Labrador; and

- the provision of timely Project-related information to encourage the participation of all potential employees, businesses and contractors in the economic opportunities of the Project.

In addition LIM will also comply with the undertakings, commitments and obligations of the Impact Benefits Agreement (IBA) entered into with the Innu Nation of Labrador, and with the provisions of LIM's Women's Employment Plan (Appendix D).

2.3 Alternatives

The Project is located in a previously disturbed area and was conceived based on the use of infrastructure developed during the historical IOC operations. As these considerations formed the basis for the Project initiation and design, it is recognized that there is no preferred alternative to the overall Project and therefore there will be no detailed alternatives analysis. However, within the Project, one aspect for which alternatives were available and evaluated was for the reject fines storage options.

2.3.1 Reject Fines Storage Area

The mined ore will be taken to the Silver Yard area for beneficiation, which involves the crushing, screening and washing of the rock, and which does not involve the use of any chemicals. The resulting washwater consists of water and fine rock material (reject fines) and, mineralogically, this material is the same as the surrounding rocks. As presented in LIM's Registration Document, dated April 28th, 2008, the reject fines will be produced at an estimated rate of 21 percent of feed. As presented in the Registration document, the preferred option involved the deposition of these reject fines into nearby historically mined pits until such time as the new mine pits are decommissioned. The four original options previously presented in the registration document included:

- an open pit at the Ruth site;
- an open pit at the Wishart Site;
- a small on-land facility to the north of the James North area in a previously excavated valley; and
- open pits at the Redmond site.

Since the Registration document was submitted, LIM undertook additional environmental and engineering studies, including the gill netting of the identified historical pits to assess for the presence or absence of fish and fish habitat. These studies were undertaken further in consideration of extensive communications with DFO. Upon completion of this work and preparation and submission of the resulting reports, DFO reviewed this information and, in an e-mail dated September 25, 2008 stated "Based upon the results, Habitat Management has determined that the historic pits, specifically Redmond Pit 1, Redmond Pit 2, Wishart Pit, and Ruth Pit, do not constitute productive fish habitat that supports, or potentially supports, a commercial, recreational or aboriginal fishery" (Appendix E).

Although preliminary consideration was given for the deposition of the reject fines to the potential use of an on land v-shaped valley, located to the north of the James North deposit, this option was discontinued based on the:

- potentially higher risk posed by the requirement for a dam on the open side of the valley;
- position of this valley at an up gradient location relative to where workers would be mining at the James North pit; and

- requirement for additional water management in an on land area.

Hydrological studies conducted by WESA of the Project area, including Ruth Pit (Section 4.1.4), confirm that Ruth Pit has the capacity to meet the water demands required for the reject fines deposition for the life of the mine operation. Based on this information, in combination with the determination from DFO, and in consideration that the Ruth Pit is an existing man-made feature, LIM concluded that the deposition of the reject fines at this location presented the least potential for environmental impacts.

2.4 Regulatory Approval Requirements

Following release from the provincial environmental assessment processes, the Project can be expected to require a number of approvals, permits and authorizations prior to Project initiation. In addition, throughout Project construction and operation, compliance with various standards contained in federal and provincial legislation, regulations and guidelines will be required. The Project will also be required to comply with any other terms and conditions associated with the EIS release.

A list of potential regulatory approvals and compliance standards that may be required for the Project is provided in Table 2.1. All appropriate permits, authorizations and approvals will be obtained for the Project. Where appropriate, authorizations will be obtained by individual contractors.

Table 2.1 Environmental Authorizations that May be Required for the Schefferville Area Iron Ore Mine

Permit, Approval or Authorization Activity	Issuing Agency
Federal (under review)	
• Authorization for Works Affecting Fish Habitat, **or** • Letter of Advice regarding Protection of Fish Habitat	Fisheries and Oceans Canada
Provincial	
• Release from environment assessment process • Approval under *Rail Service Act* Govt. of NL	DOEC – Environmental Assessment Division
• Permit to Occupy Crown Land	DOEC – Crown Lands Division
• Certificate of Environmental Approval to Alter a Body of Water - Culvert Installation - Fording - Pipe Crossing/Water Intake (reject fines deposition) - Stream Modification or Diversion - Other works within 15 m of a body of water (site drainage, dewater pits, settling ponds) • Certificate of Approval for Water Supply System • Water Use License - Beneficiation wash water	DOEC – Water Resources Management Division
• Certificate of Approval for Construction and Operation • Industrial Processing Works • Approval of MMER Emergency Response Plan • Approval of Waste Management Plan • Approval of Environmental Contingency Plan (Emergency Spill Response) • Approval of Environmental Protection Plan	DOEC – Pollution Prevention Division
• Permit to Control Nuisance Animals	DOEC – Wildlife Division
• Pesticide Operators License	DOEC – Pesticides Control Section

Permit, Approval or Authorization Activity	Issuing Agency
• Blasters Safety Certificate • Magazine License • Certificate of Approval for a Sewage/Septic System • Approval for Storage & Handling Gasoline and Associated Products • Temporary Fuel Cache • Fuel Tank Registration • Approval for Used Oil Storage Tank System (Oil/Water Separator) • Fire, Life and Safety Program • Certificate of Approval for a Waste Management System • Food Establishment License	Government Service Centre (GSC)
• Approval of Development Plan, Closure Plan, and Financial Security • Mining Lease • Surface Rights Lease • Quarry Development Permit	DNR – Mineral Lands Division
• Operating Permit to Carry out an Industrial Operation During Forest Fire Season on Crown Land • Permit to Cut Crown Timber • Permit to Burn	DNR – Forest Resources
• Approval for Operation of Lunchroom/Washroom Facilities	DH – Public Health Inspector