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OSISKO
HAMMOND REEF GOLD

HAMMOND REEF GOLD PROJECT

Cultural Heritage Resources Technical Support Document

VERSION 2

Submitted to:
Osisko Hammond Reef Gold Ltd.
155 University Avenue, Suite 1440
Toronto, Ontario M5H 3B7

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Distribution:

Alexandra Drapack, Director Sustainable Development

Cathryn Moffett, Project Manager Sustainable Development

Golder Associates

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PART A

Introduction

Version 1 of the Cultural Heritage Resources Technical Supporting Document (TSD) was published on February 15, 2013 as part of Osisko Hammond Reef Gold's (OHRG) Draft Environmental Impact Statement/Environmental Assessment (EIS/EA) Report.

The Draft EIS/EA Report underwent a seven week public review comment period after which, on April 5, 2013, OHRG received comments from the public, Aboriginal groups and the Government Review Team (GRT) seeking clarification and requesting new information.

Among the information requests received from the GRT, a letter was received from the Ministry of Tourism, Culture and Sport (MTCS) that was associated with the Cultural Heritage assessment. The comments provided in the letter were interpreted as information requests and written responses were prepared for each comment and are provided in Appendix 1.IV of the EIS/EA Report.

Version 1 of the Cultural Heritage Resources TSD has not been revised. The methods used to define baseline conditions and predict the potential effects of the Project are technically defensible and based on standard industry practices. The conclusions and results presented in the Cultural Heritage Resources TSD are sound and have remained the same after consideration of comments received.

The EIS/EA Report has been revised and updated based on comments received. Version 2 of the Cultural Heritage Resources TSD is comprised of the following:

- Part A: Introduction
- Part B: Supplemental Information Package (attached) that provides an updated report related to the Cultural Heritage Resources component.
- Part C: Version 1 of the Cultural Heritage Resources TSD. Part C was issued in February 2013, and is available online on OHRG's website; it has not been re-printed as part of this Version 2 of the Cultural Heritage Resources TSD. The Version 1 document should be reviewed within the context of this Version 2 document, and associated updated information as presented in Part A or Part B should be considered as correct should it differ from the information presented in Version 1.

A summary of the information found in Part B, and discussed in Appendix 1.IV of the EIS/EA Report is provided below. Throughout the EIS/EA Report, unless otherwise noted, all references made to the Cultural Heritage Resources TSD are to Part C.

Information Requests

One of the comments received from the MTCS requested that a Heritage Impact Assessment (HIA) be undertaken for the two historic mining operations to document the cultural heritage landscapes under the Ontario Heritage Act Reg. 9/06 Criteria for Determining Cultural Heritage Value or Interest and Reg. 10/06 Criteria for Determining Cultural Heritage Value or Interest of Provincial Significance and that the Cultural Heritage Resources TSD be updated to reflect the findings of this HIA.

Osisko is committed to complying with the above identified regulations. Therefore, an HIA will be undertaken and mitigation measures recommended through the evaluation will be implemented prior to ground disturbance in the area of the two historic mining operations. The EIS/EA has been revised to include this commitment.

Supplemental Information Package

Appendix 2.I of the Cultural Heritage Resources TSD has been updated since the February 2013 submission of the EIS/EA Report and was submitted to the Ontario Ministry of Tourism, Culture and Sport in May 2013. This document, previously titled "Stage 1 and 2 Archaeological Assessment" is now titled "Stage 1 Baseline Study and Stage 2 Archaeological Assessment". The conclusions of this study remain the same. The updated document is attached in Part B.

Supplemental Information Provided in Part B

- Stage 1 Baseline Study and Stage 2 Archaeological Assessment (May 22, 2013)

PART B

Supplemental Information Package

ORIGINAL REPORT

May 22, 2013

STAGE 1 BASELINE STUDY AND STAGE 2 ARCHAEOLOGICAL ASSESSMENT

Osisko Hammond Reef Gold Project, Ontario, Canada

Submitted to:
Osisko Hammond Reef Gold Project
155 University Avenue, Suite 1440
Toronto, ON M5H 3B7
Tel: 416-363-8653
Fax: 416-363-7579

Licensee: Drs. Carla Parslow and Scott Martin

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Golder Associates

Executive Summary

Golder Associates Ltd (Golder) was contracted by Osisko Hammond Reef Gold Ltd. (OHRG) to provide a Stage 1 and 2 archaeological assessment of the areas to be affected by the proposed Osisko Hammond Reef Gold Project (the Project). The Property is located within the Thunder Bay Mining District in northwestern Ontario. The property is approximately 170 km west of Thunder Bay, Ontario and approximately 23 km (straight line measurement) northeast of the town of Atikokan, Ontario.

This report documents the properties archaeological and land use history and present conditions as well as the results of the Stage 2 property survey. The Stage 1 and 2 archaeological assessment of the proposed project property was undertaken by Golder, on behalf of OHRG, in order to fulfill environmental assessment (EA) requirements of the *Canadian Environmental Assessment Act* (CEAA) and the *Ontario Environmental Assessment Act* (EAA).

The findings based on the Stage 1 background study concluded that **the following areas for the Project have archaeological potential and were recommended for further archaeological assessment**:

- Small pockets of land on the east side of Mitta Lake for Open Pit Mine (A);
- Relatively flat, dry lands along the bay, higher flat lands that are not classified as bedrock, as well as areas with pockets of sandy soil, indicative of relic beach ridges for Open Pit Mine (A1);
- The northern end of the Transportation Route where it crosses a waterway; and
- The higher elevation at the bend in the river in the western section of the Tailings Pond.

For those areas that could not be confirmed through the baseline study property inspection due to access issues or changes in the Project footprint since the inspection, archaeological potential modelling illustrates areas that may retain archaeological potential and **should there be any development in the areas identified as having archaeological potential, further assessment is recommended**. The modelling is based on the following features that are within the Project footprint from the list of sources above:

- Areas within 50 m of a modern water source; and
- Areas within 150 m of identified glacial features such as eskers, drumlins and relict shorelines.

Further assessment is not required in permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock.

The Stage 2 field survey was conducted in accordance with the Ministry of Tourism, Culture and Sport's (MTCS) 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). The Stage 2 assessment focused upon the Projects mine components, including the mine site, ore processing facility, tailings management facility and transmission lines. All areas determined to exhibit archaeological potential in the baseline study were ground-truthed; where areas were confirmed to retain potential they were subject to a Stage 2 survey in the form of a test pit survey at five metre intervals. Areas found to be permanently water-logged or previously disturbed do not retain archaeological potential and were not subject to the Stage 2 assessment.

The Stage 2 archaeological assessment conducted by Golder resulted in the identification of two locations associated with mid - 20th century mining activities. Location 1 was identified as remains of the Hammond Gold Reef Mine, while Location 2 was identified as remains of the Sawbill Mine. As both of these sites date well into the 20th century the information potential related to archaeological studies is considered to be low and no further archaeological assessment is recommended.

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. The MTCS is also asked to inform OHRG via letter that concerns related to archaeological resources with the Project footprint have been addressed.

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Project Personnel

Archaeology Component Lead	Carla Parslow, Ph.D. (P243)
Project Licensee	Carla Parslow, Ph.D. (P243); Scott Martin, Ph.D. (P218)
Licensed Field Director	Chris Lemon, B.Sc. (R289)
Golder Field Technicians	Michael Ghazzawi, B.A., Tatiana Istomina (R288), Sarah News, B.A., Oleksiy Vasylenko, M.A. (R287), Stephen Jarrett, M.A. (R397)
Métis Monitors	Rebecca Deslauriers, Antonio Marinaro
First Nations Monitors	Roland Boshkaykin, Janet Spoon
Report Production	Jamie Davidson, B.A. (R305), Chris Lemon, B.Sc. (R289)
Graphics Production	Shannon Cook, B.A.
Senior Review	Carla Parslow, Ph.D. (P243)

Acknowledgments

Proponent Contact	Alexandra Drapack, MBA, P.Eng, Osisko Hammond Reef Gold Ltd.
Ministry of Tourism, Culture and Sport	Robert von Bitter, B.A., Andrew Hinshelwood, M.A.; Penny Young, M.A.

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1.0 PROJECT CONTEXT

1.1 Development Context

Golder was contracted by OHRG to provide a cultural heritage resource assessment of the areas to be affected by Golder Associates Ltd (Golder) was contracted by Osisko Hammond Reef Gold Ltd. (OHRG) to provide a Stage 1 and 2 archaeological assessment of the areas to be affected by the proposed Osisko Hammond Reef Gold Project (the Project). The Property is located within the Thunder Bay Mining District in northwestern Ontario. The property is approximately 170 km west of Thunder Bay, Ontario and approximately 23 km (straight line measurement) northeast of the town of Atikokan, Ontario (**Figure 1**).

This report documents the properties archaeological and land use history and present conditions as well as the results of the Stage 2 property survey. The Stage 1 and 2 archaeological assessment of the proposed project property was undertaken by Golder, on behalf of OHRG, in order to fulfill environmental assessment (EA) requirements of the *Canadian Environmental Assessment Act* (CEAA) and the *Ontario Environmental Assessment Act* (EAA).

The Project consists of the development of an open pit mine, including an ore processing facility, and a tailings management area (**Figure 2**). Also included is the associated infrastructure at the site, the upgrading of an access road to the site, and the construction of a new electrical transmission line. Options assessments are currently being completed to determine the preferred location for the tailings management area. Three on-site options within OHRG's claim area are under consideration. All other facilities will be collocated with the mine.

Table 1 identifies the major component (e.g., mine) and the associated infrastructure (e.g., open pit, ore crushing facilities).

Table 1: Hammond Reef Gold Project Components

Major Component	Constituents
Mine	■ Open pits ■ Waste rock management ■ Warehouses, workshops and maintenance facilities ■ Chemicals, fuel and explosives storage ■ Power supply (grid) ■ All-weather roads ■ Office and support facilities ■ Waste management ■ Water management, including dewatering of the open pit
Ore Processing Facility	■ Ore crushing ■ Stockpiles ■ Ore grinding ■ Ore processing
Tailings Management Facility	■ Tailings Containment ■ Tailings Disposal Pipeline

Permission to enter the property and carry out all activity necessary for the Stage 1-2 archaeological assessment, including the removal of artifacts, was provided by Ms. Alexandra Drapack, Director of Sustainable Development, Osisko Mining Corporation.

1.2 Stage 1-2 Archaeological Assessment Objectives

The objective of the Stage 1 archaeological assessment was to determine whether the subject property possessed archaeological potential and, if so, to recommend a suitable Stage 2 archaeological assessment strategy. In compliance with the Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), the detailed objectives of the Stage 1 archaeological assessment were as follows:

- To provide information about the subject property's geography, history, previous archaeological fieldwork and current land conditions;
- To evaluate in detail the subject property's archaeological potential which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

To meet these objectives Golder archaeologists performed the following:

- A review of relevant archaeological, historic and environmental literature pertaining to the subject property;
- A review of the land use history, including pertinent historic maps;
- An examination of the Ontario Archaeological Sites Database (ASDB) to determine the presence of known archaeological sites in and around the subject property; and
- An inspection of the subject property to document existing conditions.

The objective of the Stage 2 archaeological assessment was to provide an overview of archaeological resources on the property, to determine whether any archaeological resources have potential cultural heritage value or interest, and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), the specific objectives of the Stage 2 archaeological assessment were as follows:

- To document archaeological resources on the property;
- To determine whether the property contains archaeological resources requiring further assessment; and
- To recommend appropriate Stage 3 assessment strategies for archaeological sites identified.

1.3 Historical Context

1.3.1 Early European Exploration

European exploration of Northern Ontario in the Lake Superior region began in the early 1600s. The first European to reach Lake Superior was most likely Etienne Brulé, an interpreter employed by Samuel de Champlain (Stuart 2003). It would be several decades before Lake Superior and its surrounding region were more thoroughly explored. The first known explorers on the lake were Pierre Esprit Radisson and Médard Court. They set off in 1658 and returned two years after with “a rich cargo of furs and the knowledge that the best furs could be obtained to the north and west of Superior” (Stuart 2003:16).

Around the same time the French were exploring the inland areas around Lake Superior the European exploration of the James Bay Region began in 1610 with Henry Hudson, who entered the bay while exploring what would come to be called Hudson Bay. James Bay would later be named for the British captain who explored the area more extensively from 1630-1631. During these voyages only one isolated encounter occurred with an Aboriginal person, involving Henry Hudson. It has been suggested that although Hudson had to winter his ship along the coast, the lack of encounters with Aboriginals through the winter months indicates the use of coastal areas was likely restricted to summer fishing camps (Julig 1988).

The British formally initiated trading on James Bay in 1668 when Fort Rupert was established on the Rupert River. Moose Fort (Factory) and Fort Albany followed in 1673 and 1675, both located on the south end of James Bay. It has been recorded in trading post journals the extent that Aboriginal peoples were travelling to trade at these posts; one record from Gloucester House (operated from 1777-1818) indicates that Aboriginals were travelling to the trade post from up to 600 miles away (Newton & Mountain 1980).

The earliest exploration of north-central Canada occurred along the shores of the bays and the major river systems, with further inland exploration occurring at a later date. In the early decades of European exploration northern North America was explored by both the British and the French. The British focused their efforts of exploration in and around Hudson Bay and James Bay, and further inland along the watershed systems off of these bays. The French concentrated their efforts further south and moved inland along the St. Lawrence waterway before exploring the Great Lakes area further inland. The Property is located in a region that was first explored by the French between 1657 and 1751, who at this time were exploring areas around the Abitibi River and Lake Abitibi (University of Toronto 2012). The first European to explore the region where the Property is located Jacques de Noyon, in the late 17th century (Atikokan Economic Development Corporation nd: 1).

Figure 3 illustrates the geographical spread of European exploration throughout the 17th and 18th century in northern Ontario.

1.3.2 The Fur Trade

The northern portions of Ontario, north of Lake Superior and south and west of Hudson Bay and James Bay had a number of successive exploration ventures beginning in 1610 with the Hudson’s Bay Company (HBC), but more extensively in the mid-eighteenth century. Henry Kelsey was the first of the European explorers to venture into the northern part of Ontario and further east. On Kelsey’s second expedition (1690-2), he explored from York Fort in Hudson Bay and extended the HBC trade west to the Saskatchewan River. Anthony Henday was the second explorer of European descent to venture into the Petit Nord of Ontario, penetrating further west and well into the Prairies.

During this time of initial European exploration, Charles II in 1670, granted the Hudson Bay Company (HBC) exclusive rights for British trading in the land drained by rivers flowing into Hudson's Bay, referred to as Rupert's Land. Rupert's Land is composed of a number of different physiogeographic regions that include; the Hudson Bay Lowlands located along Hudson and James Bays consisted of marshy lowlands with slow-moving rivers; the Canadian Shield located to the south, east and west of the Hudson Bay Lowlands consisting of rugged terrain, exposed bedrock, glacial features and numerous lakes. Further to the west were the Prairies and to the south were the Great Lakes region (Harris 1987).

Unlike the HBC, French interests within the area were supported by independent traders and voyagers from Montreal and the St. Lawrence venturing into western and northern Ontario through the Great Lakes. Both the British HBC and the French St. Lawrence traders (SLT) vied for control over the rich and highly productive resources of Rupert's Land. In 1686, French forces from the St. Lawrence captured Fort Albany and a few years later, took York Factory and Fort Severn on Hudson Bay. This enabled a French monopoly for fur trade. An uneasy peace was established after the signing of the Treaty of Utrecht in 1713, the main goal of which was the end the War of Spanish Succession in Europe between England and France (Miquelon 2001). The Treaty of Utrecht relegated the French to the southerly St. Lawrence–Great Lakes route into Ontario's hinterland, with the English regaining control over their forts and over the northern Hudson Bay routes (Harris 1987; Stuart 2003).

Intermixed within the network of expanding HBC and SLT posts were groups of highly mobile boreal forest adapted First Nations groups, consisting mainly of Cree and Ojibway, with Assiniboine located further to the west around Lake Winnipeg. In the early period of the fur trade, First Nations groups acted as middlemen trading furs for European goods, such as firearms, ammunition, blankets, tobacco and various other objects between European traders and other First Nations groups further afield. As tensions rose between the SLT and the HBC so did the relations between local First Nations groups. Settlement and warfare patterns changed with local First Cree families and communities settling beside or within close proximity to established forts and trading posts. These families would supply the posts with provisions and locally obtained furs. Eventually, the First Nations and Europeans intermixed giving rise to what is now referred to as the Métis.

With these increased tensions between the HBC and STL, First Nations groups allied with the different trading companies. In doing so, traditional lands shifted as Aboriginal groups expanded and retracted, vying for control over important trapping routes and transportation corridors. By 1720, the majority of the HBC lands were controlled by Cree bands. The Cree in these areas had a number of allies, including the Siouan-speaking Assiniboine to the west and the Algonquian-speaking Ojibway to the south. The Cree's prime rivals were the Athapaskan-speaking Chipweyan who were located to the north of the Churchill River. However, by 1740, the Ojibway expanded north and east of Lake Superior and occupied the territory between Lake Winnipeg and Hudson Bay, traditionally Cree territory. This displaced the Assiniboine who moved westward and occupied the parkland areas as far north as the Saskatchewan River (Harris 1987).

A major impact upon First Nations populations was the spread of epidemic diseases through the movement of people and the transport of goods. A 1737-38 smallpox outbreak killed up to two-thirds of some groups within the Petit Nord, with a further 1781-83 outbreak claiming half to two-thirds of the Ojibway in northwest Ontario. Measles, whooping cough, influenza and tuberculosis all took their toll at various times well into the twentieth century, with disease most effectively spread along the trading routes of the fur companies (Hackett 2002).

The state-organized French fur trade within the region ended fairly abruptly in 1769 when Montreal surrendered to the English. However, fur traders continued to work independently and forced the HBC to set up more inland posts. It was around this time that the North West Company (NWC) was created to quell the HBC westward advances. From the early part of the 1770s until 1821, competition between both groups was fierce. With both companies unable to sustain the prolonged and intense competitions, they amalgamated into a single operation under the overall banner of the HBC (Klimko 1994).

During the later part of the eighteenth century and the beginning of the nineteenth, neither group could dislodge the other and competed on an even footing. Gradually the Hudson's Bay Company shifted its focus towards western Canada and slowly the trading posts and forts in northern Ontario began to be abandoned. Between 1774 and 1821, there were over 600 posts, most of them only being occupied for a few years; at the time of the merger of the NWC and HBC in 1821 only 125 posts remained in operation, 68 of which by the HBC. This was further reduced to eliminate the unprofitable posts lowering the overall number to 45 in 1825 (Wynn 2007:72). Several of these forts and trade posts have been subject to archaeological excavation, most notably Fort Albany on James Bay starting in 1960 (Kenyon 1986), Gloucester House on the Albany River (Newton & Mountain 1980) and Martin's Falls, also located on the Albany River (Vyvyan 1980).

With regards to the project study area, William Tomison (1767 – 1780) explored areas from Fort Severn south and west towards Sandy Lake, Deer Lake and Poplar Hill, then further west to Lake Winnipeg. Tomison joined the HBC in 1760 and worked his way through the ranks to become the first "Chief, Inland". His primary responsibility was to spread the company's activities to the interior from Hudson Bay Forts. Around the same time, groups associated with the SLT and voyagers began exploring the vast hinterland north and west from the shore of Lake Superior.

Two of the most relevant explorers during this time period were G. Sutherland and David Thompson. Sutherland, who worked for the North West Company in the later part of the 1770s explored from Lake Nipigon, north then west through Sturgeon Lake, Lac-Seul, Trout Lake, Red Lake and into Lake Winnipeg. David Thompson was initially employed by the HBC, beginning in the 1780s. During his tenure with HBC, he refined his skills as a surveyor and mathematician and in 1774 was promoted to Chief Surveyor for the Company. In 1797, after much frustration with the politics of the HBC, Thompson quit and walked 80 kilometres to a NWC post where he finished out his days as a fur trader and surveyor. It was during this time that Thompson surveyed areas from the western shore of Lake Superior west through Rainy River, Lake of the Woods and into Lake Winnipeg, in 1797 and 1804, respectively.

During this time of initial exploration, both the HBC and the French SLT established forts and trading posts in order to establish trade routes along the various water corridors. The primary corridors that the various groups utilized for trade and transport are mapped by the distribution of forts, company houses and trade posts. Major routes utilized by traders included the waterways connecting York Factory south along the Hayes River to Lake Winnipeg. The eastern side of Lake Winnipeg and the water ways from Fort Albany in James Bay, east down the Albany River, through Osnaburgh House, Lac-Seul, Bas-de-la-Rivière into the south end of Lake Winnipeg were also well travelled. Numerous other small or secondary corridors by the traders connected various other forts, houses and depots within the Petit Nord.

Posts, forts, houses and depots associated with the HBC and the SLT were strategically located along these waterways. The most significant and relevant included Martin's Falls, Osnaburgh House, Lac-Seul, Red Lake House, Great Fall House, Sandy Lake and Trout Lake.

During the latter part of the eighteenth century and the beginning of the nineteenth neither group could dislodge the other and competed on an even footing. Between 1774 and 1821 there were over 600 posts, most of them only being occupied for a few years and; at the time of the merger of the NWC and HBC in 1821, only 125 posts remained in operation, 68 of which by the HBC. This was further reduced to eliminate the unprofitable posts lowering the overall number to 45 in 1825 (Wynn 2007:72). A mainstay of the newly united companies remained the beaver pelt, representing approximately 40% of their overall trade. **Figure 4** details the location and names of the known trade posts located in proximity to the Project.

1.3.3 First Nations Context

The official policy in Ontario, as outlined in the Royal Proclamation of 1763, has been to recognize Aboriginal title to the lands occupied by First Nations. As part of this recognition of Aboriginal title, compensation has been provided for portions of land surrendered by First Nations, and reservations have been set aside to ensure First Nations can meet their current and future needs. Treaty-making in Ontario generally started in the south, moving north as the European population grew and found more uses for northern lands and resources. Hunting pressures due to increased access to the North through the Canadian Pacific Railway was a driving force to the treaty signing.

The location of the proposed Hammond Reef Gold Mine study area is located within lands that were originally part of Treaty Number 3 (1873). After Canada acquired the title to Rupert's Land in 1869 they endeavoured to build a series of roads and canals between Thunder Bay and the Red River Settlement. Almost the entire length of this infrastructure was to bisect the yet unceded territory of the Saulteaux tribe of the Ojibway (Daugherty 1986). Hoping to avoid a repeat of the Métis Rebellion at the Red River Settlement, a treaty commission was organized and sent out to the Saulteaux in 1871. The negotiations were a long process, and delayed further with discovery of precious metals in the Saulteaux's territory (Daugherty 1986).

Terms were finally agreed to and signed on October 3, 1873. By the terms Canada acquired 55,000 square miles of land. For the Saulteaux's part, their treaty terms included:

- One square mile of land for farming per family of five;
- The construction of schools when required;
- Hunting and fishing rights;
- $12 in immediate compensation for band members;
- $20 annuity for each chief, $5 annuity for band members;
- The promise of not being conscripted to fight Canada's wars (Daugherty 1986).

While it is difficult to exactly delineate treaty boundaries today, **Figure 5** gives an approximate outline of the limits of Treaty Number 3. There are a number of First Nations communities in the vicinity of the project. The closest Aboriginal community is the Lac Des Mille Lacs First Nation, approximately 41 km to the east.

1.3.4 Historical Euro-Canadian Context

Atikokan, Ontario

Atikokan, Ontario sits approximately 180 km northwest of Thunder Bay. Mineral exploration began as early as 1882 leading to the first mines opening in the 1890s (Ontario Department of Mines 1929:42). While some copper was mined near Burchell Lake, 75 km ESE of Atikokan, the majority of the mineral developments in the area concentrated on gold or iron ores.

The non-aboriginal history of the Atikokan region is an industrial history driven by the exploration for and extraction of minerals, timber products, and the creation of the trans-Canada roads and railways. Prior to confederation, much of northern Ontario was engaged in the fur trade often involving the establishment of trading posts and military forts. However, as the beaver population declined, the fur business migrated westward. Following confederation and westward economic expansion, the Dawson Road was completed in 1874 from Port Arthur to Winnipeg, traveling just south of what would become Atikokan. The Dawson Road, part overland route part water route, operated for just under a decade until the Canadian Pacific Railway (CPR) completed a similar route in 1882, although a rail line into Atikokan was not completed until 1899 (Town of Atikokan nd).

While the goal of the CPR line was to connect growing areas of western Canada with the east, its route was laid with consideration for economic development along the way. The development of the western Ontario rail line north of Lake Superior coincided with early mineral exploration in the Atikokan region and it is likely that in addition to selecting a rail route that would minimize water and swamp crossings, future mineral developments influenced track locations. The rail line became a critically important connection for the region to the outside world, often providing a fixed geographic marker to link other geographic features, such as identifying mine locations based on their distance from CNR stations (Pye 1968:51).

According to local sources, the region of Atikokan was known to the aboriginal Ojibwa as the “country beyond the height of the land.” This rich area provided means for survival through its many lakes, thick forests, fish, small game, and woodland caribou. Following confederation, the development of the railroad, and early geological surveys, the area’s mineralogical importance was established and speculators scoured the area looking for exploitable mineral deposits.

One early speculator, Tom Rawn, settled in the Atikokan area after the opening of the CNR line in 1899 and staked a claim for iron ore in the Steep Rock area. He is considered the first non-aboriginal Atikokan resident and opened the first local hotel, the Pioneer, in 1900. That same year a general store opened and in 1906, a sawmill began operations (Town of Atikokan nd). Although the town grew modestly supporting the many small gold and iron mining ventures in the early 20th century, it did not see significant growth until the opening of the Steep Rock Iron Mines in the 1940s. Throughout its history, in addition to mining, significant lumber and pulp developments existed initially to supply the mines and early town-building, but later expanded as an export industry.

Regional Mining

From the late 19th century through the 1930s, several mines operated in the region surrounding Atikokan. Many claims produced marketable quantities of minerals but none operated for a prolonged period before the mineral veins they were working became too lean or the mines reached technological limitations to extraction that made mining unprofitable. North and east of Atikokan the Harold Lake Mine worked gold veins from 1895 to 1896, and the Elizabeth Mine at Modred Lake operated for short periods in 1902, 1912, and 1936 without significant production (Pye 1968:67-68). The Hammond Reef and Sawbill Mines saw modest success on gold seams 18 miles NE of Atikokan from 1897 to 1901 and the Sawbill Mine reopened in 1938 and was in operation until 1941 (Pye 1968:68).

The Sapawe Gold mine, in McCaul Township, was discovered in the 1890s and was subject to rudimentary work in the 1950s and early 1960s (Pye 1968:71). In 1897 a small discovery of gold and iron was found at Steep Rock Lake northwest of Atikokan (Ontario Department of Mines 1929:46). West of Atikokan, the Isabella and Goldstar mines, discovered in 1894, each worked gold veins from the 1890s to early 1900s. The Goldstar mine was reported to be the largest producer at the time, but both mines shut down after only a few years (Ontario Department of Mines 1929:53).

Sawbill Mine

The history of the Sawbill mine begins with the vein discovery by the Wiley Brothers in 1895. In 1896, the Sawbill Lake Gold Mining Co. is incorporated and a shaft was sunk to 145 ft with level cut at 60 ft and 120 ft (Wilkinson 1980:65). In 1898, a tramway was constructed. By 1899, the shaft had been deepened to 245 ft. There was a period of inactivity in the early 20th century until Upper Seine Gold Mines Limited was incorporated in 1937 where, from a period between 1938 until the mine closed on September 24, 1941 (Wilkinson 1980:66), dewatering of the mine and surface trenching of approximately 750 ft, and drifting was conducted. As well, in 1940, a 50 ton amalgamation mill was put into operation at a rate of 20 tons per day (Wilkinson 1980:66).

Hammond Reef Mine

The gold deposit was first discovered by Kabascong (Joe Mistahasen), a First Nation gentleman, in 1895 (Wilkinson 1980:69). The property was taken over by Hammond and Folger in 1896 and 14 shafts were sunk, along with open cuts and adits. In March of 1897, the Hammond Reef Gold Mining Company Limited was formed followed by the Folger-Hammond Mining Company in October. Mining activity was primarily limited to open cut mining; however, shafts were also sunk for sampling purposes. In 1898 the two companies amalgamated to form the Hammond Reef Consolidated Mining Co. Ltd. During this time, a new hydro-electric plant and a mill were constructed. In 1900, due to the mill being damaged by lightning and the low-grade ore, mining operations ceased (Wilkinson 1980:70). The property has changed hands numerous times over the course of the mid-20th century but no significant mining operations ensued since the late-19th century.

Early Iron Mining

One of the earliest iron mine developments in the region was the Atikokan Iron Mine located at Sapawe Lake, east of Atikokan. The ore lodes were discovered in 1882 but did not receive serious development until 1905 when the Atikokan Iron Company built a blast furnace at Port Arthur and began mining the Sapawe Lake ores. While the production was initially successful, significant iron ore production began on much bigger deposits at the Mesabi mines in Minnesota around the same time and by 1913 the Atikokan Iron Mine shut down

(Pye 1968:71). Two other mines operated west of Atikokan, the Banning and Mayflower mines each worked iron and copper deposits in the early 20th century but with little long-term success (Ontario Department of Mines 1929:48).

One the most successful and celebrated mine of the 20th century in the area occurred following discoveries of a rich iron ore vein below Steep Rock Lake. Although iron ore deposits were known in the vicinity of Steep Rock Lake as early as 1881 (Lawson 1912:7) and characterized in 1897 (Pye 1968:52), none of the accessible lodes were rich enough to develop. In 1930, Port Arthur engineer and speculator Julian Cross conducted an initial survey of the lake and in 1938 began a winter drilling project that led to the discovery of an exceptionally rich vein of iron ore (Pye 1968:53). This particularly high-grade ore was an important component of steel making and often combined with lower-grade ores in a complex mix in a blast furnace. The actual project, however, took another four years to start when additional capital was committed from the United States because of war-time ore shortages (Pye 1968:53).

The significant challenge to mining the Steep Rock ore beds was their location below the surface of the lake. The solution for the Steep Rock Iron Mines was to drain the lake and divert the water of the Seine River through channels and dams. This significant effort, which was reported in Time and Life magazines in the United States, resulted in the drainage of 57 feet of water and the removal of 300 feet of silt at a total cost of $18 million (US) (Time Magazine 1944:19 and Atikokan Economic Development Corporation nd: 2). With the water removed the primary vein below the lake, named Hogarth after one of the early investors, was mined using open pit methods from 1944 to 1979, producing up to 1.4 million tons of pelletized ore per year (Atikokan Economic Development Corporation n.d: 2). Just east of the Hogarth Pit, the Caland Ore Company began mining an open pit along the Falls Bay ore body. Caland operated from 1959 to 1980, but closed, like the Steep Rock Iron Mines, when changes to steel making reduced the demand for regional iron ore (Pye 1968: 56).

The Atikokan area developed like many others in Northern Ontario to mine and process significant mineral deposits. While some of the more successful mines operated for several decades, most were small modest producers that did not last longer than a few years.

1.4 Archaeological Context

1.4.1 Previous Archaeological Research

There has been a relative paucity of work within the regional area (Hinshelwood, Hamilton, per comms); however, this should not be taken to mean that there is a lack of archaeological and other cultural heritage resource sites.

Samuel de Champlain's journal of 1610 is the earliest historical reference of pre-contact sites in northern Ontario and includes a vague reference to "Indian diggings" for copper on the shores of Lake Superior (Dawson 1999). Reports of pre-contact sites in the area continued in French reports of the area up to 1750. By the mid-19th century control of the area had shifted and references to pre-contact sites were continually being made in reports from the Geological Survey of Canada. Although no formal excavations were conducted, artifacts were nonetheless collected and reported on (Dawson 1999). The first report of a pre-contact site written by an archaeologist was by Sir Daniel Wilson in 1856, who wrote about pre-contact copper mines on the shore of Lake Superior. Since the 1960s systematic research has intensified in the northern boreal forest, however this research often is focused on the shores of Lake Superior and Lake Nipigon. What this research has shown is that at the earliest ice-free times, human populations were congregating on the shorelines of the glacial lakes.

Most work within northwest Ontario has been concentrated within the Lake Superior and Lake Nipigon regions, along with the southwest portion of the province containing the Rainy River, Quetico Park and the Lake of the Woods. John Pollack conducted initial surveys of the northwest interior as well as published the first cultural sequence for the mid-northeast region (Dawson 1984). Additionally Pugh (1971) published results of survey activities along the more northern Winsk River drainage.

Historic archaeology in northern Ontario has primarily been concentrated on fur trade posts. In northwestern Ontario work has been undertaken along the Severn River (Pilon 1981, 1982; Pollock 1976) and at Osnaburgh House (Bundy 2010). Additionally, Harris (1987) provides an overview study of the region, while more detailed investigations have been published by Lytwyn (1986) and Anik (1976a and b).

General overviews of northern Ontario prehistory are provided by Dawson (1983) and Wright (1972a, 1972b, 1995, 1999, 2004). A predictive modelling study undertaken by Lakehead University also provides an excellent and detailed synopsis of the area (Hamilton & Larcombe 1994).

In order that an inventory of archaeological resources could be compiled, the registered archaeological site database (ASDB) kept by the MTCS were consulted. In Ontario, information concerning archaeological sites is stored in the ASDB maintained by the MTCS. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13 kilometres east to west and approximately 18.5 kilometres north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found.

At present there are no registered archaeological sites within the limits of the Project footprint or within a five kilometre buffer around it (von Bitter, per comm., July 23, 2010). There have also been no archaeological assessments previously conducted on the Project footprint or on land adjacent to the mine site within 50 metres.

1.4.2 The Natural Environment and Pre-Conatct Period Chronology

Paleo-Environment

At the peak of the Last Glacial Maximum (LGM) 11,000 BP all of the Project footprint would have been located under the Laurentide Ice Sheet (Harris 1987). During deglaciation and warming between 11,000 BP and 10,500 BP, the ice sheet retreated and advanced numerous times over the Project footprint before finally retreating north with the establishment of the Holocene.

Large glacial lakes were formed by melt water, with Lake Agassiz covering over a third of northern Ontario (Baldwin et al 2000) and the Tyrell Sea covering the Hudson Bay Lowlands to the north. Lake Agassiz gradually drained, exposing the Project area around 9,300 BP (Thorleifson 1996, fig. 37) and making it available for colonization by flora and fauna (**Figure 6**).

As Lake Agassiz receded, the newly exposed land would have become vegetated, pollen cores suggest first with a spruce-dominated landscape that also included birch, poplar, larch and elm, before giving way to jack and red pine along with birch.

During the period between 9,500 and 6,400 BP, the climate became warmer and drier than currently being experienced, with this episode identified as the Atlantic Climatic. This period is characterized by the opening up of previously forested land to the south, giving way to grassland with stands of pine and poplar, and the advancement north of spruce forests into the tundra. Water levels were also at their lowest during this period due to the draining of glacial lakes following the eventual melt of the ice sheets blocking outflow north into Hudson Bay.

The current Boreal forest vegetation has been established since 3,600 BP with temperatures and seasonality also stabilizing at current levels around at this time. Minor cooling episodes around 2,500 BP and 500 BP resulted in the southerly retreat of the forests and corresponding development of peat and muskeg, while minor warming around 1,500 BP resulted in a temporary advance north of the tree line (Dawson 1984, Wright 1999).

While agreement as to the exact timing, extent and even nomenclature of Northern Ontario's climatic episodes and patterns varies, general consensus based on the archaeological record points to the contemporary nature of major climatic changes and major cultural changes within the Boreal Forest populations (Dawson in Steegman 1983).

Provincial Parks

In conjunction with the above review on the modern natural environment a review of federal and provincial parks in relation to the Project was conducted (**Figure 7**). There are no federal parks in Township of Atikokan or District of Rainy River. The closest federal park to the Project in general is Pukaskwa National Park, located near the town of Marathon, on the Lake Superior shoreline and is thus far removed from the Project. Two provincial parks are located within 100 kilometres of the Mine Site: Quetico Provincial Park and Turtle River (White Otter Lake) Provincial Park. Figure 4 illustrates the location of these parks in relation to the Project.

Geological Setting

Glacial erosion and postglacial deposition have formed the present landscape. The Canadian Shield was originally an area of high relief, with extensive mountains rising up to 12,000 m; however, millennia of erosion has resulted in its current low topographic relief (Clark 1999: 95).

The Project area is underlaid by the Precambrian rock of the Canadian Shield, and is located within its oldest area, known as the Superior Province. The topography has a low total relief and drainage patterns that have been heavily altered by glacial action, resulting in poor overall drainage. The glacial deposits on the southern Shield are predominantly sandy to silty till, in contrast to the northern Shield which is dominated by lake deposits of clayey and silty till.

The Canadian Shield, including the metal rich Sudbury Basin and the Temagami Magnetic Anomaly, is one of the world's richest areas of minerals and mining deposits. This mineral abundance has produced a history of mining activity within the area, from the pre-contact mining of near surface copper and siliceous rock, through to the gold rush of the late 19th century to today's intensive mineral exploration.

Deposition by glacial streams and lakes account for the majority of soil development and the subsequent composition of supported flora and fauna. Till material deposited by rivers entering lakes formed deltaic plains, while glacial action left high relief features such as moraines, drumlins and eskers. These raised areas are better drained than the surrounding low lying land and often form a locally distinct environment capable of supporting drier ecosystems.

The Project area is characterized as an area of thinly covered bedrock, along with deeper glacial and fluvial deposits containing boulders, gravels, and mud along with deposits of sand and gravel formed as glacier meltwater streams empty into glacial lakes. There is also evidence of rock drumlins, formed by ice flows during deglaciation (**Figure 8**).

Pre-contact Aboriginal Chronology

The occupation of northwest Ontario has been sub-divided into a series of phases (Periods). These are based upon the material remains that survive within the archaeological record that allow the re-construction and differentiation of past life-ways. These subdivisions are an archaeological convenience to help better understand the development and change of cultures across the region, and benefit from the broad brush of hindsight and generalisation without the fine detail of local variation.

The broadest pre-contact archaeological periods corresponding to northwest Ontario will be referred to as Plano-Indian, Archaic, Middle Woodland and Late Woodland, within which further temporal and regional subdivisions exist. The nomenclature utilized in this report corresponds to the chronology defined within Hamilton & Larcombe (1995:9) due to the locational proximity of their research to the study area. Two other excellent overviews are provided by Wright (1999:22) and Busey *et al.* with their respective chronologies synthesised within **Figure 9**.

In discussing pre-contact northwest Ontario, there are a number of themes and issues that are relevant across all phases:

- The general acidity of the soil on the Canadian Shield leads to a lack of organic preservation. As a consequence, there are large gaps in the understanding of various aspects of past cultures, ranging from mortuary practices and skeletal morphology through to diet and subsistence strategies. A huge portion of the non-lithic technologies developed in response to the demands of the environment leave no trace; with perishable organics such as bone tools, bark storage containers, hide clothing and birch canoes, all archaeologically invisible. Aside from rare occasions of survival due to waterlogged or chemically altered soils, such ephemeral yet crucial aspects must be inferred through site locations and the general survival requirements of people within a harsh climate;
- All inhabitants of northern Ontario have used its multitude of interconnected watercourses as a transport network to some degree, either by birch bark canoe or as trails when frozen in the winter. The affiliation with water also extends to the constant utilization of fish as a stable and dependable resource, without which habitation of the Shield would be virtually impossible;
- The highly mobile, multi-resource oriented, hunting and gathering lifestyle is a consistent theme throughout the pre-contact history of northern Ontario. The very nature of the landscape and its dispersed resources mean that there are no other options to this flexible strategy in most of the Canadian Shield (Wright 1995:294). This results in a very widespread and relatively homogenous set of subsistence patterns and attendant tool kit across the boreal forests of northern Ontario. This is not to define the area as

stagnant, but rather acknowledge the complexity and mobility required to populate such an expanse of 'micro ecological zones' (Hamilton & Larcombe 1995:13);

- A combination of thin soils, bioturbation, frost action and regular forest fires have resulted in the disturbance and mixing of any previously stratified sites, with artifacts congregating at the mineral/organic soil interface (Hinshelwood 1996). This has greatly hindered attempts to separate occupation phases and the research into the temporal and spatial chronologies of such sites. This issue is discussed by Wright (2004), and investigated in finer detail by Hinshelwood (1996);
- Settlement patterns consist of small social groups engaged in seasonal subsistence hunting and gathering, with the more productive late spring and summer seasons able to support greater concentrations of population. Winter hunting camps consisted often of a single family unit or groups of two to three at most. The stability and easily available resources associated with large fishing sites enabled the congregation of people to conduct ceremonies and trade, serving as community focal points within an otherwise dispersed routine;
- Habitation probably consisted of a form of shelter constructed from wood, animal hides and/or birch bark, in keeping with early ethnographic accounts (Wright 1999). These shelters do not survive archaeologically (Wright 2004: 1533) at best leaving a hearth, post moulds and weight stones. They are, however, highly mobile and ideally suited to the Boreal adapted way of life. Large permanent settlement does occur further south during the Woodland period (Dawson 1983), but within the study areas there was likely little need for change until the encroachment of Europeans produced a reliance on trade goods and the pursuit of furs; and
- Unlike southern Ontario, agriculture, permanent settlement, and large societies did not become established in the north during the pre-contact phase, except for the areas immediately adjacent to the Minnesota border along the Rainy River. Here, settlement and ceremonial mound building has been linked to a southern Hopewell influence and the access to wild rice and maize. Otter Castle, 30 km south of Ignace is an example of a large scale ceremonial site of the Late Woodland period (Dawson 1983).

Plano 9,000 BP to 7,000 BP - Also referred to as Plano and Early Shield, Period II

Initial habitation of southern Ontario followed the retreat of the ice sheets at the end of the Late Pleistocene 11,000 BP; however, the study areas for this project was fully covered by ice and not open to inhabitation until the Holocene transition 2,000 years later.

Groups of hunter-gatherers moved north following caribou and other arctic species that colonized the tundra-like margins of the glacial lakes. Late Palaeo-Indian people of the Plains Plano culture moved north and east into the Thunder Bay area around 9,000 BP (Dawson 1983) with settlement concentrated along the strandlines of the retreating glacial Lake Agassiz. Population density was very low and large parts of the province were still under ice or water; as a consequence, late Palaeo-Indian sites are rare within northwest Ontario, mostly congregated within the Rainy River watershed, close to the Manitoba/Minnesota border (Wright 1972:10, Reid 1980b) or along the northern edge of Lake Superior (Dawson 1983:5). The retreat of the Lake Agassiz shoreline across the project area during this period (Thorleifson 1996) likely provided ideal habitation for the northern movement of Plano people.

The incoming large game hunting populations ambushed migratory caribou herds at the various bottlenecks caused by the lakes and rivers of the region (Wright 1972:33), with small family groups following game across the tundra landscape in a varied and highly flexible manner. Site location has also been linked to raw materials found in bedrock outcrops within northwestern Ontario, utilized in the production of distinctive unfluted, ribbon flaked, lanceolate spear points and knives. These lithic resources were often obtained by quarrying and used to produce blades, spear points, large scrapers and bifaces (Dawson 1983:4). There are a number of known sources of fine-grained lithic materials available in northern Ontario. Based on available information, the primary stone types utilized included Lake of Woods chert, Gunflint Silica, Kakebaca chert, Jasper Taconite, Rossport chert, and Hudson Bay Lowland chert. Other stone material commonly recovered from archaeological sites in the North and Far North include rhyolites, siltstones, argillite, slate, greywacke, quartz, quartzites, pipestone and greenstone (Fox, 2009).

Archaic 7,000 BP to 3,000 BP - Also referred to as Early Shield & Middle Shield, Period II & III

The retreat of the Laurentide Ice Sheet northwards, due to the onset of the Holocene brought with it a change in environmental conditions that consisted of the establishment of coniferous forests to a milder mixed and deciduous forest cover with open grasslands to the south (McLeod 2009). This facilitated a corresponding change in material culture and subsistence strategies. The migratory caribou herd dominated lifestyle of the Plano Indians was replaced by a more seasonally shifting hunting and gathering of caribou, deer, elk, moose, fish and plant resources. This is reflected in the archaeological record by a decrease in the size and change in style of projectile points, and the appearance of hooks and net sinkers. With specific regard to projectile points, this change appears linked with the adoption of the atlatl (spearthower) identified by the transition from stemmed to notched points (McLeod 2009:10). In adapting to a forested environment, new woodworking tools such as axes, adzes and chisels were developed (Dawson 1983:8).

A defining technological change of the Archaic Period was the development of copper tools, produced from near surface copper deposits found on the shores of Lake Superior and traded all across eastern North America. Copper work of this period consisted of heating and hammering the ore to a desired form, rather than smelting and casting. This was achievable because Lake Superior copper ore is unusually pure, allowing it to be malleable at lower temperatures and shaped with simpler tools. The earliest evidence of copper working comes from South Fowl Lake on the Ontario/Minnesota border, providing a radiocarbon date of 6,800 BP for the wooden haft of a copper projectile point (Wright 1995:126).

The Holocene induced melting of the glaciers and ice sheets covering northern Ontario resulted in a complex and changing arrangement of glacial lakes and meltwater flow. Artificially high water levels were a result of ice blocking the flow of melt water northwards along the watershed gradient, forming glacial Lake Agassiz over the study area. Eventual ice mass wastage around 6,000 BP removed this blockage resulting in a dramatic draining episode and a drop in lake levels of around 100 m. This has important implications for archaeological sites of the archaic period within northern Ontario due to their concentration in proximity to the lakeshores and watercourses of the day. Water levels gradually rose to their presently observable level by around 4,000 years BP, therefore submerging the majority of waterside occupation sites between 9,000 and 4000 years BP.

Middle Woodland 3,000 BP to 1000 BP - Also referred to as Late Western Shield, Initial Woodland, Laurel, Period IV

Within southern Ontario, the Woodland Period is split into three distinct phases, early, middle and late with influence from the preceding Laurentian cultures of the Great Lakes/St. Lawrence region. Northwest Ontario is distinct in that it divided into the Middle and Late Woodland and is more influenced by Plains cultures to the south and west.

The adoption of pottery, for archaeologists, marks the beginning of the Woodland Period. It is important to stress that this provides a marker within the archaeological record that is convenient to use as a subdivision. It is not indicative of a change of people through migration, rather a continuing development of the Plano Indian and Shield Archaic way of life by encompassing new technological advancements.

The introduction of pottery 2,200-2,300 BP (Wright 1999:726) is postulated to have diffused into northwestern Ontario from the southwest or east and, with it, the development of the Laurel culture within the northern forests of the Canadian Shield, running east from Saskatchewan to northwestern Quebec. The relative homogeneity of culture across such a large area is again a reflection of the specialized adaption to the seasonal way of life that permeated the boreal forests.

Laurel ceramics were manufactured using the coil method and were stylistically conical with a tapering base. Decoration was restricted to the upper portion of the vessel's exterior surface and consisted of a variety of techniques that left impressions or drag marks, with Initial pottery being thick walled and crude.

In addition to the introduction of pottery, the bow and arrow began to replace the atlatl as the dominant hunting technology, resulting in a change of projectile point morphology. Chipped stone technology was dominated by small side-notched arrowheads and a wide range of scraper varieties (Wright 1999:743). Tools were based mainly on relatively small nodular chert cores with a heavy reliance upon Hudson Bay lowlands nodular chert (ibid: 747) in contrast to the previously quarried rhyolite and quartzite. This resulted in a marked decrease in the size of all tool types and decline in the occurrence of biface knives, along with an increase in projectile points and scrapers (Wright 1995:272, 274).

A well-developed bone technology toolkit is suggested for Laurel culture by the unusually well preserved Heron Bay site on the north shore of Lake Superior, with hafted beaver incisors, bone awls, toggle harpoons, needles, beads and snowshoe netting recovered (Dawson 1983). Copper tools were concentrated around the Lake Superior area and were traded further afield for exotic stone, obsidian and marine shell into Manitoba, southern Ontario and the northern United States (Ross 1979, Harris 1987).

The spread of Laurel culture has been linked to the northward expansion of wild rice due to late Holocene cooling; however, no Laurel components have been found associated with microfloral evidence of rice or rice processing features. Recent microfossil analysis on middle and late woodland pottery fragments has revealed the preparation and consumption of maize on sites within the southern edge of the boreal forests. No evidence for agriculture survives at these sites; however, the results suggest trade networks linked to the maize producing cultures upon the plains to the south (Boyd & Surette 2010:120).

Within northwestern Ontario, the Laurel culture is accepted as ancestral to the following Late Woodland complexes, and subsequent Ojibwa and Western Cree (Wright 1999:726).

Late Woodland 1000 BP to 400 BP - Also referred to as Northern Algonquian, Terminal Woodland Algonkian, Period V

The Late Woodland period in northern Ontario is defined arbitrarily based on ceramic distinctions. With the climate and landscape prohibiting the adoption of agriculture above the Rainy River, there does not appear to have been the same profound change in lifestyle that occurred amongst the agricultural populations to the south. The Boreal forests and lichen woodlands of the shield are environmental constraints on the density of population that can be supported (Wright 1999:725), and also deterministic of the subsistence methods of such populations. Fish and large game were, as before, essential to supporting human existence within northern Ontario.

Settlement patterns reflect this focus on fishing and caribou hunting, with fish sought in the spring, summer and fall, and caribou hunted in the fall and early winter. Sites are located on level, well drained ground with protection from northwest winds, and access to canoe landing beaches. Larger summer encampments were located in proximity to favourable fishing locations such as lake narrows and rapids, while the probable location of dispersed winter camps on frozen creeks has led to a lack of surviving archaeological information (Wright 2004:1492).

It is tempting to view the late woodland in northwest Ontario as comprising discrete ceramic-producing cultures; however, aside from variation in ceramic decoration there is very little observable difference in lithic tools or settlement patterns.

Eschewing the gender trap it is reasonable to assume that ceramic production and decoration can be seen as a female product and therefore changes in ceramics on a site are indicative of female mobility within family groups. The movement of women through marriage served to construct blood ties between various wide ranging bands, with long distance kinship functioning as a safety net against the unreliable resources of the north (Wright 2004:1489). The stability of the lithic assemblages further suggests that men as the hunters were matrimonially immobile, requiring intimate knowledge of the surrounding landscape to succeed (Wright 1972). Late Woodland sites with any significant amount of ceramics generally have more than one tradition represented, again highlighting the mobility of women through inter-complex marriage (Wright 2004:1507).

The Late Woodland period did not appear uniformly over northern Ontario. In some areas, it can be identified around 1,500 BP while in other (usually remote) areas, Laurel-type pottery continues until 1,000 BP. A variety of pottery types are typically found at Late Woodland sites, ranging from Iroquoian through to vessels from Michigan and Wisconsin, provide evidence of trade networks and contacts with the south (Dawson 1983, Wright 2004).

Blackduck

The Blackduck complex has been identified based on the existence of a contrasting pottery tradition to Laurel. Vessels were large globular and manufactured using the paddle and anvil technique, or formed inside textile containers. Decoration is diverse, consisting of horizontal and/or oblique lines along with circular indentations or puncates, and is present on the neck, rim, lip or inner rim of the container.

Tools associated with the Blackduck culture include small triangular and side-notched arrowheads, a large array of scrapers, both stone and bone, ovate knives, stone drills, smoking pipes, bone awls needles and harpoons, and copper tools.

The development of Blackduck from the preceding Laurel is generally accepted (Wright 2004:1501) and extends through the southwest part of north Ontario, Manitoba, northern Minnesota and eastern Saskatchewan.

Selkirk

The Selkirk complex is again characterized by its pottery, manufactured with the same techniques as Blackduck, similar in form but distinguished only by decoration. If decorated, it is usually only a single row of puncates or impressed with a cord wrapped stick (Dawson 1983). The non-ceramic assemblage associated with Selkirk is almost identical to that found on Blackduck sites, with the two often being found together in northern Ontario.

The Selkirk are represented as the ancestors of the present-day Cree (McLeod 2009:14); however, it must be noted that inferring ethnicity based on pottery traditions is problematic. The interchangeable nature of both cultures purported to precede the Cree and Ojibwa in northwest Ontario highlight this and caution against focusing on a single technological element when talking of a cultural construct, such as ethnicity. It is possible to identify the Selkirk and Blackduck as ancestral to a Cree-Ojibwa complex but further separation is perhaps misrepresentative (Wright 2004:1501).

Selkirk pottery is found mainly to the north of northwestern Ontario and into northern Manitoba, Saskatchewan and northeastern Alberta. Attempts to produce a ceramic chronology in relation to the Blackduck complex have been hampered by the lack of stratified sites and the validity of carbon-dating attempts. It is now generally accepted that Selkirk is slightly later, and did not develop from Blackduck; diffusing in from the northwest rather than developing out of existing traditions.

A number of other traditions have been identified based on additional decoration variation; however the uniformity present within the non-ceramic assemblages suggests caution against over-emphasising small differences and the subscription to regional patriarchy (Ibid: 1517).

Rock Art

The Late Woodland also sees the emergence of rock art as an expression of spiritual life and ritual. Rock paintings, known as pictographs, comprised of red ochre mixed with a binding agent such as bear fat or sunflower oil, are typically found within western Ontario on the vertical faces of cliffs where they enter a body of water (Rajnovich 1994). Pictographs constitute a form of written language, signifying sounds, objects and ideas in reference to subsistence, geography, climate, history and also sacred or religious beliefs and visions (Bursey *et al*), although they could have served a variety of cosmological functions and even political ones by marking territory (Wright 2004:1545). The damming of lakes and rivers by the timber and hydroelectric industries may have undoubtedly drowned many sites, while the fragile nature of the paintings themselves, when exposed to the elements, also reduces their chances of survival. Rock etchings, or petroglyphs, are relatively rare within the Canadian Shield, with most examples occurring within the south and east of the province. Likewise, petroforms, or artificial arrangements of stones in pits or cairns, are not thought to be common within the study area (Dawson 1983).

1.4.3 Existing Conditions

The Project location falls within the Boreal Shield Ecozone of Canada, specifically within the Thunder Bay – Quetico Ecoregion. This ecoregion is classified as having a moist low ecoclimate (Ecological Stratification Working Group 1996:66). The dominant vegetation is a combination of coniferous and mixed forests with coniferous forests dominant in the western portion of the ecoregion. Characteristic species of the coniferous forests are white spruce, balsam fir, and eastern white pine. Subdominant species include trembling aspen, paper birch, and jack pine, whereas poorly drained sites are characterized by black and white spruce, balsam fir, tamarack, eastern red cedar, and willow (Ecological Stratification Working Group 1996:66).

Forest cover throughout the region has been directly influenced by the timber industry and also an increase in forest fires due to settlement and railway traffic. Forest fires have the effect of further degrading any thin soils, while also allowing the establishment of more vigorous pioneer species such as trembling aspen and balsam fir. This sequence of tree cover replacement is also encountered after the disturbance of logging operations. Without disturbance, natural or man-made, black spruce forest dominates the upland areas of the region (Winterhalder 1983:32).

Characteristic wildlife includes moose, black bear, lynx, snowshoe hare, wolf, and white-tailed deer. Bird species include the American black duck, wood duck, hooded merganser, pileated woodpecker and grouse (Ecological Stratification Working Group 1996:66).

2.0 STAGE 1 PROPERTY INSPECTION

The property inspection for the Project footprint was conducted from October 18th to the 21st, 2011 under archaeological consulting license P243 issued to Carla Parslow, Ph.D., of Golder by the MTCS. Table 2 provides a daily account of the weather. The property inspection was also conducted by Dr. Parslow and a First Nations Monitor. The weather during the property inspection ranged from cloudy and cool to sunny and cool. At no time were the conditions detrimental to the inspection and visibility was excellent. While data related to currently land conditions was collected; this information is presented and further verified in Section 4.0, Record of Finds.

Table 2: Stage 1 Property Inspection Weather Conditions

Date	Weather Conditions
October 18, 2011	Cloudy and cool
October 19, 2011	Cloudy and cool
October 20, 2011	Mixed sun and cloud, cool
October 21, 2011	Sunny and warm

The findings based on the property inspection conclude that the following areas within the Project footprint have archaeological potential and will require further archaeological assessment:

- Small pockets of land on the east side of Mitta Lake;
- Relatively flat, dry lands along the bay, higher flat lands that are not classified as bedrock, as well as areas with pockets of sandy soil, indicative of relic beach ridges;
- The northern end of the Transportation Route where it crosses a waterway; and
- The higher elevation at the bend in the river in the western section of the Tailings Management Facility.

For those areas that could not be confirmed through the property inspection due to access issues or changes in the Project footprint since the inspection, the potential modelling as seen in **Figure 10** illustrates areas that may retain archaeological potential and should there be any development in the areas identified as having archaeological potential, further assessment is recommended. The modelling is based on the following features that are within the Project footprint from the list of sources above:

- Areas within 50 m of a modern water source; and
- Areas within 150 m of identified glacial features such as eskers, drumlins and relict shorelines.

Further assessment is not required in permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock. Available geological maps are of a coarse resolution and are unable to identify smaller scale glacial features; these must be located visually and may be subject to further assessment.

2.1 Stage 1 Determination of Archaeological Potential

There are a number of criteria employed in the assessment of archaeological site potential and are formulated in consultation with the MTCS' *Standards and Guidelines for Consulting Archaeologists* (2011). For pre-contact or prehistoric sites, these criteria are principally focused on the topographical features such as the distance from the nearest source of water and the nature of that water body, distinguishing elements of the landscape including ridges, knolls and eskers, and the type of soils found within the area being assessed.

For historic sites, the assessment of archaeological site potential is more reliant on historic research, as well as cartographic and aerial photographic evidence and the inspection of the study area for possible above ground remains or other evidence of demolished historic structures. Areas within 100 metres of historic schools, churches, cemeteries, commercial buildings, industrial sites and roads are required to be assessed. Also considered in the assessment is the proximity of known archaeological sites.

The guidelines for determining archaeological potential are essentially a coarse predictive model to be applied as a broad blanket throughout Ontario. Recent advances in computer technology have allowed GIS-based predictive modeling to include ever more variables if the time and data is available. Such an approach is taken in the construction of archaeological master plans (Heritage Quest 1999; ASI 1999, 2010) and enables the assessment of large and sometimes complicated areas.

Outside of more urban areas predictive modelling studies have been undertaken within the boreal forests of Manitoba (Ebert 2002) and northern Saskatchewan (Gibson & McKeand 1996). In northern Ontario, Lakehead University (Hamilton & Larcombe 1994), on behalf of the Ontario Ministry of Natural Resources, conducted a pioneering three-year research project into the application of predictive modeling to areas ill suited for conventional cultural resource management assessment techniques. The Project study area falls within this category due to its size of the Property, difficulties with logistics and communications, largely unknown heritage resources and acidic soils - all hindrances to conventional assessment methods. When using predictive modelling to develop an assessment of archaeological potential, pre-contact resources form the primary focus.

The key variables assessed by Hamilton & Larcombe (1994) for Boreal Forest pre-contact sites are:

- Proximity to water: 0 - 50 m is high potential;
- Soil type: sandy soils, silt or clay with good drainage;
- Topography: elevated, linear glacial features;
- Slope: 0 - +/-10 degrees;
- Aspect: facing south, southeast or southwest; and,
- Landforms: eskers, knolls, Paleo-beach strandlines, deltas, waterfalls and narrows.

These variables are geared towards locating larger and more predictable sites associated with fishing activities and non-winter habitation. Hunting, kill and butchering sites, are by their nature more spatially variable and almost invisible on a temporal scale (Wright 1999, McLeod 2009).

One variable that can influence site location and provide valuable information on trade and travel routes is the location and availability of raw materials used for making stone tools. There are no recorded sources of *in-situ* lithic raw material within the Project location.

Predictive modelling is a useful tool; however, it must be cautioned that the ability to predict is directly correlated to our understanding of the cultures involved. Human behaviour and its influence by the environment may be linked to physical features currently identifiable such as water and topography; however, this understanding diminishes with increasing antiquity, and its environmentally deterministic approach is sorely hampered by neglecting the subtle effects of cosmology, belief systems and ceremony on the actions and decisions of past cultures. This is further clouded if researchers only look where they predict such sites will be located; therefore, only those sites will be identified, in turn creating a self-fulfilling prophecy that will generate a false representation of effectiveness. Modelling has limitations when recommending archaeological potential; it is therefore prudent to be conservative with the exclusion of areas or designation of low potential and recognise that sites may occur in areas for non-tangible reasons.

Building on the above information and in accordance with the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists,* the following are features or characteristics that indicate archaeological potential:

- Previously identified archaeological sites;
- Water sources:
  - Primary water sources (lakes, rivers, streams, creeks)
  - Secondary water sources (intermittent streams and creeks; springs; marshes; swamps)
  - Features indicating past water sources (e.g. glacial lake shorelines indicated by the presence of raised gravel, sand, or beach ridges; relic river or stream channels indicated by clear dip or swale in the topography; shorelines of drained lakes or marshes; and cobble beaches)
  - Accessible or inaccessible shoreline (e.g. high bluffs, swamps or marsh fields by the edge of a lake; sandbars stretching into marsh);
- Elevated topography (eskers, drumlins, large knolls, plateaux);
- Pockets of well drained sandy soil, especially near areas of heavy soil or rocky ground;
- Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases (there may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings);
- Resource areas including:
  - Food or medicinal plants
  - Scarce raw minerals (e.g. quartz, copper, ochre or outcrops of chert)
  - Early Euro-Canadian industry (fur trade, mining, logging);
- Areas of Euro-Canadian settlement; and

- Early historical transportation routes.

2.2 Stage 1 Background Study and Property Inspection Conclusions

The Stage 1 background study and property inspection resulted in the determination that archaeological potential exists within the Project footprint along waterways that are bordered by dense coniferous forest as well as areas where drumlins occur. Past archaeological investigations have resulted in the identification of numerous archaeological sites, both pre-contact Aboriginal and historic, along waterways within the greater area of northwestern Ontario. It was recommended that areas of archaeological potential based on modelling be ground-truthed to confirm the nature of their potential. If potential is deemed to exist a further assessment in the form of an archaeological survey would be required prior to any ground disturbance activities. No further assessment was recommended for areas found to not exhibit archaeological potential. Areas of archaeological potential based on the baseline study are illustrated in Figure 9. Areas found to not exhibit archaeological potential include permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock.

The Stage 1 background study and property inspection formed the basis for the following recommendations:

1) That a Stage 2 assessment be undertaken by a licensed archaeologist in areas that will be disturbed and have been identified within the Project footprint as retaining archaeological potential; and

1) That the Stage 2 testing consist of hand-excavated test pits placed at intervals of five and ten metres following the standards identified in MTCS' *Standards and Guidelines for Consulting Archaeologists* (2012).

3.0 STAGE 2 PROPERTY ASSESSMENT FIELD METHODS

The Stage 2 property assessment encompassed all lands to be affected by the construction, operation, and decommissioning of the Project (Project footprint) that were determined to have archaeological potential based on the Stage 1 background study and property inspection as well as those areas determined to have archaeological potential based on archaeological potential modelling. These lands include those areas listed in Table 1 of this report.

A number for assessment techniques were employed to ensure all areas of archaeological potential within the proposed development footprint of the Project were properly assessed. The techniques employed included a GIS potential mapping based on proximity to water within 50 metres and land elevation. This was coupled with onsite ground truthing where field crews walked into areas identified in the GIS model as areas of archaeological potential and assessed the ground conditions first hand. Areas of archaeological potential were accessed by full size vehicle (E350 van), on foot, and with the use of All Terrain Vehicles (ATV) and boats. The use of ATVs permitted crew members to cross difficult terrain in a timely fashion while permitting an up close visual inspection of large sections of the study area that would otherwise have been inaccessible on foot or by van. Power boats were utilized to assess the entirety of the shore line surrounding the study area. The use of boats facilitated crew to inspect areas that were not accessible by land and to gain an appreciation for the types of terrain that would have been attractive to past travelers in the area. Boat based water survey allowed one to link suitable docking or landing sites with areas that were well drained and flat. This not only allowed for a more extensive survey of the study area to be carried out but also increased the efficacy of the assessment and minimized the potential risks to field crews that are associated with hiking through dense bush and swamp.

The MTCS' *Standards and Guideline for Consultant Archaeologists* outlines the following Standards for Stage 2 test pit survey in northern Ontario and on Canadian Shield Terrain:

Section 2.1.5:

Standard 1 – Where the identified feature of archaeological potential is a modern water source, test pitting is required between 0 and 50 m from the feature. Space test pits at maximum intervals of 5 m. Survey is not required beyond 50m.

Standard 2 – For features of archaeological potential other than modern water sources (e.g. historic water sources such as glacial shorelines), test pitting is required as follows:

a. Space test pits at maximum intervals of 5 m between 0 and 50 m from the feature of archaeological potential;
b. Space test pits at maximum intervals of 10 m between 50 and 150 m from the feature of archaeological potential;
c. Survey is not required beyond 150 m.

As no glacial shorelines or relic beach ridges were identified in the Project footprint, the test pit survey was conducted as per the previously described Standard 1. Test pits were excavated at five metre intervals within 0 and 50 metres of water sources; test pit survey was not required beyond 50 metres.

Field work was conducted in two teams; one team would go out and conduct a ground truth survey of areas identified in the baseline report as exhibiting archaeological potential. The second team would return to the areas identified as retaining archaeological potential and would conduct a standard shovel test assessment at five metre intervals. Each test pit was approximately 30 cm in diameter, dug into the first five centimetre of subsoil, with all soil screened through six millimetre mesh hardware cloth, and subsequently back filled. All test pits were examined for evidence of stratigraphy, sub-surface cultural features and evidence of fill. A field log was maintained detailing information pertinent to the survey areas and digital photographs were taken of the surveyed areas, topography, and representative test pits. **Figure 11** illustrates the location of all photographs presented in this report while **Figure 12** illustrates the location of all areas subject to test pit assessment. Appendix A provides a photo index with associated UTM coordinates and Appendix B lists all areas subject to test pit survey as well as their associated dimensions and UTM coordinates.

UTM coordinates were recorded for all finds. Coordinates were recorded by a Trimble Recon handheld GPS unit and/or a Garmin eTrex Legend handheld GPS unit, both using the North American Datum (NAD) 83. GPS readings were accurate to five metres or better. As per the *Standards and Guidelines for Consultant Archaeologists* (Section 5, Standards 2a, 2b), for small archaeological sites (less than 10 metres by 10 metres in area) one coordinate reading from the center of the site was taken. For archaeological sites larger than 10 metres by 10 metres in area five readings were taken: one for the center of the site and the furthest site extents in each of the cardinal directions. Supplementary Document A illustrated the locations of recovered cultural material. Supplementary Document B lists the GPS coordinates for identified archaeological sites.

It should be noted the baseline study potential modelling indicated a significant number of drumlins existed throughout the study area; these drumlins were indicated in the baseline model as areas of archaeological potential. Ground truthing during the Stage 2 survey revealed these areas to be bedrock hills as opposed to glacial till drumlins; as such no Stage 2 survey was undertaken on them.

The Stage 2 archaeological assessment of the OHRG Project has involved consultation with and participation by First Nations peoples whose traditional territories are affected by the study area. The study area falls within the traditional territories of the Anishinaabe people and the traditional harvesting area of two Métis nations. Aboriginal monitors representing the Anishinaabe and Métis people whose traditional territory or traditional harvesting area are potentially impacted by the Project were present for the Stage 2 property survey.

The Stage 2 field survey was conducted between July 18 – 24; July 26 – 28; and July 30 – August 7, 2012 under archaeological consulting licence P218, issued to Scott Martin, Ph.D. The weather during the Stage 2 assessment ranged from sunny and hot to overcast and cool. At no time were the conditions detrimental to the recovery of archaeological material. Field visibility during the test pitting surveys ranged from very good to excellent. Table 3 provides daily weather conditions for the Stage 2 property survey.

Table 3: Stage 2 Field Survey Weather Conditions

Date	Weather Conditions
July 18, 2012	Clear and warm
July 19, 2012	Mixed sun and cloud, warm
July 20, 2012	Mixed sun and cloud, warm
July 21, 2012	Clear and warm, light wind
July 22, 2012	Sunny and cool

Date	Weather Conditions
July 23, 2012	Cloudy, chance of rain
July 24, 2012	Clear and warm
July 26, 2012	Overcast and muggy
July 27, 2012	Clear and warm
July 28, 2012	Clear and warm – forest fire watch
July 30, 2012	Mixed sun and cloud, warm
July 31, 2012	Sunny, clear and warm
August 1, 2012	Mixed sun and cloud, warm
August 2, 2012	Clear and warm
August 3 2012	Overcast and muggy
August 4, 2012	Overcast, high chance of rain
August 5, 2012	Sunny and warm
August 6, 2012	Mixed sun and cloud, warm
August 7, 2012	Mixed sun and cloud, warm

4.0 RECORD OF FINDS

The Stage 2 archaeological assessment was conducted employing the methods described in Section 3.0. An inventory of the documentary record generated by Stage 2 fieldwork is provided in Table 4. The Stage 2 photograph locations and test pit locations and are illustrated on Figures 11 and 12. Due to the size of the Project footprint and the numerous photographs taken, directional arrows are not illustrated on Figure 11 as it would obscure the mapping and no provide constructive information. However, all associated images (see Section 9.0) provide the direction of the photographs.

A total of two archaeological sites associated with 20th century mining activities were identified during the Stage 2 assessment. Material culture recovered from the Stage 2 property survey is contained in one banker's box and will be temporarily housed at Golder's Whitby office until formal arrangements can be made for their transfer to an MTCS collections facility.

Table 4: Inventory of Documentary Record

Document Type	Current Location of Document	Additional Comments
Field Notes	Golder office in Whitby	In original field book, photocopied in project file and stored digitally in project file
Hand Drawn Maps	Golder office in Whitby	In original field book and photocopied in project file
Maps Provided by Client	Golder office in Whitby	Stored in project file
Digital Photographs	Golder office in Whitby	Stored digitally in project file

4.1 Tailings Management Facility (TMF)

The tailings management facility (TMF) is located in the northeast portion of the study area. The area is typified by low-laying poorly drained soils supporting a number swamp loving tree species including black and white spruce, cedar and willow. Plates 1, 2 and 3 provide representative examples of the typical forest cover in the area. The soils of the area are comprised of fine silts, sands and organic based muck soil. Much of the tailings management area is covered in low lichens and Labrador Tea, both being plants that thrive in poorly drained soils (Plate 4). Areas that were not poorly drained were steeply sloped and non-conducive to human occupation (Plate 5). Modern mining exploration has resulted in extensive disturbance within the area to facilitate the placement of diamond drill platforms across the area (Plate 6). The vast majority of the established trails are constructed of downed trees placed side by side to form a type of corduroy road to facilitate the movement of heavy machinery (Plate 7). Apart from the established trail system the area is nearly impassable on foot due to the poorly drained nature of the area and equipment frequently becomes stuck.

Based on the Stage 1 background study, a total of 17 areas of archaeological potential were identified. These areas were based on proximity to water, either streams or ponds. As a result of the baseline report field work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of several areas that retained archaeological potential (**Figure 12**). Each of the identified areas was subject to test pit survey at 5 metre intervals. Areas of potential were based on soil conditions (well drained), geographic conditions (relatively flat), and proximity to water (within 50 metres). None of the areas subject to shovel testing yielded any cultural artifacts.

In addition to inspecting the TMF for suitable sites for past human occupation the cliff faces surrounding the area to the northwest were inspected for signs of pictographs. This was accomplished by physically walking along the cliffs and observing the rock face. These cliffs also provided an excellent vantage point of the surrounding landscape (Plate 8).

4.2 Explosives Storage

The proposed explosives storage area, situated between the proposed TMF and the proposed mine site, is located on a relatively flat area overlooking a cove of Sawbill Bay. The area is typified by bedrock outcrops (Plate 9) and mature coniferous forest cover (Plate 10). Unlike other areas within the study area the proposed explosives storage area is relatively undisturbed and is only bisected by a couple of small access cuts (Plate 11).

Based on the baseline study three areas of archaeological potential were identified. These areas were based on proximity to water (ponds or cove edge). As a result of the baseline report work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of no areas retaining archaeological potential. Based on the location of the proposed explosives storage area and the lack of land-based access roads the assessment was primarily conducted by boat. Boat based assessment provided a clear view of the shore line and allowed one to more easily assess areas of easy egress to and from any potential camp areas. Based on the water survey it was found that the shore edges within the proposed explosives storage footprint were extremely steep and not conducive to human occupation or archaeological survey. In addition to the areas assessed along the water’s edge a single area of interest was identified in the baseline report located inland. When this area was ground truthed the water body identified in the baseline report was actually an area of poorly drained soil; further test pit survey was not required.

To summarize, no areas of archaeological potential were confirmed within the explosives storage area; as such test pit survey was not required in this area.

4.3 Hammond Reef Peninsula Components

The Hammond Reef peninsula of the proposed development is located in the southern portion of the study area. This peninsula is where a number of mine infrastructure components will be located; each component will be discussed separately below. The area is typified by a mix of mature coniferous trees interspersed with areas of poor drainage and disturbance. Plates 12, 13 provide representative examples of the typical forest cover in the area. The soils of the area are comprised of fine silts, sands and organic based muck soil. Overall the soils in the area are quite thin and provide very little structural or nutritional support for the area’s vegetation (Plate 14). As stated previously, much of the peninsula has been extensively impacted by past and present mining activities and as such is covered in low scrub trees such as willow and alder as well as water loving lichens and mosses. Previous and current exploration activities have resulted in extensive disturbance within the area to facilitate the placement of diamond drill platforms across the area (Plate 15). The level of impact is such that some areas have been backfilled and the re-habilitation process has begun while others are in the process of being developed (Plate 16). The vast majority of the established trails are constructed of bulldozed paths cleared through the areas of thicker soil and scraped down to bedrock in areas of thinner soil (Plate 17). Based on what remains of the native vegetation it appears the Mitta Lake peninsula would have been relatively easy to traverse on food, compared to many of the other areas within the study area. Large areas of the peninsula were found to be poorly drained, previously disturbed or steeply sloped and not favourable to human occupation (Plate 18).

Based on the baseline study over 40 areas of archaeological potential were identified; these areas on the Mitta Lake peninsula will be discussed further below as they relate to proposal mine site components. These areas were based on proximity to water, streams, ponds or lakes. As a result of the baseline report field work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of several areas retaining archaeological potential. The below sections provide detailed information on the test pit survey undertaken with regards to mine site components on the Mitta Lake peninsula.

4.4 Associated Project Infrastructure

Associated mine infrastructure components are located on the western side of the Mitta Lake peninsula and consist of a number of structures. The area chosen for the structures contains a single small lake fed by several small streams and a large section of shore line facing into Sawbill Bay (**Figure 2**). As with all areas within the study area the general landscape of the area is one of mixed coniferous forest as well as scrub growth, willow and alder. The landscape is generally undulating, ranging from steep bedrock outcrops to low laying poorly drained organic soils (Plate 19 and 20). The Stage 1 background study determined the area around the small internal pond to be a water feature that used as a de-watering pond; based on aquatic assessments of the pond conducted by Golder in 2011 found that pond contains no fish (Golder 2012). As a result the baseline report concluded the pond had no archaeological potential. This was confirmed by on the ground during the Stage 2 assessment. The pond is surrounded by steep cliffs on its southern shores and marsh bog on the northeastern shores. Plate 21 illustrates the nature of this water body. All areas of archaeological potential associated with the Project infrastructure are located along the shore of Sawbill Bay, as such the shore line was inspected by boat and areas of relatively flat, well drained soils were subject to test pit survey at five metre intervals (**Figure 12**). One of the areas subject to test pit survey resulted in the recovery of artifacts associated with 20th century mining activities (Location 1).

4.4.1 Location 1

Location 1 is comprised of a 20 metre east/west by 15 metre north/south surface scatter of artifacts as well as two artifact yielding test pits in the center of the scatter. The sparse ground cover in the area allowed for artifacts to be identified on the surface. Location 1 consists of 64 pieces of 20th century historic material. This material included 46 glass artifacts, nine ceramic artifacts, seven metal artifacts and two wire drawn nails (Plate 67). The recovered glass artifacts include 41 pieces of bottle glass (16 amber, 22 clear and 2 green) and five window glass shards, all measuring greater than 1.6 millimetres in thickness. Thick window glass is commonly found in the late 19th century and into the 20th century. The recovered ceramics include six pieces of ironstone and three pieces of semi-porcelain, both of which are ceramics that were manufactured from the late 19th century into the 20th century. The metal assemblage includes a mix of metal handles, miscellaneous fragments and piece of a cast iron stove. Wire drawn nails were popular from about 1890 into the 20th century. Table 5 provides a listing of the Location 1 Stage 3 catalogue.

Location 1 is situated in area operated as the Hammond Gold Reef Mine in the late 19th and early 20th centuries. The historic Hammond Gold Reef Mine is discussed in Section 1.3.4 and further in Section 5.0. The remains of the road are visible as an area of compact earth covered in scrub tree growth bordered by mature forest. A section of the trail has recently been subject to reforestation. Test pitting of the road area revealed the surface soil to be only three to five centimetres in depth overlaying compact grey clay. In addition to the artifacts recovered from the test pits and surface scatter two large iron rings were identified. These were not recovered and were left in situ on site.

The Stage 2 assessment also identified the remains of the historic Hammond Gold Reef Mine reservoir (Plate 52): this included the ruins of two dams, one wood (Plate 53) and one earth (Plate 54) and a channel flowing from the dam to the former location of a stamp mill and a saw mill, of which no remains exists today.

Due to the relatively late date of the recovered artifacts, the small spatially defined area in which they were recovered and the high occurrence of glass and metal artifacts, UTM coordinates were not recorded for each surface artifact; UTM coordinates were recorded for the site centroid, the furthest extent of the scatter in each of the cardinal directions as well as for positive test pits.

Table 5: Location 1 Stage 2 Catalogue

Cat. #	Date	Context	Artifact	Freq.	Comments
1a	30-Jul-12	surface	glass, bottle	40	16 amber, 2 green, 22 clear
1b	30-Jul-12	surface	glass, window	4	>1.6mm
2	30-Jul-12	surface	metal, handle	1	
3	30-Jul-12	surface	metal, miscellaneous	2	
4	30-Jul-12	surface	metal, pipe	1	fragment
5	30-Jul-12	surface	cast iron stove fragment	1	part of a burner
6	30-Jul-12	surface	nail, wire drawn	2	
7	30-Jul-12	surface	ironstone, plain	5	
8	30-Jul-12	surface	porcelain, semi	3	
9	30-Jul-12	test pit #2	ironstone, plain	1	
10	30-Jul-12	test pit #1	glass, bottle	1	clear
11	30-Jul-12	test pit #1	glass, window	1	>1.6mm
12	30-Jul-12	test pit #1	metal, wire handle	1	
13	30-Jul-12	test pit #1	metal, handle	1	

4.5 Waste Rock/Overburden Stockpiles

The proposed waste rock/overburden stockpile area is located on the northeastern limit of the Mitta Lake peninsula. The area is typified by undulating sand knolls interspersed with outcrops of bedrock and areas of poorly drained soil (Plate 22). The area of the proposed waste rock stock pile is primarily covered in mature forest but also contains areas of previous disturbance Plate 23). The baseline study indicated 10 areas of archaeological potential are situated in this area based on proximity to water (Golder 2012). When these areas were ground truthed it was revealed that those areas located along the existing access road were modern ditches (Plate 24) and did not retain archaeological potential as they are a modern man-made water source. Assessment of the medium sized pond within the waste rock/overburden stockpile footprint revealed several areas of archaeological potential; these areas were subject to test pit survey at five metre intervals (**Figure 12**). Plate 25 illustrates an example of the test pit activities conducted along the shore of this pond. The survey resulted in no finds. The shore line of the peninsula was assessed via boat and three areas were identified as retaining archaeological potential. These areas were subject to test pit survey at five metre intervals (Plate 26).

In the northwest portion of the waste rock/overburden stockpiles footprint cultural artifacts related to 20th century mining activities were recovered (Location 2).

4.5.1 Location 2

Location 2 is situated in an area operated in the late 19th and early 20th centuries as Sawbill Mine. Within this area a concentration of artifact yielding test pits were excavated; as well a small surface scatter was identified, exposed by the construction of an ATV trail. Location 2 is located in association with the historically documented position of the historic Sawbill Mine. The Sawbill Mine will be discussed further in Section 5.0. The area comprising the five artifact yielding test pits and the surface scatter is approximately 25 metres east/west by 35 metres north/south. Location 2 consists of 54 pieces of 20th century historic material. This material included 48 wire drawn nails, two ceramic insulators, two components of a light bulb, one piece of porcelain and one complete bottle (Plate 68). Wire drawn nails were popular from about 1890 into the 20th century. The porcelain fragment is a 20th century piece stamped “MADE IN JAPAN”. The complete bottle is a small, clear medicine bottle with measurements embossed on the sides; other than that there are no distinguishing markings. Table 4 provides a listing of the Location 2 Stage 3 catalogue. In addition to the recovered artifacts the surface scatter contained the remains of a large cast iron stove (Plate 30, 31) that was photographed but left in situ.

In addition to the artifact scatter the remains of a steam engine and the remains of the original tramway that was used in the transport of ore from the mine to the processing plant located on the shores of Sawbill Bay were identified. Both will be discussed further in Section 5.0.

Due to the relatively late date of the recovered artifacts, the small spatially defined area in which they were recovered and the high occurrence of nails and glass artifacts, UTM coordinates were not recorded for each surface artifact; UTM coordinates were recorded for the site centroid, the furthest extent of the scatter in each of the cardinal directions as well as for positive test pits.

Table 6: Location 2 Stage 2 Catalogue

Cat. #	Date	Context	Artifact	Freq.	Comments
1	28-Jul-12	test pit #2	nail, wire drawn	12	
2	28-Jul-12	test pit #5	nail, wire drawn	1	
3	28-Jul-12	test pit#8	nail, wire drawn	4	
4	28-Jul-12	test pit #7	porcelain	1	made in Japan

Cat. #	Date	Context	Artifact	Freq.	Comments
5	28-Jul-12	test pit #1	nail, wire drawn	29	
6	28-Jul-12	test pit #1	insulator	1	ceramic
7	28-Jul-12	surface	nail, wire drawn	2	
8	28-Jul-12	surface	light socket	1	metal, jacket
9	28-Jul-12	surface	glass, light bulb	1	
10	28-Jul-12	surface	insulator	1	ceramic
11	28-Jul-12	surface	glass, complete bottle	1	clear, medicine, 3IV

4.6 Open Pit (East and West) and Low Grade Ore Stockpile

The proposed east and west open pit and the ore stock pile area are located on the southern tip of the Mitta Lake peninsula. The southern tip of the Mitta Lake peninsula is the area that has been subject to the most intensive disturbance. The area has been stripped of the majority of trees and areas of water have been either drained or back filled with organic slash (Plate 27). The level of disturbance in this area is typified by (Plate 28). Any areas that remained undisturbed were either steeply sloped, poorly drained or both (Plate 29). The entire shore line of the peninsula was assessed for areas of archaeological potential by way of boat assessment. This resulted in a number of areas of potential being identified and subject to test pit survey at five meter intervals. **Figure 12** illustrates all areas that were subject to test pit assessment. No remains of cultural material were recovered from this area.

4.7 Project Access Road

The area delineated as the access road is an approximately 45 kilometre long by 290 metre wide linear corridor that begins at Highway 622 and runs in a northerly direction until its termination at Mitta Lake. The delineated area is already home to a four seasons gravel access road; the current project layout indicates activities will be undertaken to level and straighten undefined sections of the road to reduce the risks associates with the use of the road by large haul trucks to transport needed construction material to the mine site. The current road follows a serpentine route along the path of least resistance. The entire length of the access road was subject to Stage 2 archaeological assessment to confirm areas of archaeological potential. The landscape along the access road is typified by steep slopes (Plate 32), rocky outcrops (Plate 33) and low poorly drained areas (Plate 34). The Stage 2 assessment revealed several areas retaining potential but test pit survey did not result in the recovery of any cultural remains. Areas subject to test pit survey (Plate 35, 36) were typified as relatively flat sandy areas, with the largest areas located between kilometre marker 12 and 14 on the Sawbill Road and Kilometre 9 and 10 on the Sawbill Road. Kilometre 9 and 10 are located where the access road intersects the proposed transmission corridor. Several other small areas along the length of the access also being subject to test pit assessment (**Figure 12**). The Stage 2 assessment of the Project access road did not result in the recovery of cultural material.

4.8 Transmission Corridor

The proposed Transmission Corridor consists of an approximately 18.6 kilometre long by approximately 350 meter wide linear corridor that will originate at the extant hydro corridor located approximately 600 metres north of the intersection of Highway 622 and Hardtack Road. The proposed corridor will proceeded in a more or less parallel fashion to the existing access road and will terminate at the proposed transformer station located on the Mitta Lake peninsula. The proposed transmission corridor was subject to Stage 2 assessment based on GIS predictive modeling as outlined in Section 2.0 of this report. As such areas within 50 metres of water courses were ground truthed to confirm for archaeological potential. Of the areas identified in the predictive model only three areas were found to possess well drained, flat soils and required test pit survey (**Figure 10**). One of these areas was an area of well drained sand located between the access road and the proposed transmission corridor (Plate 37). The other two areas of interest were located on either side of a small bay (**Figure 12**). Test pit assessment of these areas did not result in the recovery of any cultural material. All other areas indicated in the GIS model exhibited no archaeological potential and were typified by steep slopes, rocky outcrops (Plate 38) or were poorly drained (Plate 39). Additional photos of transmission corridor conditions can be found in Plates 40-46.

4.9 Workers Camp

The workers camp is proposed to be located where the current exploration camp is situated at the northern limit of the Sawbill Road at the transition to the Reef Road that facilitates access to the proposed infrastructure located on the Mitta Lake peninsula. The workers camp will occupy an expanded footprint of the existing exploration camp. The area in question is situated on a small inlet of the Sawbill Reservoir on an area of relatively flat, well drained ground (Plate 47). The workers camp area is bisected by a small, fast flowing creek that empties into the bay which borders the eastern extent of the proposed camp. While the existing bay is likely the result of the extensive water management plans that have impacted the overall study area, the presence of a creek flowing through and areas of well drained, flat soil would likely have made the area attractive to past inhabitants of the region (Plate 48). Due to the camp's access to water and well drained soils the area was subject to test pit survey within 50 metres of all existing water features (Plate 49). Due to the fact the camp is located partially within the existing limits of the current exploration camp large sections of the area were previously disturbed and therefore not subject to test pit survey (Plate 50). No cultural remains were recovered in this area.

5.0 ANALYSIS AND CONCLUSIONS

The Stage 1 background study and property inspection concluded that archaeological potential exists within the Project footprint along waterways that are bordered by dense coniferous forest as well as areas that show that drumlins occur. As a result, the subject property was subject to a Stage 2 archaeological assessment.

The Stage 2 archaeological assessment entailed test pit survey at five metre intervals across areas determined to have archaeological potential where required as per Section 2.1.5, Standards 1 and 2 of the MTCS *Standards and Guidelines for Consultant Archaeologists* within the Project footprint.

A total of two archaeological sites associated with 20th century mining activities were identified during the Stage 2 assessment. Location 1 is located in association with the historically documented position of the Hammond Gold Reef workers accommodations along one of the original access roads for the property. Location 2 is located in association with the historically documented position of the Sawbill Mine. Supplementary Document A shows the location of each mine site.

5.1 Hammond Gold Reef Mine (Location 1)

The Hammond Gold Reef located to the southwest of the Sawbill mine was originally owned by Mr. James Hammond and Mr. Henry Folger (Bureau of Mine 1899). Artifacts were recovered in this area over a 20 metre by 15 metre area. The mine operated slightly differently than the nearby Sawbill Mine and employed a combination of open pit mining and Adits. An Adit is a horizontal access to a mine shaft. The Stage 2 assessment of the area around the Hammond Gold Reef Mine revealed two such Adits (Plate 51) and several large areas of past disturbance, any of which could be past evidence of open pit mining. In addition to the open pits and Adits the Hammond Mine consisted of a stamp mill, a small saw mill, water reservoir and several other structures involved in the processing and extraction of gold ore. The Stage 2 assessment uncovered the remains of the reservoir (Plate 52): this included the ruins of two dams, one wood (Plate 53) and one earth (Plate 54) and a channel flowing from the dam to the location of the stamp mill and saw mill. In conjunction with the infrastructure needed for gold processing, structures necessary for the care of workers were also present. These included a bunk house, cook house, and storage facility (Bureau of Mine 1899). The location of the recovered artifacts (Location 1) corresponds with the placement of the bunk house and the location of one of the original access roads to the property (Plate 55). No evidence of the stamp mill or the saw mill were found, but this is likely due to the level of modern disturbance that has occurred in the area where these structures are reported to have been. The modern Osisko operation is using the area of these past structures as their main core storage area (Plate 56). As such the area had been extensively modified to allow for the installation of access roads and core shacks. The extensive alterations in water level of Sawbill Bay since the 1890s had an impact on the landscape and it is very likely that further evidence of the Hammond Gold Reef mine now resides under the waters of Sawbill Bay.

Given the limited size of the artifact collection and its 20th century association, the cultural heritage value or interest of the site is considered to be sufficiently documented.

5.2 Sawbill Mine (Location 2)

The remains Sawbill Mine are located approximately 1,500 metres east of the shore of Sawbill Bay. The site itself is comprised of a collection of cement foundations (Plate 57) and three vertical shafts (Plate 58 and 59) sunk into a quartzite vein that transects the mine site from north to south (Plate 60). In association with the shafts and foundations is a large engine (Plate 61) and a series of test trenches (Plate 62) that would have been used to identify the extent of the gold bearing quartz vein, as well as a stone damn that, according to research, was used to supply the processing plant with water during the summer months (Bureau of Mine 1899). The engine located on the site was produced by Imperial Keighley and appears to be a two cylinder gas engine. Based on visual assessment and the placement of the engine it is likely that it was used in the dewatering of the mine and the transport of materials and men from the shaft and associated level cuts. Further research on the Imperial Keighley Company yielded only rudimentary information and no direct information was found regarding the true purpose of the engine identified at the Sawbill Mine. What is available on the Imperial Keighley Company is that it was a British Company and Canada imported a lot of industrial equipment from Britain. Based on its assembly it appears to be an overbuilt two cylinder machine that is similar to ones that were installed in other Canadian establishments in the late 1930s and early 1940s (Personal communication, Chris Andreae, August 2012). This assessment is in keeping with the fact the Sawbill Mine was re-opened in the early 1940s. The final piece of infrastructure associated with the Sawbill Mine is what remains of the original tramway that was used in the transport of oar from the mine to the processing plant located on the shores of Sawbill Bay. According to the 1899 Bureau of Mines Report a surface tram 550 feet in length was used to transport oar to the mill (Bureau of Mines 1899). The remains of what is presumably this line were identified running from the mine shaft to the shore line of Sawbill Bay. The identified line was measured to be approximately 365 meters long and three meters wide. The line is composed of two different construction techniques. The most visually obvious being elevated sections constructed of field stone (Plate 63, 64, 65). The full extent of the rail line was traced by following the slight elevation in ground resulting from the construction of the rail bed. A series of artifact yielding test pits (Plate 66) were found in association with the remains of a cast iron stove (Plate 30, 31) located to the north of the main concentration of shafts, foundations and equipment.

Given the limited size of the artifact collection and its 20th century association, the cultural heritage value or interest of the site is considered to be sufficiently documented.

6.0 RECOMMENDATIONS

Given the findings of the Stage 1-2 archaeological assessment within the footprint of the Project components, the following recommendation is made:

1) The footprint of the Project components may be considered sufficiently documented for archaeological resources. No further archaeological assessment is required.

In spite of the results and recommendations presented in this report, no archaeological assessment, however comprehensive the research and sampling strategy, can necessarily detect isolated or deeply buried archaeological deposits. See Section 7.0 for specific limitations of this report. In the event that deeply buried archaeological remains are encountered on the subject property during future land disturbance activities, the Ministry of Tourism, Culture and Sport must be notified immediately. In the event that human remains are encountered on the subject property during future land disturbance activities, the police or coroner and the Registrar of the Cemeteries Regulation Unit at the Ministry of Consumer Services must be notified immediately.

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. The MTCS is also asked to inform OHRG via letter that concerns related to archaeological resources with the Project footprint have been addressed.

7.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sports as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the Project footprint of a development proposal have been addressed to the satisfaction of the Ministry of Tourism and Culture, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, R.S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

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9.0 IMAGES

Plate 1: Photo 624, Waypoint 666, typical forest cover, facing north

Plate 2: Photo 630, Waypoint 216, typical forest cover and slope, facing north

Plate 3: Photo 691, Waypoint 120, typical forest cover in poorly drained soil, facing east

Plate 4: Photo 123, Waypoint 120, poorly drained soil, moss and Labrador Tea, facing south

Plate 5: Photo 623, Waypoint 215, slope, facing south

Plate 6: Photo 079, Waypoint 667, slope, facing north

Plate 7: Photo 086, Waypoint 668, corduroy type road, facing west

Plate 8: Photo 702, Waypoint 669, overview of landscape from cliff face, facing east

Plate 9: Photo 100, Waypoint 058, bedrock outcrops, facing west

Plate 10: Photo 099, Waypoint 057, coniferous forest, facing northwest

Plate 11: Photo 4, Waypoint A14 2, small forestry road and ditch, facing north

Plate 12: Photo 001, Waypoint P1, slope, disturbance and forest, facing south

Plate 13: Photo 010, Waypoint P004, disturbance and tree cover, facing east

Plate 14: Photo 016, Waypoint 670, thin soil over bedrock, facing southeast

Plate 15: Photo 006, Waypoint P4, previous disturbance, facing northwest

Plate 16: Photo 041, Waypoint P34, backfilling wetlands, facing southeast

Plate 17: Photo 028, Waypoint P29, access trail installation, facing north

Plate 18: Photo 008, Waypoint P6, undisturbed sloped area, facing south

Plate 19: Photo 020, Waypoint 015, steep slope, facing west

Plate 20: Photo 019, Waypoint 014, poorly drained area, facing southwest

Plate 21: Photo 021, Waypoint 016, overview of pond, facing southwest

Plate 22: Photo 786, Waypoint Preside 1, rock and poorly drained area, facing east

Plate 23: Photo 193, Waypoint 115, area of previous extraction, facing south

Plate 24: Photo 200, Waypoint 116, modern ditch on side of Reef Road, facing south

Plate 25: Photo 802, Waypoint wrtp6, typical area subject to test pit assessment, facing west

Plate 26: Photo 623, Waypoint 097, test pitting, facing south

Plate 27: Photo 014, Waypoint 007, drained wetland with tree backfill, facing southeast

Plate 28: Photo 015, Waypoint 008, drained wetland with tree backfill, facing east

Plate 29: Photo 007, Waypoint P5, disturbance and tree cover, facing northeast

Plate 30: Photo 283, Waypoint 150, cast iron stove remains, facing north

Plate 31: Photo 284, Waypoint 150, cast iron stove top "HAZELWOOD", looking down

Plate 32: Photo 334, Waypoint 175, steeply sloped area on access corridor, facing north

Plate 33: Photo 324, waypoint 169, rocky outcrop on access corridor, facing north

Plate 34: Photo 314, Waypoint 162, poorly drained area on access corridor, facing west

Plate 35: Photo 102, Waypoint P060, test pitting on access corridor, facing north

Plate 36: Photo 411, Waypoint 190, test pitting along Sawbill Road, facing east

Plate 37: Photo 465, Waypoint 192, testpitting along Sawbill Road, facing southeast

Plate 38: Photo 499, Waypoint 682, steep rocky slope on transmission corridor, facing west

Plate 39: Photo 500, Waypoint 683, poorly drained area on transmission corridor, facing west

Plate 40: Photo 501, Waypoint 200, boat assessment, facing northeast

Plate 41: Photo 519, Waypoint 205, poorly drained area (orange tape is logging line), facing west

Plate 42: Photo 528, Waypoint 206, stone dam remains, facing north

Plate 43: Photo 539, Waypoint 208, iron plate, facing north

Plate 44: Photo 542, Waypoint 209, modified stone channel, facing west

Plate 45: Photo 547, Waypoint 212, stone dam and waste rock pile, facing west

Plate 46: Photo 561, Waypoint 807, steep rock slope, facing north

Plate 47: Photo 151, Waypoint P0022, well drained soil, facing west

Plate 48: Photo 137, Waypoint P017, creek, facing west

Plate 49: Photo 607, Waypoint P023, test pitting, facing south

Plate 50: Photo 126, Waypoint P013, area of previous disturbance, facing west

Plate 51: Photo 042, Waypoint 680, Hammond Gold Reef "Adit" opening, facing southeast

Plate 52: Photo 275, Waypoint 681, water line of Hammond Gold Reef Mine reservoir, facing northeast

Plate 53: Photo 677, Waypoint k97, Hammond Gold Reef Mine reservoir wood dam, facing southeast

Plate 54: Photo 277, Waypoint k97, Hammond Gold Reef Mine reservoir earth dam, facing east

Plate 55: Photo 309, Waypoint Hist 1, Hammond Gold Reef Mine Location 1, facing west

Plate 56: Photo 309, stock photo Google Earth, Waypoint 500, Osisko core storage, facing west

Plate 57: Photo 268, Waypoint 'building', cement foundations, facing southeast

Plate 58: Photo 066, Waypoint 039, mine shafts (in orange fencing), facing northeast

Plate 59: Photo 222, Waypoint 036, mine shaft filled with water, facing west

Plate 60: Photo 251, Waypoint 036, mine shaft showing quartz vein, facing south

Plate 61: Photo 286, Waypoint 036, "IMPERIAL KEIGHLEY" engine, facing southwest

Plate 62: Photo 727, Waypoint TRE3, test trenches, facing southwest

Plate 63: Photo 259, Waypoint R10, field stone footing for tram line, facing east

Plate 64: Photo 254, Waypoint R6, field stone footing for tram line, facing southwest

Plate 65: Photo 263, Waypoint 128, field stone footing for tram line, facing southeast

Plate 66: Photo 284, Waypoint 150, Sawbill Mine Location 2 artifact yielding test pits, facing east

Plate 67: Location 1 Stage 2 Artifacts

1. Wire Drawn Nails

2. Porcelain

3. Light Socket Jacket

4. Complete Clear Bottle
One Half Size

Plate 68: Location 2 Stage 2 Artifacts

10.0 MAPS

All mapping will follow on succeeding pages.

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.;
Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

100 0 100 200 300 400
SCALE 1:10,000,000 KILOMETRES

Golder Associates
Mississauga, Ontario

PROJECT No.	10-1118-0020		
SCALE	AS SHOWN	VERSION 1	

DATE	February, 2013
DESIGN	CGE
GIS	JO
CHECK	CP
REVIEW	CP

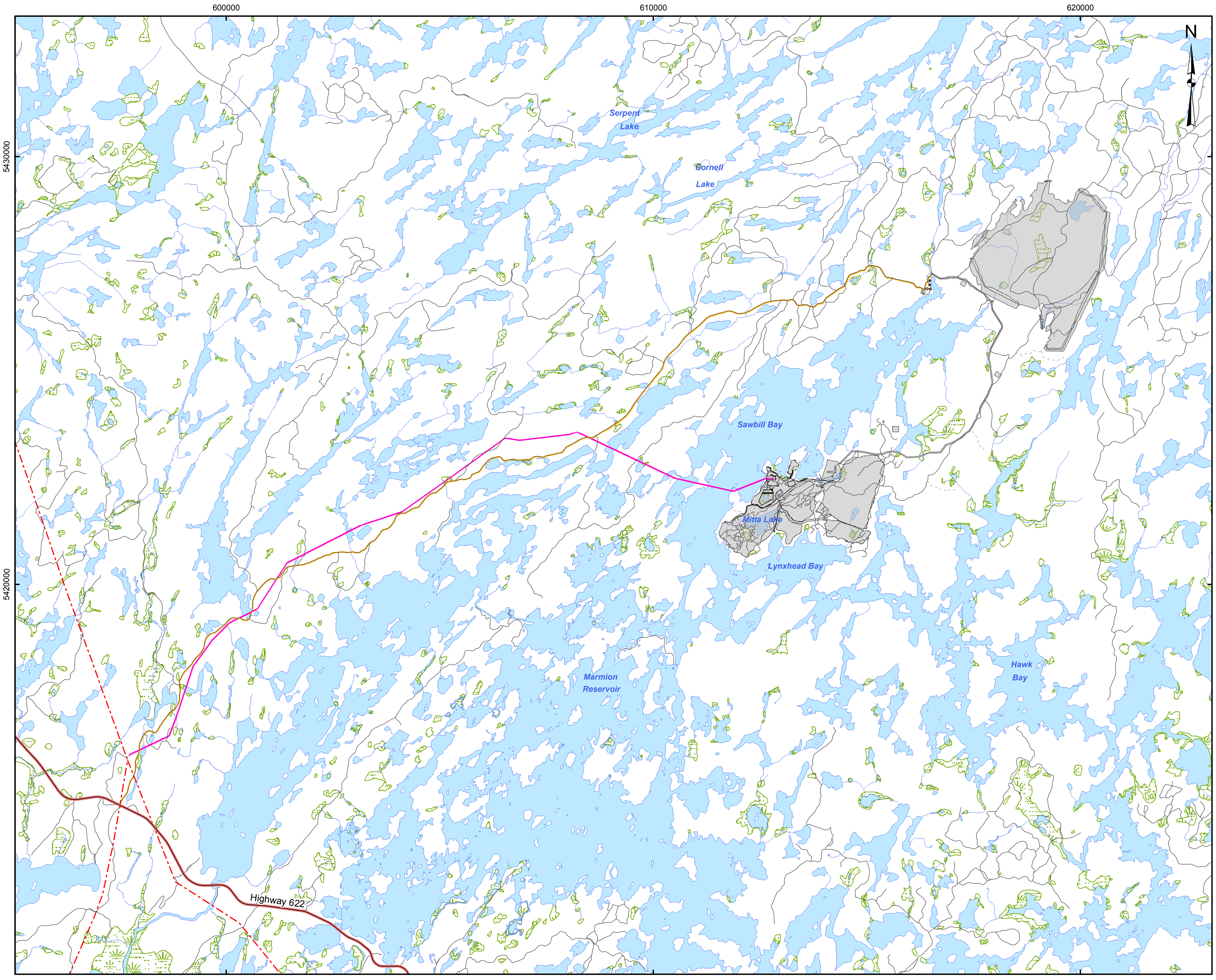
TITLE

PROJECT LOCATION

PROJECT HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

FIGURE: 1

G:\Projects\2010\10-1118-0020_BrettResources_HammondReef\GIS\MXDs\Draft\Archaeology\CulturalResources\Stage2Report\ProjectLocation.mxd



LEGEND

- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

1,000 0 1,000 2,000 3,000 4,000 5,000
METRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

SITE STUDY AREA

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

FIGURE: 2

G:\Projects\2010\10-1118-0020_BrettResources_HammondReef\GIS\MXDs\Draft\CulturalHeritage\TSD\Stage1and2\SiteStudyArea.mxd

LEGEND

- Project Location
- City/Town
- River
- Waterbody

Depots and/or Break-of-Bulk Points

- Hudson's Bay Company
- St. Lawrence Traders
- Major Boat-Building Centre
- Major Canoe-Building Centre

Transportation Route Types

- Major Route
- Minor Route

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
HIstorical Atlas of Canada, Vol. 1. ED. R. Cole. Harris 1987. University of Toronto Press. Toronto ON, Canada.
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

25 0 25 50 75 100 125
SCALE 1:2,500,000 KILOMETRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

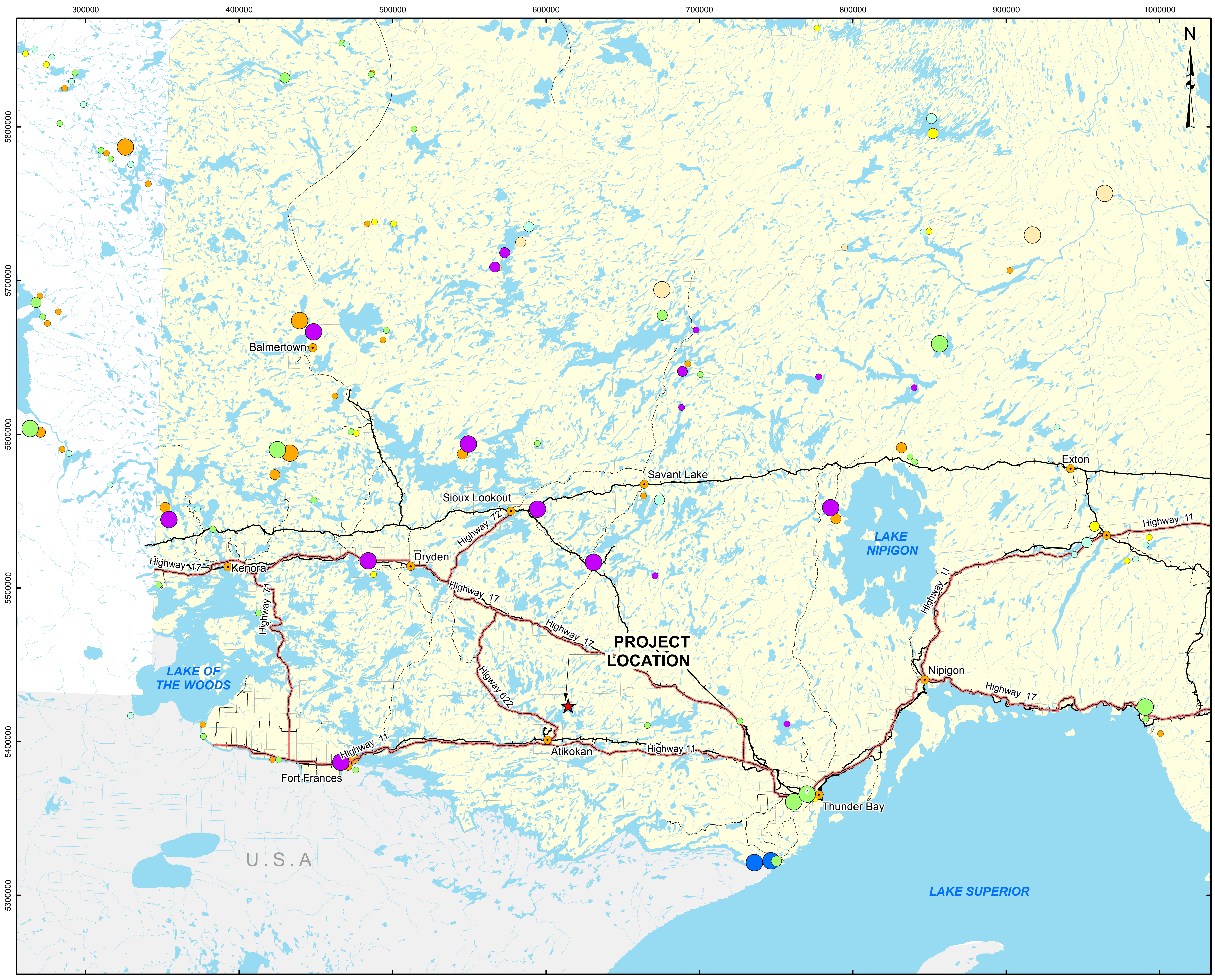
TITLE

HISTORICAL TRANSPORTATION ROUTES

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

FIGURE: 3



LEGEND

- Project Location
- City/Town
- Provincial Highway
- Road
- Existing Railway
- Power Transmission Line
- River
- Waterbody

Hudson's Bay Company

- Pre-1774
- 1774-1789
- 1790-1805
- 1806-1821

St. Lawrence Traders

- Pre-1774
- 1774-1789
- 1790-1805
- 1806-1821

Duration of Post

- < 5 years
- 5 to 15 years
- > 15 years

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
HIstorical Atlas of Canada, Vol. 1. ED. R. Cole. Harris 1987. University of Toronto Press. Toronto ON, Canada.
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

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SCALE 1:2,500,000 KILOMETRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

FUR TRADE POSTS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 4	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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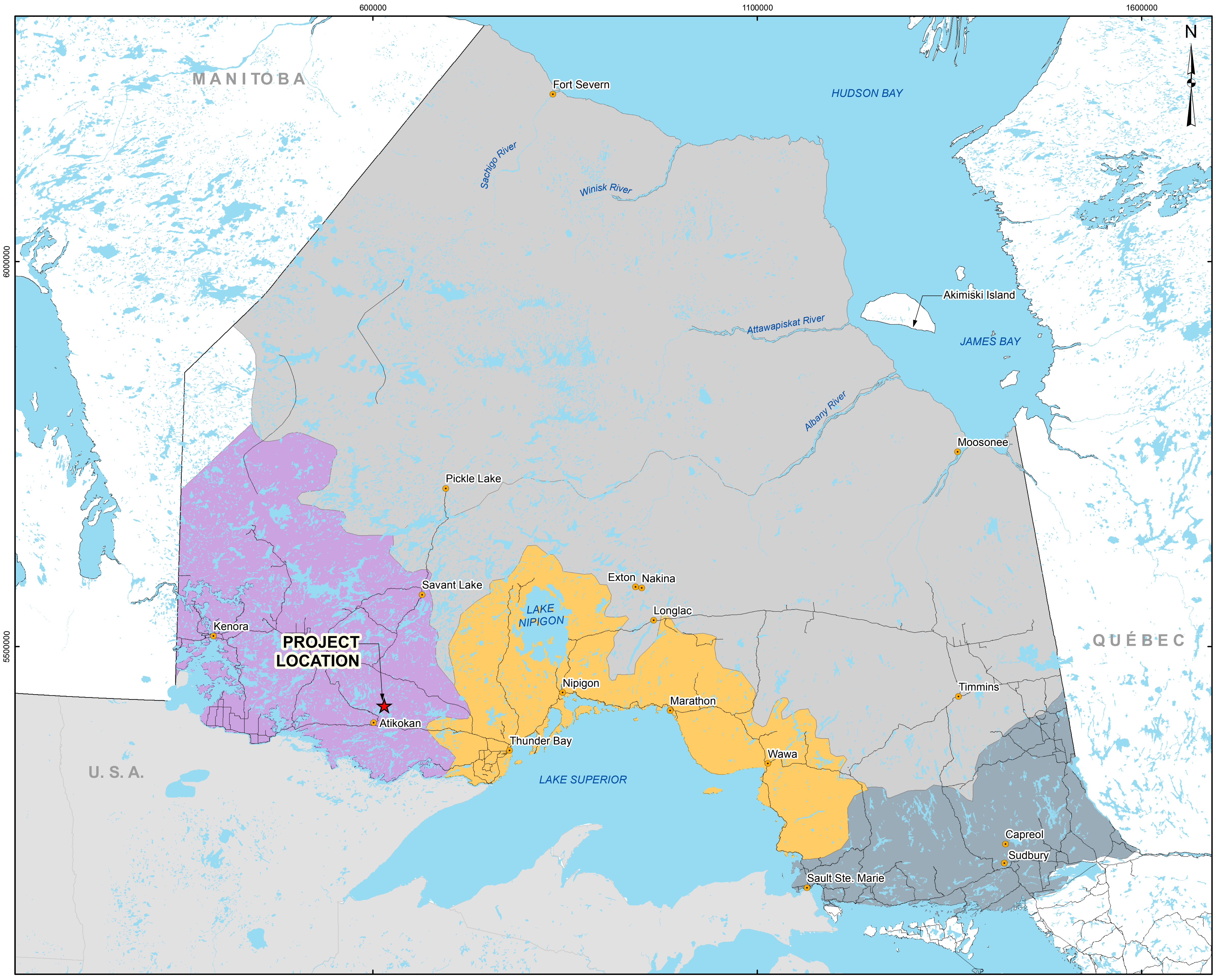

LEGEND

- Project Location
- Community
- Existing Rail Line
- Exisitng Road
- Waterbody

Historical Indian Treaties

- Robinson-Huron Treaty
- Robinson-Superior Treaty
- Treaty 3
- Treaty 9

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd
Base Data - MNR NRVIS, obtained 2004
First Nations Communities from Indian and Northern Affairs Canada.
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone15N

50 0 200

SCALE 1:5,000,000 KILOMETRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

ABORIGINAL TREATY LANDS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 5	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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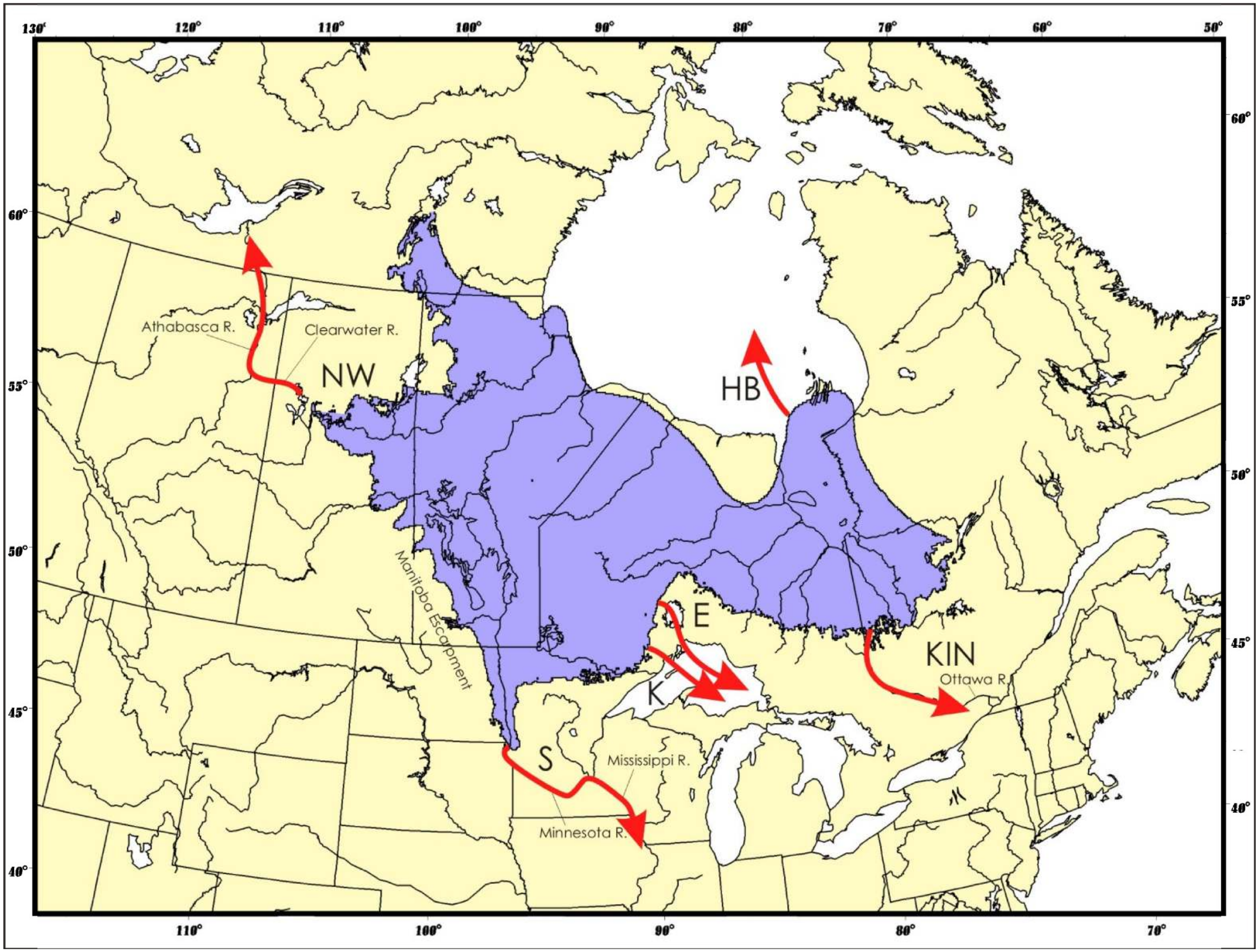

LEGEND

Major Drainage Routes

S - Southern outlet to the Gulf of Mexico
K - Kaministikwia route to the Superior basin
NW - Northwestern outlet to the Arctic Ocean
E - Eastern outlet system to the Superior basin
KIN - Angliers and Kinojévis outlets to the St. Lawrence River valley
HB - Final release of Lake Agassiz waters into the Tyrrell Sea

Lake Agassiz

REFERENCE

Leverington, D.W., Teller, J.T., 2003. Paleotopographic reconstructions of the eastern outlets of glacial Lake Agassiz, Canadian Journal of Earth Sciences 40, 1259-1278.

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
APPROXIMATE TOTAL AREA OCCUPIED BY LAKE AGASSIZ OVER ITS 5000 CALENDAR-YEAR HISTORY

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			NOT TO SCALE	VERSION 1
DESIGN	JO	3 Oct. 2012	FIGURE: 6	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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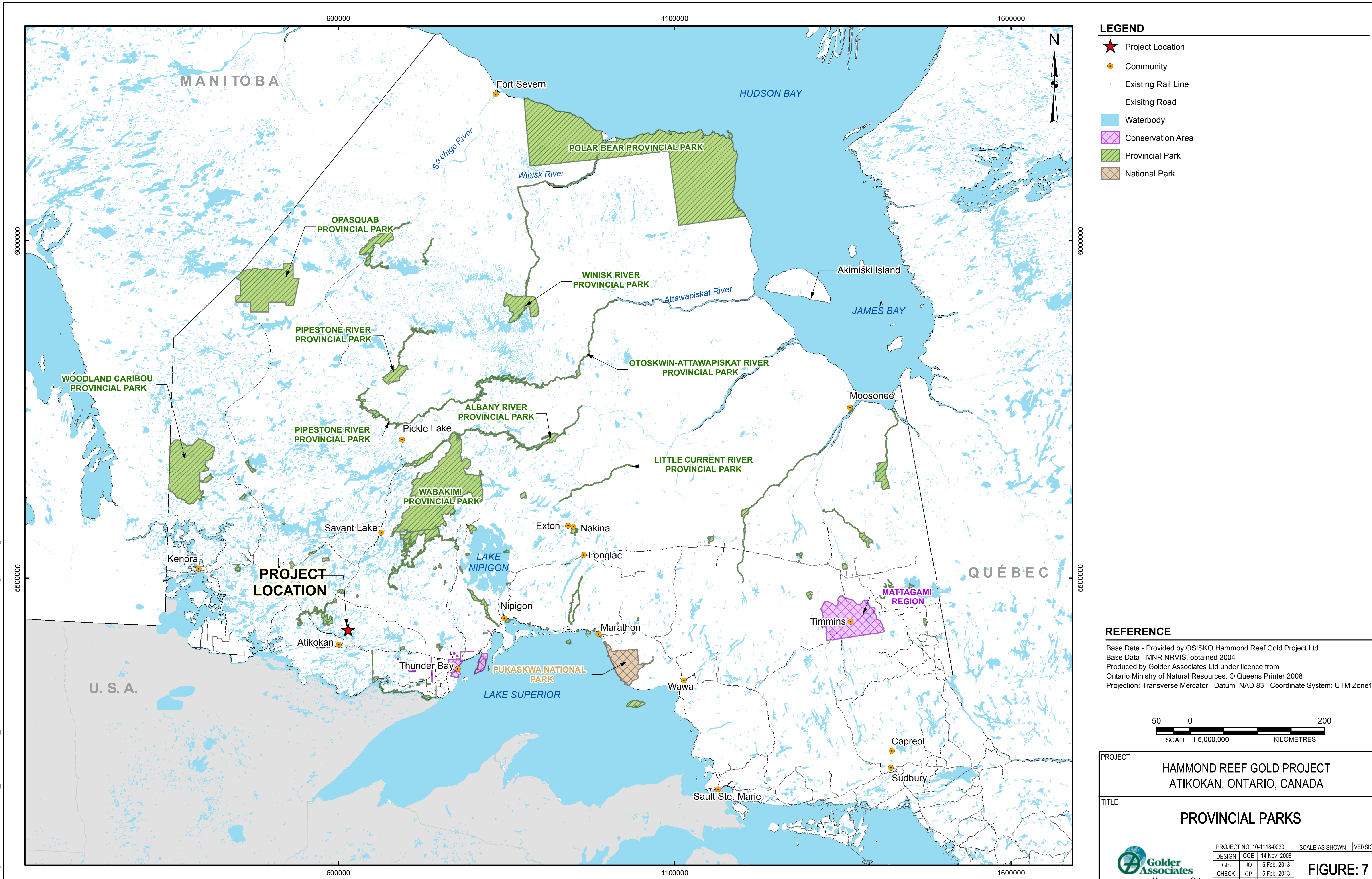

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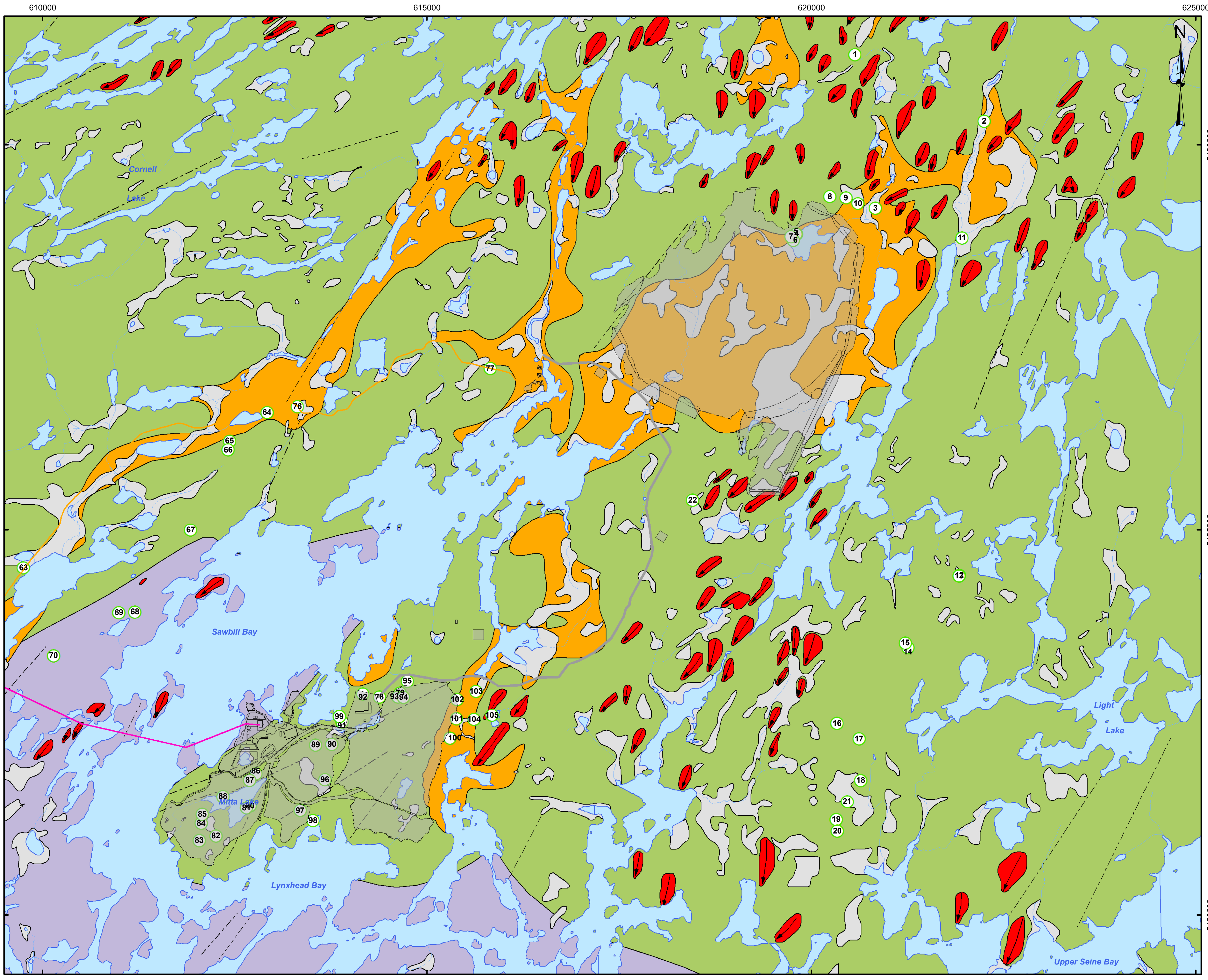

LEGEND

- Waypoints
- River/Stream
- Lake
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities
- Structural Lineament
- Organic Terrain (deposits of peat laid down in areas of high water table)
- Disturbed Ground (terrain significantly modified by industrial activity (mining/forestry))
- Outwash Deltas and Meltwater Channels (deposits of sand and gravel formed as glacier meltwater streams empty into glacial lakes)
- Till Veneer-Discontinous (unsorted deposits of boulders/gravel/mud deposited directly by a glacier; basal facies formed near base of glacier, ablation facies from debris higher in the ice)
- Scoured Bedrock (Bedrock scoured by ice and meltwater action, sediment removed)
- Rock Drumlin (rock-cored hill streamlined by glacier erosion, arrow indicates ice flow direction)
- Finlayson Moraine (ridge formed at the margin of a continental glacier)

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

500 0 500 1,000 1,500 2,000 2,500
SCALE 1:50,000 METRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

SURFICIAL GEOLOGY

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 8	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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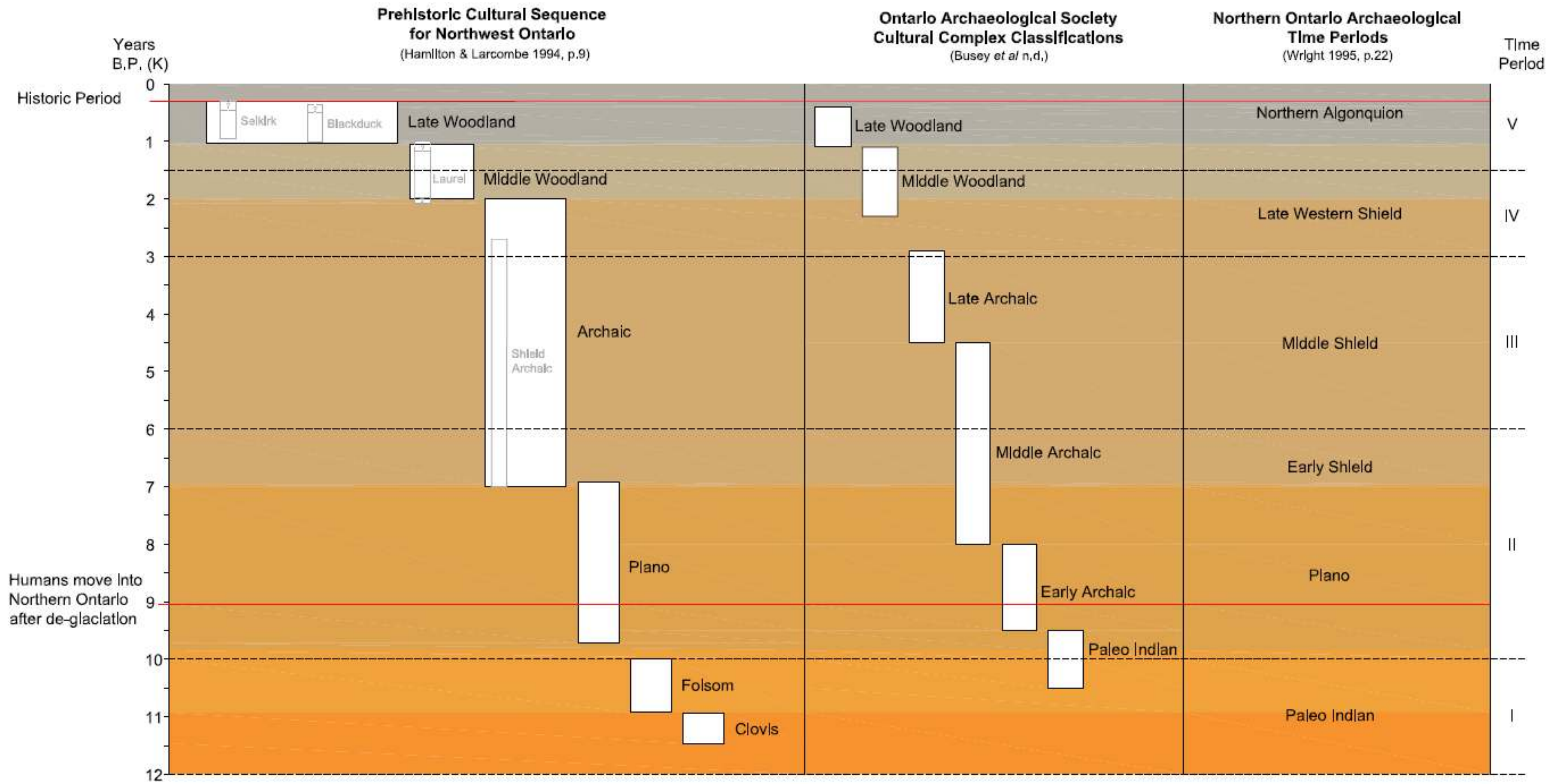

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

PRE-CONTACT CHRONOLOGY

PROJECT NO. 10-1118-0020			VERSION 1
DESIGN	JO	3 Oct. 2012	
GIS	JO	5 Feb. 2013	
CHECK	CP	5 Feb. 2013	
REVIEW	CP	5 Feb. 2013	

Golder Associates
Mississauga, Ontario

FIGURE: 9

REFERENCES

Busey, J. Daechsel, H. Hinshelwood, A. & Murphy, C. ;2010, **Summary of OntarioArchaeology**. http://www.ontarioarchaeology.on.ca/summary/contents.php;

Hamilton, S. & Larcombe, L., ; 1994, **Cultural Heritage Resource Predictive Modelling Project: Volume 1: Introduction to the Research. Centre for Archaeological Resource Prediction**, Lakehead University, Thunder Bay, ON.

Wright, J.V.,; 1995, **A History of the Native People of Canada (Volume I)**, Mercury Series Archaeological Survey of Canada, Paper 152, Canadian Museum of Civilization, Ottawa, ON.

NOTE

This figure is to be read in conjunction with the accompanying report.

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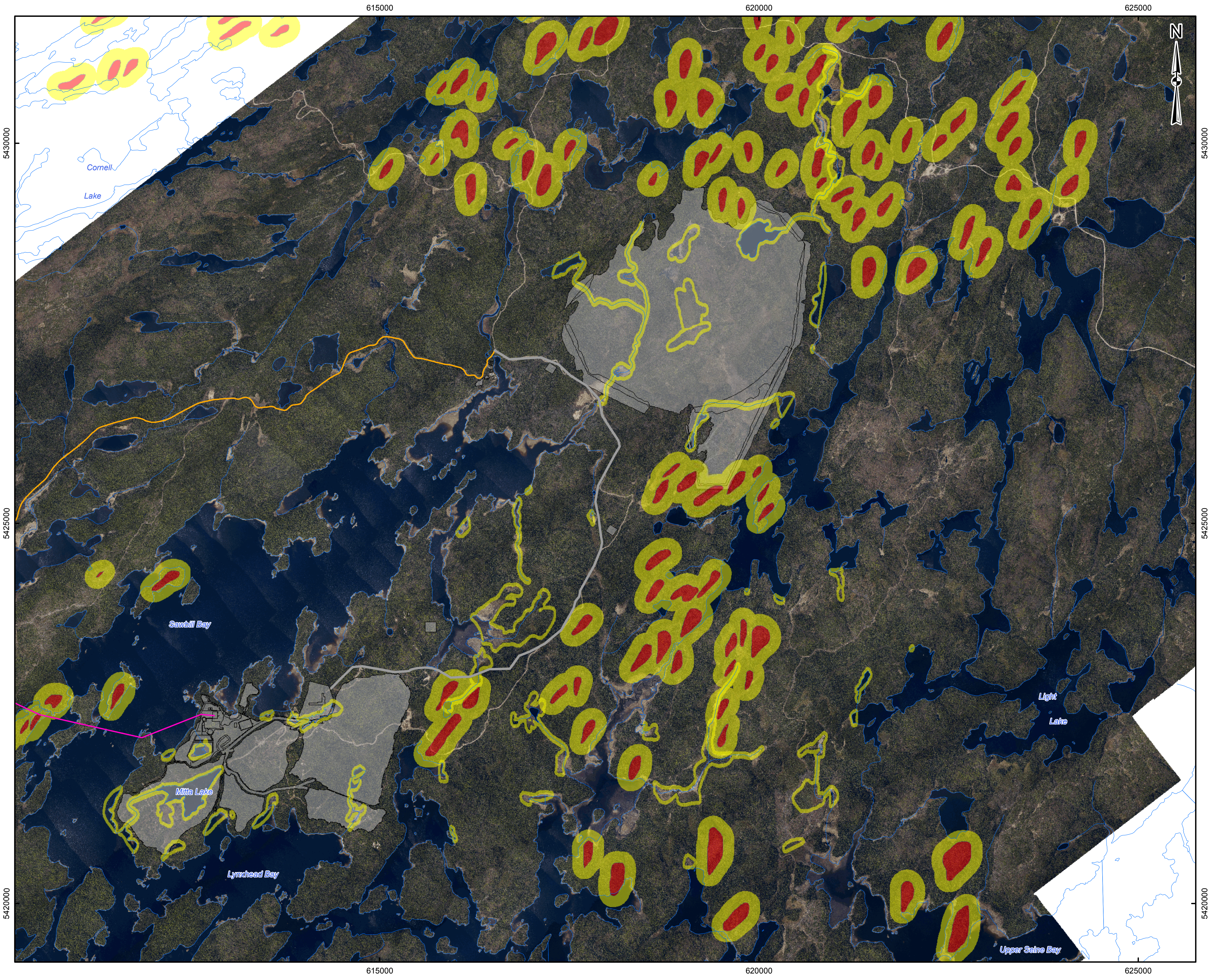

LEGEND

- River/Stream
- Lake
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities
- Archaeology Testing Area
- Rock Drumlin (rock-cored hill streamlined by glacier erosion, arrow indicates ice flow direction)

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Image - Provided by OSISKO Hammond Reef Gold Project Ltd (July 2010)
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

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SCALE 1:50,000 METRES

PROJECT

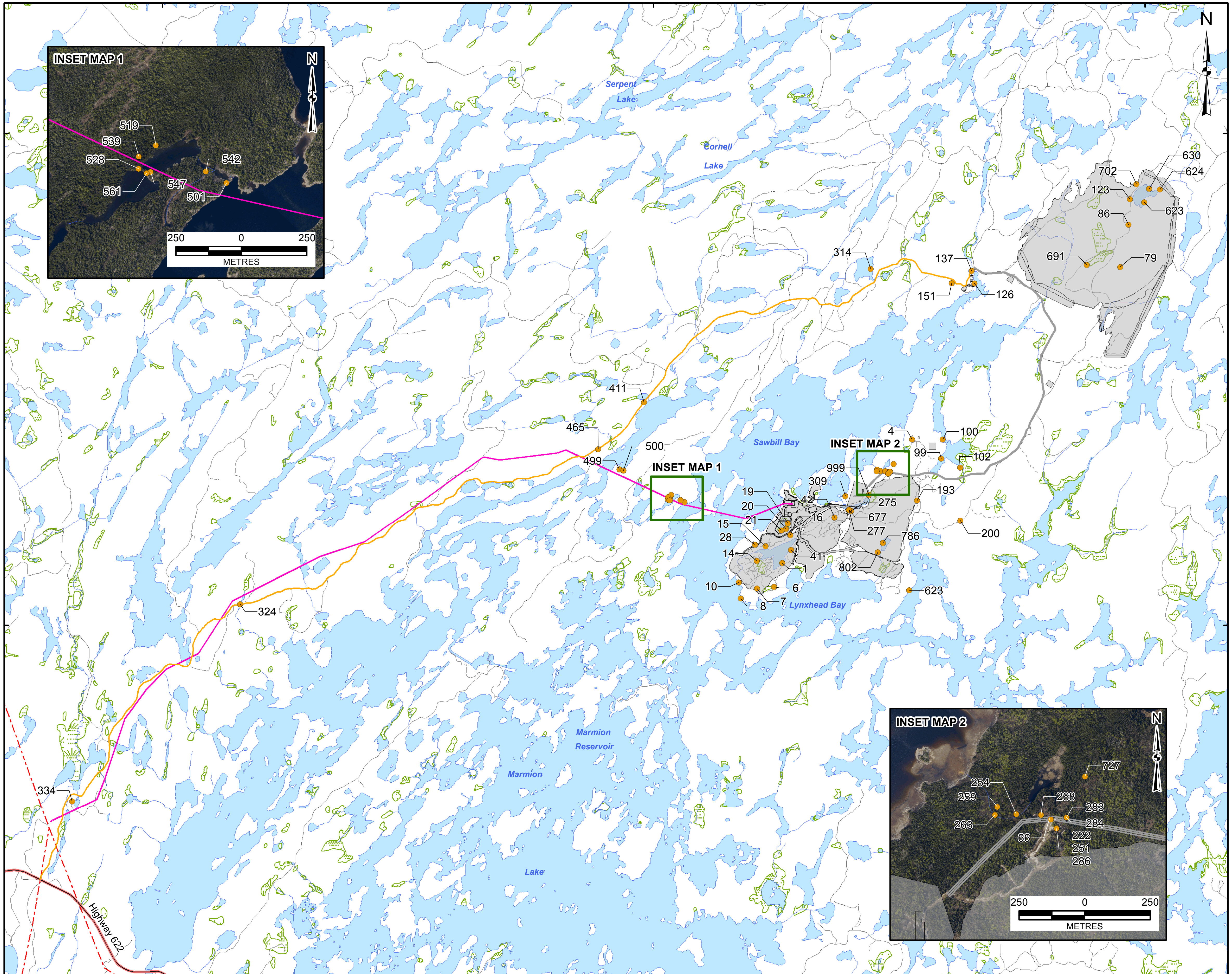
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

ARCHAEOLOGICAL POTENTIAL MODEL

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 10	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		



LEGEND

- Photo Location
- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

1,000 0 1,000 2,000 3,000 4,000 5,000
METRES

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

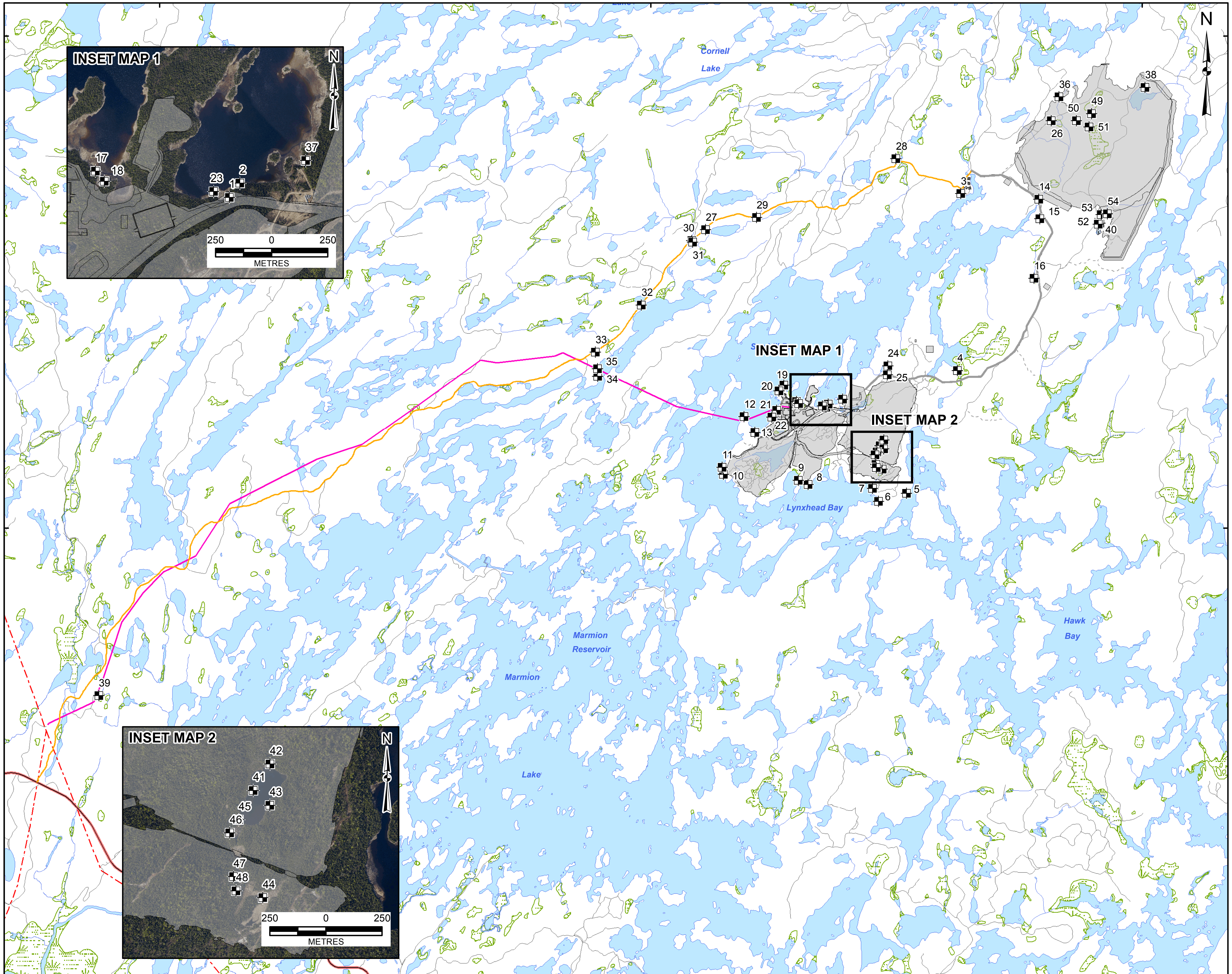
TITLE
PHOTO LOCATIONS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

FIGURE: 11

G:\Projects\2010\10-1118-0020_BrettResources_HammondReef\GIS\MXDs\Draft\CulturalHeritage\TSD\Stage1and2\Photolocations.mxd



LEGEND

- Test Pit Location
- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

800 0 800 1,600 2,400 3,200 4,000
METRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

TEST PIT LOCATIONS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 12	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

G:\Projects\2010\10-1118-0020_BrettResources_HammondReef\GIS\MXDs\Draft\CulturalHeritage\TSD\Stage1and2\TestpitLocations.mxd

11.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

This report has been prepared for the specific site, design objective, developments and purpose described to Golder by Osisko Hammond Reef Gold Ltd. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the Client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Tourism and Culture's *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

Report Signature Page

GOLDER ASSOCIATES LTD.

Jamie Davidson, B.A.
Project Archaeologist

Carla Parslow, Ph.D.
Senior Archaeologist

JLD/CP/mb/tg

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APPENDIX A

Photograph Waypoints

Plate Number	Photo Number	Waypoint Number	Easting	Northing	Zone	Direction	Comments
12	1	P1	612614.43	5421268.36	15U	South	Disturbance
11	4	A14 2	615259	5423780	15U	North	Ditch beside old forestry road
15	6	p4	612446.5	5420782.8	15U	Northwest	Disturbance
29	7	P5	612102.09	5420747.44	15U	Northeast	Disturbance
18	8	P6	611771.83	5420547.16	15U	South	Shoreline rock face
13	10	P004	611729.49	5420870.22	15U	East	Disturbance
27	14	7	612096.41	5421312.02	15U	Southeast	Disturbed area around water
28	15	8	612274.48	5421609.13	15U	East	Disturbance
14	16	670	612785.06	5421835.61	15U	Southeast	Thin soil over bedrock
20	19	14	612728.02	5422074.35	15U	Southwest	Muskeg
19	20	15	612691.6	5421960.83	15U	West	Steep slope
21	21	16	612596.86	5421930.41	15U	Southwest	Shoreline around pond
17	28	29	612063.03	5421639.28	15U	North	Disturbance
16	41	P34	612797.15	5421532.99	15U	Southeast	Excavator filling wetland
51	42	680	613681.36	5422191.56	15U	Southeast	Hammond mine
58	66	39	614752.57	5423116.19	15U	Northeast	mine shafts
6	79	667	619495.38	5427284.19	15U	North	Slope
7	86	668	619667.4	5428143.53	15U	West	Corduroy-type road
10	99	57	615851.03	5423389.65	15U	Northwest	Coniferous Forest
9	100	58	615883.77	5423781.87	15U	West	Bedrock outcrops
35	102	p060	616238.54	5423207.99	15U	North	Test pitting
4	123	777	619697.26	5428660.56	15U	South	Poorly drained soil
50	126	po13	616530	5426952	15U	West	Disturbance
48	137	p017	616473	5427203	15U	West	Creek
47	151	p0022	616064	5426958	15U	West	Well drained soil
23	193	115	615359.36	5422535.74	15U	South	Area of extracted sand
24	200	116	616241.23	5422131.32	15U	South	Modern water source on side of Reef Road
59	222	36	614774.47	5423081.56	15U	West	Around Sawbill Mine
60	251	36	614774.47	5423081.56	15U	South	Around Sawbill Mine
64	254	R6	614620.36	5423136.21	15U	Southwest	Tram line
63	259	R10	614548.33	5423164.4	15U	East	Tram line
65	263	128	614539.11	5423133.13	15U	Southeast	Tram line
57	268	building	614715	5423133	15U	Southeast	Cement foundations
52	275	681	614019.19	5422327.94	15U	Northeast	Hammond mine

Plate Number	Photo Number	Waypoint Number	Easting	Northing	Zone	Direction	Comments
54	277	K97	613976	5422346	15U	East	Hammond mine
30	283	150	614812.32	5423123.27	15U	North	Cast iron stove remains
31	284	150	614812.32	5423123.27	15U	Down	Cast iron stove remains
66	284	150	614812.32	5423123.27	15U	East	Sawbill Mine
61	286	36	614774.47	5423081.56	15U	Southwest	Imperial Keighley engine
55	309	Hist1	613902.36	5422630.07	15U	West	Hammond mine
34	314	162	614417.6	5427250	15U	West	Poorly drained soil
33	324	169	601580.2	5420432	15U	North	Rock outcrop
32	334	175	598156.9	5416423	15U	North	Steep slope
36	411	190	609803.74	5424536.63	15U	East	Test pitting
37	465	192	608869.22	5423578.84	15U	Southeast	Test pitting
38	499	682	609300.23	5423172.09	15U	West	Rock slope
39	500	683	609383	5423148.26	15U	West	Poorly drained soil
40	501	200	610624.7	5422507.96	15U	Northeast	Boat assessment
41	519	205	610355.45	5422651.05	15U	West	Poorly drained soil
42	528	206	610288.8	5422561.6	15U	North	Stone dam remains
43	539	208	610289.92	5422608.62	15U	North	Iron plate
44	542	209	610545.4	5422551.46	15U	West	Modified stone channel
45	547	212	610334.87	5422549.79	15U	West	Stone dam remains
46	561	807	610319.81	5422545.06	15U	North	Rock slope
49	607	P023	616458	5427223	15U	South	Test pitting
26	623	97	615203.35	5420712.9	15U	South	Test pitting
1	624	666	620307.41	5428860.91	15U	North	Typical forst cover
2	630	216	620084.95	5428873.57	15U	North	Typical forst cover
53	677	K97	613976	5422346	15U	Southeast	Hammond mine
3	691	120	618813.72	5427325.24	15U	East	Poorly drained soil
8	702	669	619828.98	5428969.73	15U	East	Landscape from top of cliff
62	727	TRE3	614883	5423280	15U	Southwest	Historic test trenches
22	786	preside 1	614666	5421677	15U	East	Poorly drained soil
25	802	wrtp6	614562	5421488	15U	West	Test pit area
56	309	500	614379.18	5422657.15	15U	West	Core storage

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APPENDIX B

Test Pit Locations

Test Pit Number	Waypoint Number	Easting	Northing	Zone	Dimensions (m)
1	tps1	613563	5422461	15U	15 (N-S) X 10 (E-W)
2	tps2	613610	5422524	15U	15 (N-S) X 20 (E-W)
3	Camp	616308	5426805	15U	400 (SW-NE) X 150 (NW-SE)
4	60	616238.54	5423207.99	15U	15 (N-S) X 20 (E-W)
5	97	615203.35	5420712.9	15U	20 (N-S) X 12 (E-W)
6	98	614633.55	5420546.01	15U	50 (N-S) X 15 (E-W)
7	99	614511.62	5420813.24	15U	30 (SW-NE) X 250 (NW-SE)
8	101	613202.58	5420891.6	15U	35 (N-S) X 10 (E-W)
9	102	613001.13	5420974.4	15U	15 (N-S) X 15 (E-W)
10	103	611473.62	5421092.89	15U	10 (N-S) X 10 (E-W)
11	104	611448.01	5421235.9	15U	40 (N-S) X 30 (E-W)
12	105	611893.24	5422267.99	15U	50 (N-S) X 20 (E-W)
13	106	612114.03	5421946.49	15U	15 (N-S) X 20 (E-W)
14	107	617894.69	5426684.63	15U	15 (N-S) X 15 (E-W)
15	108	617916.52	5426292.74	15U	100 (N-S) X 50 (E-W)
16	109	617797.71	5425079.89	15U	50 (N-S) X 25 (E-W)
17	31	612966	5422578	15U	30 (SW-NE) X 60 (NW-SE)
18	32	613007	5422533	15U	30 (N-S) X 30 (E-W)
19	33	612708	5422908	15U	15 (N-S) X 30 (E-W)
20	34	612604	5422792	15U	100 (SW-NE) X 25 (NW-SE)
21	35	612558	5422397	15U	40 (SW-NE) X 25 (NW-SE)
22	36	612460	5422258	15U	20 (SW-NE) X 15 (NW-SE)
23	37	613493	5422487	15U	15 (N-S) X 15 (E-W)
24	148	614822.18	5423302.65	15U	50 (N-S) X 25 (E-W)
25	150	614812.32	5423123.27	15U	15 (N-S) X 20 (E-W)
26	152	618150	5428286	15U	20 (N-S) X 15 (E-W)
27	183	611112.77	5426065.99	15U	400 (SW-NE) X 75 (NW-SE)
28	184	614987.03	5427512.61	15U	20 (N-S) X 15 (E-W)
29	185	612147.01	5426317.16	15U	75 (N-S) X 25 (E-W)
30	188	610830.23	5425848.79	15U	50 (N-S) X 50 (E-W)
31	189	610848.81	5425814.81	15U	200 (SW-NE) X 50 (NW-SE)
32	190	609803.74	5424536.63	15U	100 (SW-NE) X 50 (NW-SE)
33	192	608869.22	5423578.84	15U	150 (SW-NE) X 50 (NW-SE)
34	194	608916.45	5423091.87	15U	150 (SW-NE) X 50 (NW-SE)

Test Pit Number	Waypoint Number	Easting	Northing	Zone	Dimensions (m)
35	193	608914.16	5423244.51	15U	125 (SW-NE) X 50 (NW-SE)
36	153	618304.91	542876.72	15U	20 (N-S) X 15 (E-W)
37	155	613903	5422625	15U	50 (N-S) X 50 (E-W)
38	218	620060.63	5428960.82	15U	20 (N-S) X 15 (E-W)
39	na	598760	5416598	15U	20 (N-S) X 20 (E-W)
40	tp1	619138	5426196	15U	20 (N-S) X 15 (E-W)
41	PH1	614666	5421677	15U	15 (N-S) X 20 (E-W)
42	WRTP2	614741	5421795	15U	20 (N-S) X 10 (E-W)
43	WRTP3	614740	5421611	15U	25 (N-S) X 12 (E-W)
44	WRTP4	614709	5421200	15U	15 (N-S) X 12 (E-W)
45	WRTP5	614602	5421547	15U	8 (SW-NE) X 20 (NW-SE)
46	WRTP6	614562	5421488	15U	15 (N-S) X 10 (E-W)
47	WRTP7	614579	5421294	15U	40 (N-S) X 10 (E-W)
48	WRTP8	614590	5421231	15U	25 (SW-NE) X 8 (NW-SE)
49	TAILTP1	618968	5428427	15U	15 (N-S) X 20 (E-W)
50	TAILTP2	618661	5428285	15U	35 (N-S) X 10 (E-W)
51	TAILTP3	618918	5428158	15U	40 (N-S) X 7 (E-W)
52	TAILTP4	619104	5426179	15U	45 (SW-NE) X 6 (NW-SE)
53	TAILTP5	619167	5426372	15U	25 (SW-NE) X 8 (NW-SE)
54	TAILTP6	619293	5426389	15U	25 (SW-NE) X 6 (NW-SE)

\\golder.gds\gal\mississauga\active\2010\1118\10-1118-0020 brett resources-hammond reef\005 environmental\9200 archaeology\report\stage 1-2 arch assessment\1011180020-9200-r02 appendix b - test pit locations.docx

PART C

Cultural Heritage Resources Technical Support Document, Version 1

February 2013

OSISKO
HAMMOND REEF GOLD


HAMMOND REEF GOLD PROJECT
Cultural Heritage Resources Technical Support Document

VERSION 1

Submitted to:
Osisko Hammond Reef Gold Ltd.
155 University Avenue, Suite 1440
Toronto, Ontario M5H 3B7

Project Number: 10-1118-0020

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Distribution:

Alexandra Drapack, Director Sustainable Development

Cathryn Moffett, Project Manager Sustainable Development

Hammond Reef Gold Project
Cultural Heritage Resources Technical Support Document

Prepared by: Jamie Davidson, B.A.
Project Archaeologist
Golder Associates Ltd.
Date: February 19, 2013

Reviewed by: Carla Parslow, Ph.D.
Senior Archaeologist
Golder Associates Ltd.
Date: February 19, 2013

Approved by: Ken DeVos
Principal, Project Director
Golder Associates Ltd.
Date: February 20, 2013

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APPENDICES

APPENDIX 2.I
Osisko Hammond Reef Gold Project Stage 1 and 2 Archaeological Assessment

APPENDIX 3.I
Summary List of Project Activities for the Assessment of Environmental Effects

1.0 INTRODUCTION

Osisko Hammond Reef Gold Ltd. (OHRG) proposes the development of an open pit gold mine in northwestern Ontario, herein referred to as the Hammond Reef Gold Project (Project). This Technical Support Document (TSD) is one of a series of reports in support of the Project's Environmental Impact Statement/Environmental Assessment Report (EIS/EA Report).

The following reports have been prepared to support the EIS/EA Report:

- Atmospheric Environment TSD.
- Geochemistry, Geology and Soil TSD.
- Hydrogeology TSD.
- Hydrology TSD.
- Water and Sediment Quality TSD.
- Site Water Quality TSD.
- Lake Water Quality TSD.
- Aquatic Environment TSD.
- Terrestrial Ecology TSD.
- Aboriginal Interests TSD.
- **Cultural Heritage Resources TSD.**
- Human Health and Ecological Risk Assessment TSD.
- Socio economic Environment TSD.
- Alternatives Assessment Report.
- Conceptual Closure and Rehabilitation Plan.

The EIS/EA Report will summarize the findings of this TSD and of the above-listed supporting reports.

1.1 Purpose and Scope

The purpose of this TSD is to fulfill the assessment scope outlined in the Project's Terms of Reference (ToR) approved by the Ontario Minister of the Environment (July 2012), and in the Environmental Impact Statement Guidelines (EIS Guidelines) published by the Canadian Environmental Assessment Agency (CEA Agency) (December 2011).

This TSD describes the cultural heritage resources that may potentially be affected by the Project, as well as the results of the Stage 2 field survey. The objective of the Stage 2 field survey was to identify any cultural heritage resources in the Project Site and to advise OHRG on the management and/or protection of these resources.

The assessment of cultural heritage resources was undertaken by Golder Associates Ltd. (Golder), on behalf of OHRG, in order to fulfill environmental assessment requirements of the *Canadian Environmental Assessment Act* (CEAA) and the *Ontario Environmental Assessment Act* (EAA).

Further consideration of Aboriginal cultural heritage resources is included in the Aboriginal Interests TSD.

1.2 Report Organization

This TSD is structured as follows:

- Section 1 presents the purpose and scope of the TSD, an overview of the Project, the general assessment approach, Valued Ecosystem Components (VECs), assessment boundaries of the TSD, and other aspects of the Project relevant to the evaluation of cultural heritage resources.
- Section 2 describes known and potential cultural heritage resources (i.e., archaeological, built heritage, and cultural landscape resources) within the vicinity of the Project Site, and provides direction for the protection, management and/or recovery of these resources.
- Section 3 presents the assessment of Project effects on the cultural heritage resources, focusing on VECs. The effects assessment includes the screening of effects, the identification of additional mitigation measures, the description of residual effects, and the assessment of significance of residual effects.
- Section 4 outlines the monitoring requirements for cultural heritage resources for each of the Project's phases.
- Section 5 summarizes the findings of this report.

1.3 Project Overview

The Project overview and Project Description are provided in Chapter 5 of the EIS/EA Report. Characteristics of the Project setting relevant to the assessment of cultural heritage resources are described in Sections 1.3 to 1.8.

1.3.1 Project Location

The Project is located within the Thunder Bay Mining District in north-western Ontario, approximately 170 kilometres (km) west of Thunder Bay and 23 km northeast of the town of Atikokan (Figure 1-1).

Access to the Hammond Reef property is presently via two routes: the Premier Lake Road, a gravel road that intersects Highway 623 near Sapawe and the Hardtack-Sawbill Road, a gravel road that intersects Highway 622 northwest of the Town of Atikokan. The exploration camp is located at the northern end of Sawbill Bay in Upper Marmion Reservoir. The property is also accessible by water from the southwest end of the Marmion Reservoir at its access point from Highway 622. The existing Hardtack-Sawbill road located to the north of Finlayson Lake has been upgraded to provide an improved and more direct linkage to the Project Site in support of the expanded exploration program.

The Hammond Reef deposit is located mainly on a peninsula of land extending into the north end of the Upper Marmion Reservoir. The peninsula containing the deposit is surrounded by the Upper Marmion Reservoir on three sides with Sawbill Bay to the northwest and Lynxhead Bay to the southeast. The property also contains a number of smaller lakes. Mitta Lake is a small, steep-sided waterbody located atop mineralized zones of the deposit. Due to its location, the proposed open pit mine and secondary pit areas will encompass Mitta Lake.

1.3.2 Climate

The Project is located in a typical boreal climate region, which is characterized by long, usually very cold winters, and short, cool to mild summers. The annual temperature average is 1.6 degrees Celsius (°C) for Atikokan with a seasonal maximum of 16.2°C (average) for summer and a minimum of minus 15.4°C (average) for winter. Temperatures lower than minus 37°C have been recorded during the fall and winter. The annual normal total for precipitation is 788 millimetres (mm) (568 mm of rainfall and 220 mm of snowfall) for Atikokan with a seasonal maximum of 299 mm for the summer period.

1.3.3 Project Phases

The Project comprises four phases: construction, operations, closure and post-closure. With regards to assessment of cultural heritage resources, the most relevant Project phase is the construction phase.

Activities expected to have the greatest influence on cultural heritage resources during the construction phase include: clearing, grubbing, stripping, excavation and blasting during construction of all Project components. Effects during the remaining Project phases are assumed to be bounded by effects during the construction phase, and are therefore not considered further.

Additional details regarding activities expected to take place in each phase of the Project are provided in Chapter 5 of the EIS/EA Report.

1.3.4 Project Components

The Project consists of the following eight main components:

- Mine, including two open pits (i.e., east pit and west pit).
- Waste Rock Management Facility.
- Ore Processing Facility.
- Tailings Management Facility.
- Support and Ancillary Infrastructure.
- Water Management System.
- Linear Infrastructure.
- Borrow Sites.

For the purposes of this effects assessment the activities described above for the construction of all Project components are considered together. Project components are shown in Figure 1-2. A detailed description of Project components is provided in Chapter 5 of the EIS/EA Report.

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.;
Base Data - MNR NRVIS, obtained 2004. Produced by Golder Associates Ltd
under licence from Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

100 0 100 200 300 400
SCALE 1:10,000,000 KILOMETRES

Golder Associates
Mississauga, Ontario

PROJECT No.	10-1118-0020
SCALE	AS SHOWN
VERSION 1	
DATE	February, 2013
DESIGN	CGE
GIS	JO
CHECK	CP
REVIEW	CP

TITLE

PROJECT LOCATION

PROJECT HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

FIGURE: 1-1

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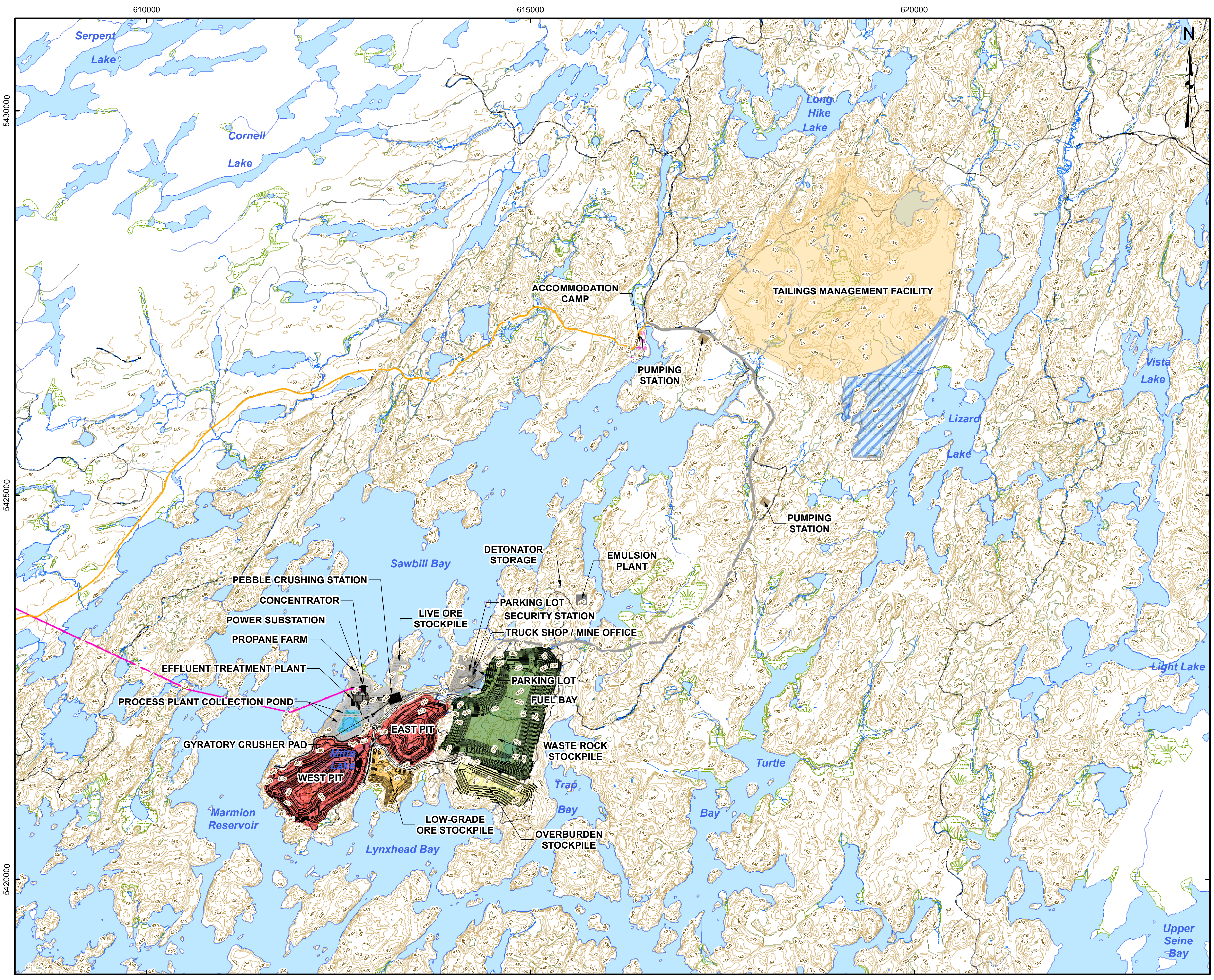

LEGEND

- Index Contour (5m interval)
- Ditch
- Marsh/Swamp
- River/Stream
- Road
- Trail
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Accommodation Camp
- Laydown Area
- Office and Truck Shop, Explosives Storage and Processing Plant
- Open Pits
- Low-Grade Ore Stockpile
- Overburden Stockpile
- Process Plant Collection Pond
- Pumping Station
- Tailings Management Facility
- Tailings Management Facility Reclaim Pond
- Waste Rock Stockpile

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

500 0 500 1,000 1,500 2,000 2,500
SCALE 1:50,000 METERS

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
SITE LAYOUT

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 1-2	
GIS	JO	11 Feb. 2013		
CHECK	CP	11 Feb. 2013		
REVIEW	CP	11 Feb. 2013		

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1.4 Assessing of Cultural Heritage Resource Potential

1.4.1 Archaeological Resources

There are a number of criteria employed in the assessment of archaeological site potential and are formulated in consultation with the Ontario Ministry of Tourism, Culture and Sport (MTCS) *Standards and Guidelines for Consulting Archaeologists* (2011). For pre-contact or prehistoric sites, these criteria are principally focused on the topographical features such as the distance from the nearest source of water and the nature of that water body, distinguishing elements of the landscape including ridges, knolls and eskers, and the type of soils found within the area being assessed.

For historic sites, the assessment of archaeological site potential is more reliant on historic research, as well as cartographic and aerial photographic evidence and the inspection of a study area for possible above ground remains or other evidence of demolished historic structures. Areas within 100 metres (m) of historic schools, churches, cemeteries, commercial buildings, industrial sites, railways and roads are required to be assessed. Also considered in the assessment is the proximity of known archaeological sites.

The guidelines for determining archaeological potential are essentially a coarse predictive model to be applied as a broad blanket throughout Ontario. Recent advances in computer technology have allowed predictive modeling based on geographic information systems (GIS) to include ever more variables if the time and data is available. Such an approach is taken in the construction of archaeological master plans (Heritage Quest 1999, Archaeological Services Inc. 1999, 2010) and enables the assessment of large and sometimes complicated areas.

Outside of more urban areas predictive modelling studies have been undertaken within the boreal forests of Manitoba (Ebert 2002) and northern Saskatchewan (Gibson & McKeand 1996). In northern Ontario, Lakehead University (Hamilton and Larcombe 1994), on behalf of the Ontario Ministry of Natural Resources (MNR), conducted a three-year research project into the application of predictive modeling to areas ill-suited for conventional cultural resources management (CRM) assessment techniques. The Project Site falls within this category due to its large size, difficulties with logistics and communications, largely unknown heritage resources and acidic soils – all hindrances to conventional assessment methods. In attempting to use predictive modelling to develop an assessment of archaeological potential, pre-contact resources form the primary focus.

The key variables assessed by Hamilton and Larcombe (1994) for Boreal Forest pre-contact sites are:

- Proximity to water: 0 to 50 m is high potential.
- Soil type: sandy soils, silt or clay with good drainage.
- Topography: elevated, linear glacial features.
- Slope: 0 - +/-10 degrees.
- Aspect: facing south, southeast or southwest.
- Landforms: eskers, knolls, paleo-beach strandlines, deltas, waterfalls and narrows.

These variables are geared towards locating larger and more predictable sites associated with fishing activities and non-winter habitation. Hunting, kill and butchering sites, are by their nature more spatially variable and almost invisible on a temporal scale (Wright 1999, McLeod 2009).

One variable that can influence site location and provide valuable information on trade and travel routes is the location and availability of raw materials used for making stone tools. There are no recorded sources of in-situ lithic raw material within the Project Site.

Predictive modelling is a useful tool; however, it must be cautioned that the ability to predict is directly correlated with our understanding of the cultures involved. Human behaviour and its influence by the environment may be linked to physical features currently identifiable such as water and topography; however, this understanding diminishes with increasing antiquity, and its environmentally deterministic approach is hampered by neglecting the subtle effects of cosmology, belief systems and ceremony on the actions and decisions of past cultures. This is further clouded if researchers only look where they predict such sites will be located; therefore, only those sites will be identified, in turn creating a self-fulfilling prophecy that will generate a false representation of effectiveness. This is not to invalidate this methodology, but rather to acknowledge the limitations when recommending archaeological potential; it is therefore prudent to be conservative with the exclusion of areas or designation of low potential and recognise that sites may occur in areas for non-tangible reasons.

1.4.2 Built Heritage Resources and Cultural Heritage Landscapes

In 2005 the *Ontario Heritage Act* was revised to provide municipalities and the province with enhanced powers to conserve Ontario's heritage. O. Reg. 9/06 was prepared to provide *criteria for determining cultural heritage value or interest*:

A property may be designated under Section 29 of the *Ontario Heritage Act* if it meets one or more of the following criteria for determining whether it is of cultural heritage value or interest:

1) The property has ***design value or physical value*** because it:

   - Is a rare, unique, representative or early example of a style, type, expression, material or construction method.
   - Displays a high degree of craftsmanship or artistic merit.
   - Demonstrates a high degree of technical or scientific achievement.

2) The property has ***historic value or associative value*** because it:

   - Has direct associations with a theme, event, belief, person, activity, organization, or institution that is significant to a community.
   - Yields, or has the potential to yield information that contributes to an understanding of a community or culture.
   - Demonstrates or reflects the work or ideas of an architect, artist, builder, designer, or theorist who is significant to a community.

3) The property has ***contextual value*** because it:

- Is important in defining, maintaining or supporting the character of an area.
- Is physically, functionally, visually or historically linked to its surroundings.
- Is a landmark.

1.5 Incorporation of Traditional Knowledge

Traditional knowledge in combination with other information sources is valuable in achieving a better understanding of the Project's potential effects on the biophysical and socio-economic environment. It also contributes to the description of the existing biophysical and human environment, natural cycles, resource distribution and abundance, and the use of land and water resources. A detailed discussion on traditional knowledge, including any aspects relevant to cultural heritage resources, is included in the Aboriginal Interests TSD.

1.6 Precautionary Approach

Environmental assessments are forward-looking planning tools, used in early stages of project development. As such, environmental assessments are based on a precautionary approach. This approach is guided by judgement, based on values, and intended to address uncertainties in the assessment. This approach is consistent with the Canadian government's framework for applying precaution in decision-making processes.

This TSD applies a precautionary approach to the assessment of potential Project effects. The Project is conservatively considered, and effects are advanced through the assessment process if they cannot be systematically removed from consideration through rigorous scientific evidence. The evaluation of effects is based both on regulatory compliance and on predicted changes to the existing environment. This captures and assesses changes to the existing environment that may fall outside or below applicable regulatory frameworks.

1.7 Selection of Valued Ecosystem Components

The Valued Ecosystem Components (VECs) selected for the assessment of cultural heritage resources, the rationale for selection of these VECs, and proposed indicators and measures are provided in Table 1-1.

Table 1-1: Valued Ecosystem Components Selected for Cultural Heritage Resources

Valued Ecosystem Component	Rationale for Selection	Indicators
Cultural Heritage Resources		
Archaeological Sites	■ The Project may affect archaeological sites through the disturbance and/or removal of soils during construction and/or operation which potentially contain the remains of archaeological sites.	■ Project related changes to archaeological sites and artifacts
Built Heritage	■ The Project may affect late 19th and early 20th century built heritage features	■ Project-related changes to 19th to mid-20th century built heritage features
Cultural Heritage Landscapes	■ The Project may affect cultural heritage landscapes	■ Project-related changes to cultural heritage landscapes

1.8 Temporal and Spatial Boundaries

1.8.1 Temporal Boundaries

Temporal boundaries define the temporal extents within which changes to the environment resulting from Project activities are considered. The temporal boundaries of the assessment of cultural heritage resources are directly related to the Project phases, namely:

- Construction phase: 30 months.
- Operations phase: 11 years.
- Closure phase: 2 years.
- Post-closure phase: 10 years.

Given that activities expected to have the greatest influence on cultural heritage resources occur during the construction phase, the construction phase constitutes the bounding scenario for this TSD effects assessment.

1.8.2 Spatial Boundaries

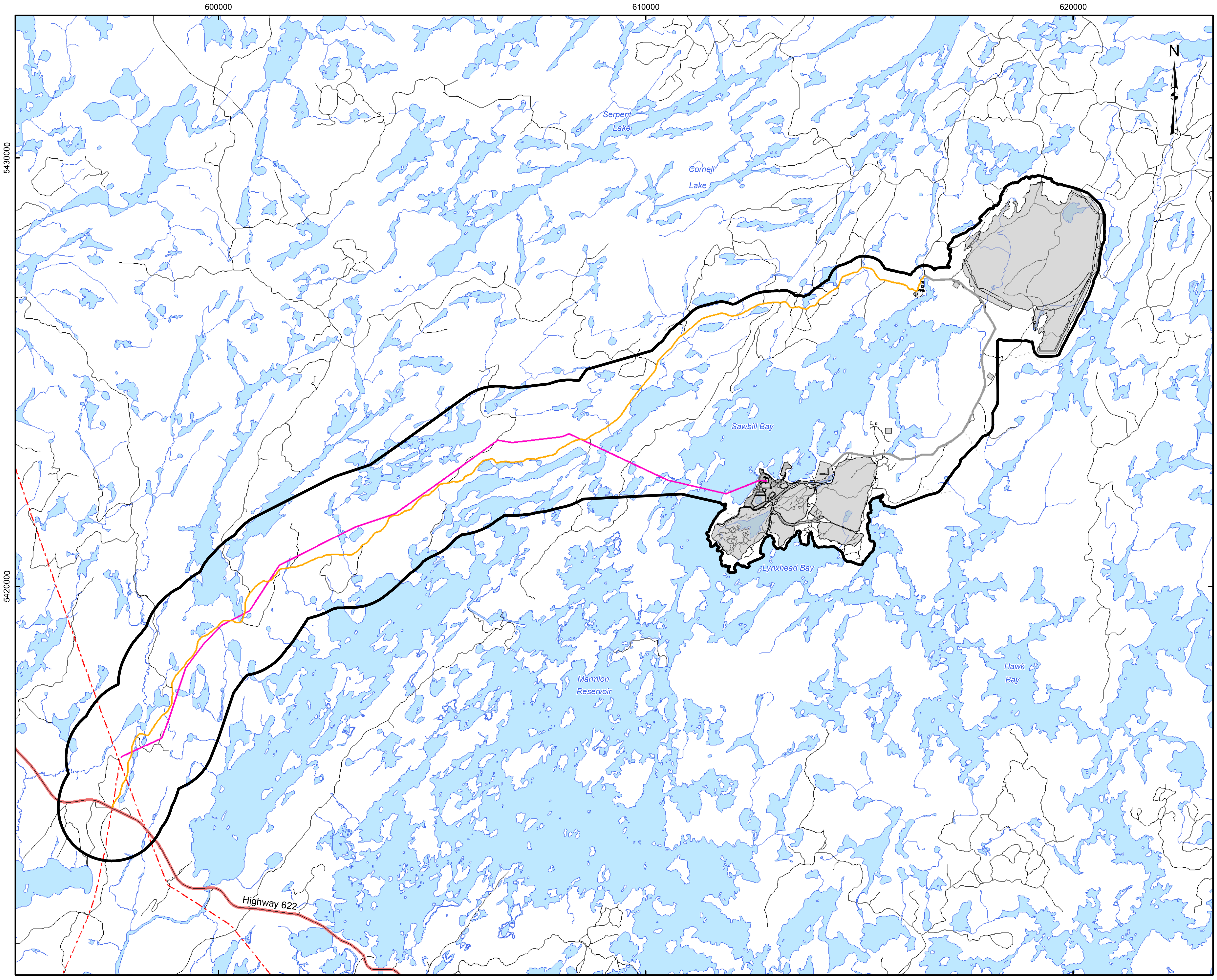
Spatial boundaries define the geographical extents within which potential environmental changes may occur. As such, spatial boundaries become the Project's study areas for cultural heritage resources.

Figure 1-1 presents the location of the Project within the broader regional context. Figure 1-2 depicts the Site Layout, including the Project components listed in Section 1.3.4.

A Local Study Area (LSA) was selected as the spatial basis for this TSD effects assessment. The LSA for cultural heritage resources encompasses the entire Project Site, and represents the entire area within which effects to cultural heritage resources may occur. Those areas that may be affected by the Project within the Project Site have undergone further archaeological assessment.

1.8.2.1 Local Study Area

The LSA is delineated in Figure 1-3. The LSA encompasses all Project components, including a buffer around the mine site road and the project transmission line as shown on Figure 1-3.



LEGEND

- Small Community
- Provincial Highway
- Road
- Existing Railway
- River/Stream
- Lake
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities
- Cultural Heritage Resources Local Study Area

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

2 1 0 2 4
KILOMETRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

CULTURAL HERITAGE
RESOURCES LOCAL STUDY AREA

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 1-3	
GIS	JO	8 Feb. 2013		
CHECK	SP	8 Feb. 2013		
REVIEW	SP	8 Feb. 2013		

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2.0 EXISTING CONDITIONS

2.1 Methods

The objective of the existing conditions characterization of cultural heritage resources was to compile all available information about the known and potential cultural heritage resources (i.e., archaeological, built heritage, and cultural landscape resources) within the Project Site and to provide specific direction for the protection, management and/or recovery of these resources.

The methods to achieve this objective included a screening for known archaeological, built heritage and cultural heritage landscape resources and desktop (background) research in and surrounding the Project Site, as well as a property inspection and an archaeological survey. The methods for compiling information on archaeological, built heritage and cultural landscape resources are provided in Sections 2.1.1 and 2.1.2.

The screening for archaeological, built heritage and cultural heritage landscape resources was conducted using the Ministry of Tourism, Culture and Sport's (MTCS) Standards and Guidelines for Consultant Archaeologists and the Archaeological Checklist for Evaluating Archaeological Potential (Government of Ontario 2011a, 2011b) as well as the Standard Checklist for Identifying Potential Heritage Sites (Government of Ontario 2010).

The cultural heritage resource existing conditions characterization was also conducted in compliance with the *Canadian Environmental Assessment Act's* Reference Guide on Physical and Cultural Heritage Resources (1996). In accordance with the reference guide, the framework for evaluating the potential environmental effects of a project on cultural heritage resources consists of the following steps:

- Consideration of all terrestrial and aquatic areas containing features of historical, archaeological, paleontological, architectural or cultural importance.
- Identification of cultural heritage resources located on and off-site which potentially could be affected by the Project.
- Assessment of the potential for the presence of cultural heritage resources first through site survey or inspection, then identify and evaluate them.
- Development of mitigation measures for any adverse effects to cultural heritage resources.
- Recommendation of appropriate strategies for additional assessment, if applicable.

This framework is not linear but iterative in nature as circumstances may change over the course of the assessment requiring the steps in this framework to be revisited.

2.1.1 Secondary Data Review

To meet the objectives of the existing conditions characterization, the following research strategies were employed:

- Review of relevant archaeological, archival, historic and environmental literature pertaining to the Project Site.

- Review of an updated listing of provincial and federal archaeological and sites within 1 km of the Project Site (MTCS).
- Review of conservation easements and municipally or provincially designated historical sites (MTCS, Ontario Heritage Trust).
- Review of the Canadian Register of Heritage Properties and lists of national parks, national historical sites, and historic canals (Parks Canada).
- Review of historic maps of the LSA.
- A property inspection of the site layout for the Project.

2.1.2 Field Studies

2.1.2.1 Property Inspection

The property inspection for the LSA was conducted from October 18 to 21, 2011 under archaeological consulting license P243 issued to Carla Parslow, Ph.D., of Golder by the MTCS. The property inspection was also conducted by Dr. Parslow. During the course of the initial property inspection the following indicators of archaeological potential were documented:

- Water sources: Primary and secondary water sources; past water sources (e.g., glacial lake shorelines indicated by the presence of raised gravel, sand, or beach ridges; relic river or stream channels indicated by clear dip or swale in the topography; shorelines of drained lakes or marshes; and cobble beaches).
- Accessible shorelines.
- Elevated topography (eskers, drumlins, large knolls, plateaux).
- Pockets of well drained sandy soil, especially near areas of heavy soil or rocky ground.
- Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases.
- Areas of Euro-Canadian settlement, industry and early historical transportation routes.

2.1.2.2 Additional Property Assessment and Stage 2 Survey

Additional assessment was conducted between July 17, 2012 and August 9, 2012 under archaeological consulting licence P218, issued to Scott Martin, Ph.D. The property assessment of the Project has involved consultation with and participation by First Nations peoples whose traditional territories may be affected by the Project.

A number for assessment techniques were employed to ensure consideration of all terrestrial areas containing features of historical, archaeological, architectural or cultural importance were documented.

The techniques employed included a GIS potential mapping based on proximity to water within 50 m and land elevation. This was coupled with on-site groundtruthing where field crews walked into areas identified in the GIS model as areas of cultural heritage resource potential and assessed the ground conditions first hand. Areas of cultural heritage resource potential were accessed by full-size vehicle (E350 van), on foot, and with the use of all-terrain vehicles (ATV) and boats. The use of ATVs permitted crew members to cross difficult terrain in a timely fashion while permitting an up close visual inspection of large sections of the study area that would otherwise have been inaccessible on foot or by van. Power boats were utilized to assess the entirety of the shore line surrounding the study area. The use of boats facilitated crew to inspect areas that were not accessible by land and to gain an appreciation for the types of terrain that would have been attractive to past travelers in the area. Boat based water survey allowed one to link suitable docking or landing sites with areas that were well drained and flat. This not only allowed for a more extensive survey of the study area to be carried out but also increased the efficacy of the assessment and minimized the potential risks to field crews that are associated with hiking through dense bush and swamp.

Regarding property assessment for archaeological resources, the MTCS Standards and Guideline for Consultant Archaeologists outlines the following Standards for Stage 2 test pit survey in northern Ontario and on Canadian Shield Terrain:

- **Standard 1** – Where the identified feature of archaeological potential is a modern water source, test pitting is required between 0 and 50 m from the feature. Space test pits at maximum intervals of 5 m. Survey is not required beyond 50 m.
- **Standard 2** – For features of archaeological potential other than modern water sources (e.g., historic water sources such as glacial shorelines), test pitting is required as follows:
  - Space test pits at maximum intervals of 5 m between 0 and 50 m from the feature of archaeological potential.
  - Space test pits at maximum intervals of 10 m between 50 and 150 m from the feature of archaeological potential.
  - Survey is not required beyond 150 m.

As no glacial shorelines or relic beach ridges were identified in the LSA, the test pit survey was conducted as per the previously described Standard 1. Test pits were excavated at 5 m intervals within 0 and 50 m of water sources; test pit survey was not required beyond 50 m.

Assessment of archaeological resources was conducted using standard shovel test assessment at five metre intervals. Excavated test pits were approximately 30 cm in diameter and excavated until either sterile subsoil or bedrock was reached. Where subsoil was reached, test pits were excavated at leave 5 cm into the subsoil. All soil from the test pits is screen through a 6 mm mesh to recover any archaeological material.

UTM coordinates were recorded for all finds. Coordinates were recorded by a Trimble Recon handheld Global Positioning System (GPS) unit and/or a Garmin eTrex Legend handheld GPS unit, both using the North American Datum (NAD) 83. GPS readings were accurate to 5 m or better. As per the *Standards and Guidelines for Consultant Archaeologists* (Section 5, Standards 2a, 2b), for small archaeological sites (less than 10 m by 10 m in area) one coordinate reading from the center of the site was taken. For archaeological sites larger than 10 m by 10 m in area, five readings were taken: one for the center of the site and the furthest site extents in each of the cardinal directions.

2.2 Results

2.2.1 Archaeological Context

2.2.1.1 Paleo-environment

At the peak of the Last Glacial Maximum (LGM) 11,000 BP all of the LSA would have been located under the Laurentide Ice Sheet (Harris 1987). During deglaciation and warming between 11,000 BP and 10,500 BP, the ice sheet retreated and advanced numerous times over the LSA before finally retreating north with the establishment of the Holocene.

Large glacial lakes were formed by melt water, with Lake Agassiz covering over a third of northern Ontario (Baldwin et al. 2000) and the Tyrell Sea covering the Hudson Bay Lowlands to the north. Lake Agassiz gradually drained, exposing the LSA around 9,300 BP (Thorleifson 1996, fig. 37) and making it available for colonization by flora and fauna.

As Lake Agassiz receded, the newly exposed land would have become vegetated, pollen cores suggest first with a spruce-dominated landscape that also included birch, poplar, larch and elm, before giving way to jack and red pine along with birch.

During the period between 9,500 and 6,400 BP, the climate became warmer and drier than currently being experienced, with this episode identified as the Atlantic Climatic. This period is characterized by the opening up of previously forested land to the south, giving way to grassland with stands of pine and poplar, and the advancement north of spruce forests into the tundra. Water levels were also at their lowest during this period due to the draining of glacial lakes following the eventual melt of the ice sheets blocking outflow north into Hudson Bay.

The current Boreal forest vegetation has been established since 3,600 BP with temperatures and seasonality also stabilizing at current levels around at this time. Minor cooling episodes around 2,500 BP and 500 BP resulted in the southerly retreat of the forests and corresponding development of peat and muskeg, while minor warming around 1,500 BP resulted in a temporary advance north of the tree line (Dawson 1984, Wright 1999).

While agreement as to the exact timing, extent and even nomenclature of Northern Ontario's climatic episodes and patterns varies, general consensus based on the archaeological record points to the contemporary nature of major climatic changes and major cultural changes within the Boreal Forest populations (Dawson in Steegman 1983).

2.2.1.2 Archaeological Cultural Chronology

The occupation of northwest Ontario has been sub-divided into a series of phases (periods). These are based on the material remains that survive within the archaeological record that allow the re-construction and differentiation of past life-ways. These subdivisions are an archaeological convenience to help better understand the development and change of cultures across the region, and benefit from the broad brush of hindsight and generalisation without the fine detail of local variation.

The broadest archaeological periods corresponding to northwest Ontario will be referred to as Plano-Indian, Archaic, Middle Woodland and Late Woodland, within which further temporal and regional subdivisions exist. The nomenclature utilized in this report corresponds to the chronology defined within Hamilton and Larcombe (1995:9) due to the locational proximity of their research to the LSA. Two other excellent overviews are provided by Wright (1999:22) and Busey et al. (n.d.). In discussing archaeological chronology in northwest Ontario, there are a number of themes and issues that are relevant across all phases:

- The general acidity of the soil on the Canadian Shield leads to a lack of organic preservation. As a consequence, there are large gaps in the understanding of various aspects of past cultures, ranging from mortuary practices and skeletal morphology through to diet and subsistence strategies. A huge portion of the non-lithic technologies developed in response to the demands of the environment leave no trace; with perishable organics such as bone tools, bark storage containers, hide clothing and birch canoes, all archaeologically invisible. Aside from rare occasions of survival due to waterlogged or chemically altered soils, such ephemeral yet crucial aspects must be inferred through site locations and the general survival requirements of people within a harsh climate.
- All inhabitants of northern Ontario have used its multitude of interconnected watercourses as a transport network to some degree, either by birch bark canoe or as trails when frozen in the winter. The affiliation with water also extends to the constant utilization of fish as a stable and dependable resource, without which habitation of the Shield would be virtually impossible.
- The highly mobile, multi-resource oriented, hunting and gathering lifestyle is a consistent theme throughout the history of northern Ontario. The very nature of the landscape and its dispersed resources mean that there are no other options to this flexible strategy in most of the Canadian Shield (Wright 1995:294). This results in a very widespread and relatively homogenous set of subsistence patterns and attendant tool kit across the boreal forests of northern Ontario. This is not to define the area as stagnant or culturally backward, but rather acknowledge the complexity and mobility required to populate such an expanse of ‘micro ecological zones’ (Hamilton and Larcombe 1995:13).
- A combination of thin soils, bioturbation, frost action and regular forest fires have resulted in the disturbance and mixing of any previously stratified sites, with artifacts congregating at the mineral/organic soil interface (Hinshelwood 1996). This has greatly hindered attempts to separate occupation phases and the research into the temporal and spatial chronologies of such sites. This issue is discussed by Wright (2004), and investigated in finer detail by Hinshelwood (1996).
- Settlement patterns consist of small social groups engaged in seasonal subsistence hunting and gathering, with the more productive late spring and summer seasons able to support greater concentrations of population. Winter hunting camps consisted often of a single family unit or groups of two to three at most. The stability and easily available resources associated with large fishing sites enabled the congregation of people to conduct ceremonies and trade, serving as community focal points within an otherwise dispersed routine.
- Habitation probably consisted of a form of shelter constructed from wood, animal hides and/or birch bark, in keeping with early ethnographic accounts (Wright 1999). These shelters do not survive archaeologically (Wright 2004:1533) at best leaving a hearth, post moulds and weight stones. They are, however, highly mobile and ideally suited to the Boreal adapted way of life. Large permanent settlement does occur further south during the Woodland period (Dawson 1983), but within the study areas there was likely little need for change until the encroachment of Europeans produced a reliance on trade goods and the pursuit of furs.

- Unlike southern Ontario, agriculture, permanent settlement, and large societies did not become established in the north during the pre-contact phase, except for the areas immediately adjacent to the Minnesota border along the Rainy River. Here, settlement and ceremonial mound building has been linked to a southern Hopewell influence and the access to wild rice and maize. Otter Castle, 30 km south of Ignace is an example of a large scale ceremonial site of the Late Woodland period (Dawson 1983).

2.2.1.2.1 Plano

9,000 BP to 7,000 BP - Also referred to as Plano and Early Shield, Period II

Initial habitation of southern Ontario followed the retreat of the ice sheets at the end of the Late Pleistocene 11,000 BP; however, the study areas for this Project was fully covered by ice and not open to inhabitation until the Holocene transition 2,000 years later.

Groups of hunter-gatherers moved north following caribou and other arctic species that colonized the tundra-like margins of the glacial lakes. Late Palaeo-Indian people of the Plains Plano culture moved north and east into the Thunder Bay area around 9,000 BP (Dawson 1983) with settlement concentrated along the strandlines of the retreating glacial Lake Agassiz. Population density was very low and large parts of the province were still under ice or water; as a consequence, late Palaeo-Indian sites are rare within northwest Ontario, mostly congregated within the Rainy River watershed, close to the Manitoba/Minnesota border (Wright 1972a:10, Reid 1980) or along the northern edge of Lake Superior (Dawson 1983:5). The retreat of the Lake Agassiz shoreline across the LSA during this period (Thorleifson 1996) likely provided ideal habitation for the northern movement of Plano people.

The incoming large game hunting populations ambushed migratory caribou herds at the various bottlenecks caused by the lakes and rivers of the region (Wright 1972:33), with small family groups following game across the tundra landscape in a varied and highly flexible manner. Site location has also been linked to raw materials found in bedrock outcrops within northwestern Ontario, utilized in the production of distinctive unfluted, ribbon-flaked, lanceolate spear points and knives. These lithic resources were often obtained by quarrying and used to produce blades, spear points, large scrapers and bifaces (Dawson 1983:4). There are a number of known sources of fine-grained lithic materials available in northern Ontario. Based on available information, the primary stone types utilized included Lake of the Woods chert, Gunflint Silica, Kakebaca chert, Jasper Taconite, Rossport chert, and Hudson Bay Lowland chert. Other stone material commonly recovered from archaeological sites in the North and Far North include rhyolites, siltstones, argillite, slate, greywacke, quartz, quartzites, pipestone and greenstone (Fox 2009).

2.2.1.2.2 Archaic

7,000 BP to 3,000 BP - Also referred to as Early Shield & Middle Shield, Period II & III

The retreat of the Laurentide Ice Sheet northwards, due to the onset of the Holocene brought with it a change in environmental conditions that consisted of the establishment of coniferous forests to a milder mixed and deciduous forest cover with open grasslands to the south (McLeod 2009). This facilitated a corresponding change in material culture and subsistence strategies. The migratory caribou herd dominated lifestyle of the Plano Indians was replaced by a more seasonally shifting hunting and gathering of caribou, deer, elk, moose, fish and plant resources. This is reflected in the archaeological record by a decrease in the size and change in style of projectile points, and the appearance of hooks and net sinkers. With specific regard to projectile points, this change appears linked with the adoption of the atlatl (spearthower) identified by the transition from stemmed to notched points (McLeod 2009:10). In adapting to a forested environment, new woodworking tools such as axes, adzes and chisels were developed (Dawson 1983:8).

A defining technological change of the Archaic Period was the development of copper tools, produced from near surface copper deposits found on the shores of Lake Superior and traded all across eastern North America. Copper work of this period consisted of heating and hammering the ore to a desired form, rather than smelting and casting. This was achievable because Lake Superior copper ore is unusually pure, allowing it to be malleable at lower temperatures and shaped with simpler tools. The earliest evidence of copper working comes from South Fowl Lake on the Ontario/Minnesota border, providing a radiocarbon date of 6,800 BP for the wooden haft of a copper projectile point (Wright 1995:126).

The Holocene induced melting of the glaciers and ice sheets covering northern Ontario resulted in a complex and changing arrangement of glacial lakes and meltwater flow. Artificially high water levels were a result of ice blocking the flow of melt water northwards along the watershed gradient, forming glacial Lake Agassiz over the LSA. Eventual ice mass wastage around 6,000 BP removed this blockage resulting in a dramatic draining episode and a drop in lake levels of around 100 m. This has important implications for archaeological sites of the archaic period within northern Ontario due to their concentration in proximity to the lakeshores and watercourses of the day. Water levels gradually rose to their presently observable level by around 4,000 years BP, therefore submerging the majority of waterside occupation sites between 9,000 and 4,000 years BP.

2.2.1.2.3 Middle Woodland

3,000 BP to 1,000 BP - Also referred to as Late Western Shield, Initial Woodland, Laurel, Period IV

Within southern Ontario, the Woodland Period is split into three distinct phases, early, middle and late with influence from the preceding Laurentian cultures of the Great Lakes/St. Lawrence region. Northwest Ontario is distinct in that it divided into the Middle and Late Woodland and is more influenced by Plains cultures to the south and west.

The adoption of pottery, for archaeologists, marks the beginning of the Woodland Period. It is important to stress that this provides a marker within the archaeological record that is convenient to use as a subdivision. It is not indicative of a change of people through migration, rather a continuing development of the Plano Indian and Shield Archaic way of life by encompassing new technological advancements.

The introduction of pottery, 2,200 to 2,300 BP (Wright 1999:726), is postulated to have diffused into northwestern Ontario from the southwest or east and, with it, the development of the Laurel culture within the northern forests of the Canadian Shield, running east from Saskatchewan to northwestern Quebec. The relative homogeneity of culture across such a large area is again a reflection of the specialized adaption to the seasonal way of life that permeated the boreal forests.

Laurel ceramics were manufactured using the coil method and were stylistically conical with a tapering base. Decoration was restricted to the upper portion of the vessel’s exterior surface and consisted of a variety of techniques that left impressions or drag marks, with Initial pottery being thick walled and crude.

In addition to the introduction of pottery, the bow and arrow began to replace the atlatl as the dominant hunting technology, resulting in a change of projectile point morphology. Chipped stone technology was dominated by small side-notched arrowheads and a wide range of scraper varieties (Wright 1999:743). Tools were based mainly on relatively small nodular chert cores with a heavy reliance upon Hudson Bay lowlands nodular chert

(Wright 1999:747) in contrast to the previously quarried rhyolite and quartzite. This resulted in a marked decrease in the size of all tool types and decline in the occurrence of biface knives, along with an increase in projectile points and scrapers (Wright 1995:272, 274).

A well-developed bone technology toolkit is suggested for Laurel culture by the unusually well preserved Heron Bay site on the north shore of Lake Superior, with hafted beaver incisors, bone awls, toggle harpoons, needles, beads and snowshoe netting recovered (Dawson 1983). Copper tools were concentrated around the Lake Superior area and were traded further afield for exotic stone, obsidian and marine shell into Manitoba, southern Ontario and the northern United States (Ross 1979, Harris 1987).

The spread of Laurel culture has been linked to the northward expansion of wild rice due to late Holocene cooling; however, no Laurel components have been found associated with microfloral evidence of rice or rice processing features. Recent microfossil analysis on middle and late woodland pottery fragments has revealed the preparation and consumption of maize on sites within the southern edge of the boreal forests. No evidence for agriculture survives at these sites; however, the results suggest trade networks linked to the maize producing cultures upon the plains to the south (Boyd and Surette 2010:120).

Within northwestern Ontario, the Laurel culture is accepted as ancestral to the following Late Woodland complexes, and subsequent Ojibwa and Western Cree (Wright 1999:726).

2.2.1.2.4 Late Woodland

1,000 BP to 400 BP - Also referred to as Northern Algonquian, Terminal Woodland Algonkian, Period V

The Late Woodland period in northern Ontario is defined arbitrarily based on ceramic distinctions. With the climate and landscape prohibiting the adoption of agriculture above the Rainy River, there does not appear to have been the same profound change in lifestyle that occurred amongst the agricultural populations to the south. The Boreal forests and lichen woodlands of the shield are environmental constraints on the density of population that can be supported (Wright 1999:725), and also deterministic of the subsistence methods of such populations. Fish and large game were, as before, essential to supporting human existence within northern Ontario.

Settlement patterns reflect this focus on fishing and caribou hunting, with fish sought in the spring, summer and fall, and caribou hunted in the fall and early winter. Sites are located on level, well drained ground with protection from northwest winds, and access to canoe landing beaches. Larger summer encampments were located in proximity to favourable fishing locations such as lake narrows and rapids, while the probable location of dispersed winter camps on frozen creeks has led to a lack of surviving archaeological information (Wright 2004:1492).

It is tempting to view the late woodland in northwest Ontario as comprising discrete ceramic-producing cultures; however, aside from variation in ceramic decoration there is very little observable difference in lithic tools or settlement patterns.

Eschewing the gender trap it is reasonable to assume that ceramic production and decoration can be seen as a female product and therefore changes in ceramics on a site are indicative of female mobility within family groups. The movement of women through marriage served to construct blood ties between various wide ranging bands, with long distance kinship functioning as a safety net against the unreliable resources of the north (Wright 2004:1489). The stability of the lithic assemblages further suggests that men as the hunters were matrimonially immobile, requiring intimate knowledge of the surrounding landscape to succeed (Wright 1972b).

Late Woodland sites with any significant amount of ceramics generally have more than one tradition represented, again highlighting the mobility of women through inter-complex marriage (Wright 2004:1507).

The Late Woodland period did not appear uniformly over northern Ontario. In some areas, it can be identified around 1,500 BP while in other (usually remote) areas, Laurel-type pottery continues until 1,000 BP. A variety of pottery types are typically found at Late Woodland sites, ranging from Iroquoian through to vessels from Michigan and Wisconsin, provide evidence of trade networks and contacts with the south (Dawson 1983, Wright 2004).

Blackduck

The Blackduck complex has been identified based on the existence of a contrasting pottery tradition to Laurel. Vessels were large globular and manufactured using the paddle and anvil technique, or formed inside textile containers. Decoration is diverse, consisting of horizontal and/or oblique lines along with circular indentations or puncates, and is present on the neck, rim, lip or inner rim of the container.

Tools associated with the Blackduck culture include small triangular and side-notched arrowheads, a large array of scrapers, both stone and bone, ovate knives, stone drills, smoking pipes, bone awls needles and harpoons, and copper tools.

The development of Blackduck from the preceding Laurel is generally accepted (Wright 2004:1501) and extends through the southwest part of north Ontario, Manitoba, northern Minnesota and eastern Saskatchewan.

Selkirk

The Selkirk complex is again characterized by its pottery, manufactured with the same techniques as Blackduck, similar in form but distinguished only by decoration. If decorated, it is usually only a single row of puncates or impressed with a cord wrapped stick (Dawson 1983). The non-ceramic assemblage associated with Selkirk is almost identical to that found on Blackduck sites, with the two often being found together in northern Ontario.

The Selkirk are represented as the ancestors of the present-day Cree (McLeod 2009:14); however, it must be noted that inferring ethnicity based on pottery traditions is problematic. The interchangeable nature of both cultures purported to precede the Cree and Ojibwa in northwest Ontario highlight this and caution against focusing on a single technological element when talking of a cultural construct, such as ethnicity. It is possible to identify the Selkirk and Blackduck as ancestral to a Cree-Ojibwa complex but further separation is perhaps misrepresentative (Wright 2004:1501).

Selkirk pottery is found mainly to the north of northwestern Ontario and into northern Manitoba, Saskatchewan and northeastern Alberta. Attempts to produce a ceramic chronology in relation to the Blackduck complex have been hampered by the lack of stratified sites and the validity of carbon-dating attempts. It is now generally accepted that Selkirk is slightly later, and did not develop from Blackduck; diffusing in from the northwest rather than developing out of existing traditions.

A number of other traditions have been identified based on additional decoration variation; however the uniformity present within the non-ceramic assemblages suggests caution against over-emphasising small differences and the subscription to regional patriarchy (Ibid: 1517).

Rock Art

The Late Woodland also sees the emergence of rock art as an expression of spiritual life and ritual. Rock paintings, known as pictographs, comprised of red ochre mixed with a binding agent such as bear fat or sunflower oil, are typically found within western Ontario on the vertical faces of cliffs where they enter a body of water (Rajnovich 1994). Pictographs constitute a form of written language, signifying sounds, objects and ideas in reference to subsistence, geography, climate, history and also sacred or religious beliefs and visions (Busey et al.), although they could have served a variety of cosmological functions and even political ones by marking territory (Wright 2004:1545). The damming of lakes and rivers by the timber and hydroelectric industries may have undoubtedly drowned many sites, while the fragile nature of the paintings themselves, when exposed to the elements, also reduces their chances of survival. Rock etchings, or petroglyphs, are relatively rare within the Canadian Shield, with most examples occurring within the south and east of the province. Likewise, petroforms, or artificial arrangements of stones in pits or cairns, are not thought to be common within the LSA (Dawson 1983).

2.2.1.3 Previous Archaeological Research

There has been a relative paucity of work within the Regional Study Area (RSA); however, this should not be taken to mean that there is a lack of archaeological and other cultural heritage resource sites. In fact, the opposite is the case (i.e., a large amount of potential sites remain).

Samuel de Champlain's journal of 1610 is the earliest historical reference of pre-contact sites in northern Ontario and includes a vague reference to "Indian diggings" for copper on the shores of Lake Superior (Dawson 1999). Reports of pre-contact sites in the area continued in French reports of the area up to 1750. By the mid-19th century control of the area had shifted and references to pre-contact sites were continually being made in reports from the Geological Survey of Canada. Although no formal excavations were conducted, artifacts were nonetheless collected and reported on (Dawson 1999). The first report of a pre-contact site written by an archaeologist was by Sir Daniel Wilson in 1856, who wrote about pre-contact copper mines on the shore of Lake Superior. Since the 1960s systematic research has intensified in the northern boreal forest, however this research often is focused on the shores of Lake Superior and Lake Nipigon. What this research has shown is that at the earliest ice-free times, human populations were congregating on the shorelines of the glacial lakes.

Most work within northwest Ontario has been concentrated within the Lake Superior and Lake Nipigon regions, along with the southwest portion of the province containing the Rainy River, Quetico Park and the Lake of the Woods. John Pollack conducted initial surveys of the northwest interior as well as published the first cultural sequence for the mid-northeast region (Dawson 1984). Additionally Pugh (1971) published results of survey activities along the more northern Winsk River drainage.

Historic archaeology in northern Ontario has primarily been concentrated on fur trade posts. In northwestern Ontario work has been undertaken along the Severn River (Pilon 1981, 1982; Pollock 1976) and at Osnaburgh House (Bundy 2010). Additionally, Harris (1987) provides an overview study of the region, while more detailed investigations have been published by Lytwyn (1986) and Anik (1976a, 1976b).

General overviews of northern Ontario prehistory are provided by Dawson (1983) and Wright (1972a, 1972b, 1995, 1999, 2004). A predictive modelling study undertaken by Lakehead University also provides an excellent and detailed synopsis of the area (Hamilton and Larcombe 1994).

In order that an inventory of archaeological resources could be compiled, the registered archaeological site database (ASDB) kept by the MTCS were consulted. In Ontario, information concerning archaeological sites is stored in the ASDB maintained by the MTCS. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13 kilometres east to west and approximately 18.5 km north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found.

At present there are no registered archaeological sites within the limits of the LSA or within a five kilometre buffer around it (von Bitter, per comm., July 23, 2010). There have also been no archaeological assessments previously conducted on the LSA or on land adjacent to the Mine within 50 metres.

2.2.2 Historical Context

2.2.2.1 Regional Historical Context

The northern portions of Ontario, north of Lake Superior and south and west of Hudson Bay and James Bay had a number of successive exploration ventures beginning in 1610 with the Hudson's Bay Company (HBC), but more extensively in the mid-18th century. Henry Kelsey was the first of the European explorers to venture into the northern part of Ontario and further east. On Kelsey's second expedition (1690-2), he explored from York Fort in Hudson Bay and extended the HBC trade west to the Saskatchewan River. Anthony Henday was the second explorer of European descent to venture into the Petit Nord of Ontario, penetrating further west and well into the Prairies.

During this time of initial European exploration, Charles II in 1670, granted the Hudson Bay Company (HBC) exclusive rights for British trading in the land drained by rivers flowing into Hudson's Bay, referred to as Rupert's Land. Rupert's Land is composed of a number of different physio-geographic regions that include; the Hudson Bay Lowlands located along Hudson and James Bays consisted of marshy lowlands with slow-moving rivers; the Canadian Shield located to the south, east and west of the Hudson Bay Lowlands consisting of rugged terrain, exposed bedrock, glacial features and numerous lakes. Further to the west were the Prairies and to the south were the Great Lakes region (Harris 1987).

Unlike the HBC, French interests within the area were supported by independent traders and voyagers from Montreal and the St. Lawrence venturing into western and northern Ontario through the Great Lakes. Both the British HBC and the French St. Lawrence traders (SLT) vied for control over the rich and highly productive resources of Rupert's Land. In 1686, French forces from the St. Lawrence captured Fort Albany and a few years later, took York Factory and Fort Severn on Hudson Bay. This enabled a French monopoly for fur trade in the Hudson Bay region until 1713 when the Treaty of Utrecht relegated the French to the southerly St. Lawrence – Great Lakes route into Ontario's hinterland, with the English regaining control over their forts and over the northern Hudson Bay routes (Harris 1987).

Intermixed within the network of expanding HBC and SLT posts were groups of highly mobile boreal forest adapted First Nations groups, consisting mainly of Cree and Ojibway, with Assiniboine located further to the west around Lake Winnipeg. In the early period of the fur trade, First Nations groups acted as middlemen trading furs for European goods, such as firearms, ammunition, blankets, tobacco and various other objects between European traders and other First Nations groups further afield. As tensions rose between the SLT and the HBC so did the relations between local First Nations groups. Settlement and warfare patterns changed with local Cree families and communities settling beside or within close proximity to established forts and trading posts. These families would supply the posts with provisions and locally obtained furs. Eventually, the First Nations and Europeans intermixed giving rise to what is now referred to as the Métis.

With these increased tensions between the HBC and SLT, First Nations groups allied with the different trading companies. In doing so, traditional lands shifted as Aboriginal groups expanded and retracted vying for control over important trapping routes and transportation corridors. By 1720 the majority of the HBC lands were controlled by Cree bands. The Cree in these areas had a number of allies, including the Siouan-speaking Assiniboine to the west and the Algonquian-speaking Ojibway to the south. The Cree's prime rivals were the Athapaskan-speaking Chipweyan who were located to the north of the Churchill River. However, by 1740, the Ojibway expanded north and east of Lake Superior and occupied the territory between Lake Winnipeg and Hudson Bay, traditionally Cree territory. This displaced the Assiniboine who moved westward and occupied the parkland areas as far north as the Saskatchewan River (Harris 1987).

A major impact upon native populations was the spread of epidemic diseases through the movement of people and the transport of goods. A 1737-38 smallpox outbreak killed up to two-thirds of some groups within the Petit Nord, with a further 1781-83 outbreak claiming half to two-thirds of the Ojibway in northwest Ontario. Measles, whooping cough, influenza and tuberculosis all took their toll at various times well into the 20th century, with disease most effectively spread along the trading routes of the fur companies (Hackett 2002).

The state-organized French fur trade within the region ended fairly abruptly in 1769 when Montreal surrendered to the English. However, fur traders continued to work independently and forced the HBC to set up more inland posts. It was around this time that the North West Company (NWC) was created to quell the HBC westward advances. From the early part of the 1770s until 1821, competition between both groups was fierce. With both companies unable to sustain the prolonged and intense competitions, they amalgamated into a single operation under the overall banner of the HBC (Klimko 1994).

With regards to the Project LSA, William Tomison (1767 to 1780) explored areas from Fort Severn south and west towards Sandy Lake, Deer Lake and Poplar Hill, then further west to Lake Winnipeg. Tomison joined the HBC in 1760 and worked his way through the ranks to become the first "Chief, Inland." His primary responsibility was to spread the company's activities to the interior from Hudson Bay Forts. Around the same time, groups associated with the SLT and voyagers began exploring the vast hinterland north and west from the shore of Lake Superior.

Two of the most relevant explorers during this time period were G. Sutherland and David Thompson. Sutherland, who worked for the North West Company in the later part of the 1770s explored from Lake Nipigon, north then west through Sturgeon Lake, Lac-Seul, Trout Lake, Red Lake and into Lake Winnipeg. David Thompson was initially employed by the HBC, beginning in the 1780s. During his tenure with HBC, he refined his skills as a surveyor and mathematician and in 1774 was promoted to Chief Surveyor for the Company. In 1797, after much frustration with the politics of the HBC, Thompson quit and walked 80 kilometres to a NWC post where he finished out his days as a fur trader and surveyor. It was during this time that Thompson surveyed areas from the western shore of Lake Superior west through Rainy River, Lake of the Woods and into Lake Winnipeg, in 1797 and 1804, respectively.

During this time of initial exploration, both the HBC and the French SLT began to create forts and houses in order to establish trade routes along the various water corridors. The primary corridors that the various groups utilized for trade and transport are mapped by the distribution of forts, company houses and trade posts. Major routes utilized by traders included the waterways connecting York Factory south along the Hayes River to Lake Winnipeg. The eastern side of Lake Winnipeg and the water ways from Fort Albany in James Bay, east down the Albany River, through Osnaburgh House, Lac-Seul, Bas-de-la-Rivière into the south end of Lake Winnipeg were also well travelled. Numerous other small or secondary corridors by the traders connected various other forts, houses and depots within the Petit Nord.

Posts, forts, houses and depots associated with the HBC and the SLT were strategically located along these waterways. The most significant and relevant included Martin's Falls, Osnaburgh House, Lac-Seul, Red Lake House, Great Fall House, Sandy Lake and Trout Lake.

During the latter part of the 18th century and the beginning of the nineteenth neither group could dislodge the other and competed on an even footing. Between 1774 and 1821 there were over 600 posts, most of them only being occupied for a few years and; at the time of the merger of the NWC and HBC in 1821, only 125 posts remained in operation, 68 of which by the HBC. This was further reduced to eliminate the unprofitable posts lowering the overall number to 45 in 1825 (Wynn 2007:72). A mainstay of the newly united companies remained the beaver pelt, representing approximately 40% of their overall trade.

2.2.2.2 Local Historical Context

Atikokan, Ontario is approximately 180 km WNW of Thunder Bay. Mineral exploration began as early as 1882 leading to the first mines opening in the 1890s (Ontario Department of Mines 1929a:42). While some copper was mined near Burchell Lake, 75 km ESE of Atikokan, the majority of the mineral developments in the area concentrated on gold or iron ores.

The non-aboriginal history of the Atikokan region is an industrial history driven by the exploration for and extraction of minerals, timber products, and the creation of the trans-Canada roads and railways. Prior to confederation, much of northern Ontario was engaged in the fur trade often involving the establishment of trading posts and military forts. However, as the beaver population declined, the fur business migrated westward. Following confederation and westward economic expansion, the Dawson Road was completed in 1874 from Port Arthur to Winnipeg, traveling just south of what would become Atikokan. The Dawson Road, part overland route part water route, operated for just under a decade until the Canadian Pacific Railway (CPR) completed a similar route in 1882, although a rail line into Atikokan was not completed until 1899 (Town of Atikokan n.d.).

While the goal of the CPR line was to connect growing areas of western Canada with the east, its route was laid with consideration for economic development along the way. The development of the western Ontario rail line north of Lake Superior coincided with early mineral exploration in the Atikokan region and it is likely that in addition to selecting a rail route that would minimize water and swamp crossings, future mineral developments influenced track locations. The rail line became a critically important connection for the region to the outside world, often providing a fixed geographic marker to link other geographic features, such as identifying mine locations based on their distance from CNR stations (Pye 1968:51).

According to local sources, the region of Atikokan was known to the aboriginal Ojibwa as the "country beyond the height of the land." This rich area provided means for survival through its many lakes, thick forests, fish, small game, and woodland caribou. The first European to explore the area was Jacques de Noyon, in the late 17th century, and the region later provided pelts to the French and British fur trades until they began moving west as local resources were depleted (Atikokan Economic Development Corporation n.d.: 1). Following confederation, the development of the railroad, and early geological surveys, the area's mineralogical importance was established and speculators scoured the area looking for exploitable mineral deposits.

One early speculator, Tom Rawn, settled in the Atikokan area after the opening of the CNR line in 1899 and staked a claim for iron ore in the Steep Rock area. He is considered the first non-aboriginal Atikokan resident and opened the first local hotel, the Pioneer, in 1900. That same year a general store opened and in 1906, a sawmill began operations (Town of Atikokan n.d.). Although the town grew modestly supporting the many small gold and iron mining ventures in the early 20th century, it did not see significant growth until the opening of the Steep Rock Iron Mines in the 1940s. Throughout its history, in addition to mining, significant lumber and pulp developments existed initially to supply the mines and early town-building, but later expanded as an export industry.

2.2.2.3 Historical Mining Context

2.2.2.3.1 Early Gold Mining

From the late 19th century through the 1930s, several mines operated in the region surrounding Atikokan. Many claims produced marketable quantities of minerals but none operated for a prolonged period before the mineral veins they were working became too lean or the mines reached technological limitations to extraction that made mining unprofitable. North and east of Atikokan the Harold Lake Mine worked gold veins from 1895 to 1896, and the Elizabeth Mine at Modred Lake operated for short periods in 1902, 1912, and 1936 without significant production (Pye 1968:67-68). The Hammond Reef and Sawbill Mines saw modest success on gold seams 18 miles NE of Atikokan from 1897 to 1901 and the Sawbill Mine reopened in 1938 and was in operation until 1941 (Pye 1968:68).

The Sapawe Gold mine, in McCaul Township, was discovered in the 1890s and was subject to rudimentary work in the 1950s and early 1960s (Pye 1968:71). In 1897 a small discovery of gold and iron was found at Steep Rock Lake northwest of Atikokan (Ontario Department of Mines 1929b:46). West of Atikokan, the Isabella and Goldstar mines, discovered in 1894, each worked gold veins from the 1890s to early 1900s. The Goldstar mine was reported to be the largest producer at the time, but both mines shut down after only a few years (Ontario Department of Mines 1929b:53).

Sawbill Mine

The history of the Sawbill mine begins with the vein discovery by the Wiley Brothers in 1895. In 1896, the Sawbill Lake Gold Mining Co. is incorporated and a shaft was sunk to 145 ft with level cut at 60 ft and 120 ft (Wilkinson 1980:65). In 1898, a tramway was constructed. By 1899, the shaft had been deepened to 245 ft. There was a period of inactivity in the early 20th century until Upper Seine Gold Mines Limited was incorporated in 1937 where, from a period between 1938 until the mine closed on September 24, 1941 (Wilkinson 1980:66), dewatering of the mine and surface trenching of approximately 750 ft, and drifting was conducted. As well, in 1940, a 50 ton amalgamation mill was put into operation at a rate of 20 tons per day (Wilkinson 1980:66).

Hammond Reef Mine

The gold deposit was first discovered by Kabascong (Joe Mistahasen), a First Nation gentleman, in 1895 (Wilkinson 1980:69). The property was taken over by Hammond and Folger in 1896 and 14 shafts were sunk, along with open cuts and adits. In March of 1897, the Hammond Reef Gold Mining Company Limited was formed followed by the Folger-Hammond Mining Company in October. Mining activity was primarily limited to open cut mining; however, shafts were also sunk for sampling purposes. In 1898 the two companies amalgamated to form the Hammond Reef Consolidated Mining Co. Ltd. During this time, a new hydro-electric plant and a mill were constructed. In 1900, due to the mill being damaged by lightning and the low-grade ore, mining operations ceased (Wilkinson 1980:70). The property has changed hands numerous times over the course of the mid-20th century but no significant mining operations ensued since the late-19th century.

2.2.2.3.2 Early Iron Mining

Probably the most successful early iron mine in the region was the Atikokan Iron Mine located at Sapawe Lake, east of Atikokan. The ore lodes were discovered in 1882 but did not receive serious development until 1905 when the Atikokan Iron Company built a blast furnace at Port Arthur and began mining the Sapawe Lake ores. While the production was initially successful, significant iron ore production began on much bigger deposits at the Mesabi mines in Minnesota around the same time and by 1913 the Atikokan Iron Mine shut down (Pye 1968:71). Two other mines operated west of Atikokan, the Banning and Mayflower mines each worked iron and copper deposits in the early 20th century but with little long-term success (Ontario Department of Mines 1929a:48; 1939).

Steep Rock Lake

The most successful and celebrated mine of the 20th century in the area occurred following discoveries of a rich iron ore vein below Steep Rock Lake. Although iron ore deposits were known in the vicinity of Steep Rock Lake as early as 1881 (Lawson 1912:7) and characterized in 1897 (Pye 1968:52), none of the accessible lodes were rich enough to develop. In 1930, Port Arthur engineer and speculator Julian Cross conducted an initial survey of the lake and in 1938 began a winter drilling project that led to the discovery of an exceptionally rich vein of iron ore (Pye 1968:53). This particularly high-grade ore was an important component of steel making and often combined with lower-grade ores in a complex mix in a blast furnace. The actual project, however, took another four years to start when additional capital was committed from the United States because of war-time ore shortages (Pye 1968:53).

The significant challenge to mining the Steep Rock ore beds was their location below the surface of the lake. The solution for the Steep Rock Iron Mines was to drain the lake and divert the water of the Seine River through channels and dams. This significant effort, which was reported in Time and Life magazines in the United States, resulted in the drainage of 57 feet of water and the removal of 300 feet of silt at a total cost of $18 million (US) (Time Magazine 1944:19 and Atikokan Economic Development Corporation n.d.: 2). With the water removed the primary vein below the lake, named Hogarth after one of the early investors, was mined using open pit methods from 1944 to 1979, producing up to 1.4 million tons of pelletized ore per year (Atikokan Economic Development Corporation n.d.: 2). Just east of the Hogarth Pit, the Caland Ore Company began mining an open pit along the Falls Bay ore body. Caland operated from 1959 to 1980, but closed, like the Steep Rock Iron Mines, when changes to steel making reduced the demand for regional iron ore (Pye 1968: 56).

The Atikokan area developed like many others in Northern Ontario to mine and process significant mineral deposits. While some of the more successful mines operated for several decades, most were small modest producers that did not last longer than a few years.

A search for Ontario Heritage Trust Historical Plaques and Conservation Easements (Ontario Heritage Trust n.d.) concluded that while there are no conservation easements in or around the LSA, there is a historic plaque located at the entrance to the Atikokan Public Library and Centennial Museum. This plaque commemorates the Steep Rock Iron Range. The plaque reads:

As early as 1897 it was thought that a substantial iron ore body lay beneath the waters of Steep Rock Lake, but it was not until 1938 that ore was actually discovered. Mining began six years later, and over the next 20 years more than 36 million tons of ore were mined.

2.2.2.4 Other Historic Cultural Heritage Resources

A search for known built heritage and cultural landscapes in and around the LSA was undertaken to determine potential for these resources within the Project Site. According to the Atikokan Cultural Plan (2012:47-48) the town currently has no official policies regarding heritage properties and spaces and there do not appear to be many properties that would be considered architecturally significant or of great heritage value in the community. Given this, the Cultural Plan does recommend that a roster of buildings that still exist in town that are, 75 or more years old or any that have a particularly unique design or features be developed.

Although the Ontario Heritage Properties Database is no longer maintained by the MTCS, a search of the database found that two properties within the Town of Atikokan are, or were, previously registered as provincial or municipal heritage properties. These properties are the Atikokan OPP detachment, maintained by Infrastructure Ontario (formerly the Ontario Reality Corporation), and the Atikokan Railway Station, originally constructed in 1923 but now demolished. Although the Atikokan railway station was never designated under the Ontario Heritage Act, it was referenced in "Planning for Heritage Railway Stations: Inventory" (Ontario Heritage Foundation and the Ministry of Citizenship and Culture in co-operation with CN/VIA, February 1987) where it was described as follows:

The Atikokan railway station was an individually designed station. It was a rare design for a northern station and locally important historic building. It was evaluated a Heritage Class B.

A search in the Canadian Register of Historic Places database concluded that there are no federal historic places in Township of Atikokan or District of Rainy River.

2.2.2.4.1 Seine River Watershed

The Seine River is located in Northwestern Ontario and gathers its flow from a watershed having an area of approximately 6,250 km^2. Parts of the Seine River Watershed lie within the LSA, but not within the Project Site. The Seine River is part of the Winnipeg River drainage system that flows west through Ontario and north through Manitoba to Hudson Bay. Three bodies of water are used as reservoirs for power production along the Seine River system. Lac des Mille Lacs is controlled by the Lac des Mille Lacs dam, Lower Marmion Reservoir is controlled by the Lower Marmion Sluiceway, and Upper Marmion Reservoir is controlled by the Raft Lake Dam. Within the LSA, built heritage resources and cultural landscapes associated with the Seine River Watershed and associated hydroelectric developments include the Marmion Reservoir, Valerie Falls Dam, and the Lower Marmion Sluiceway.

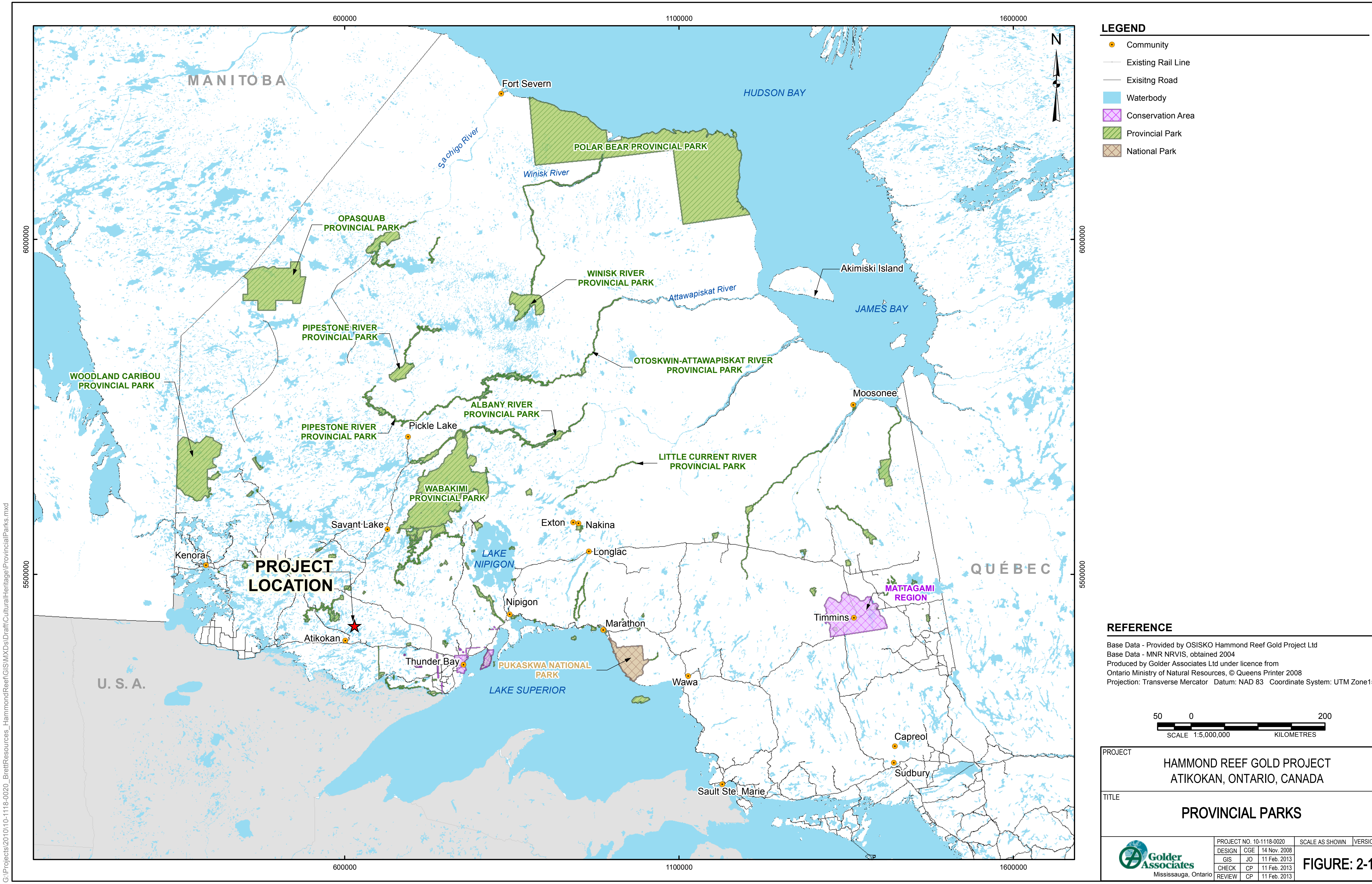
In 1926 the Marmion Reservoir was created and served as the primary storage basin for power regulation at Moose, Calm and Sturgeon Falls generating stations. The Marmion Sluiceway was constructed in the early 1950s when the Marmion block dams were constructed. In 1983, Ontario Hydro, now Ontario Power Generation (OPG), rebuilt the block dams. In 1997, Valerie Falls Limited Partnership (Brookfield Renewable Energy Group) installed the new navigation sluice.

The Raft Lake dam was built by Steep Rock Iron Mines in 1943 as part of legal requirement to achieve the diversion. Raft Lake dam controls the water levels and outflows of Upper Marmion Reservoir.

2.2.2.5 Provincial Parks

In conjunction with the above review on the modern natural environment a review of federal and provincial parks in relation to the Project was conducted. There are no federal parks in Township of Atikokan or District of Rainy River. The closest federal park to the Project in general is Pukaskwa National Park, located near the town of Marathon, on the Lake Superior shoreline and is thus far removed from the Project. Two provincial parks are located within 100 kilometres of the Project Site: Quetico Provincial Park and Turtle River (White Otter Lake) Provincial Park. Figure 2-1 illustrates the location of these parks in relation to the Project Site.

The Ministry of Natural Resources (MNR) is the governing body of Provincial Parks in Ontario. In order to conduct archaeological investigations with the boundaries of a Provincial Park, a permit is required (MNR 2002). The application and approval process can take up to two months. Information relating to the nature of the investigation, size, location, methods and the personnel, amongst others must be included in the application. As the Project does not cross any Provincial Park boundaries, no permit is required.



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MANITOBA
QUÉBEC
U. S. A.
HUDSON BAY
JAMES BAY
LAKE NIPIGON
LAKE SUPERIOR
Fort Severn
Sachigo River
Winisk River
Attawapiskat River
POLAR BEAR PROVINCIAL PARK
OPASQUAB PROVINCIAL PARK
WINISK RIVER PROVINCIAL PARK
PIPESTONE RIVER PROVINCIAL PARK
OTOSKWIN-ATTAWAPISKAT RIVER PROVINCIAL PARK
WOODLAND CARIBOU PROVINCIAL PARK
ALBANY RIVER PROVINCIAL PARK
LITTLE CURRENT RIVER PROVINCIAL PARK
WABAKIMI PROVINCIAL PARK
PUKASKWA NATIONAL PARK
MATTAGAMI REGION
Akimiski Island
Moosonee
Pickle Lake
Savant Lake
Exton
Nakina
Longlac
Kenora
PROJECT LOCATION
Nipigon
Marathon
Timmins
Atikokan
Thunder Bay
Wawa
Capreol
Sudbury
Sault Ste. Marie
N
LEGEND
Community
Existing Rail Line
Exisitng Road
Waterbody
Conservation Area
Provincial Park
National Park
REFERENCE
Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2008
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone15N
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SCALE 1:5,000,000 KILOMETRES
PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA
TITLE
PROVINCIAL PARKS
Golder Associates
Mississauga, Ontario
PROJECT NO. 10-1118-0020
SCALE AS SHOWN
VERSION 1
DESIGN CGE 14 Nov. 2008
GIS JO 11 Feb. 2013
CHECK CP 11 Feb. 2013
REVIEW CP 11 Feb. 2013
FIGURE: 2-1
G:\Projects\2010\10-1118-0020_BrettResources_HammondReef\GIS\MXDs\Draft\CulturalHeritage\ProvincialParks.mxd

2.2.3 Field Studies

2.2.3.1 Property Inspection

The findings based on the property inspection concluded that the following areas for the Project Site have archaeological potential and will require further archaeological assessment:

- Small pockets of land on the east side of Mitta Lake.
- Relatively flat, dry lands along the bay, higher flat lands that are not classified as bedrock, as well as areas with pockets of sandy soil, indicative of relic beach ridges.
- The northern end of the Transportation Route where it crosses a waterway.
- The higher elevation at the bend in the river in the western section of the Tailings Management Facility.

For those areas that could not be confirmed through the property inspection due to access issues or changes in the Project Site since the inspection, archaeological potential modelling illustrated areas that may retain archaeological potential and should there be any development in the areas identified as having archaeological potential, further assessment was recommended. The modelling is based on the following features that are within the LSA from the list of sources above.

- Areas within 50 m of a modern water source.
- Areas within 150 m of identified glacial features such as eskers, drumlins and relict shorelines.

Further assessment was not required in permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock. Available geological maps are of a coarse resolution and are unable to identify smaller scale glacial features; these features may be subject to further assessment.

An inventory of any potential Euro-Canadian built heritage or cultural landscape resources was also recorded for the Project Site. Further consideration of Aboriginal cultural heritage resources is included in the Aboriginal Interests TSD.

2.2.3.2 Stage 2 Archaeological Survey

A total of two archaeological sites associated with 20th century mining activities were identified during the Stage 2 assessment and are discussed further below. The Stage 1 and 2 archeological assessment report is provided in Appendix 2.I.

Location 1

Location 1 is situated in area operated as the Hammond Gold Reef Mine in the late 19th and early 20th centuries. Location 1 comprises a 20 m east/west by 15 m north/south surface scatter of artifacts as well as two artifact yielding test pits in the centre of the scatter. The sparse ground cover in the area allowed for artifacts to be identified on the surface. Location 1 consists of 64 pieces of 20th century historic material. This material includes 46 glass artifacts, nine ceramic artifacts, seven metal artifacts and two wire drawn nails. The recovered glass artifacts include 41 pieces of bottle glass (16 amber, 22 clear and 2 green) and five window glass shards, all measuring greater than 1.6 mm in thickness. Thick window glass is commonly found in the late 19th century and into the 20th century. The recovered ceramics include six pieces of ironstone and three pieces of semi-porcelain, both of which are ceramics that were manufactured from the late 19th century into the 20th century. The metal assemblage includes a mix of metal handles, miscellaneous fragments and piece of a cast iron stove.

The remains of the road to the former mine site are visible as an area of compact earth covered in scrub tree growth bordered by mature forest. A section of the trail has recently been subject to reforestation. Test pitting of the road area revealed the surface soil to be only 3 to 5 cm in depth overlaying compact grey clay. In addition to the artifacts recovered from the test pits and surface scatter two large iron rings were identified. These were not recovered and were left in-situ on site.

The Stage 2 assessment also identified the remains of the Hammond Gold Reef Mine reservoir; this included the ruins of two dams, one wood and one earth and a channel flowing from the dam to the former location of a stamp mill and a saw mill, of which no remains exists today.

Location 2

Location 2 is situated in an area operated in the late 19th and early 20th centuries as Sawbill Mine. Within this area, a concentration of artifact yielding test pits were excavated; as well a small surface scatter was identified, exposed by the construction of an ATV trail. Location 2 is located in association with the historically documented position of the Sawbill Mine. The area comprising the five artifact yielding test pits and the surface scatter is approximately 25 m east/west by 35 m north/south. Location 2 consists of 54 pieces of 20th century historic material. This material included 48 wire drawn nails, two ceramic insulators, two components of a light bulb, one piece of porcelain and one complete bottle. Wire drawn nails were popular from about 1890 into the 20th century. The porcelain fragment is a 20th century piece stamped "MADE IN JAPAN." The complete bottle is a small, clear medicine bottle with measurements embossed on the sides; other than that there are no distinguishing markings. In addition to the recovered artifacts, the surface scatter contained the remains of a large cast iron stove that was photographed but left in-situ.

In addition to the artifact scatter, the remains of a Keighley Gas and Oil Engine Co. engine dating to the early 20th century and the remains of the original tramway that was used in the transport of ore from the mine to the processing plant located on the shores of Sawbill Bay were identified.

3.0 EFFECTS ASSESSMENT

This section predicts and describes potential changes to cultural heritage resources that are likely to result from the Project. These changes are then assessed to determine if an adverse effect is expected, whether said adverse effect can be mitigated, and for adverse effects that cannot be fully mitigated (residual effects), the significance of the effect is determined. Section 3.1 provides a description of effects assessment methods.

3.1 Effects Assessment Methods

The effects assessment comprises the following steps:

- Step 1: Screening of Project activities with the potential to have interactions with selected VECs.
- Step 2: Prediction (i.e., identification and description) of potential effects of the Project.
- Step 3: Identification of suitable mitigation measures to reduce or eliminate the identified effects.
- Step 4: Assessment of whether adverse effects remain after mitigation (i.e., residual effects).
- Step 5: Determination of the significance of residual effects. If there is uncertainty of whether an effect remains after mitigation, the effect is forwarded for determination of significance.

The effects assessment is completed within the framework of temporal and spatial boundaries described in Section 1.8. The assessment takes into account a precautionary approach and incorporates Aboriginal traditional knowledge, where available.

The effects assessment identifies potential effects of the Project on the environment following a source-pathway-receptor approach. Project activities represent sources of effects, measurable changes to the environment represent pathways, and VECs represent receptors. In some cases, VECs may act as both pathways and receptors.

This effects assessment recognizes the widest, reasonable range of potential direct effects of the Project without specific regard for their probability of occurrence.

The effects assessment uses six criteria, as following:

- Direction: the direction of the effect as positive or negative.
- Magnitude: the size or degree of the effect for a given parameter.
- Geographic extent: the spatial area over which the effect may occur.
- Duration: the length of time over which the effect may occur.
- Frequency: the rate of recurrence of the effect (or conditions causing the effect).
- Reversibility: whether the effect may or may not be reversed.

In order to assess effects, levels are associated to each criterion except direction. Criteria such as geographic extent, duration, frequency and reversibility use three levels: low, medium and high, as shown in Table 3-1.

Magnitude levels are VEC-specific as shown in Table 3-2. Four levels are associated to the magnitude criterion: negligible, low, medium and high.

Table 3-1: Assessment Criteria and Levels for Determining Significance

Assessment Criteria	Level		
Geographic Extent (of effect)	**Low**	**Medium**	**High**
	Effect is within the Project Site (i.e., Mine Study Area or Linear Infrastructure Study Area)	Effect extends into the Local Study Area	Effect extends into the Regional Study Area
Frequency (of effect)	**Low**	**Medium**	**High**
	Conditions or phenomena causing the effect to occur infrequently (i.e., several times per year)	Conditions or phenomena causing the effect to occur at regular, although infrequent intervals (i.e., several times per month)	Conditions or phenomena causing the effect to occur at regular and frequent intervals (i.e., daily or continuously)
Duration (of conditions causing effect)	**Low**	**Medium**	**High**
	Conditions causing effect are evident during the site preparation and construction phase, or decommissioning phase	Conditions causing effect are evident during the operations phase	Conditions causing effect extend beyond any one phase
Degree of Irreversibility (of effect)	**Low**	**Medium**	**High**
	Effect is readily (i.e., immediately) reversible	Effect is reversible with time	Effect is not reversible (i.e., permanent)

Table 3-2: Magnitude Levels for Valued Ecosystem Components of Cultural Heritage Resources

Valued Ecosystem Component	Magnitude			
	Negligible	**Low**	**Medium**	**High**
Archaeological Sites	No destruction, alteration, disturbance, increased access/exposure of archaeological sites likely.	No destruction, alteration or direct disturbance of archaeological sites, but likely increased access/exposure of significant attributes or features.	Some alteration or disturbance of significant cultural heritage resource attributes or features likely, but no destruction.	Destruction of all or part, or substantial disturbance or alteration of significant heritage attributes or features.

Table 3-2: Magnitude Levels for Valued Ecosystem Components of Cultural Heritage Resources (Continued)

Valued Ecosystem Component	Magnitude			
	Negligible	**Low**	**Medium**	**High**
Built Heritage	No destruction, alteration, disturbance, increased access/exposure or isolation of significant heritage attributes or features likely.	No destruction, alteration or direct disturbance of heritage attributes or features, but likely increased access/exposure or isolation of significant attributes or features.	Some alteration or disturbance of significant cultural heritage resource attributes or features likely, but no destruction.	Destruction of all or part, or substantial disturbance or alteration of significant heritage attributes or features.
Cultural Landscapes	No destruction, alteration, disturbance, increased access/exposure or isolation of significant heritage attributes or features likely.	No destruction, alteration or direct disturbance of heritage attributes or features, but likely increased access/exposure or isolation of significant attributes or features.	Some alteration or disturbance of significant cultural heritage resource attributes or features likely, but no destruction.	Destruction of all or part, or substantial disturbance or alteration of significant heritage attributes or features.

The assessment of significance of an effect is determined using a decision tree specific to cultural heritage resources. In a decision tree magnitude, geographic extent, frequency, duration, and degree of irreversibility are combined to determine the overall significance of the effect. For cultural heritage resources, geographic extent is not applicable because the effect would be limited to the geographic location of the potentially-affected cultural heritage resource only. Frequency and duration are also not applicable to this assessment because all effects are bounded by the construction phase; and a resource is destroyed, altered, disturbed, exposed or isolated, or it is not. Accordingly, irreversibility is also not used to assign significance to residual effects, because it is difficult to assess whether a change to a heritage resource can ever be reversed. Therefore, the most meaningful way to evaluate significance is to use magnitude only. Three levels of significance are differentiated: Negligible, Moderate and High. Only residual effects are assessed for significance.

The decision tree for cultural heritage resources is shown in Figure 3-1.

Magnitude		Significance
Negligible	→	Negligible
Low Medium	→	Moderate
High	→	High

Figure 3-1: Decision Tree for Assigning Significance to Residual Effects on Cultural Heritage Resources

3.2 Screening of Project Activities and VECs Interactions

Section 3.2.1 identifies which Project activities may have a direct interaction with the cultural heritage resources VEC. Project activities are described in detail in Chapter 5 of the EIS/EA Report and a summarized list of Project activities is provided in Appendix 3.I. It is assumed for purposes of this effects assessment that all project-related effects are bounded by effects during the construction phase, and therefore this is the only phase assessed herein.

3.2.1 Construction Phase

Table 3-3: Construction Phase Activities and Interaction with Cultural Heritage Resources Valued Ecosystem Components

Project Activities	Cultural Heritage Resources
Clearing, grubbing, stripping, excavation or blasting for the construction of all Project components.	X

Notes:
X = Interaction identified.

3.2.1.1 Prediction of Potential Effects

Interactions between Project activities and VEC1 are identified in Section 6.2.1. The potential resulting effects from these interactions are summarized in Table 3-4 and include the following:

- Clearing, grubbing, stripping, excavation or blasting for the construction of all Project components would affect cultural heritage resources if all or part of a significant attribute or feature of a resource is destroyed, altered, disturbed, exposed or isolated.

Table 3-4: Effects on Cultural Heritage Resources Due to Project Activities in the Construction Phase

Project Activities	Effect 1
Clearing, grubbing, stripping, excavation or blasting for the construction of all project components	Potential to destroy, alter, disturb, expose or isolate a significant attribute or feature of a cultural heritage resource

3.2.1.1.1 Effect 1

No significant archaeological sites and artifacts were found, with the exception of two late 19th century to mid-20th century mine sites, which are likely to be affected by the Project.

Two historic mining operations reside within the footprint of the proposed development, the Hammond Gold Reef Mine, located on the northern limit of the Mitta Lake Peninsula, and the Sawbill Mine, located within the footprint of the proposed waste rock and overburden stockpiles. In both cases cultural remains exist that illustrate the location of the abandoned mining operations. Potential effects on the two former mine sites described above are limited to the LSA. Potential effects include the destruction, alteration, disturbance, exposure or isolation of attributes or features of these sites.

A visual impact assessment, completed by OHRG, concluded that the waste rock will remain during closure and post-closure, and is expected to be the only feature to be visible from publicly accessible areas, resulting in changes to the visual landscape.

The effect is forwarded for consideration of additional mitigation measures in Section 3.2.1.2.

3.2.1.2 Additional Mitigation

3.2.1.2.1 Effect 1

As both of these sites date well into the 20th century the information potential related to archaeological studies is considered to be low and no further archaeological assessment is recommended; however given the available historical literature in the form of government mining reports and the presence of remains such as mine shafts, adits, dams and tramways these areas are considered to be culturally modified landscapes and it is recommended that a Cultural Heritage Evaluation Report (CHER) be undertaken for the two historic mining operations to document and the cultural heritage landscapes under the Ontario Heritage Act Reg. 9/06 Criteria for Determining Cultural Heritage Value or Interest and Reg. 10/06 Criteria for Determining Cultural Heritage Value or Interest of Provincial Significance; and to recommend further mitigation if required prior to these areas being impacted by ground disturbance activities. At the request of OHRG Golder can provide a scope of work and timeline to undertake the CHER, under separate cover.

3.2.1.3 Residual Effects

No residual adverse effects on cultural heritage resources were identified.

4.0 MONITORING PROGRAM

Based on the effects assessment screening, prediction, and identification of suitable mitigation measures, it is anticipated that there will be no requirement for a monitoring program for cultural heritage resources.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, R.S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

5.0 SUMMARY OF FINDINGS

The objective of the cultural heritage resource characterization was to compile all available information about the known and potential cultural heritage resources (i.e., archaeological, built heritage, and cultural landscape resources) within the Project Site and to provide specific direction for the protection, management and/or recovery of these resources.

The methods to achieve this objective included a screening for known archaeological, built heritage and cultural heritage landscape resources and desktop (background) research in and surrounding the Project Site, as well as a property inspection and an archaeological survey. The screening for archaeological, built heritage and cultural heritage landscape resources was conducted using the Ministry of Tourism, Culture and Sport's (MTCS) Standards and Guidelines for Consultant Archaeologists and the Archaeological Checklist for Evaluating Archaeological Potential (Government of Ontario 2011a, 2011b) as well as the Standard Checklist for Identifying Potential Heritage Sites (Government of Ontario 2010). The cultural heritage resource existing conditions characterization was also conducted in compliance with the *Canadian Environmental Assessment Act's* Reference Guide on Physical and Cultural Heritage Resources (1996).

The Valued Ecosystem Components (VECs) selected for the assessment of cultural heritage resources, the rationale for selection of these VECs, and proposed indicators and measures are provided in Table 5-1.

Table 5-1: Valued Ecosystem Components Selected for Cultural Heritage Resources

Valued Ecosystem Component	Rationale for Selection	Indicators
Cultural Heritage Resources		
Archaeological Sites	■ The Project may affect archaeological sites.	■ Project related changes to archaeological sites and artifacts.
Built Heritage	■ The Project may affect late 19th and early 20th century built heritage features.	■ Project-related changes to 19th to mid-20th century built heritage features.
Cultural Heritage Landscapes	■ The Project may affect cultural heritage landscapes.	■ Project-related changes to cultural heritage landscapes.

The results of the cultural heritage resource characterization were the identification of two historic mining operations within the Project Site: the Hammond Gold Reef Mine, located on the northern limit of the Mitta Lake Peninsula, and the Sawbill Mine, located within the footprint of the proposed waste rock and overburden stockpiles. In both cases cultural remains exist that illustrate the location of the abandoned mining operations. It is recommended that a Cultural Heritage Evaluation Report (CHER) be undertaken for the two historic mining operations to document and to evaluate the cultural heritage landscapes under the Ontario Heritage Act Reg. 9/06 Criteria for Determining Cultural Heritage Value or Interest and Reg. 10/06 Criteria for Determining Cultural Heritage Value or Interest of Provincial Significance; and to recommend further mitigation if required prior to these areas being impacted by ground disturbance activities.

Clearing, grubbing, stripping, excavation or blasting for the construction of all Project components would affect cultural heritage resources if all or part of a significant attribute or feature of a resource is destroyed, altered, disturbed, exposed or isolated.

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7.0 GLOSSARY OF TERMS

Table 7-1: Glossary of Terms

Term	Definition
Adit	A nearly horizontal underground excavation in an abutment having an opening in only one end. An opening in the face of a dam for access to galleries or operating chambers. (U.S. Department of the Interior 2012)
Baseline	Conditions that would prevail if no actions were taken. (U.S. Department of the Interior 2012)
Bedrock	The solid rock at the surface or underlying other surface materials. Rock of relatively great thickness and extent in its native location. A general term for any solid rock, not exhibiting soil-like properties, that underlies soil or other unconsolidated surficial materials. As distinguished from boulders. The consolidated body of natural solid mineral matter which underlies the overburden soils. The solid rock that underlies all soil, sand, clay, gravel, and other loose materials on the earth's surface. Any sedimentary, igneous, or metamorphic material represented as a unit in geology; being a sound and solid mass, layer, or ledge of mineral matter; and with shear wave velocities greater than 2500 feet per second. (U.S. Department of the Interior 2012)
Cartography	Art and science of graphically representing the features of the Earth's surface; synonymous with map making. (U.S. Department of the Interior 2012)
Easement	The right to use land owned by another for some specific purpose. (U.S. Department of the Interior 2012)
Grubbing	Removal of stumps, roots, and vegetable matter from the ground surface after clearing and prior to excavation. (U.S. Department of the Interior 2012)
Mineralization	The conversion of organic compounds into inorganic, plant-available compounds such as ammonium. This is accomplished by soil organisms as they consume organic matter and excrete wastes. (USDA 2012)
Ore	Rock or earth containing workable quantities of a mineral or minerals of commercial value. (U.S. Department of the Interior 2012)
Peat	A fibrous mass of organic matter in various stages of decomposition, generally dark brown to black in color and of spongy consistency. A soft light swamp soil consisting mostly of decayed vegetation. (U.S. Department of the Interior 2012)
Terrestrial	Living or growing on land. Land-based. (U.S. Department of the Interior 2012)
Test Pit	Pit dug for geologic investigation or inspection and testing of earthwork placement. (U.S. Department of the Interior 2012)
Till	A deposit of sediment formed under a glacier, consisting of an unlayered mixture of clay, silt, sand, and gravel ranging widely in size and shape. (U.S. Department of the Interior 2012)
Topography	Physical shape of the ground surface. Collective features of the Earth's surface, especially the relief and contour of the land. The arrangement of hills and valleys in a geographic area. (U.S. Department of the Interior 2012)

8.0 LIST OF ABBREVIATIONS, ACRONYMS AND INITIALISMS

Table 8-1: List of Abbreviations, Acronyms and Initialisms

Acronym	Definition
APMP	Archaeological Predictive Modeling Project
ASDB	Archaeological Site Database
ASI	Archaeological Services Inc.
ATV	All-terrain Vehicle
AXYS	AXYS Environmental Consulting Ltd
BP	Before Present
CEA Agency	Canadian Environmental Assessment Agency
CEAA	Canadian Environmental Assessment Act
CFB	Canadian Forces Base
CHER	Cultural Heritage Evaluation Report
CN	Canadian National Railway Company
CNR	Canadian National Railway
CPR	Canadian Pacific Railway
CRM	Cultural Resources Management
EAA	Ontario Environmental Assessment Act
EIS Guidelines	Environmental Impact Statement Guidelines
EIS/EA Report	Environmental Impact Statement/Environmental Assessment Report
ESE	East-southeast
GIS	Geographic Information System
Golder	Golder Associates Ltd.
GPS	Global Positioning System
HBC	Hudson’s Bay Company
LGM	Last Glacial Maximum
LSA	Local Study Area
MNR	Ministry of Natural Resources
MOE	Ontario Ministry of the Environment
MTCS	Ontario Ministry of Tourism, Culture and Sport
NAD	North American Datum
NE	Northeast
NWC	North West Company
OHRG	Osisko Hammond Reef Gold Ltd.
ON	Ontario
OPG	Ontario Power Generation
OPP	Ontario Provincial Police

Table 8-1: List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
Project	Hammond Reef Gold Project
SK	Saskatchewan
SLT	St. Lawrence Traders
TMF	Tailings Management Facility
ToR	Terms of Reference
TSD	Technical Support Document
UBC	University of British Columbia
US	United States
USDA	U.S. Department of Agriculture
UTM	Universal Transverse Mercator
VEC	Valued Ecosystem Component
VIA	VIA Rail Canada
WNW	West-northwest

9.0 LIST OF UNITS

Table 9-1: List of Units

Abbreviation	Unit
°C	degrees Celsius
BP	before present
cm	centimetre
ft	Feet
km	kilometre
m	metres
mm	millimetre

APPENDIX 2.I

Osisko Hammond Reef Gold Project Stage 1 and 2 Archaeological Assessment

February 4, 2013

STAGE 1 AND 2 ARCHAEOLOGICAL ASSESSMENT

Osisko Hammond Reef Gold Project
Thunder Bay District, Ontario, Canada

ORIGINAL REPORT

Submitted to:
Osisko Hammond Reef Gold Project
155 University Avenue, Suite 1440
Toronto, ON M5H 3B7
Tel: 416-363-8653
Fax: 416-363-7579

Licensee: Drs. Carla Parslow and Scott Martin

License Number: P243 and P218

PIF Number: P243-069-2010; P218-336-2012

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Golder Associates

Executive Summary

Golder Associates Ltd (Golder) was contracted by Osisko Hammond Reef Gold Ltd. (OHRG) to provide a Stage 1 and 2 archaeological assessment of the areas to be affected by the proposed Osisko Hammond Reef Gold Project (the Project). The Property is located within the Thunder Bay Mining District in northwestern Ontario. The property is approximately 170 km west of Thunder Bay, Ontario and approximately 23 km (straight line measurement) northeast of the town of Atikokan, Ontario.

This report documents the properties archaeological and land use history and present conditions as well as the results of the Stage 2 property survey. The Stage 1 and 2 archaeological assessment of the proposed project property was undertaken by Golder, on behalf of OHRG, in order to fulfill environmental assessment (EA) requirements of the *Canadian Environmental Assessment Act* (CEAA) and the *Ontario Environmental Assessment Act* (EAA).

The findings based on the Stage 1 background study concluded that **the following areas for the Project have archaeological potential and were recommended for further archaeological assessment**:

- Small pockets of land on the east side of Mitta Lake for Open Pit Mine (A);
- Relatively flat, dry lands along the bay, higher flat lands that are not classified as bedrock, as well as areas with pockets of sandy soil, indicative of relic beach ridges for Open Pit Mine (A1);
- The northern end of the Transportation Route where it crosses a waterway; and
- The higher elevation at the bend in the river in the western section of the Tailings Pond.

For those areas that could not be confirmed through the baseline study property inspection due to access issues or changes in the Project footprint since the inspection, archaeological potential modelling illustrates areas that may retain archaeological potential and **should there be any development in the areas identified as having archaeological potential, further assessment is recommended**. The modelling is based on the following features that are within the Project footprint from the list of sources above:

- Areas within 50 m of a modern water source; and
- Areas within 150 m of identified glacial features such as eskers, drumlins and relict shorelines.

Further assessment is not required in permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock.

The Stage 2 field survey was conducted in accordance with the Ministry of Tourism, Culture and Sport's (MTCS) 2011 *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011). The Stage 2 assessment focused upon the Projects mine components, including the mine site, ore processing facility, tailings management facility and transmission lines. All areas determined to exhibit archaeological potential in the baseline study were ground-truthed; where areas were confirmed to retain potential they were subject to a Stage 2 survey in the form of a test pit survey at five metre intervals. Areas found to be permanently water-logged or previously disturbed do not retain archaeological potential and were not subject to the Stage 2 assessment.

The Stage 2 archaeological assessment conducted by Golder resulted in the identification of two locations associated with mid - 20th century mining activities. Location 1 was identified as remains of the Hammond Gold Reef Mine, while Location 2 was identified as remains of the Sawbill Mine. As both of these sites date well into the 20th century the information potential related to archaeological studies is considered to be low and no further archaeological assessment is recommended.

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. The MTCS is also asked to inform OHRG via letter that concerns related to archaeological resources with the Project footprint have been addressed.

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Project Personnel

Archaeology Component Lead	Carla Parslow, Ph.D. (P243)
Project Licensee	Carla Parslow, Ph.D. (P243); Scott Martin, Ph.D. (P218)
Licensed Field Director	Chris Lemon, B.Sc. (R289)
Golder Field Technicians	Michael Ghazzawi, B.A., Tatiana Istomina (R288), Sarah News, B.A., Oleksiy Vasylenko, M.A. (R287), Stephen Jarrett, M.A. (R397)
Métis Monitors	Rebecca Deslauriers, Antonio Marinaro
First Nations Monitors	Roland Boshkaykin, Janet Spoon
Report Production	Jamie Davidson, B.A. (R305), Chris Lemon, B.Sc. (R289)
Graphics Production	Shannon Cook, B.A.
Senior Review	Carla Parslow, Ph.D. (P243)

Acknowledgments

Proponent Contact	Alexandra Drapack, MBA, P.Eng, Osisko Hammond Reef Gold Ltd.
Ministry of Tourism, Culture and Sport	Robert von Bitter, B.A., Andrew Hinshelwood, M.A.; Penny Young, M.A.

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1.0 PROJECT CONTEXT

1.1 Development Context

Golder was contracted by OHRG to provide a cultural heritage resource assessment of the areas to be affected by Golder Associates Ltd (Golder) was contracted by Osisko Hammond Reef Gold Ltd. (OHRG) to provide a Stage 1 and 2 archaeological assessment of the areas to be affected by the proposed Osisko Hammond Reef Gold Project (the Project). The Property is located within the Thunder Bay Mining District in northwestern Ontario. The property is approximately 170 km west of Thunder Bay, Ontario and approximately 23 km (straight line measurement) northeast of the town of Atikokan, Ontario (**Figure 1**).

This report documents the properties archaeological and land use history and present conditions as well as the results of the Stage 2 property survey. The Stage 1 and 2 archaeological assessment of the proposed project property was undertaken by Golder, on behalf of OHRG, in order to fulfill environmental assessment (EA) requirements of the *Canadian Environmental Assessment Act* (CEAA) and the *Ontario Environmental Assessment Act* (EAA).

The Project consists of the development of an open pit mine, including an ore processing facility, and a tailings management area (**Figure 2**). Also included is the associated infrastructure at the site, the upgrading of an access road to the site, and the construction of a new electrical transmission line. Options assessments are currently being completed to determine the preferred location for the tailings management area. Three on-site options within OHRG's claim area are under consideration. All other facilities will be collocated with the mine.

Table 1 identifies the major component (e.g., mine) and the associated infrastructure (e.g., open pit, ore crushing facilities).

Table 1: Hammond Reef Gold Project Components

Major Component	Constituents
Mine	■ Open pits ■ Waste rock management ■ Warehouses, workshops and maintenance facilities ■ Chemicals, fuel and explosives storage ■ Power supply (grid) ■ All-weather roads ■ Office and support facilities ■ Waste management ■ Water management, including dewatering of the open pit
Ore Processing Facility	■ Ore crushing ■ Stockpiles ■ Ore grinding ■ Ore processing
Tailings Management Facility	■ Tailings Containment ■ Tailings Disposal Pipeline

Permission to enter the property and carry out all activity necessary for the Stage 1-2 archaeological assessment, including the removal of artifacts, was provided by Ms. Alexandra Drapack, Director of Sustainable Development, Osisko Mining Corporation.

1.2 Stage 1-2 Archaeological Assessment Objectives

The objective of the Stage 1 archaeological assessment was to determine whether the subject property possessed archaeological potential and, if so, to recommend a suitable Stage 2 archaeological assessment strategy. In compliance with the Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), the detailed objectives of the Stage 1 archaeological assessment were as follows:

- To provide information about the subject property's geography, history, previous archaeological fieldwork and current land conditions;
- To evaluate in detail the subject property's archaeological potential which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

To meet these objectives Golder archaeologists performed the following:

- A review of relevant archaeological, historic and environmental literature pertaining to the subject property;
- A review of the land use history, including pertinent historic maps;
- An examination of the Ontario Archaeological Sites Database (ASDB) to determine the presence of known archaeological sites in and around the subject property; and
- An inspection of the subject property to document existing conditions.

The objective of the Stage 2 archaeological assessment was to provide an overview of archaeological resources on the property, to determine whether any archaeological resources have potential cultural heritage value or interest, and to provide specific direction for the protection, management and/or recovery of these resources. In compliance with the Ministry of Tourism, Culture and Sport's *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011), the specific objectives of the Stage 2 archaeological assessment were as follows:

- To document archaeological resources on the property;
- To determine whether the property contains archaeological resources requiring further assessment; and
- To recommend appropriate Stage 3 assessment strategies for archaeological sites identified.

1.3 Historical Context

1.3.1 Early European Exploration

European exploration of Northern Ontario in the Lake Superior region began in the early 1600s. The first European to reach Lake Superior was most likely Etienne Brulé, an interpreter employed by Samuel de Champlain (Stuart 2003). It would be several decades before Lake Superior and its surrounding region were more thoroughly explored. The first known explorers on the lake were Pierre Esprit Radisson and Médard Court. They set off in 1658 and returned two years after with “a rich cargo of furs and the knowledge that the best furs could be obtained to the north and west of Superior” (Stuart 2003:16).

Around the same time the French were exploring the inland areas around Lake Superior the European exploration of the James Bay Region began in 1610 with Henry Hudson, who entered the bay while exploring what would come to be called Hudson Bay. James Bay would later be named for the British captain who explored the area more extensively from 1630-1631. During these voyages only one isolated encounter occurred with an Aboriginal person, involving Henry Hudson. It has been suggested that although Hudson had to winter his ship along the coast, the lack of encounters with Aboriginals through the winter months indicates the use of coastal areas was likely restricted to summer fishing camps (Julig 1988).

The British formally initiated trading on James Bay in 1668 when Fort Rupert was established on the Rupert River. Moose Fort (Factory) and Fort Albany followed in 1673 and 1675, both located on the south end of James Bay. It has been recorded in trading post journals the extent that Aboriginal peoples were travelling to trade at these posts; one record from Gloucester House (operated from 1777-1818) indicates that Aboriginals were travelling to the trade post from up to 600 miles away (Newton & Mountain 1980).

The earliest exploration of north-central Canada occurred along the shores of the bays and the major river systems, with further inland exploration occurring at a later date. In the early decades of European exploration northern North America was explored by both the British and the French. The British focused their efforts of exploration in and around Hudson Bay and James Bay, and further inland along the watershed systems off of these bays. The French concentrated their efforts further south and moved inland along the St. Lawrence waterway before exploring the Great Lakes area further inland. The Property is located in a region that was first explored by the French between 1657 and 1751, who at this time were exploring areas around the Abitibi River and Lake Abitibi (University of Toronto 2012). The first European to explore the region where the Property is located Jacques de Noyon, in the late 17th century (Atikokan Economic Development Corporation nd: 1).

Figure 3 illustrates the geographical spread of European exploration throughout the 17th and 18th century in northern Ontario.

1.3.2 The Fur Trade

The northern portions of Ontario, north of Lake Superior and south and west of Hudson Bay and James Bay had a number of successive exploration ventures beginning in 1610 with the Hudson’s Bay Company (HBC), but more extensively in the mid-eighteenth century. Henry Kelsey was the first of the European explorers to venture into the northern part of Ontario and further east. On Kelsey’s second expedition (1690-2), he explored from York Fort in Hudson Bay and extended the HBC trade west to the Saskatchewan River. Anthony Henday was the second explorer of European descent to venture into the Petit Nord of Ontario, penetrating further west and well into the Prairies.

During this time of initial European exploration, Charles II in 1670, granted the Hudson Bay Company (HBC) exclusive rights for British trading in the land drained by rivers flowing into Hudson's Bay, referred to as Rupert's Land. Rupert's Land is composed of a number of different physiogeographic regions that include; the Hudson Bay Lowlands located along Hudson and James Bays consisted of marshy lowlands with slow-moving rivers; the Canadian Shield located to the south, east and west of the Hudson Bay Lowlands consisting of rugged terrain, exposed bedrock, glacial features and numerous lakes. Further to the west were the Prairies and to the south were the Great Lakes region (Harris 1987).

Unlike the HBC, French interests within the area were supported by independent traders and voyagers from Montreal and the St. Lawrence venturing into western and northern Ontario through the Great Lakes. Both the British HBC and the French St. Lawrence traders (SLT) vied for control over the rich and highly productive resources of Rupert's Land. In 1686, French forces from the St. Lawrence captured Fort Albany and a few years later, took York Factory and Fort Severn on Hudson Bay. This enabled a French monopoly for fur trade. An uneasy peace was established after the signing of the Treaty of Utrecht in 1713, the main goal of which was the end the War of Spanish Succession in Europe between England and France (Miquelon 2001). The Treaty of Utrecht relegated the French to the southerly St. Lawrence–Great Lakes route into Ontario's hinterland, with the English regaining control over their forts and over the northern Hudson Bay routes (Harris 1987; Stuart 2003).

Intermixed within the network of expanding HBC and SLT posts were groups of highly mobile boreal forest adapted First Nations groups, consisting mainly of Cree and Ojibway, with Assiniboine located further to the west around Lake Winnipeg. In the early period of the fur trade, First Nations groups acted as middlemen trading furs for European goods, such as firearms, ammunition, blankets, tobacco and various other objects between European traders and other First Nations groups further afield. As tensions rose between the SLT and the HBC so did the relations between local First Nations groups. Settlement and warfare patterns changed with local First Cree families and communities settling beside or within close proximity to established forts and trading posts. These families would supply the posts with provisions and locally obtained furs. Eventually, the First Nations and Europeans intermixed giving rise to what is now referred to as the Métis.

With these increased tensions between the HBC and STL, First Nations groups allied with the different trading companies. In doing so, traditional lands shifted as Aboriginal groups expanded and retracted, vying for control over important trapping routes and transportation corridors. By 1720, the majority of the HBC lands were controlled by Cree bands. The Cree in these areas had a number of allies, including the Siouan-speaking Assiniboine to the west and the Algonquian-speaking Ojibway to the south. The Cree's prime rivals were the Athapaskan-speaking Chipweyan who were located to the north of the Churchill River. However, by 1740, the Ojibway expanded north and east of Lake Superior and occupied the territory between Lake Winnipeg and Hudson Bay, traditionally Cree territory. This displaced the Assiniboine who moved westward and occupied the parkland areas as far north as the Saskatchewan River (Harris 1987).

A major impact upon First Nations populations was the spread of epidemic diseases through the movement of people and the transport of goods. A 1737-38 smallpox outbreak killed up to two-thirds of some groups within the Petit Nord, with a further 1781-83 outbreak claiming half to two-thirds of the Ojibway in northwest Ontario. Measles, whooping cough, influenza and tuberculosis all took their toll at various times well into the twentieth century, with disease most effectively spread along the trading routes of the fur companies (Hackett 2002).

The state-organized French fur trade within the region ended fairly abruptly in 1769 when Montreal surrendered to the English. However, fur traders continued to work independently and forced the HBC to set up more inland posts. It was around this time that the North West Company (NWC) was created to quell the HBC westward advances. From the early part of the 1770s until 1821, competition between both groups was fierce. With both companies unable to sustain the prolonged and intense competitions, they amalgamated into a single operation under the overall banner of the HBC (Klimko 1994).

During the later part of the eighteenth century and the beginning of the nineteenth, neither group could dislodge the other and competed on an even footing. Gradually the Hudson's Bay Company shifted its focus towards western Canada and slowly the trading posts and forts in northern Ontario began to be abandoned. Between 1774 and 1821, there were over 600 posts, most of them only being occupied for a few years; at the time of the merger of the NWC and HBC in 1821 only 125 posts remained in operation, 68 of which by the HBC. This was further reduced to eliminate the unprofitable posts lowering the overall number to 45 in 1825 (Wynn 2007:72). Several of these forts and trade posts have been subject to archaeological excavation, most notably Fort Albany on James Bay starting in 1960 (Kenyon 1986), Gloucester House on the Albany River (Newton & Mountain 1980) and Martin's Falls, also located on the Albany River (Vyvyan 1980).

With regards to the project study area, William Tomison (1767 – 1780) explored areas from Fort Severn south and west towards Sandy Lake, Deer Lake and Poplar Hill, then further west to Lake Winnipeg. Tomison joined the HBC in 1760 and worked his way through the ranks to become the first "Chief, Inland". His primary responsibility was to spread the company's activities to the interior from Hudson Bay Forts. Around the same time, groups associated with the SLT and voyagers began exploring the vast hinterland north and west from the shore of Lake Superior.

Two of the most relevant explorers during this time period were G. Sutherland and David Thompson. Sutherland, who worked for the North West Company in the later part of the 1770s explored from Lake Nipigon, north then west through Sturgeon Lake, Lac-Seul, Trout Lake, Red Lake and into Lake Winnipeg. David Thompson was initially employed by the HBC, beginning in the 1780s. During his tenure with HBC, he refined his skills as a surveyor and mathematician and in 1774 was promoted to Chief Surveyor for the Company. In 1797, after much frustration with the politics of the HBC, Thompson quit and walked 80 kilometres to a NWC post where he finished out his days as a fur trader and surveyor. It was during this time that Thompson surveyed areas from the western shore of Lake Superior west through Rainy River, Lake of the Woods and into Lake Winnipeg, in 1797 and 1804, respectively.

During this time of initial exploration, both the HBC and the French SLT established forts and trading posts in order to establish trade routes along the various water corridors. The primary corridors that the various groups utilized for trade and transport are mapped by the distribution of forts, company houses and trade posts. Major routes utilized by traders included the waterways connecting York Factory south along the Hayes River to Lake Winnipeg. The eastern side of Lake Winnipeg and the water ways from Fort Albany in James Bay, east down the Albany River, through Osnaburgh House, Lac-Seul, Bas-de-la-Rivière into the south end of Lake Winnipeg were also well travelled. Numerous other small or secondary corridors by the traders connected various other forts, houses and depots within the Petit Nord.

Posts, forts, houses and depots associated with the HBC and the SLT were strategically located along these waterways. The most significant and relevant included Martin's Falls, Osnaburgh House, Lac-Seul, Red Lake House, Great Fall House, Sandy Lake and Trout Lake.

During the latter part of the eighteenth century and the beginning of the nineteenth neither group could dislodge the other and competed on an even footing. Between 1774 and 1821 there were over 600 posts, most of them only being occupied for a few years and; at the time of the merger of the NWC and HBC in 1821, only 125 posts remained in operation, 68 of which by the HBC. This was further reduced to eliminate the unprofitable posts lowering the overall number to 45 in 1825 (Wynn 2007:72). A mainstay of the newly united companies remained the beaver pelt, representing approximately 40% of their overall trade. **Figure 4** details the location and names of the known trade posts located in proximity to the Project.

1.3.3 First Nations Context

The official policy in Ontario, as outlined in the Royal Proclamation of 1763, has been to recognize Aboriginal title to the lands occupied by First Nations. As part of this recognition of Aboriginal title, compensation has been provided for portions of land surrendered by First Nations, and reservations have been set aside to ensure First Nations can meet their current and future needs. Treaty-making in Ontario generally started in the south, moving north as the European population grew and found more uses for northern lands and resources. Hunting pressures due to increased access to the North through the Canadian Pacific Railway was a driving force to the treaty signing.

The location of the proposed Hammond Reef Gold Mine study area is located within lands that were originally part of Treaty Number 3 (1873). After Canada acquired the title to Rupert’s Land in 1869 they endeavoured to build a series of roads and canals between Thunder Bay and the Red River Settlement. Almost the entire length of this infrastructure was to bisect the yet unceded territory of the Saulteaux tribe of the Ojibway (Daugherty 1986). Hoping to avoid a repeat of the Metis Rebellion at the Red River Settlement, a treaty commission was organized and sent out to the Saulteaux in 1871. The negotiations were a long process, and delayed further with discovery of precious metals in the Saulteaux’s territory (Daugherty 1986).

Terms were finally agreed to and signed on October 3, 1873. By the terms Canada acquired 55,000 square miles of land. For the Saulteaux’s part, their treaty terms included:

- One square mile of land for farming per family of five;
- The construction of schools when required;
- Hunting and fishing rights;
- $12 in immediate compensation for band members;
- $20 annuity for each chief, $5 annuity for band members;
- The promise of not being conscripted to fight Canada’s wars (Daugherty 1986).

While it is difficult to exactly delineate treaty boundaries today, **Figure 5** gives an approximate outline of the limits of Treaty Number 3. There are a number of First Nations communities in the vicinity of the project. The closest Aboriginal community is the Lac Des Mille Lacs First Nation, approximately 41 km to the east.

1.3.4 Historical Euro-Canadian Context

Atikokan, Ontario

Atikokan, Ontario sits approximately 180 km northwest of Thunder Bay. Mineral exploration began as early as 1882 leading to the first mines opening in the 1890s (Ontario Department of Mines 1929:42). While some copper was mined near Burchell Lake, 75 km ESE of Atikokan, the majority of the mineral developments in the area concentrated on gold or iron ores.

The non-aboriginal history of the Atikokan region is an industrial history driven by the exploration for and extraction of minerals, timber products, and the creation of the trans-Canada roads and railways. Prior to confederation, much of northern Ontario was engaged in the fur trade often involving the establishment of trading posts and military forts. However, as the beaver population declined, the fur business migrated westward. Following confederation and westward economic expansion, the Dawson Road was completed in 1874 from Port Arthur to Winnipeg, traveling just south of what would become Atikokan. The Dawson Road, part overland route part water route, operated for just under a decade until the Canadian Pacific Railway (CPR) completed a similar route in 1882, although a rail line into Atikokan was not completed until 1899 (Town of Atikokan nd).

While the goal of the CPR line was to connect growing areas of western Canada with the east, its route was laid with consideration for economic development along the way. The development of the western Ontario rail line north of Lake Superior coincided with early mineral exploration in the Atikokan region and it is likely that in addition to selecting a rail route that would minimize water and swamp crossings, future mineral developments influenced track locations. The rail line became a critically important connection for the region to the outside world, often providing a fixed geographic marker to link other geographic features, such as identifying mine locations based on their distance from CNR stations (Pye 1968:51).

According to local sources, the region of Atikokan was known to the aboriginal Ojibwa as the “country beyond the height of the land.” This rich area provided means for survival through its many lakes, thick forests, fish, small game, and woodland caribou. Following confederation, the development of the railroad, and early geological surveys, the area’s mineralogical importance was established and speculators scoured the area looking for exploitable mineral deposits.

One early speculator, Tom Rawn, settled in the Atikokan area after the opening of the CNR line in 1899 and staked a claim for iron ore in the Steep Rock area. He is considered the first non-aboriginal Atikokan resident and opened the first local hotel, the Pioneer, in 1900. That same year a general store opened and in 1906, a sawmill began operations (Town of Atikokan nd). Although the town grew modestly supporting the many small gold and iron mining ventures in the early 20th century, it did not see significant growth until the opening of the Steep Rock Iron Mines in the 1940s. Throughout its history, in addition to mining, significant lumber and pulp developments existed initially to supply the mines and early town-building, but later expanded as an export industry.

Regional Mining

From the late 19th century through the 1930s, several mines operated in the region surrounding Atikokan. Many claims produced marketable quantities of minerals but none operated for a prolonged period before the mineral veins they were working became too lean or the mines reached technological limitations to extraction that made mining unprofitable. North and east of Atikokan the Harold Lake Mine worked gold veins from 1895 to 1896, and the Elizabeth Mine at Modred Lake operated for short periods in 1902, 1912, and 1936 without significant production (Pye 1968:67-68). The Hammond Reef and Sawbill Mines saw modest success on gold seams 18 miles NE of Atikokan from 1897 to 1901 and the Sawbill Mine reopened in 1938 and was in operation until 1941 (Pye 1968:68).

The Sapawe Gold mine, in McCaul Township, was discovered in the 1890s and was subject to rudimentary work in the 1950s and early 1960s (Pye 1968:71). In 1897 a small discovery of gold and iron was found at Steep Rock Lake northwest of Atikokan (Ontario Department of Mines 1929:46). West of Atikokan, the Isabella and Goldstar mines, discovered in 1894, each worked gold veins from the 1890s to early 1900s. The Goldstar mine was reported to be the largest producer at the time, but both mines shut down after only a few years (Ontario Department of Mines 1929:53).

Sawbill Mine

The history of the Sawbill mine begins with the vein discovery by the Wiley Brothers in 1895. In 1896, the Sawbill Lake Gold Mining Co. is incorporated and a shaft was sunk to 145 ft with level cut at 60 ft and 120 ft (Wilkinson 1980:65). In 1898, a tramway was constructed. By 1899, the shaft had been deepened to 245 ft. There was a period of inactivity in the early 20th century until Upper Seine Gold Mines Limited was incorporated in 1937 where, from a period between 1938 until the mine closed on September 24, 1941 (Wilkinson 1980:66), dewatering of the mine and surface trenching of approximately 750 ft, and drifting was conducted. As well, in 1940, a 50 ton amalgamation mill was put into operation at a rate of 20 tons per day (Wilkinson 1980:66).

Hammond Reef Mine

The gold deposit was first discovered by Kabascong (Joe Mistahasen), a First Nation gentleman, in 1895 (Wilkinson 1980:69). The property was taken over by Hammond and Folger in 1896 and 14 shafts were sunk, along with open cuts and adits. In March of 1897, the Hammond Reef Gold Mining Company Limited was formed followed by the Folger-Hammond Mining Company in October. Mining activity was primarily limited to open cut mining; however, shafts were also sunk for sampling purposes. In 1898 the two companies amalgamated to form the Hammond Reef Consolidated Mining Co. Ltd. During this time, a new hydro-electric plant and a mill were constructed. In 1900, due to the mill being damaged by lightning and the low-grade ore, mining operations ceased (Wilkinson 1980:70). The property has changed hands numerous times over the course of the mid-20th century but no significant mining operations ensued since the late-19th century.

Early Iron Mining

One of the earliest iron mine developments in the region was the Atikokan Iron Mine located at Sapawe Lake, east of Atikokan. The ore lodes were discovered in 1882 but did not receive serious development until 1905 when the Atikokan Iron Company built a blast furnace at Port Arthur and began mining the Sapawe Lake ores. While the production was initially successful, significant iron ore production began on much bigger deposits at the Mesabi mines in Minnesota around the same time and by 1913 the Atikokan Iron Mine shut down

(Pye 1968:71). Two other mines operated west of Atikokan, the Banning and Mayflower mines each worked iron and copper deposits in the early 20th century but with little long-term success (Ontario Department of Mines 1929:48).

One the most successful and celebrated mine of the 20th century in the area occurred following discoveries of a rich iron ore vein below Steep Rock Lake. Although iron ore deposits were known in the vicinity of Steep Rock Lake as early as 1881 (Lawson 1912:7) and characterized in 1897 (Pye 1968:52), none of the accessible lodes were rich enough to develop. In 1930, Port Arthur engineer and speculator Julian Cross conducted an initial survey of the lake and in 1938 began a winter drilling project that led to the discovery of an exceptionally rich vein of iron ore (Pye 1968:53). This particularly high-grade ore was an important component of steel making and often combined with lower-grade ores in a complex mix in a blast furnace. The actual project, however, took another four years to start when additional capital was committed from the United States because of war-time ore shortages (Pye 1968:53).

The significant challenge to mining the Steep Rock ore beds was their location below the surface of the lake. The solution for the Steep Rock Iron Mines was to drain the lake and divert the water of the Seine River through channels and dams. This significant effort, which was reported in Time and Life magazines in the United States, resulted in the drainage of 57 feet of water and the removal of 300 feet of silt at a total cost of $18 million (US) (Time Magazine 1944:19 and Atikokan Economic Development Corporation nd: 2). With the water removed the primary vein below the lake, named Hogarth after one of the early investors, was mined using open pit methods from 1944 to 1979, producing up to 1.4 million tons of pelletized ore per year (Atikokan Economic Development Corporation n.d: 2). Just east of the Hogarth Pit, the Caland Ore Company began mining an open pit along the Falls Bay ore body. Caland operated from 1959 to 1980, but closed, like the Steep Rock Iron Mines, when changes to steel making reduced the demand for regional iron ore (Pye 1968: 56).

The Atikokan area developed like many others in Northern Ontario to mine and process significant mineral deposits. While some of the more successful mines operated for several decades, most were small modest producers that did not last longer than a few years.

1.4 Archaeological Context

1.4.1 Previous Archaeological Research

There has been a relative paucity of work within the regional area (Hinshelwood, Hamilton, per comms); however, this should not be taken to mean that there is a lack of archaeological and other cultural heritage resource sites.

Samuel de Champlain's journal of 1610 is the earliest historical reference of pre-contact sites in northern Ontario and includes a vague reference to "Indian diggings" for copper on the shores of Lake Superior (Dawson 1999). Reports of pre-contact sites in the area continued in French reports of the area up to 1750. By the mid 19th century control of the area had shifted and references to pre-contact sites were continually being made in reports from the Geological Survey of Canada. Although no formal excavations were conducted, artifacts were nonetheless collected and reported on (Dawson 1999). The first report of a pre-contact site written by an archaeologist was by Sir Daniel Wilson in 1856, who wrote about pre-contact copper mines on the shore of Lake Superior. Since the 1960s systematic research has intensified in the northern boreal forest, however this research often is focused on the shores of Lake Superior and Lake Nipigon. What this research has shown is that at the earliest ice-free times, human populations were congregating on the shorelines of the glacial lakes.

Most work within northwest Ontario has been concentrated within the Lake Superior and Lake Nipigon regions, along with the southwest portion of the province containing the Rainy River, Quetico Park and the Lake of the Woods. John Pollack conducted initial surveys of the northwest interior as well as published the first cultural sequence for the mid-northeast region (Dawson 1984). Additionally Pugh (1971) published results of survey activities along the more northern Winsk River drainage.

Historic archaeology in northern Ontario has primarily been concentrated on fur trade posts. In northwestern Ontario work has been undertaken along the Severn River (Pilon 1981, 1982; Pollock 1976) and at Osnaburgh House (Bundy 2010). Additionally, Harris (1987) provides an overview study of the region, while more detailed investigations have been published by Lytwyn (1986) and Anik (1976a and b).

General overviews of northern Ontario prehistory are provided by Dawson (1983) and Wright (1972a, 1972b, 1995, 1999, 2004). A predictive modelling study undertaken by Lakehead University also provides an excellent and detailed synopsis of the area (Hamilton & Larcombe 1994).

In order that an inventory of archaeological resources could be compiled, the registered archaeological site database (ASDB) kept by the MTCS were consulted. In Ontario, information concerning archaeological sites is stored in the ASDB maintained by the MTCS. This database contains archaeological sites registered according to the Borden system. Under the Borden system, Canada is divided into grid blocks based on latitude and longitude. A Borden Block is approximately 13 kilometres east to west and approximately 18.5 kilometres north to south. Each Borden Block is referenced by a four-letter designator and sites within a block are numbered sequentially as they are found.

At present there are no registered archaeological sites within the limits of the Project footprint or within a five kilometre buffer around it (von Bitter, per comm., July 23, 2010). There have also been no archaeological assessments previously conducted on the Project footprint or on land adjacent to the mine site within 50 metres.

1.4.2 The Natural Environment and Pre-Contact Period Chronology

Paleo-Environment

At the peak of the Last Glacial Maximum (LGM) 11,000 BP all of the Project footprint would have been located under the Laurentide Ice Sheet (Harris 1987). During deglaciation and warming between 11,000 BP and 10,500 BP, the ice sheet retreated and advanced numerous times over the Project footprint before finally retreating north with the establishment of the Holocene.

Large glacial lakes were formed by melt water, with Lake Agassiz covering over a third of northern Ontario (Baldwin et al 2000) and the Tyrell Sea covering the Hudson Bay Lowlands to the north. Lake Agassiz gradually drained, exposing the Project area around 9,300 BP (Thorleifson 1996, fig. 37) and making it available for colonization by flora and fauna (**Figure 6**).

As Lake Agassiz receded, the newly exposed land would have become vegetated, pollen cores suggest first with a spruce-dominated landscape that also included birch, poplar, larch and elm, before giving way to jack and red pine along with birch.

During the period between 9,500 and 6,400 BP, the climate became warmer and drier than currently being experienced, with this episode identified as the Atlantic Climatic. This period is characterized by the opening up of previously forested land to the south, giving way to grassland with stands of pine and poplar, and the advancement north of spruce forests into the tundra. Water levels were also at their lowest during this period due to the draining of glacial lakes following the eventual melt of the ice sheets blocking outflow north into Hudson Bay.

The current Boreal forest vegetation has been established since 3,600 BP with temperatures and seasonality also stabilizing at current levels around at this time. Minor cooling episodes around 2,500 BP and 500 BP resulted in the southerly retreat of the forests and corresponding development of peat and muskeg, while minor warming around 1,500 BP resulted in a temporary advance north of the tree line (Dawson 1984, Wright 1999).

While agreement as to the exact timing, extent and even nomenclature of Northern Ontario's climatic episodes and patterns varies, general consensus based on the archaeological record points to the contemporary nature of major climatic changes and major cultural changes within the Boreal Forest populations (Dawson in Steegman 1983).

Provincial Parks

In conjunction with the above review on the modern natural environment a review of federal and provincial parks in relation to the Project was conducted (**Figure 7**). There are no federal parks in Township of Atikokan or District of Rainy River. The closest federal park to the Project in general is Pukaskwa National Park, located near the town of Marathon, on the Lake Superior shoreline and is thus far removed from the Project. Two provincial parks are located within 100 kilometres of the Mine Site: Quetico Provincial Park and Turtle River (White Otter Lake) Provincial Park. Figure 4 illustrates the location of these parks in relation to the Project.

Geological Setting

Glacial erosion and postglacial deposition have formed the present landscape. The Canadian Shield was originally an area of high relief, with extensive mountains rising up to 12,000 m; however, millennia of erosion has resulted in its current low topographic relief (Clark 1999: 95).

The Project area is underlaid by the Precambrian rock of the Canadian Shield, and is located within its oldest area, known as the Superior Province. The topography has a low total relief and drainage patterns that have been heavily altered by glacial action, resulting in poor overall drainage. The glacial deposits on the southern Shield are predominantly sandy to silty till, in contrast to the northern Shield which is dominated by lake deposits of clayey and silty till.

The Canadian Shield, including the metal rich Sudbury Basin and the Temagami Magnetic Anomaly, is one of the world's richest areas of minerals and mining deposits. This mineral abundance has produced a history of mining activity within the area, from the pre-contact mining of near surface copper and siliceous rock, through to the gold rush of the late 19th century to today's intensive mineral exploration.

Deposition by glacial streams and lakes account for the majority of soil development and the subsequent composition of supported flora and fauna. Till material deposited by rivers entering lakes formed deltaic plains, while glacial action left high relief features such as moraines, drumlins and eskers. These raised areas are better drained than the surrounding low lying land and often form a locally distinct environment capable of supporting drier ecosystems.

The Project area is characterized as an area of thinly covered bedrock, along with deeper glacial and fluvial deposits containing boulders, gravels, and mud along with deposits of sand and gravel formed as glacier meltwater streams empty into glacial lakes. There is also evidence of rock drumlins, formed by ice flows during deglaciation (**Figure 8**).

Pre-contact Aboriginal Chronology

The occupation of northwest Ontario has been sub-divided into a series of phases (Periods). These are based upon the material remains that survive within the archaeological record that allow the re-construction and differentiation of past life-ways. These subdivisions are an archaeological convenience to help better understand the development and change of cultures across the region, and benefit from the broad brush of hindsight and generalisation without the fine detail of local variation.

The broadest pre-contact archaeological periods corresponding to northwest Ontario will be referred to as Plano-Indian, Archaic, Middle Woodland and Late Woodland, within which further temporal and regional subdivisions exist. The nomenclature utilized in this report corresponds to the chronology defined within Hamilton & Larcombe (1995:9) due to the locational proximity of their research to the study area. Two other excellent overviews are provided by Wright (1999:22) and Busey *et al.* with their respective chronologies synthesised within **Figure 9**.

In discussing pre-contact northwest Ontario, there are a number of themes and issues that are relevant across all phases:

- The general acidity of the soil on the Canadian Shield leads to a lack of organic preservation. As a consequence, there are large gaps in the understanding of various aspects of past cultures, ranging from mortuary practices and skeletal morphology through to diet and subsistence strategies. A huge portion of the non-lithic technologies developed in response to the demands of the environment leave no trace; with perishable organics such as bone tools, bark storage containers, hide clothing and birch canoes, all archaeologically invisible. Aside from rare occasions of survival due to waterlogged or chemically altered soils, such ephemeral yet crucial aspects must be inferred through site locations and the general survival requirements of people within a harsh climate;
- All inhabitants of northern Ontario have used its multitude of interconnected watercourses as a transport network to some degree, either by birch bark canoe or as trails when frozen in the winter. The affiliation with water also extends to the constant utilization of fish as a stable and dependable resource, without which habitation of the Shield would be virtually impossible;
- The highly mobile, multi-resource oriented, hunting and gathering lifestyle is a consistent theme throughout the pre-contact history of northern Ontario. The very nature of the landscape and its dispersed resources mean that there are no other options to this flexible strategy in most of the Canadian Shield (Wright 1995:294). This results in a very widespread and relatively homogenous set of subsistence patterns

and attendant tool kit across the boreal forests of northern Ontario. This is not to define the area as stagnant, but rather acknowledge the complexity and mobility required to populate such an expanse of ‘micro ecological zones’ (Hamilton & Larcombe 1995:13);

- A combination of thin soils, bioturbation, frost action and regular forest fires have resulted in the disturbance and mixing of any previously stratified sites, with artifacts congregating at the mineral/organic soil interface (Hinshelwood 1996). This has greatly hindered attempts to separate occupation phases and the research into the temporal and spatial chronologies of such sites. This issue is discussed by Wright (2004), and investigated in finer detail by Hinshelwood (1996);
- Settlement patterns consist of small social groups engaged in seasonal subsistence hunting and gathering, with the more productive late spring and summer seasons able to support greater concentrations of population. Winter hunting camps consisted often of a single family unit or groups of two to three at most. The stability and easily available resources associated with large fishing sites enabled the congregation of people to conduct ceremonies and trade, serving as community focal points within an otherwise dispersed routine;
- Habitation probably consisted of a form of shelter constructed from wood, animal hides and/or birch bark, in keeping with early ethnographic accounts (Wright 1999). These shelters do not survive archaeologically (Wright 2004: 1533) at best leaving a hearth, post moulds and weight stones. They are, however, highly mobile and ideally suited to the Boreal adapted way of life. Large permanent settlement does occur further south during the Woodland period (Dawson 1983), but within the study areas there was likely little need for change until the encroachment of Europeans produced a reliance on trade goods and the pursuit of furs; and
- Unlike southern Ontario, agriculture, permanent settlement, and large societies did not become established in the north during the pre-contact phase, except for the areas immediately adjacent to the Minnesota border along the Rainy River. Here, settlement and ceremonial mound building has been linked to a southern Hopewell influence and the access to wild rice and maize. Otter Castle, 30 km south of Ignace is an example of a large scale ceremonial site of the Late Woodland period (Dawson 1983).

Plano 9,000 BP to 7,000 BP - Also referred to as Plano and Early Shield, Period II

Initial habitation of southern Ontario followed the retreat of the ice sheets at the end of the Late Pleistocene 11,000 BP; however, the study areas for this project was fully covered by ice and not open to inhabitation until the Holocene transition 2,000 years later.

Groups of hunter-gatherers moved north following caribou and other arctic species that colonized the tundra-like margins of the glacial lakes. Late Palaeo-Indian people of the Plains Plano culture moved north and east into the Thunder Bay area around 9,000 BP (Dawson 1983) with settlement concentrated along the strandlines of the retreating glacial Lake Agassiz. Population density was very low and large parts of the province were still under ice or water; as a consequence, late Palaeo-Indian sites are rare within northwest Ontario, mostly congregated within the Rainy River watershed, close to the Manitoba/Minnesota border (Wright 1972:10, Reid 1980b) or along the northern edge of Lake Superior (Dawson 1983:5). The retreat of the Lake Agassiz shoreline across the project area during this period (Thorleifson 1996) likely provided ideal habitation for the northern movement of Plano people.

The incoming large game hunting populations ambushed migratory caribou herds at the various bottlenecks caused by the lakes and rivers of the region (Wright 1972:33), with small family groups following game across the tundra landscape in a varied and highly flexible manner. Site location has also been linked to raw materials found in bedrock outcrops within northwestern Ontario, utilized in the production of distinctive unfluted, ribbon flaked, lanceolate spear points and knives. These lithic resources were often obtained by quarrying and used to produce blades, spear points, large scrapers and bifaces (Dawson 1983:4). There are a number of known sources of fine-grained lithic materials available in northern Ontario. Based on available information, the primary stone types utilized included Lake of Woods chert, Gunflint Silica, Kakebaca chert, Jasper Taconite, Rossport chert, and Hudson Bay Lowland chert. Other stone material commonly recovered from archaeological sites in the North and Far North include rhyolites, siltstones, argillite, slate, greywacke, quartz, quartzites, pipestone and greenstone (Fox, 2009).

Archaic 7,000 BP to 3,000 BP - Also referred to as Early Shield & Middle Shield, Period II & III

The retreat of the Laurentide Ice Sheet northwards, due to the onset of the Holocene brought with it a change in environmental conditions that consisted of the establishment of coniferous forests to a milder mixed and deciduous forest cover with open grasslands to the south (McLeod 2009). This facilitated a corresponding change in material culture and subsistence strategies. The migratory caribou herd dominated lifestyle of the Plano Indians was replaced by a more seasonally shifting hunting and gathering of caribou, deer, elk, moose, fish and plant resources. This is reflected in the archaeological record by a decrease in the size and change in style of projectile points, and the appearance of hooks and net sinkers. With specific regard to projectile points, this change appears linked with the adoption of the atlatl (spearthower) identified by the transition from stemmed to notched points (McLeod 2009:10). In adapting to a forested environment, new woodworking tools such as axes, adzes and chisels were developed (Dawson 1983:8).

A defining technological change of the Archaic Period was the development of copper tools, produced from near surface copper deposits found on the shores of Lake Superior and traded all across eastern North America. Copper work of this period consisted of heating and hammering the ore to a desired form, rather than smelting and casting. This was achievable because Lake Superior copper ore is unusually pure, allowing it to be malleable at lower temperatures and shaped with simpler tools. The earliest evidence of copper working comes from South Fowl Lake on the Ontario/Minnesota border, providing a radiocarbon date of 6,800 BP for the wooden haft of a copper projectile point (Wright 1995:126).

The Holocene induced melting of the glaciers and ice sheets covering northern Ontario resulted in a complex and changing arrangement of glacial lakes and meltwater flow. Artificially high water levels were a result of ice blocking the flow of melt water northwards along the watershed gradient, forming glacial Lake Agassiz over the study area. Eventual ice mass wastage around 6,000 BP removed this blockage resulting in a dramatic draining episode and a drop in lake levels of around 100 m. This has important implications for archaeological sites of the archaic period within northern Ontario due to their concentration in proximity to the lakeshores and watercourses of the day. Water levels gradually rose to their presently observable level by around 4,000 years BP, therefore submerging the majority of waterside occupation sites between 9,000 and 4000 years BP.

Middle Woodland 3,000 BP to 1000 BP - Also referred to as Late Western Shield, Initial Woodland, Laurel, Period IV

Within southern Ontario, the Woodland Period is split into three distinct phases, early, middle and late with influence from the preceding Laurentian cultures of the Great Lakes/St. Lawrence region. Northwest Ontario is distinct in that it divided into the Middle and Late Woodland and is more influenced by Plains cultures to the south and west.

The adoption of pottery, for archaeologists, marks the beginning of the Woodland Period. It is important to stress that this provides a marker within the archaeological record that is convenient to use as a subdivision. It is not indicative of a change of people through migration, rather a continuing development of the Plano Indian and Shield Archaic way of life by encompassing new technological advancements.

The introduction of pottery 2,200-2,300 BP (Wright 1999:726) is postulated to have diffused into northwestern Ontario from the southwest or east and, with it, the development of the Laurel culture within the northern forests of the Canadian Shield, running east from Saskatchewan to northwestern Quebec. The relative homogeneity of culture across such a large area is again a reflection of the specialized adaption to the seasonal way of life that permeated the boreal forests.

Laurel ceramics were manufactured using the coil method and were stylistically conical with a tapering base. Decoration was restricted to the upper portion of the vessel’s exterior surface and consisted of a variety of techniques that left impressions or drag marks, with Initial pottery being thick walled and crude.

In addition to the introduction of pottery, the bow and arrow began to replace the atlatl as the dominant hunting technology, resulting in a change of projectile point morphology. Chipped stone technology was dominated by small side-notched arrowheads and a wide range of scraper varieties (Wright 1999:743). Tools were based mainly on relatively small nodular chert cores with a heavy reliance upon Hudson Bay lowlands nodular chert (ibid: 747) in contrast to the previously quarried rhyolite and quartzite. This resulted in a marked decrease in the size of all tool types and decline in the occurrence of biface knives, along with an increase in projectile points and scrapers (Wright 1995:272, 274).

A well-developed bone technology toolkit is suggested for Laurel culture by the unusually well preserved Heron Bay site on the north shore of Lake Superior, with hafted beaver incisors, bone awls, toggle harpoons, needles, beads and snowshoe netting recovered (Dawson 1983). Copper tools were concentrated around the Lake Superior area and were traded further afield for exotic stone, obsidian and marine shell into Manitoba, southern Ontario and the northern United States (Ross 1979, Harris 1987).

The spread of Laurel culture has been linked to the northward expansion of wild rice due to late Holocene cooling; however, no Laurel components have been found associated with microfloral evidence of rice or rice processing features. Recent microfossil analysis on middle and late woodland pottery fragments has revealed the preparation and consumption of maize on sites within the southern edge of the boreal forests. No evidence for agriculture survives at these sites; however, the results suggest trade networks linked to the maize producing cultures upon the plains to the south (Boyd & Surette 2010:120).

Within northwestern Ontario, the Laurel culture is accepted as ancestral to the following Late Woodland complexes, and subsequent Ojibwa and Western Cree (Wright 1999:726).

Late Woodland 1000 BP to 400 BP - Also referred to as Northern Algonquian, Terminal Woodland Algonkian, Period V

The Late Woodland period in northern Ontario is defined arbitrarily based on ceramic distinctions. With the climate and landscape prohibiting the adoption of agriculture above the Rainy River, there does not appear to have been the same profound change in lifestyle that occurred amongst the agricultural populations to the south. The Boreal forests and lichen woodlands of the shield are environmental constraints on the density of population that can be supported (Wright 1999:725), and also deterministic of the subsistence methods of such populations. Fish and large game were, as before, essential to supporting human existence within northern Ontario.

Settlement patterns reflect this focus on fishing and caribou hunting, with fish sought in the spring, summer and fall, and caribou hunted in the fall and early winter. Sites are located on level, well drained ground with protection from northwest winds, and access to canoe landing beaches. Larger summer encampments were located in proximity to favourable fishing locations such as lake narrows and rapids, while the probable location of dispersed winter camps on frozen creeks has led to a lack of surviving archaeological information (Wright 2004:1492).

It is tempting to view the late woodland in northwest Ontario as comprising discrete ceramic-producing cultures; however, aside from variation in ceramic decoration there is very little observable difference in lithic tools or settlement patterns.

Eschewing the gender trap it is reasonable to assume that ceramic production and decoration can be seen as a female product and therefore changes in ceramics on a site are indicative of female mobility within family groups. The movement of women through marriage served to construct blood ties between various wide ranging bands, with long distance kinship functioning as a safety net against the unreliable resources of the north (Wright 2004:1489). The stability of the lithic assemblages further suggests that men as the hunters were matrimonially immobile, requiring intimate knowledge of the surrounding landscape to succeed (Wright 1972). Late Woodland sites with any significant amount of ceramics generally have more than one tradition represented, again highlighting the mobility of women through inter-complex marriage (Wright 2004:1507).

The Late Woodland period did not appear uniformly over northern Ontario. In some areas, it can be identified around 1,500 BP while in other (usually remote) areas, Laurel-type pottery continues until 1,000 BP. A variety of pottery types are typically found at Late Woodland sites, ranging from Iroquoian through to vessels from Michigan and Wisconsin, provide evidence of trade networks and contacts with the south (Dawson 1983, Wright 2004).

Blackduck

The Blackduck complex has been identified based on the existence of a contrasting pottery tradition to Laurel. Vessels were large globular and manufactured using the paddle and anvil technique, or formed inside textile containers. Decoration is diverse, consisting of horizontal and/or oblique lines along with circular indentations or puncates, and is present on the neck, rim, lip or inner rim of the container.

Tools associated with the Blackduck culture include small triangular and side-notched arrowheads, a large array of scrapers, both stone and bone, ovate knives, stone drills, smoking pipes, bone awls needles and harpoons, and copper tools.

The development of Blackduck from the preceding Laurel is generally accepted (Wright 2004:1501) and extends through the southwest part of north Ontario, Manitoba, northern Minnesota and eastern Saskatchewan.

Selkirk

The Selkirk complex is again characterized by its pottery, manufactured with the same techniques as Blackduck, similar in form but distinguished only by decoration. If decorated, it is usually only a single row of puncates or impressed with a cord wrapped stick (Dawson 1983). The non-ceramic assemblage associated with Selkirk is almost identical to that found on Blackduck sites, with the two often being found together in northern Ontario.

The Selkirk are represented as the ancestors of the present-day Cree (McLeod 2009:14); however, it must be noted that inferring ethnicity based on pottery traditions is problematic. The interchangeable nature of both cultures purported to precede the Cree and Ojibwa in northwest Ontario highlight this and caution against focusing on a single technological element when talking of a cultural construct, such as ethnicity. It is possible to identify the Selkirk and Blackduck as ancestral to a Cree-Ojibwa complex but further separation is perhaps misrepresentative (Wright 2004:1501).

Selkirk pottery is found mainly to the north of northwestern Ontario and into northern Manitoba, Saskatchewan and northeastern Alberta. Attempts to produce a ceramic chronology in relation to the Blackduck complex have been hampered by the lack of stratified sites and the validity of carbon-dating attempts. It is now generally accepted that Selkirk is slightly later, and did not develop from Blackduck; diffusing in from the northwest rather than developing out of existing traditions.

A number of other traditions have been identified based on additional decoration variation; however the uniformity present within the non-ceramic assemblages suggests caution against over-emphasising small differences and the subscription to regional patriarchy (Ibid: 1517).

Rock Art

The Late Woodland also sees the emergence of rock art as an expression of spiritual life and ritual. Rock paintings, known as pictographs, comprised of red ochre mixed with a binding agent such as bear fat or sunflower oil, are typically found within western Ontario on the vertical faces of cliffs where they enter a body of water (Rajnovich 1994). Pictographs constitute a form of written language, signifying sounds, objects and ideas in reference to subsistence, geography, climate, history and also sacred or religious beliefs and visions (Bursey *et al*), although they could have served a variety of cosmological functions and even political ones by marking territory (Wright 2004:1545). The damming of lakes and rivers by the timber and hydroelectric industries may have undoubtedly drowned many sites, while the fragile nature of the paintings themselves, when exposed to the elements, also reduces their chances of survival. Rock etchings, or petroglyphs, are relatively rare within the Canadian Shield, with most examples occurring within the south and east of the province. Likewise, petroforms, or artificial arrangements of stones in pits or cairns, are not thought to be common within the study area (Dawson 1983).

1.4.3 Existing Conditions

The Project location falls within the Boreal Shield Ecozone of Canada, specifically within the Thunder Bay – Quetico Ecoregion. This ecoregion is classified as having a moist low ecoclimate (Ecological Stratification Working Group 1996:66). The dominant vegetation is a combination of coniferous and mixed forests with coniferous forests dominant in the western portion of the ecoregion. Characteristic species of the coniferous forests are white spruce, balsam fir, and eastern white pine. Subdominant species include trembling aspen, paper birch, and jack pine, whereas poorly drained sites are characterized by black and white spruce, balsam fir, tamarack, eastern red cedar, and willow (Ecological Stratification Working Group 1996:66).

Forest cover throughout the region has been directly influenced by the timber industry and also an increase in forest fires due to settlement and railway traffic. Forest fires have the effect of further degrading any thin soils, while also allowing the establishment of more vigorous pioneer species such as trembling aspen and balsam fir. This sequence of tree cover replacement is also encountered after the disturbance of logging operations. Without disturbance, natural or man-made, black spruce forest dominates the upland areas of the region (Winterhalder 1983:32).

Characteristic wildlife includes moose, black bear, lynx, snowshoe hare, wolf, and white-tailed deer. Bird species include the American black duck, wood duck, hooded merganser, pileated woodpecker and grouse (Ecological Stratification Working Group 1996:66).

2.0 STAGE 1 PROPERTY INSPECTION

The property inspection for the Project footprint was conducted from October 18th to the 21st, 2011 under archaeological consulting license P243 issued to Carla Parslow, Ph.D., of Golder by the MTCS. Table 2 provides a daily account of the weather. The property inspection was also conducted by Dr. Parslow and a First Nations Monitor. The weather during the property inspection ranged from cloudy and cool to sunny and cool. At no time were the conditions detrimental to the inspection and visibility was excellent. While data related to currently land conditions was collected; this information is presented and further verified in Section 4.0, Record of Finds.

Table 2: Stage 2 Weather Conditions

Date	Weather Conditions
October 18, 2011	Cloudy and cool
October 19, 2011	Cloudy and cool
October 20, 2011	Mixed sun and cloud, cool
October 21, 2011	Sunny and warm

The findings based on the property inspection conclude that the following areas within the Project footprint have archaeological potential and will require further archaeological assessment:

- Small pockets of land on the east side of Mitta Lake;
- Relatively flat, dry lands along the bay, higher flat lands that are not classified as bedrock, as well as areas with pockets of sandy soil, indicative of relic beach ridges;
- The northern end of the Transportation Route where it crosses a waterway; and
- The higher elevation at the bend in the river in the western section of the Tailings Management Facility.

For those areas that could not be confirmed through the property inspection due to access issues or changes in the Project footprint since the inspection, the potential modelling as seen in **Figure 10** illustrates areas that may retain archaeological potential and should there be any development in the areas identified as having archaeological potential, further assessment is recommended. The modelling is based on the following features that are within the Project footprint from the list of sources above:

- Areas within 50 m of a modern water source; and
- Areas within 150 m of identified glacial features such as eskers, drumlins and relict shorelines.

Further assessment is not required in permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock. Available geological maps are of a coarse resolution and are unable to identify smaller scale glacial features; these must be located visually and may be subject to further assessment.

2.1 Stage 1 Determination of Archaeological Potential

There are a number of criteria employed in the assessment of archaeological site potential and are formulated in consultation with the MTCS' *Standards and Guidelines for Consulting Archaeologists* (2011). For pre-contact or prehistoric sites, these criteria are principally focused on the topographical features such as the distance from the nearest source of water and the nature of that water body, distinguishing elements of the landscape including ridges, knolls and eskers, and the type of soils found within the area being assessed.

For historic sites, the assessment of archaeological site potential is more reliant on historic research, as well as cartographic and aerial photographic evidence and the inspection of the study area for possible above ground remains or other evidence of demolished historic structures. Areas within 100 metres of historic schools, churches, cemeteries, commercial buildings, industrial sites and roads are required to be assessed. Also considered in the assessment is the proximity of known archaeological sites.

The guidelines for determining archaeological potential are essentially a coarse predictive model to be applied as a broad blanket throughout Ontario. Recent advances in computer technology have allowed GIS-based predictive modeling to include ever more variables if the time and data is available. Such an approach is taken in the construction of archaeological master plans (Heritage Quest 1999; ASI 1999, 2010) and enables the assessment of large and sometimes complicated areas.

Outside of more urban areas predictive modelling studies have been undertaken within the boreal forests of Manitoba (Ebert 2002) and northern Saskatchewan (Gibson & McKeand 1996). In northern Ontario, Lakehead University (Hamilton & Larcombe 1994), on behalf of the Ontario Ministry of Natural Resources, conducted a pioneering three-year research project into the application of predictive modeling to areas ill suited for conventional cultural resource management assessment techniques. The Project study area falls within this category due to its size of the Property, difficulties with logistics and communications, largely unknown heritage resources and acidic soils - all hindrances to conventional assessment methods. When using predictive modelling to develop an assessment of archaeological potential, pre-contact resources form the primary focus.

The key variables assessed by Hamilton & Larcombe (1994) for Boreal Forest pre-contact sites are:

- Proximity to water: 0 - 50 m is high potential;
- Soil type: sandy soils, silt or clay with good drainage;
- Topography: elevated, linear glacial features;
- Slope: 0 - +/-10 degrees;
- Aspect: facing south, southeast or southwest; and,
- Landforms: eskers, knolls, Paleo-beach strandlines, deltas, waterfalls and narrows.

These variables are geared towards locating larger and more predictable sites associated with fishing activities and non-winter habitation. Hunting, kill and butchering sites, are by their nature more spatially variable and almost invisible on a temporal scale (Wright 1999, McLeod 2009).

One variable that can influence site location and provide valuable information on trade and travel routes is the location and availability of raw materials used for making stone tools. There are no recorded sources of *in-situ* lithic raw material within the Project location.

Predictive modelling is a useful tool; however, it must be cautioned that the ability to predict is directly correlated to our understanding of the cultures involved. Human behaviour and its influence by the environment may be linked to physical features currently identifiable such as water and topography; however, this understanding diminishes with increasing antiquity, and its environmentally deterministic approach is sorely hampered by neglecting the subtle effects of cosmology, belief systems and ceremony on the actions and decisions of past cultures. This is further clouded if researchers only look where they predict such sites will be located; therefore, only those sites will be identified, in turn creating a self-fulfilling prophecy that will generate a false representation of effectiveness. Modelling has limitations when recommending archaeological potential; it is therefore prudent to be conservative with the exclusion of areas or designation of low potential and recognise that sites may occur in areas for non-tangible reasons.

Building on the above information and in accordance with the MTCS' 2011 *Standards and Guidelines for Consultant Archaeologists,* the following are features or characteristics that indicate archaeological potential:

- Previously identified archaeological sites;
- Water sources:
  - Primary water sources (lakes, rivers, streams, creeks)
  - Secondary water sources (intermittent streams and creeks; springs; marshes; swamps)
  - Features indicating past water sources (e.g. glacial lake shorelines indicated by the presence of raised gravel, sand, or beach ridges; relic river or stream channels indicated by clear dip or swale in the topography; shorelines of drained lakes or marshes; and cobble beaches)
  - Accessible or inaccessible shoreline (e.g. high bluffs, swamps or marsh fields by the edge of a lake; sandbars stretching into marsh);
- Elevated topography (eskers, drumlins, large knolls, plateaux);
- Pockets of well drained sandy soil, especially near areas of heavy soil or rocky ground;
- Distinctive land formations that might have been special or spiritual places, such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases (there may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings);
- Resource areas including:
  - Food or medicinal plants
  - Scarce raw minerals (e.g. quartz, copper, ochre or outcrops of chert)
  - Early Euro-Canadian industry (fur trade, mining, logging);
- Areas of Euro-Canadian settlement; and

- Early historical transportation routes.

2.2 Stage 1 Background Study and Property Inspection Conclusions

The Stage 1 background study and property inspection resulted in the determination that archaeological potential exists within the Project footprint along waterways that are bordered by dense coniferous forest as well as areas where drumlins occur. Past archaeological investigations have resulted in the identification of numerous archaeological sites, both pre-contact Aboriginal and historic, along waterways within the greater area of northwestern Ontario. It was recommended that areas of archaeological potential based on modelling be ground-truthed to confirm the nature of their potential. If potential is deemed to exist a further assessment in the form of an archaeological survey would be required prior to any ground disturbance activities. No further assessment was recommended for areas found to not exhibit archaeological potential. Areas of archaeological potential based on the baseline study are illustrated in Figure 9. Areas found to not exhibit archaeological potential include permanently waterlogged areas, areas of previous disturbance, or upon areas of exposed bedrock.

The Stage 1 background study and property inspection formed the basis for the following recommendations:

1) That a Stage 2 assessment be undertaken by a licensed archaeologist in areas that will be disturbed and have been identified within the Project footprint as retaining archaeological potential; and

1) That the Stage 2 testing consist of hand-excavated test pits placed at intervals of five and ten metres following the standards identified in MTCS' *Standards and Guidelines for Consulting Archaeologists* (2012).

3.0 STAGE 2 PROPERTY ASSESSMENT FIELD METHODS

The Stage 2 property assessment encompassed all lands to be affected by the construction, operation, and decommissioning of the Project (Project footprint) that were determined to have archaeological potential based on the Stage 1 background study and property inspection as well as those areas determined to have archaeological potential based on archaeological potential modelling. These lands include those areas listed in Table 1 of this report.

A number for assessment techniques were employed to ensure all areas of archaeological potential within the proposed development footprint of the Project were properly assessed. The techniques employed included a GIS potential mapping based on proximity to water within 50 metres and land elevation. This was coupled with onsite ground truthing where field crews walked into areas identified in the GIS model as areas of archaeological potential and assessed the ground conditions first hand. Areas of archaeological potential were accessed by full size vehicle (E350 van), on foot, and with the use of All Terrain Vehicles (ATV) and boats. The use of ATVs permitted crew members to cross difficult terrain in a timely fashion while permitting an up close visual inspection of large sections of the study area that would otherwise have been inaccessible on foot or by van. Power boats were utilized to assess the entirety of the shore line surrounding the study area. The use of boats facilitated crew to inspect areas that were not accessible by land and to gain an appreciation for the types of terrain that would have been attractive to past travelers in the area. Boat based water survey allowed one to link suitable docking or landing sites with areas that were well drained and flat. This not only allowed for a more extensive survey of the study area to be carried out but also increased the efficacy of the assessment and minimized the potential risks to field crews that are associated with hiking through dense bush and swamp.

The MTCS' *Standards and Guideline for Consultant Archaeologists* outlines the following Standards for Stage 2 test pit survey in northern Ontario and on Canadian Shield Terrain:

Section 2.1.5:

Standard 1 – Where the identified feature of archaeological potential is a modern water source, test pitting is required between 0 and 50 m from the feature. Space test pits at maximum intervals of 5 m. Survey is not required beyond 50m.

Standard 2 – For features of archaeological potential other than modern water sources (e.g. historic water sources such as glacial shorelines), test pitting is required as follows:

a. Space test pits at maximum intervals of 5 m between 0 and 50 m from the feature of archaeological potential;
b. Space test pits at maximum intervals of 10 m between 50 and 150 m from the feature of archaeological potential;
c. Survey is not required beyond 150 m.

As no glacial shorelines or relic beach ridges were identified in the Project footprint, the test pit survey was conducted as per the previously described Standard 1. Test pits were excavated at five metre intervals within 0 and 50 metres of water sources; test pit survey was not required beyond 50 metres.

Field work was conducted in two teams; one team would go out and conduct a ground truth survey of areas identified in the baseline report as exhibiting archaeological potential. The second team would return to the areas identified as retaining archaeological potential and would conduct a standard shovel test assessment at five metre intervals. Each test pit was approximately 30 cm in diameter, dug into the first five centimetre of subsoil, with all soil screened through six millimetre mesh hardware cloth, and subsequently back filled. All test pits were examined for evidence of stratigraphy, sub-surface cultural features and evidence of fill. A field log was maintained detailing information pertinent to the survey areas and digital photographs were taken of the surveyed areas, topography, and representative test pits. **Figure 11** illustrates the location of all photographs presented in this report while **Figure 12** illustrates the location of all areas subject to test pit assessment. Appendix A provides a photo index with associated UTM coordinates and Appendix B lists all areas subject to test pit survey as well as their associated dimensions and UTM coordinates.

UTM coordinates were recorded for all finds. Coordinates were recorded by a Trimble Recon handheld GPS unit and/or a Garmin eTrex Legend handheld GPS unit, both using the North American Datum (NAD) 83. GPS readings were accurate to five metres or better. As per the *Standards and Guidelines for Consultant Archaeologists* (Section 5, Standards 2a, 2b), for small archaeological sites (less than 10 metres by 10 metres in area) one coordinate reading from the center of the site was taken. For archaeological sites larger than 10 metres by 10 metres in area five readings were taken: one for the center of the site and the furthest site extents in each of the cardinal directions. Supplementary Document A illustrated the locations of recovered cultural material. Supplementary Document B lists the GPS coordinates for identified archaeological sites.

It should be noted the baseline study potential modelling indicated a significant number of drumlins existed throughout the study area; these drumlins were indicated in the baseline model as areas of archaeological potential. Ground truthing during the Stage 2 survey revealed these areas to be bedrock hills as opposed to glacial till drumlins; as such no Stage 2 survey was undertaken on them.

The Stage 2 archaeological assessment of the OHRG Project has involved consultation with and participation by First Nations peoples whose traditional territories are affected by the study area. The study area falls within the traditional territories of the Anishinaabe people and the traditional harvesting area of two Métis nations. Aboriginal monitors representing the Anishinaabe and Métis people whose traditional territory or traditional harvesting area are potentially impacted by the Project were present for the Stage 2 property survey.

The Stage 2 field survey was conducted between July 18 – 24; July 26 – 28; and July 30 – August 8, 2012 under archaeological consulting licence P218, issued to Scott Martin, Ph.D. The weather during the Stage 2 assessment ranged from sunny and hot to overcast and cool. At no time were the conditions detrimental to the recovery of archaeological material. Field visibility during the test pitting surveys ranged from very good to excellent. Table 3 provides daily weather conditions for the Stage 2 property survey.

Table 3: Stage 2 Weather Conditions

Date	Weather Conditions
July 18, 2012	Clear and warm
July 19, 2012	Mixed sun and cloud, warm
July 20, 2012	Mixed sun and cloud, warm
July 21, 2012	Clear and warm, light wind
July 22, 2012	Sunny and cool

Date	Weather Conditions
July 23, 2012	Cloudy, chance of rain
July 24, 2012	Clear and warm
July 26, 2012	Overcast and muggy
July 27, 2012	Clear and warm
July 28, 2012	Clear and warm – forest fire watch
July 30, 2012	Mixed sun and cloud, warm
July 31, 2012	Sunny, clear and warm
August 1, 2012	Mixed sun and cloud, warm
August 2, 2012	Clear and warm
August 3 2012	Overcast and muggy
August 4, 2012	Overcast, high chance of rain
August 5, 2012	Sunny and warm
August 6, 2012	Mixed sun and cloud, warm
August 7, 2012	Mixed sun and cloud, warm
August 8, 2012	

4.0 RECORD OF FINDS

The Stage 2 archaeological assessment was conducted employing the methods described in Section 3.0. An inventory of the documentary record generated by Stage 2 fieldwork is provided in Table 4. The Stage 2 photograph locations and test pit locations and are illustrated on Figures 11 and 12. Due to the size of the Project footprint and the numerous photographs taken, directional arrows are not illustrated on Figure 11 as it would obscure the mapping and no provide constructive information. However, all associated images (see Section 9.0) provide the direction of the photographs.

A total of two archaeological sites associated with 20th century mining activities were identified during the Stage 2 assessment. Material culture recovered from the Stage 2 property survey is contained in one banker's box and will be temporarily housed at Golder's Whitby office until formal arrangements can be made for their transfer to an MTCS collections facility.

Table 4: Inventory of Documentary Record

Document Type	Current Location of Document	Additional Comments
Field Notes	Golder office in Whitby	In original field book, photocopied in project file and stored digitally in project file
Hand Drawn Maps	Golder office in Whitby	In original field book and photocopied in project file
Maps Provided by Client	Golder office in Whitby	Stored in project file
Digital Photographs	Golder office in Whitby	Stored digitally in project file

4.1 Tailings Management Facility (TMF)

The tailings management facility (TMF) is located in the northeast portion of the study area. The area is typified by low-laying poorly drained soils supporting a number swamp loving tree species including black and white spruce, cedar and willow. Plates 1, 2 and 3 provide representative examples of the typical forest cover in the area. The soils of the area are comprised of fine silts, sands and organic based muck soil. Much of the tailings management area is covered in low lichens and Labrador Tea, both being plants that thrive in poorly drained soils (Plate 4). Areas that were not poorly drained were steeply sloped and non-conducive to human occupation (Plate 5). Modern mining exploration has resulted in extensive disturbance within the area to facilitate the placement of diamond drill platforms across the area (Plate 6). The vast majority of the established trails are constructed of downed trees placed side by side to form a type of corduroy road to facilitate the movement of heavy machinery (Plate 7). Apart from the established trail system the area is nearly impassable on foot due to the poorly drained nature of the area and equipment frequently becomes stuck.

Based on the Stage 1 background study, a total of 17 areas of archaeological potential were identified. These areas were based on proximity to water, either streams or ponds. As a result of the baseline report field work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of several areas that retained archaeological potential (**Figure 12**). Each of the identified areas was subject to test pit survey at 5 metre intervals. Areas of potential were based on soil conditions (well drained), geographic conditions (relatively flat), and proximity to water (within 50 metres). None of the areas subject to shovel testing yielded any cultural artifacts.

In addition to inspecting the TMF for suitable sites for past human occupation the cliff faces surrounding the area to the northwest were inspected for signs of pictographs. This was accomplished by physically walking along the cliffs and observing the rock face. These cliffs also provided an excellent vantage point of the surrounding landscape (Plate 8).

4.2 Explosives Storage

The proposed explosives storage area, situated between the proposed TMF and the proposed mine site, is located on a relatively flat area overlooking a cove of Sawbill Bay. The area is typified by bedrock outcrops (Plate 9) and mature coniferous forest cover (Plate 10). Unlike other areas within the study area the proposed explosives storage area is relatively undisturbed and is only bisected by a couple of small access cuts (Plate 11).

Based on the baseline study three areas of archaeological potential were identified. These areas were based on proximity to water (ponds or cove edge). As a result of the baseline report work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of no areas retaining archaeological potential. Based on the location of the proposed explosives storage area and the lack of land-based access roads the assessment was primarily conducted by boat. Boat based assessment provided a clear view of the shore line and allowed one to more easily assess areas of easy egress to and from any potential camp areas. Based on the water survey it was found that the shore edges within the proposed explosives storage footprint were extremely steep and not conducive to human occupation or archaeological survey. In addition to the areas assessed along the water's edge a single area of interest was identified in the baseline report located inland. When this area was ground truthed the water body identified in the baseline report was actually an area of poorly drained soil; further test pit survey was not required.

To summarize, no areas of archaeological potential were confirmed within the explosives storage area; as such test pit survey was not required in this area.

4.3 Hammond Reef Peninsula Components

The Hammond Reef peninsula of the proposed development is located in the southern portion of the study area. This peninsula is where a number of mine infrastructure components will be located; each component will be discussed separately below. The area is typified by a mix of mature coniferous trees interspersed with areas of poor drainage and disturbance. Plates 12, 13 provide representative examples of the typical forest cover in the area. The soils of the area are comprised of fine silts, sands and organic based muck soil. Overall the soils in the area are quite thin and provide very little structural or nutritional support for the area's vegetation (Plate 14). As stated previously, much of the peninsula has been extensively impacted by past and present mining activities and as such is covered in low scrub trees such as willow and alder as well as water loving lichens and mosses. Previous and current exploration activities have resulted in extensive disturbance within the area to facilitate the placement of diamond drill platforms across the area (Plate 15). The level of impact is such that some areas have been backfilled and the re-habilitation process has begun while others are in the process of being developed (Plate 16). The vast majority of the established trails are constructed of bulldozed paths cleared through the areas of thicker soil and scraped down to bedrock in areas of thinner soil (Plate 17). Based on what remains of the native vegetation it appears the Mitta Lake peninsula would have been relatively easy to traverse on food, compared to many of the other areas within the study area. Large areas of the peninsula were found to be poorly drained, previously disturbed or steeply sloped and not favourable to human occupation (Plate 18).

Based on the baseline study over 40 areas of archaeological potential were identified; these areas on the Mitta Lake peninsula will be discussed further below as they relate to proposal mine site components. These areas were based on proximity to water, streams, ponds or lakes. As a result of the baseline report field work was targeted at the identified areas to assess firsthand the potential of the areas to have supported past human occupation. First hand assessments of the area resulted in the identification of several areas retaining archaeological potential. The below sections provide detailed information on the test pit survey undertaken with regards to mine site components on the Mitta Lake peninsula.

4.4 Associated Project Infrastructure

Associated mine infrastructure components are located on the western side of the Mitta Lake peninsula and consist of a number of structures. The area chosen for the structures contains a single small lake fed by several small streams and a large section of shore line facing into Sawbill Bay (**Figure 2**). As with all areas within the study area the general landscape of the area is one of mixed coniferous forest as well as scrub growth, willow and alder. The landscape is generally undulating, ranging from steep bedrock outcrops to low laying poorly drained organic soils (Plate 19 and 20). The Stage 1 background study determined the area around the small internal pond to be a water feature that used as a de-watering pond; based on aquatic assessments of the pond conducted by Golder in 2011 found that pond contains no fish (Golder 2012). As a result the baseline report concluded the pond had no archaeological potential. This was confirmed by on the ground during the Stage 2 assessment. The pond is surrounded by steep cliffs on its southern shores and marsh bog on the northeastern shores. Plate 21 illustrates the nature of this water body. All areas of archaeological potential associated with the Project infrastructure are located along the shore of Sawbill Bay, as such the shore line was inspected by boat and areas of relatively flat, well drained soils were subject to test pit survey at five metre intervals (**Figure 12**). One of the areas subject to test pit survey resulted in the recovery of artifacts associated with 20th century mining activities (Location 1).

4.4.1 Location 1

Location 1 is comprised of a 20 metre east/west by 15 metre north/south surface scatter of artifacts as well as two artifact yielding test pits in the center of the scatter. The sparse ground cover in the area allowed for artifacts to be identified on the surface. Location 1 consists of 64 pieces of 20th century historic material. This material included 46 glass artifacts, nine ceramic artifacts, seven metal artifacts and two wire drawn nails (Plate 67). The recovered glass artifacts include 41 pieces of bottle glass (16 amber, 22 clear and 2 green) and five window glass shards, all measuring greater than 1.6 millimetres in thickness. Thick window glass is commonly found in the late 19th century and into the 20th century. The recovered ceramics include six pieces of ironstone and three pieces of semi-porcelain, both of which are ceramics that were manufactured from the late 19th century into the 20th century. The metal assemblage includes a mix of metal handles, miscellaneous fragments and piece of a cast iron stove. Wire drawn nails were popular from about 1890 into the 20th century. Table 5 provides a listing of the Location 1 Stage 3 catalogue.

Location 1 is situated in area operated as the Hammond Gold Reef Mine in the late 19th and early 20th centuries. The historic Hammond Gold Reef Mine is discussed in Section 1.3.4 and further in Section 5.0. The remains of the road are visible as an area of compact earth covered in scrub tree growth bordered by mature forest. A section of the trail has recently been subject to reforestation. Test pitting of the road area revealed the surface soil to be only three to five centimetres in depth overlaying compact grey clay. In addition to the artifacts recovered from the test pits and surface scatter two large iron rings were identified. These were not recovered and were left in situ on site.

The Stage 2 assessment also identified the remains of the historic Hammond Gold Reef Mine reservoir (Plate 52): this included the ruins of two dams, one wood (Plate 53) and one earth (Plate 54) and a channel flowing from the dam to the former location of a stamp mill and a saw mill, of which no remains exists today.

Due to the relatively late date of the recovered artifacts, the small spatially defined area in which they were recovered and the high occurrence of glass and metal artifacts, UTM coordinates were not recorded for each surface artifact; UTM coordinates were recorded for the site centroid, the furthest extent of the scatter in each of the cardinal directions as well as for positive test pits.

Table 5: Location 1 Stage 2 Catalogue

Cat. #	Date	Context	Artifact	Freq.	Comments
1a	30-Jul-12	surface	glass, bottle	40	16 amber, 2 green, 22 clear
1b	30-Jul-12	surface	glass, window	4	>1.6mm
2	30-Jul-12	surface	metal, handle	1	
3	30-Jul-12	surface	metal, miscellaneous	2	
4	30-Jul-12	surface	metal, pipe	1	fragment
5	30-Jul-12	surface	cast iron stove fragment	1	part of a burner
6	30-Jul-12	surface	nail, wire drawn	2	
7	30-Jul-12	surface	ironstone, plain	5	
8	30-Jul-12	surface	porcelain, semi	3	
9	30-Jul-12	test pit #2	ironstone, plain	1	
10	30-Jul-12	test pit #1	glass, bottle	1	clear
11	30-Jul-12	test pit #1	glass, window	1	>1.6mm
12	30-Jul-12	test pit #1	metal, wire handle	1	
13	30-Jul-12	test pit #1	metal, handle	1	

4.5 Waste Rock/Overburden Stockpiles

The proposed waste rock/overburden stockpile area is located on the northeastern limit of the Mitta Lake peninsula. The area is typified by undulating sand knolls interspersed with outcrops of bedrock and areas of poorly drained soil (Plate 22). The area of the proposed waste rock stock pile is primarily covered in mature forest but also contains areas of previous disturbance Plate 23). The baseline study indicated 10 areas of archaeological potential are situated in this area based on proximity to water (Golder 2012). When these areas were ground truthed it was revealed that those areas located along the existing access road were modern ditches (Plate 24) and did not retain archaeological potential as they are a modern man-made water source. Assessment of the medium sized pond within the waste rock/overburden stockpile footprint revealed several areas of archaeological potential; these areas were subject to test pit survey at five metre intervals (**Figure 12**). Plate 25 illustrates an example of the test pit activities conducted along the shore of this pond. The survey resulted in no finds. The shore line of the peninsula was assessed via boat and three areas were identified as retaining archaeological potential. These areas were subject to test pit survey at five metre intervals (Plate 26).

In the northwest portion of the waste rock/overburden stockpiles footprint cultural artifacts related to 20th century mining activities were recovered (Location 2).

4.5.1 Location 2

Location 2 is situated in an area operated in the late 19th and early 20th centuries as Sawbill Mine. Within this area a concentration of artifact yielding test pits were excavated; as well a small surface scatter was identified, exposed by the construction of an ATV trail. Location 2 is located in association with the historically documented position of the historic Sawbill Mine. The Sawbill Mine will be discussed further in Section 5.0. The area comprising the five artifact yielding test pits and the surface scatter is approximately 25 metres east/west by 35 metres north/south. Location 2 consists of 54 pieces of 20th century historic material. This material included 48 wire drawn nails, two ceramic insulators, two components of a light bulb, one piece of porcelain and one complete bottle (Plate 68). Wire drawn nails were popular from about 1890 into the 20th century. The porcelain fragment is a 20th century piece stamped “MADE IN JAPAN”. The complete bottle is a small, clear medicine bottle with measurements embossed on the sides; other than that there are no distinguishing markings. Table 4 provides a listing of the Location 2 Stage 3 catalogue. In addition to the recovered artifacts the surface scatter contained the remains of a large cast iron stove (Plate 30, 31) that was photographed but left in situ.

In addition to the artifact scatter the remains of a steam engine and the remains of the original tramway that was used in the transport of ore from the mine to the processing plant located on the shores of Sawbill Bay were identified. Both will be discussed further in Section 5.0.

Due to the relatively late date of the recovered artifacts, the small spatially defined area in which they were recovered and the high occurrence of nails and glass artifacts, UTM coordinates were not recorded for each surface artifact; UTM coordinates were recorded for the site centroid, the furthest extent of the scatter in each of the cardinal directions as well as for positive test pits.

Table 6: Location 2 Stage 2 Catalogue

Cat. #	Date	Context	Artifact	Freq.	Comments
1	28-Jul-12	test pit #2	nail, wire drawn	12	
2	28-Jul-12	test pit #5	nail, wire drawn	1	
3	28-Jul-12	test pit#8	nail, wire drawn	4	
4	28-Jul-12	test pit #7	porcelain	1	made in Japan

Cat. #	Date	Context	Artifact	Freq.	Comments
5	28-Jul-12	test pit #1	nail, wire drawn	29	
6	28-Jul-12	test pit #1	insulator	1	ceramic
7	28-Jul-12	surface	nail, wire drawn	2	
8	28-Jul-12	surface	light socket	1	metal, jacket
9	28-Jul-12	surface	glass, light bulb	1	
10	28-Jul-12	surface	insulator	1	ceramic
11	28-Jul-12	surface	glass, complete bottle	1	clear, medicine, 3IV

4.6 Open Pit (East and West) and Low Grade Ore Stockpile

The proposed east and west open pit and the ore stock pile area are located on the southern tip of the Mitta Lake peninsula. The southern tip of the Mitta Lake peninsula is the area that has been subject to the most intensive disturbance. The area has been stripped of the majority of trees and areas of water have been either drained or back filled with organic slash (Plate 27). The level of disturbance in this area is typified by (Plate 28). Any areas that remained undisturbed were either steeply sloped, poorly drained or both (Plate 29). The entire shore line of the peninsula was assessed for areas of archaeological potential by way of boat assessment. This resulted in a number of areas of potential being identified and subject to test pit survey at five meter intervals. **Figure 12** illustrates all areas that were subject to test pit assessment. No remains of cultural material were recovered from this area.

4.7 Project Access Road

The area delineated as the access road is an approximately 45 kilometre long by 290 metre wide linear corridor that begins at Highway 622 and runs in a northerly direction until its termination at Mitta Lake. The delineated area is already home to a four seasons gravel access road; the current project layout indicates activities will be undertaken to level and straighten undefined sections of the road to reduce the risks associates with the use of the road by large haul trucks to transport needed construction material to the mine site. The current road follows a serpentine route along the path of least resistance. The entire length of the access road was subject to Stage 2 archaeological assessment to confirm areas of archaeological potential. The landscape along the access road is typified by steep slopes (Plate 32), rocky outcrops (Plate 33) and low poorly drained areas (Plate 34). The Stage 2 assessment revealed several areas retaining potential but test pit survey did not result in the recovery of any cultural remains. Areas subject to test pit survey (Plate 35, 36) were typified as relatively flat sandy areas, with the largest areas located between kilometre marker 12 and 14 on the Sawbill Road and Kilometre 9 and 10 on the Sawbill Road. Kilometre 9 and 10 are located where the access road intersects the proposed transmission corridor. Several other small areas along the length of the access also being subject to test pit assessment (**Figure 12**). The Stage 2 assessment of the Project access road did not result in the recovery of cultural material.

4.8 Transmission Corridor

The proposed Transmission Corridor consists of an approximately 18.6 kilometre long by approximately 350 meter wide linear corridor that will originate at the extant hydro corridor located approximately 600 metres north of the intersection of Highway 622 and Hardtack Road. The proposed corridor will proceeded in a more or less parallel fashion to the existing access road and will terminate at the proposed transformer station located on the Mitta Lake peninsula. The proposed transmission corridor was subject to Stage 2 assessment based on GIS predictive modeling as outlined in Section 2.0 of this report. As such areas within 50 metres of water courses were ground truthed to confirm for archaeological potential. Of the areas identified in the predictive model only three areas were found to possess well drained, flat soils and required test pit survey (**Figure 10**). One of these areas was an area of well drained sand located between the access road and the proposed transmission corridor (Plate 37). The other two areas of interest were located on either side of a small bay (**Figure 12**). Test pit assessment of these areas did not result in the recovery of any cultural material. All other areas indicated in the GIS model exhibited no archaeological potential and were typified by steep slopes, rocky outcrops (Plate 38) or were poorly drained (Plate 39). Additional photos of transmission corridor conditions can be found in Plates 40-46.

4.9 Workers Camp

The workers camp is proposed to be located where the current exploration camp is situated at the northern limit of the Sawbill Road at the transition to the Reef Road that facilitates access to the proposed infrastructure located on the Mitta Lake peninsula. The workers camp will occupy an expanded footprint of the existing exploration camp. The area in question is situated on a small inlet of the Sawbill Reservoir on an area of relatively flat, well drained ground (Plate 47). The workers camp area is bisected by a small, fast flowing creek that empties into the bay which borders the eastern extent of the proposed camp. While the existing bay is likely the result of the extensive water management plans that have impacted the overall study area, the presence of a creek flowing through and areas of well drained, flat soil would likely have made the area attractive to past inhabitants of the region (Plate 48). Due to the camp’s access to water and well drained soils the area was subject to test pit survey within 50 metres of all existing water features (Plate 49). Due to the fact the camp is located partially within the existing limits of the current exploration camp large sections of the area were previously disturbed and therefore not subject to test pit survey (Plate 50). No cultural remains were recovered in this area.

5.0 ANALYSIS AND CONCLUSIONS

The Stage 1 background study and property inspection concluded that archaeological potential exists within the Project footprint along waterways that are bordered by dense coniferous forest as well as areas that show that drumlins occur. As a result, the subject property was subject to a Stage 2 archaeological assessment.

The Stage 2 archaeological assessment entailed test pit survey at five metre intervals across areas determined to have archaeological potential where required as per Section 2.1.5, Standards 1 and 2 of the MTCS *Standards and Guidelines for Consultant Archaeologists* within the Project footprint.

A total of two archaeological sites associated with 20th century mining activities were identified during the Stage 2 assessment. Location 1 is located in association with the historically documented position of the Hammond Gold Reef workers accommodations along one of the original access roads for the property. Location 2 is located in association with the historically documented position of the Sawbill Mine. Supplementary Document A shows the location of each mine site.

5.1 Hammond Gold Reef Mine (Location 1)

The Hammond Gold Reef located to the southwest of the Sawbill mine was originally owned by Mr. James Hammond and Mr. Henry Folger (Bureau of Mine 1899). Artifacts were recovered in this area over a 20 metre by 15 metre area. The mine operated slightly differently than the nearby Sawbill Mine and employed a combination of open pit mining and Adits. An Adit is a horizontal access to a mine shaft. The Stage 2 assessment of the area around the Hammond Gold Reef Mine revealed two such Adits (Plate 51) and several large areas of past disturbance, any of which could be past evidence of open pit mining. In addition to the open pits and Adits the Hammond Mine consisted of a stamp mill, a small saw mill, water reservoir and several other structures involved in the processing and extraction of gold ore. The Stage 2 assessment uncovered the remains of the reservoir (Plate 52): this included the ruins of two dams, one wood (Plate 53) and one earth (Plate 54) and a channel flowing from the dam to the location of the stamp mill and saw mill. In conjunction with the infrastructure needed for gold processing, structures necessary for the care of workers were also present. These included a bunk house, cook house, and storage facility (Bureau of Mine 1899). The location of the recovered artifacts (Location 1) corresponds with the placement of the bunk house and the location of one of the original access roads to the property (Plate 55). No evidence of the stamp mill or the saw mill were found, but this is likely due to the level of modern disturbance that has occurred in the area where these structures are reported to have been. The modern Osisko operation is using the area of these past structures as their main core storage area (Plate 56). As such the area had been extensively modified to allow for the installation of access roads and core shacks. The extensive alterations in water level of Sawbill Bay since the 1890s had an impact on the landscape and it is very likely that further evidence of the Hammond Gold Reef mine now resides under the waters of Sawbill Bay.

Given the limited size of the artifact collection and its 20th century association, the cultural heritage value or interest of the site is considered to be sufficiently documented.

5.2 Sawbill Mine (Location 2)

The remains Sawbill Mine are located approximately 1,500 metres east of the shore of Sawbill Bay. The site itself is comprised of a collection of cement foundations (Plate 57) and three vertical shafts (Plate 58 and 59) sunk into a quartzite vein that transects the mine site from north to south (Plate 60). In association with the shafts and foundations is a large engine (Plate 61) and a series of test trenches (Plate 62) that would have been used to identify the extent of the gold bearing quartz vein, as well as a stone damn that, according to research, was used to supply the processing plant with water during the summer months (Bureau of Mine 1899). The engine located on the site was produced by Imperial Keighley and appears to be a two cylinder gas engine. Based on visual assessment and the placement of the engine it is likely that it was used in the dewatering of the mine and the transport of materials and men from the shaft and associated level cuts. Further research on the Imperial Keighley Company yielded only rudimentary information and no direct information was found regarding the true purpose of the engine identified at the Sawbill Mine. What is available on the Imperial Keighley Company is that it was a British Company and Canada imported a lot of industrial equipment from Britain. Based on its assembly it appears to be an overbuilt two cylinder machine that is similar to ones that were installed in other Canadian establishments in the late 1930s and early 1940s (Personal communication, Chris Andreae, August 2012). This assessment is in keeping with the fact the Sawbill Mine was re-opened in the early 1940s. The final piece of infrastructure associated with the Sawbill Mine is what remains of the original tramway that was used in the transport of oar from the mine to the processing plant located on the shores of Sawbill Bay. According to the 1899 Bureau of Mines Report a surface tram 550 feet in length was used to transport oar to the mill (Bureau of Mines 1899). The remains of what is presumably this line were identified running from the mine shaft to the shore line of Sawbill Bay. The identified line was measured to be approximately 365 meters long and three meters wide. The line is composed of two different construction techniques. The most visually obvious being elevated sections constructed of field stone (Plate 63, 64, 65). The full extent of the rail line was traced by following the slight elevation in ground resulting from the construction of the rail bed. A series of artifact yielding test pits (Plate 66) were found in association with the remains of a cast iron stove (Plate 30, 31) located to the north of the main concentration of shafts, foundations and equipment.

Given the limited size of the artifact collection and its 20th century association, the cultural heritage value or interest of the site is considered to be sufficiently documented.

6.0 RECOMMENDATIONS

Given the findings of the Stage 1-2 archaeological assessment within the footprint of the Project components, the following recommendation is made:

1) The footprint of the Project components may be considered sufficiently documented for archaeological resources. No further archaeological assessment is required.

In spite of the results and recommendations presented in this report, no archaeological assessment, however comprehensive the research and sampling strategy, can necessarily detect isolated or deeply buried archaeological deposits. See Section 7.0 for specific limitations of this report. In the event that deeply buried archaeological remains are encountered on the subject property during future land disturbance activities, the Ministry of Tourism, Culture and Sport must be notified immediately. In the event that human remains are encountered on the subject property during future land disturbance activities, the police or coroner and the Registrar of the Cemeteries Regulation Unit at the Ministry of Consumer Services must be notified immediately.

The MTCS is asked to review the results presented and to accept this report into the Ontario Public Register of Archaeological Reports. The MTCS is also asked to inform OHRG via letter that concerns related to archaeological resources with the Project footprint have been addressed.

7.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sports as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the Project footprint of a development proposal have been addressed to the satisfaction of the Ministry of Tourism and Culture, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, R.S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

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9.0 IMAGES

Plate 1: Photo 624, Waypoint 666, typical forest cover, facing north

Plate 2: Photo 630, Waypoint 216, typical forest cover and slope, facing north

Plate 3: Photo 691, Waypoint 120, typical forest cover in poorly drained soil, facing east

Plate 4: Photo 123, Waypoint 120, poorly drained soil, moss and Labrador Tea, facing south

Plate 5: Photo 623, Waypoint 215, slope, facing south

Plate 6: Photo 079, Waypoint 667, slope, facing north

Plate 7: Photo 086, Waypoint 668, corduroy type road, facing west

Plate 8: Photo 702, Waypoint 669, overview of landscape from cliff face, facing east

Plate 9: Photo 100, Waypoint 058, bedrock outcrops, facing west

Plate 10: Photo 099, Waypoint 057, coniferous forest, facing northwest

Plate 11: Photo 4, Waypoint A14 2, small forestry road and ditch, facing north

Plate 12: Photo 001, Waypoint P1, slope, disturbance and forest, facing south

Plate 13: Photo 010, Waypoint P004, disturbance and tree cover, facing east

Plate 14: Photo 016, Waypoint 670, thin soil over bedrock, facing southeast

Plate 15: Photo 006, Waypoint P4, previous disturbance, facing northwest

Plate 16: Photo 041, Waypoint P34, backfilling wetlands, facing southeast

Plate 17: Photo 028, Waypoint P29, access trail installation, facing north

Plate 18: Photo 008, Waypoint P6, undisturbed sloped area, facing south

Plate 19: Photo 020, Waypoint 015, steep slope, facing west

Plate 20: Photo 019, Waypoint 014, poorly drained area, facing southwest

Plate 21: Photo 021, Waypoint 016, overview of pond, facing southwest

Plate 22: Photo 786, Waypoint Preside 1, rock and poorly drained area, facing east

Plate 23: Photo 193, Waypoint 115, area of previous extraction, facing south

Plate 24: Photo 200, Waypoint 116, modern ditch on side of Reef Road, facing south

Plate 25: Photo 802, Waypoint wrtp6, typical area subject to test pit assessment, facing west

Plate 26: Photo 623, Waypoint 097, test pitting, facing south

Plate 27: Photo 014, Waypoint 007, drained wetland with tree backfill, facing southeast

Plate 28: Photo 015, Waypoint 008, drained wetland with tree backfill, facing east

Plate 29: Photo 007, Waypoint P5, disturbance and tree cover, facing northeast

Plate 30: Photo 283, Waypoint 150, cast iron stove remains, facing north

Plate 31: Photo 284, Waypoint 150, cast iron stove top “HAZELWOOD”, looking down

Plate 32: Photo 334, Waypoint 175, steeply sloped area on access corridor, facing north

Plate 33: Photo 324, waypoint 169, rocky outcrop on access corridor, facing north

Plate 34: Photo 314, Waypoint 162, poorly drained area on access corridor, facing west

Plate 35: Photo 102, Waypoint P060, test pitting on access corridor, facing north

Plate 36: Photo 411, Waypoint 190, test pitting along Sawbill Road, facing east

Plate 37: Photo 465, Waypoint 192, testpitting along Sawbill Road, facing southeast

Plate 38: Photo 499, Waypoint 682, steep rocky slope on transmission corridor, facing west

Plate 39: Photo 500, Waypoint 683, poorly drained area on transmission corridor, facing west

Plate 40: Photo 501, Waypoint 200, boat assessment, facing northeast

Plate 41: Photo 519, Waypoint 205, poorly drained area (orange tape is logging line), facing west

Plate 42: Photo 528, Waypoint 206, stone dam remains, facing north

Plate 43: Photo 539, Waypoint 208, iron plate, facing north

Plate 44: Photo 542, Waypoint 209, modified stone channel, facing west

Plate 45: Photo 547, Waypoint 212, stone dam and waste rock pile, facing west

Plate 46: Photo 561, Waypoint 807, steep rock slope, facing north

Plate 47: Photo 151, Waypoint P0022, well drained soil, facing west

Plate 48: Photo 137, Waypoint P017, creek, facing west

Plate 49: Photo 607, Waypoint P023, test pitting, facing south

Plate 50: Photo 126, Waypoint P013, area of previous disturbance, facing west

Plate 51: Photo 042, Waypoint 680, Hammond Gold Reef "Adit" opening, facing southeast

Plate 52: Photo 275, Waypoint 681, water line of Hammond Gold Reef Mine reservoir, facing northeast

Plate 53: Photo 677, Waypoint k97, Hammond Gold Reef Mine reservoir wood dam, facing southeast

Plate 54: Photo 277, Waypoint k97, Hammond Gold Reef Mine reservoir earth dam, facing east

Plate 55: Photo 309, Waypoint Hist 1, Hammond Gold Reef Mine Location 1, facing west

Plate 56: Photo 309, stock photo Google Earth, Waypoint 500, Osisko core storage, facing west

Plate 57: Photo 268, Waypoint 'building', cement foundations, facing southeast

Plate 58: Photo 066, Waypoint 039, mine shafts (in orange fencing), facing northeast

Plate 59: Photo 222, Waypoint 036, mine shaft filled with water, facing west

Plate 60: Photo 251, Waypoint 036, mine shaft showing quartz vein, facing south

Plate 61: Photo 286, Waypoint 036, "IMPERIAL KEIGHLEY" engine, facing southwest

Plate 62: Photo 727, Waypoint TRE3, test trenches, facing southwest

Plate 63: Photo 259, Waypoint R10, field stone footing for tram line, facing east

Plate 64: Photo 254, Waypoint R6, field stone footing for tram line, facing southwest

Plate 65: Photo 263, Waypoint 128, field stone footing for tram line, facing southeast

Plate 66: Photo 284, Waypoint 150, Sawbill Mine Location 2 artifact yielding test pits, facing east

Plate 67: Location 1 Stage 2 Artifacts

Plate 68: Location 2 Stage 2 Artifacts

10.0 MAPS

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.;
Base Data - MNR NRVIS, obtained 2004, CANMAP v2006.4 Produced by Golder Associates Ltd under licence from Ontario Ministry of Natural Resources, © Queens Printer 2012
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

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Golder Associates
Mississauga, Ontario

DATE	February, 2013	TITLE	PROJECT LOCATION
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GIS	JO		
CHECK	CP	PROJECT	HAMMOND REEF GOLD PROJECT ATIKOKAN, ONTARIO, CANADA
REVIEW	CP	FIGURE: 1	

PROJECT No. 10-1118-0020

SCALE AS SHOWN VERSION 1

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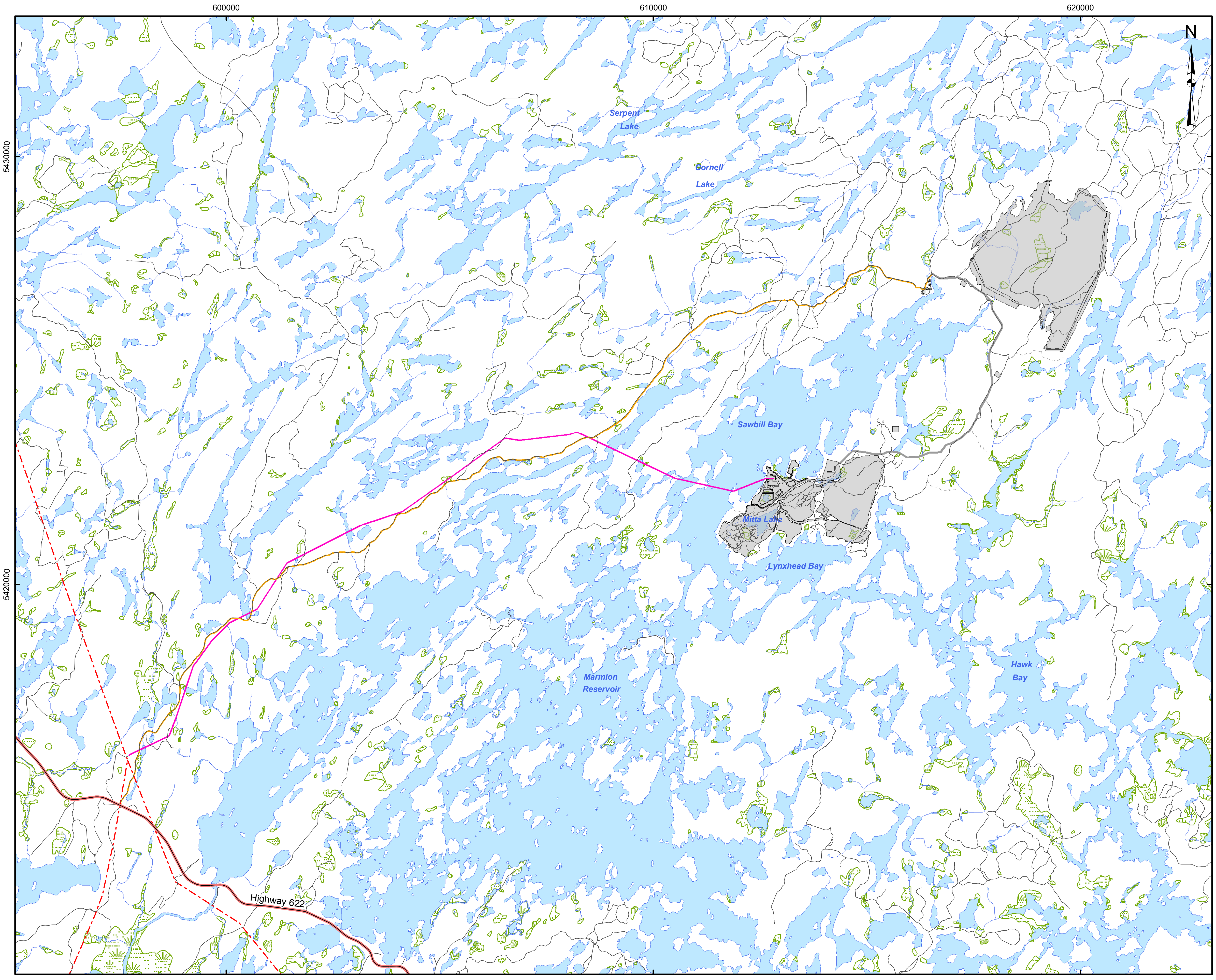

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LEGEND

- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
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Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

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PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
SITE STUDY AREA

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
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REVIEW	CP	5 Feb. 2013		

FIGURE: 2

LEGEND

- Project Location
- City/Town
- River
- Waterbody

Depots and/or Break-of-Bulk Points

- Hudson's Bay Company
- St. Lawrence Traders
- Major Boat-Building Centre
- Major Canoe-Building Centre

Transportation Route Types

- Major Route
- Minor Route

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
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PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

HISTORICAL
TRANSPORTATION ROUTES

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
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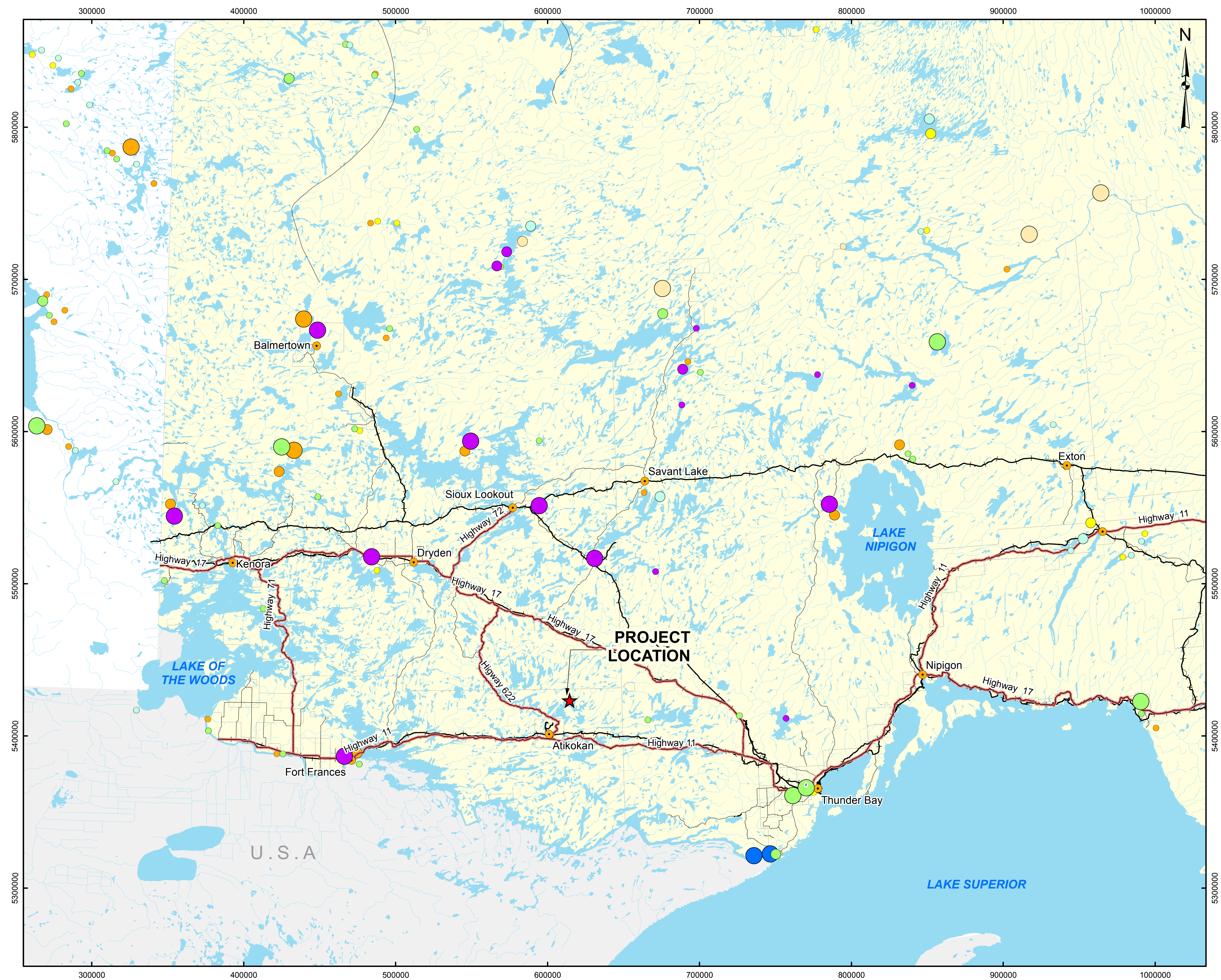
REVIEW	CP	5 Feb. 2013		

Golder Associates
Mississauga, Ontario



LEGEND

- Project Location
- City/Town
- Provincial Highway
- Road
- Existing Railway
- Power Transmission Line
- River
- Waterbody

Hudson's Bay Company

- Pre-1774
- 1774-1789
- 1790-1805
- 1806-1821

St. Lawrence Traders

- Pre-1774
- 1774-1789
- 1790-1805
- 1806-1821

Duration of Post

- < 5 years
- 5 to 15 years
- > 15 years

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
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Historical Atlas of Canada, Vol. 1. ED. R. Cole. Harris 1987. University of Toronto Press. Toronto ON, Canada.
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PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
FUR TRADE POSTS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
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FIGURE: 4

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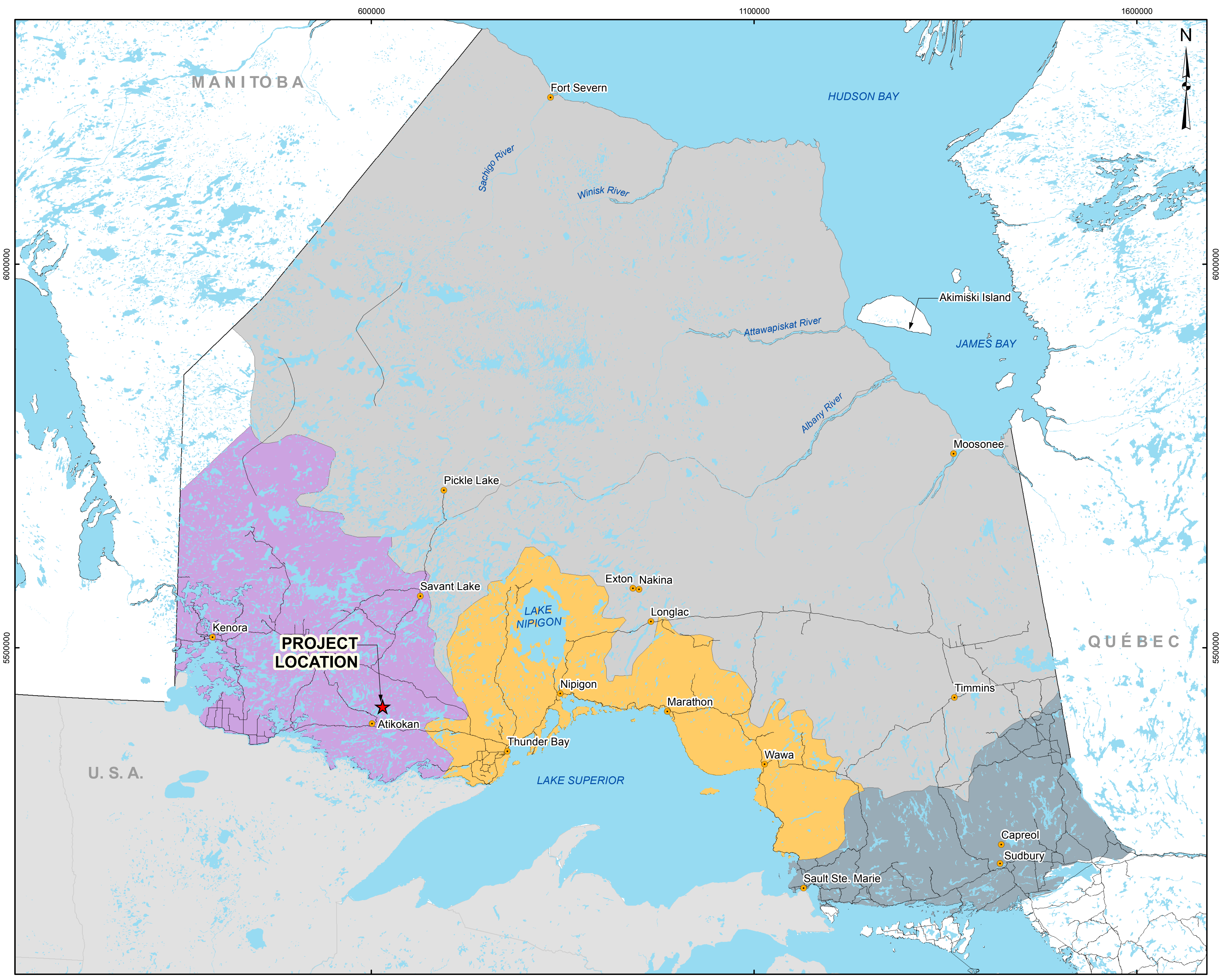

LEGEND

- Project Location
- Community
- Existing Rail Line
- Exisitng Road
- Waterbody

Historical Indian Treaties

- Robinson-Huron Treaty
- Robinson-Superior Treaty
- Treaty 3
- Treaty 9

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd
Base Data - MNR NRVIS, obtained 2004
First Nations Communities from Indian and Northern Affairs Canada.
Produced by Golder Associates Ltd under licence from
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PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

ABORIGINAL TREATY LANDS

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
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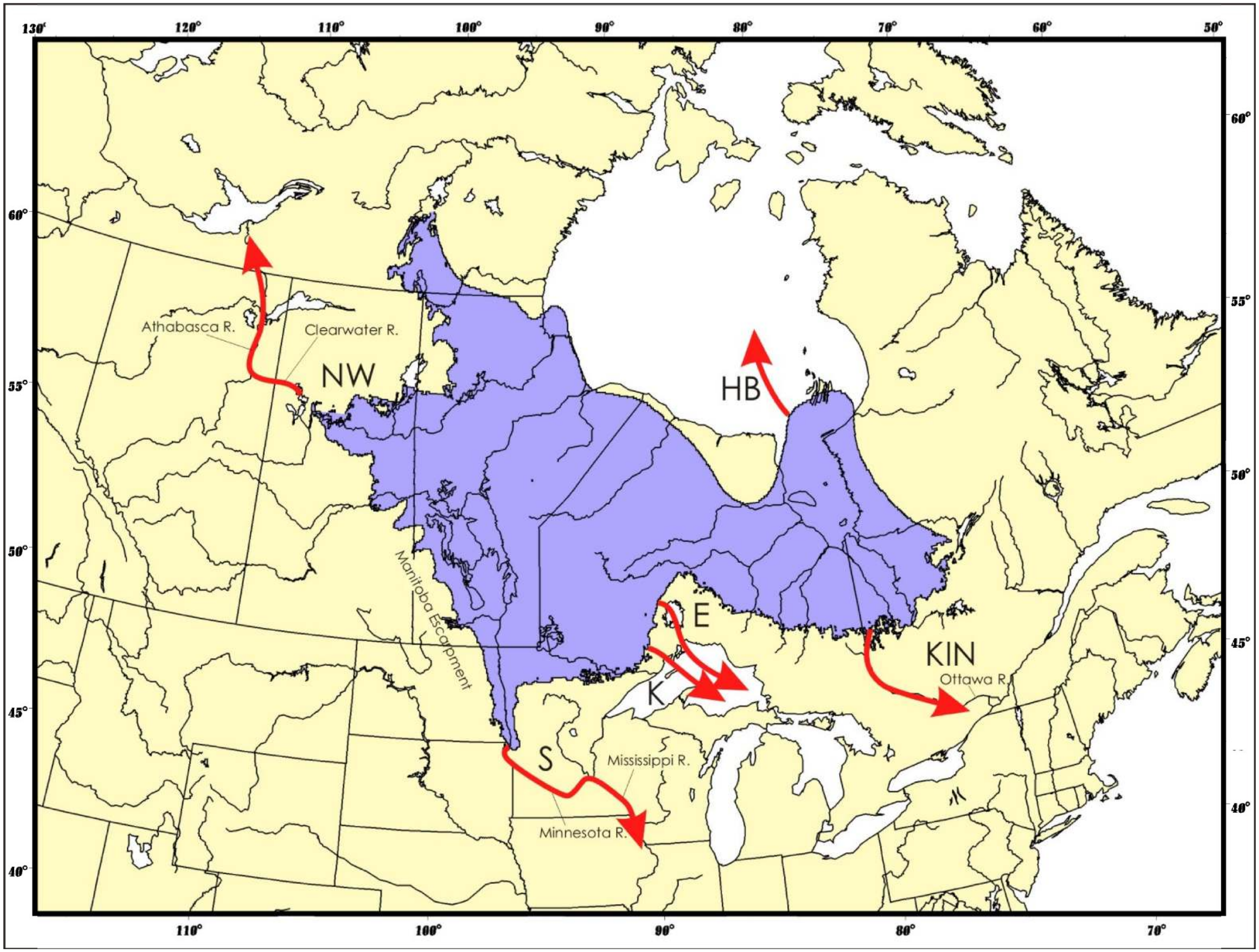

LEGEND

Major Drainage Routes

S - Southern outlet to the Gulf of Mexico
K - Kaministikwia route to the Superior basin
NW - Northwestern outlet to the Arctic Ocean
E - Eastern outlet system to the Superior basin
KIN - Angliers and Kinojévis outlets to the St. Lawrence River valley
HB - Final release of Lake Agassiz waters into the Tyrrell Sea

Lake Agassiz

REFERENCE

Leverington, D.W., Teller, J.T., 2003. Paleotopographic reconstructions of the eastern outlets of glacial Lake Agassiz, Canadian Journal of Earth Sciences 40, 1259-1278.

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

APPROXIMATE TOTAL AREA OCCUPIED BY LAKE AGASSIZ OVER ITS 5000 CALENDAR-YEAR HISTORY

Golder Associates
Mississauga, Ontario

PROJECT NO. 10-1118-0020			NOT TO SCALE	VERSION 1
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FIGURE: 6

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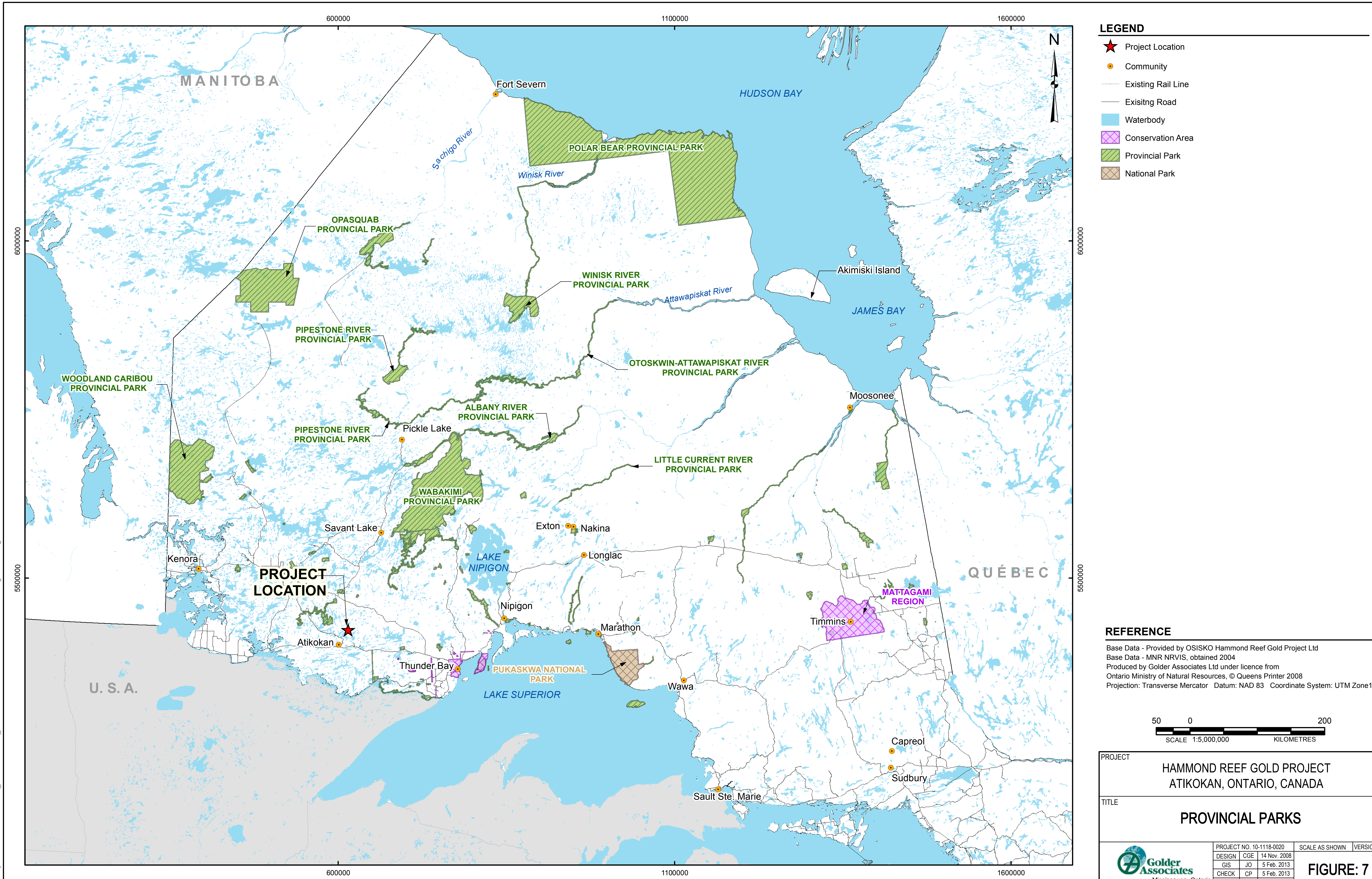

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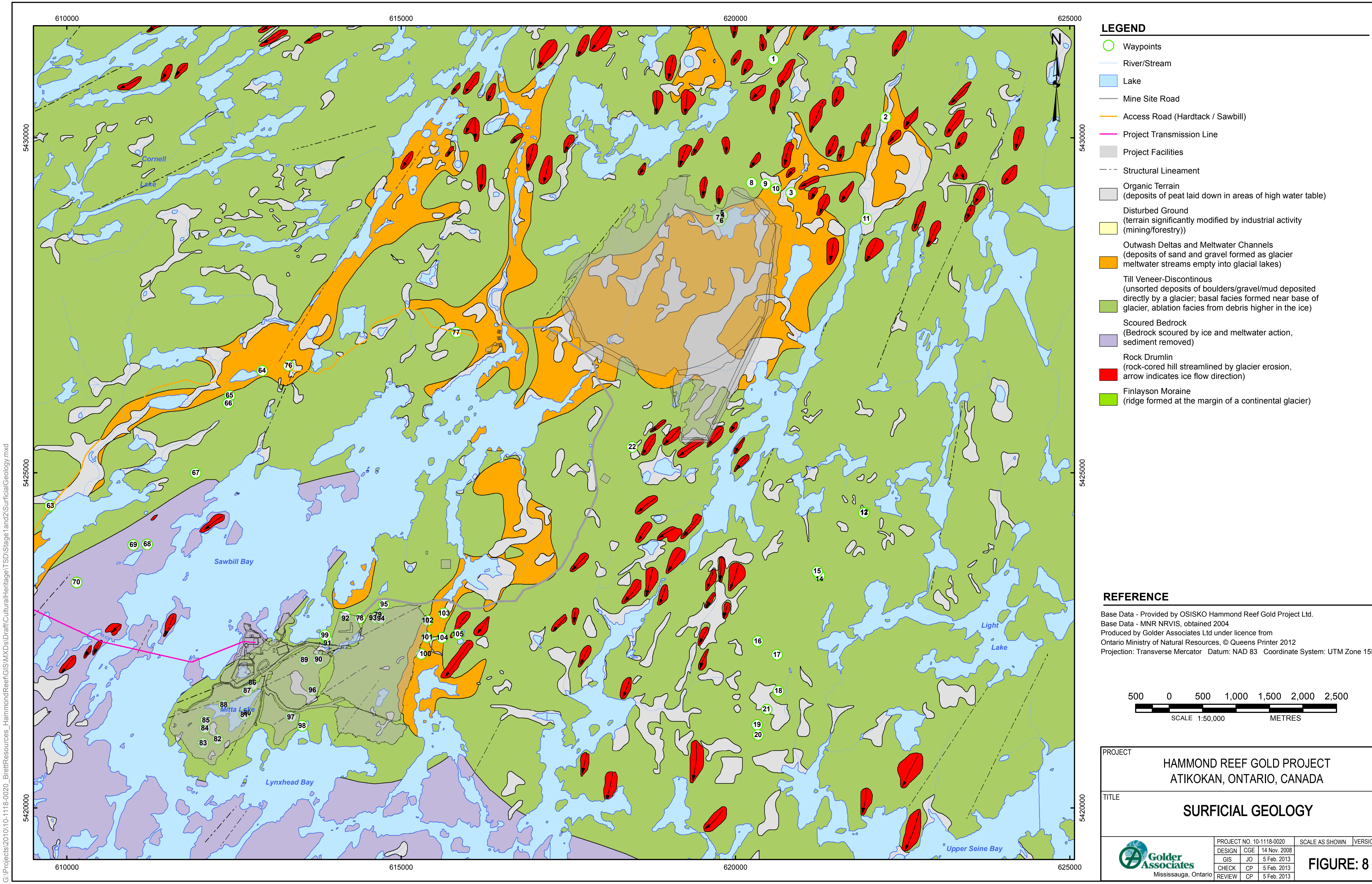
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Cornell Lake
Sawbill Bay
Mitta Lake
Lynxhead Bay
Light Lake
Upper Seine Bay
N
LEGEND
Waypoints
River/Stream
Lake
Mine Site Road
Access Road (Hardtack / Sawbill)
Project Transmission Line
Project Facilities
Structural Lineament
Organic Terrain
(deposits of peat laid down in areas of high water table)
Disturbed Ground
(terrain significantly modified by industrial activity (mining/forestry))
Outwash Deltas and Meltwater Channels
(deposits of sand and gravel formed as glacier meltwater streams empty into glacial lakes)
Till Veneer-Discontinous
(unsorted deposits of boulders/gravel/mud deposited directly by a glacier; basal facies formed near base of glacier, ablation facies from debris higher in the ice)
Scoured Bedrock
(Bedrock scoured by ice and meltwater action, sediment removed)
Rock Drumlin
(rock-cored hill streamlined by glacier erosion, arrow indicates ice flow direction)
Finlayson Moraine
(ridge formed at the margin of a continental glacier)
REFERENCE
Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
Produced by Golder Associates Ltd under licence from
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Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N
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PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA
TITLE
SURFICIAL GEOLOGY
Golder Associates
Mississauga, Ontario
PROJECT NO. 10-1118-0020
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VERSION 1
DESIGN CGE 14 Nov. 2008
GIS JO 5 Feb. 2013
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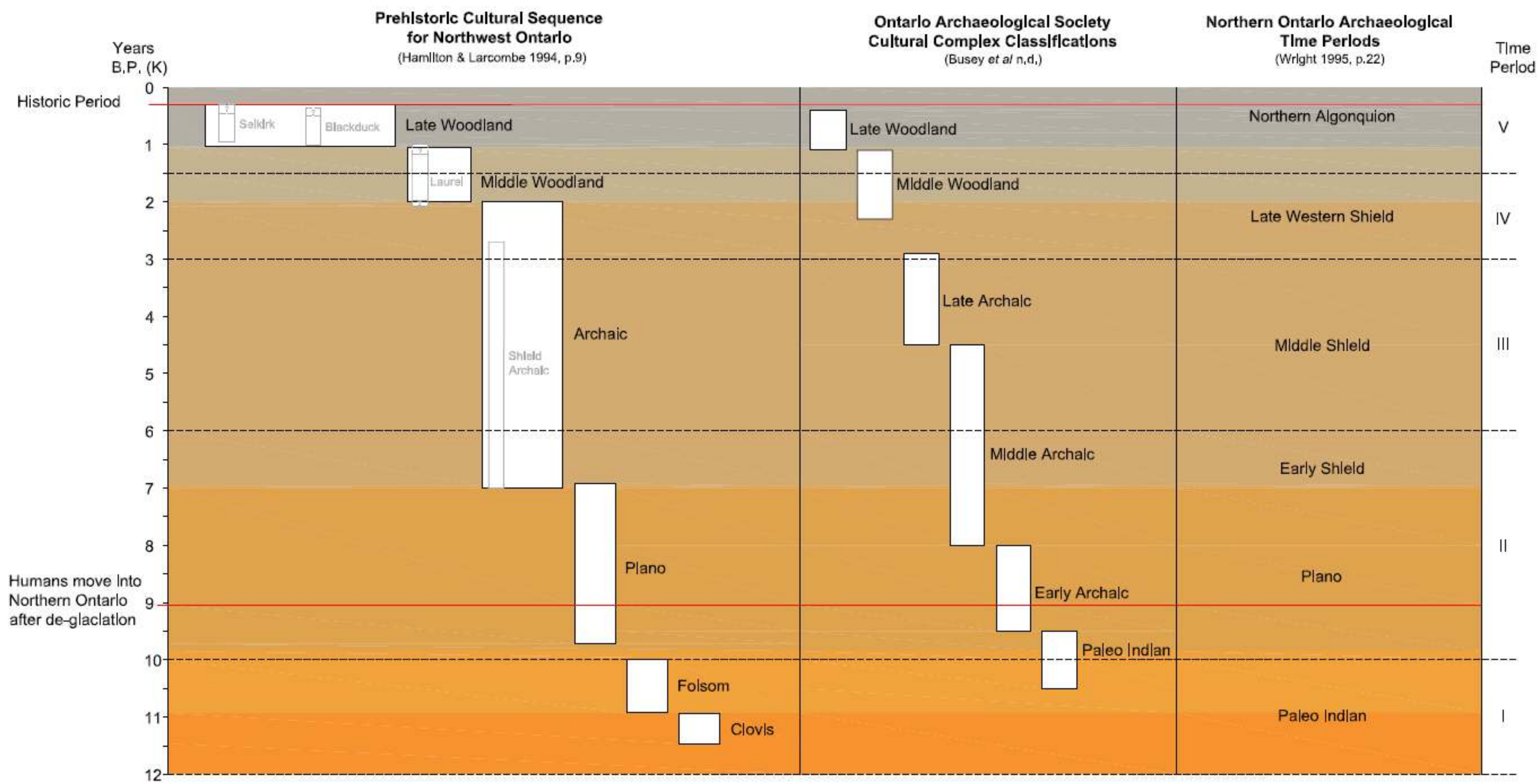

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

PRE-CONTACT CHRONOLOGY

PROJECT NO. 10-1118-0020			VERSION 1
DESIGN	JO	3 Oct. 2012	
GIS	JO	5 Feb. 2013	
CHECK	CP	5 Feb. 2013	
REVIEW	CP	5 Feb. 2013	

Golder Associates
Mississauga, Ontario

FIGURE: 9

REFERENCES

Busey, J. Daechsel, H. Hinshelwood, A. & Murphy, C. ;2010, **Summary of OntarioArchaeology**. http://www.ontarioarchaeology.on.ca/summary/contents.php;

Hamilton, S. & Larcombe, L., ; 1994, **Cultural Heritage Resource Predictive Modelling Project: Volume 1: Introduction to the Research. Centre for Archaeological Resource Prediction**, Lakehead University, Thunder Bay, ON.

Wright, J.V.,; 1995, **A History of the Native People of Canada (Volume I)**, Mercury Series Archaeological Survey of Canada, Paper 152, Canadian Museum of Civilization, Ottawa, ON.

NOTE

This figure is to be read in conjunction with the accompanying report.

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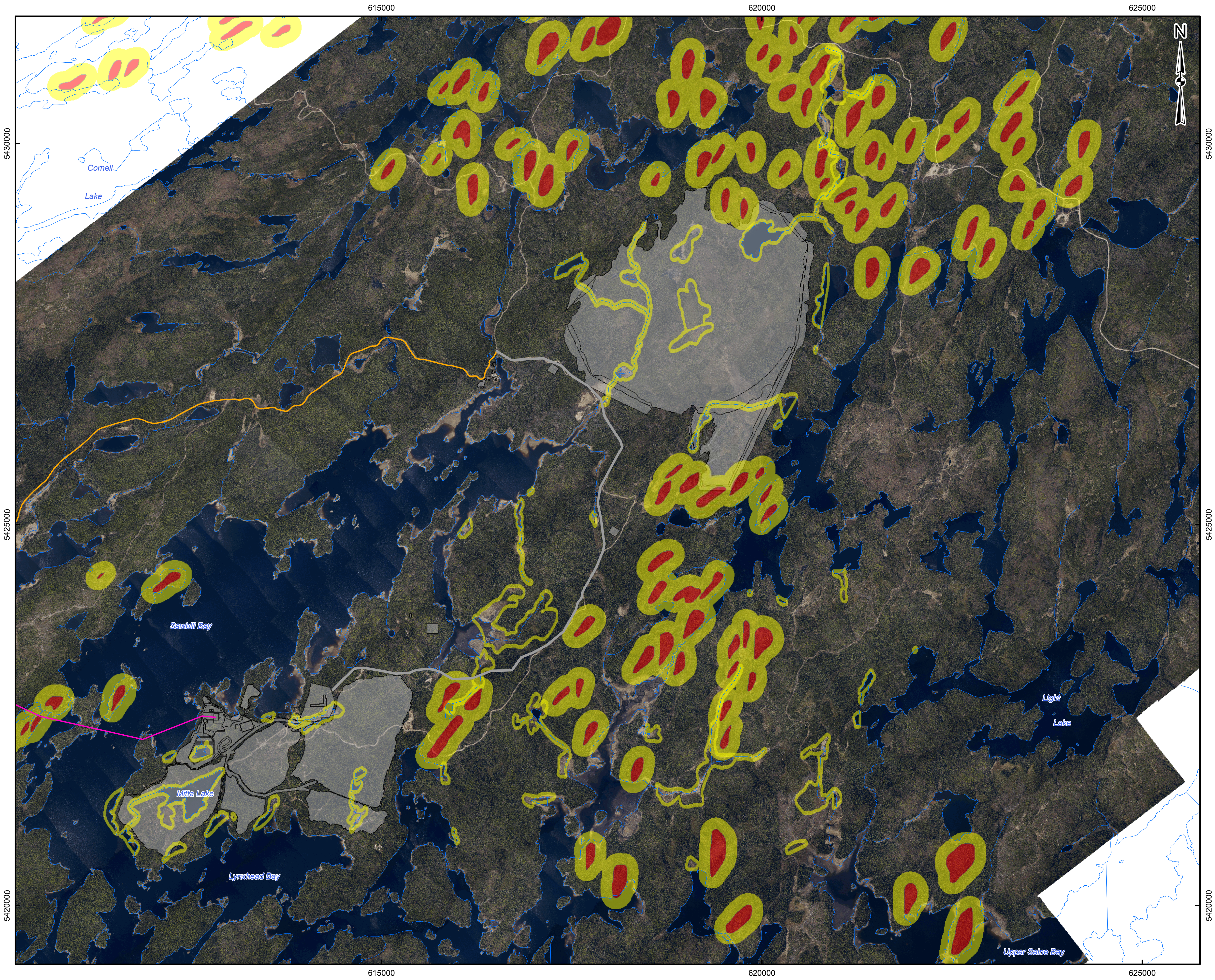

LEGEND

- River/Stream
- Lake
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities
- Archaeology Testing Area
- Rock Drumlin (rock-cored hill streamlined by glacier erosion, arrow indicates ice flow direction)

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Image - Provided by OSISKO Hammond Reef Gold Project Ltd (July 2010)
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Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

500 0 500 1,000 1,500 2,000 2,500

SCALE 1:50,000 METRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

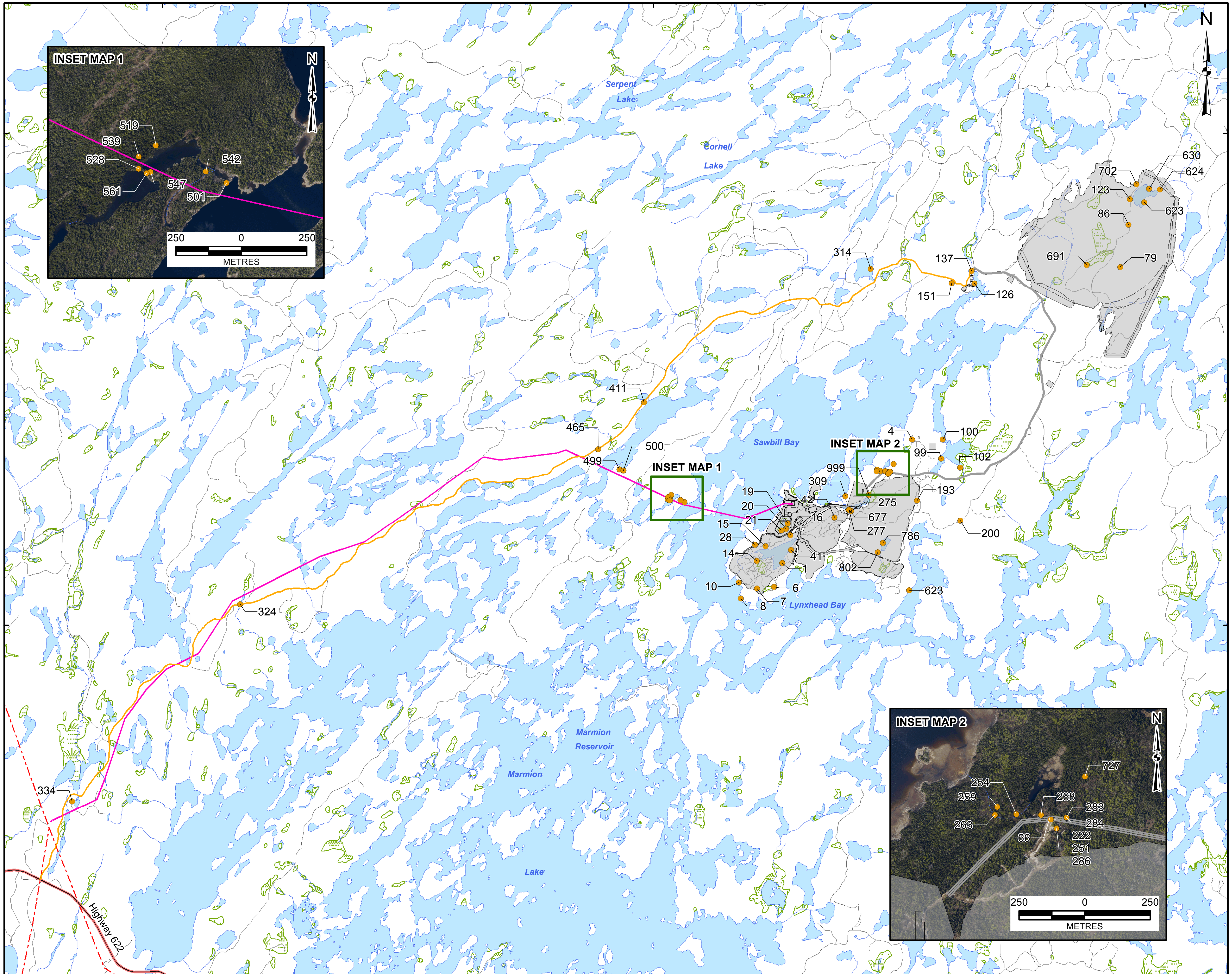
TITLE

ARCHAEOLOGICAL POTENTIAL MODEL

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

Golder Associates
Mississauga, Ontario

FIGURE: 10



LEGEND

- Photo Location
- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

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1,000 0 1,000 2,000 3,000 4,000 5,000
METRES

PROJECT
HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE
PHOTO LOCATIONS

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PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008	FIGURE: 11	
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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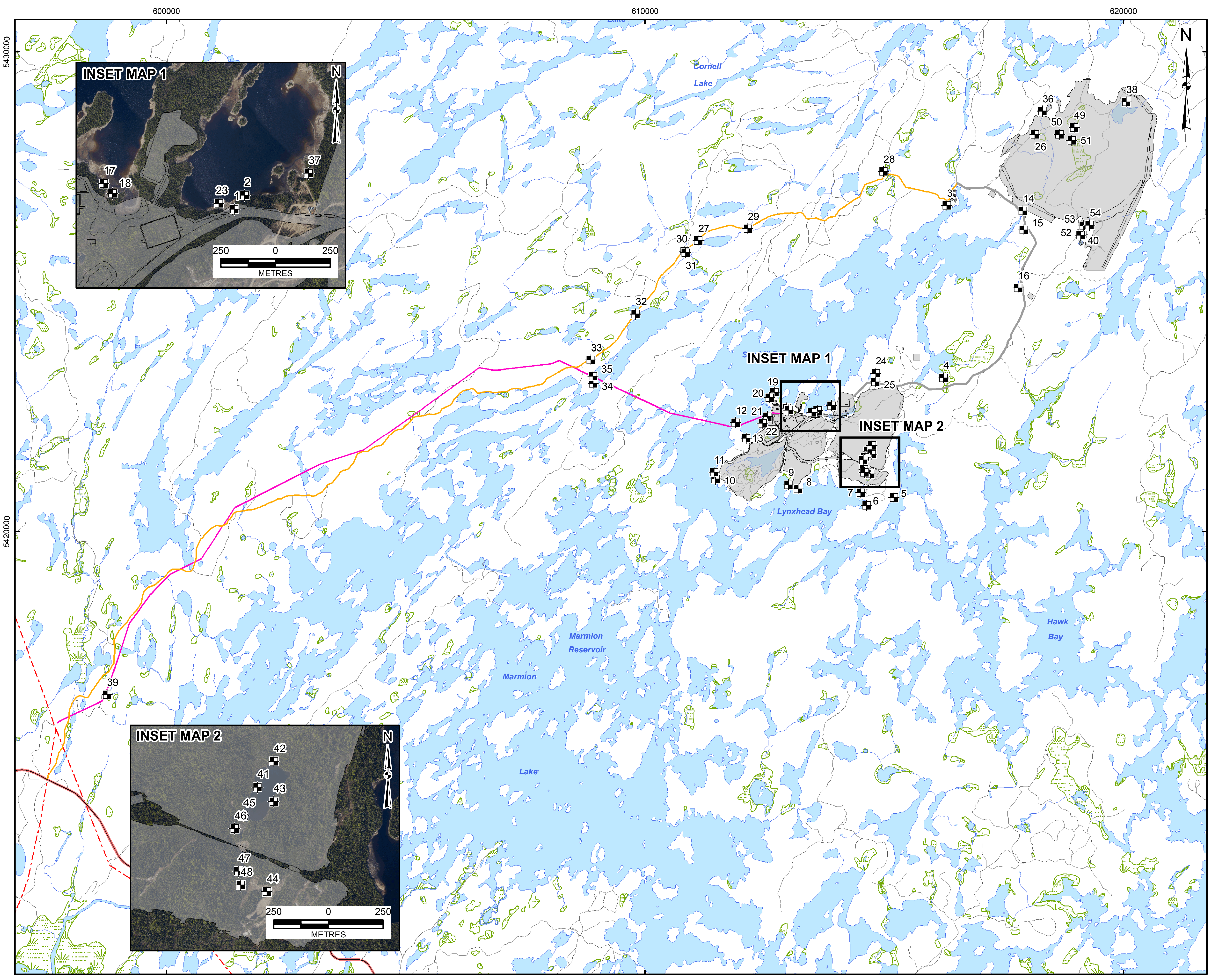

LEGEND

- Test Pit Location
- Provincial Highway
- Road
- Trail
- Power Transmission Line
- River/Stream
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Project Facilities

REFERENCE

Base Data - Provided by OSISKO Hammond Reef Gold Project Ltd.
Base Data - MNR NRVIS, obtained 2004
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800 0 800 1,600 2,400 3,200 4,000

METRES

PROJECT

HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

TITLE

TEST PIT LOCATIONS

PROJECT NO. 10-1118-0020			SCALE AS SHOWN	VERSION 1
DESIGN	CGE	14 Nov. 2008		
GIS	JO	5 Feb. 2013		
CHECK	CP	5 Feb. 2013		
REVIEW	CP	5 Feb. 2013		

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FIGURE: 12

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11.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

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This report has been prepared for the specific site, design objective, developments and purpose described to Golder by Osisko Hammond Reef Gold Ltd. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

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Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Tourism and Culture's *Standards and Guidelines for Consultant Archaeologists* (Government of Ontario 2011).

Report Signature Page

GOLDER ASSOCIATES LTD.

Jamie Davidson, B.A.
Project Archaeologist

Carla Parslow, Ph.D.
Senior Archaeologist

JLD/CP/mb/sv

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APPENDIX A

Photograph Waypoints

Plate Number	Photo Number	Waypoint Number	Easting	Northing	Zone	Direction	Comments
12	1	P1	612614.43	5421268.36	15U	South	Disturbance
11	4	A14 2	615259	5423780	15U	North	Ditch beside old forestry road
15	6	p4	612446.5	5420782.8	15U	Northwest	Disturbance
29	7	P5	612102.09	5420747.44	15U	Northeast	Disturbance
18	8	P6	611771.83	5420547.16	15U	South	Shoreline rock face
13	10	P004	611729.49	5420870.22	15U	East	Disturbance
27	14	7	612096.41	5421312.02	15U	Southeast	Disturbed area around water
28	15	8	612274.48	5421609.13	15U	East	Disturbance
14	16	670	612785.06	5421835.61	15U	Southeast	Thin soil over bedrock
20	19	14	612728.02	5422074.35	15U	Southwest	Muskeg
19	20	15	612691.6	5421960.83	15U	West	Steep slope
21	21	16	612596.86	5421930.41	15U	Southwest	Shoreline around pond
17	28	29	612063.03	5421639.28	15U	North	Disturbance
16	41	P34	612797.15	5421532.99	15U	Southeast	Excavator filling wetland
51	42	680	613681.36	5422191.56	15U	Southeast	Hammond mine
58	66	39	614752.57	5423116.19	15U	Northeast	mine shafts
6	79	667	619495.38	5427284.19	15U	North	Slope
7	86	668	619667.4	5428143.53	15U	West	Corduroy-type road
10	99	57	615851.03	5423389.65	15U	Northwest	Coniferous Forest
9	100	58	615883.77	5423781.87	15U	West	Bedrock outcrops
35	102	p060	616238.54	5423207.99	15U	North	Test pitting
4	123	777	619697.26	5428660.56	15U	South	Poorly drained soil
50	126	po13	616530	5426952	15U	West	Disturbance
48	137	p017	616473	5427203	15U	West	Creek
47	151	p0022	616064	5426958	15U	West	Well drained soil
23	193	115	615359.36	5422535.74	15U	South	Area of extracted sand
24	200	116	616241.23	5422131.32	15U	South	Modern water source on side of Reef Road
59	222	36	614774.47	5423081.56	15U	West	Around Sawbill Mine
60	251	36	614774.47	5423081.56	15U	South	Around Sawbill Mine
64	254	R6	614620.36	5423136.21	15U	Southwest	Tram line
63	259	R10	614548.33	5423164.4	15U	East	Tram line
65	263	128	614539.11	5423133.13	15U	Southeast	Tram line
57	268	building	614715	5423133	15U	Southeast	Cement foundations
52	275	681	614019.19	5422327.94	15U	Northeast	Hammond mine

APPENDIX A
Photograph Waypoints and Data

Plate Number	Photo Number	Waypoint Number	Easting	Northing	Zone	Direction	Comments
54	277	K97	613976	5422346	15U	East	Hammond mine
30	283	150	614812.32	5423123.27	15U	North	Cast iron stove remains
31	284	150	614812.32	5423123.27	15U	Down	Cast iron stove remains
66	284	150	614812.32	5423123.27	15U	East	Sawbill Mine
61	286	36	614774.47	5423081.56	15U	Southwest	Imperial Keighley engine
55	309	Hist1	613902.36	5422630.07	15U	West	Hammond mine
34	314	162	614417.6	5427250	15U	West	Poorly drained soil
33	324	169	601580.2	5420432	15U	North	Rock outcrop
32	334	175	598156.9	5416423	15U	North	Steep slope
36	411	190	609803.74	5424536.63	15U	East	Test pitting
37	465	192	608869.22	5423578.84	15U	Southeast	Test pitting
38	499	682	609300.23	5423172.09	15U	West	Rock slope
39	500	683	609383	5423148.26	15U	West	Poorly drained soil
40	501	200	610624.7	5422507.96	15U	Northeast	Boat assessment
41	519	205	610355.45	5422651.05	15U	West	Poorly drained soil
42	528	206	610288.8	5422561.6	15U	North	Stone dam remains
43	539	208	610289.92	5422608.62	15U	North	Iron plate
44	542	209	610545.4	5422551.46	15U	West	Modified stone channel
45	547	212	610334.87	5422549.79	15U	West	Stone dam remains
46	561	807	610319.81	5422545.06	15U	North	Rock slope
49	607	P023	616458	5427223	15U	South	Test pitting
26	623	97	615203.35	5420712.9	15U	South	Test pitting
1	624	666	620307.41	5428860.91	15U	North	Typical forst cover
2	630	216	620084.95	5428873.57	15U	North	Typical forst cover
53	677	K97	613976	5422346	15U	Southeast	Hammond mine
3	691	120	618813.72	5427325.24	15U	East	Poorly drained soil
8	702	669	619828.98	5428969.73	15U	East	Landscape from top of cliff
62	727	TRE3	614883	5423280	15U	Southwest	Historic test trenches
22	786	preside 1	614666	5421677	15U	East	Poorly drained soil
25	802	wrtp6	614562	5421488	15U	West	Test pit area
56	309	500	614379.18	5422657.15	15U	West	Core storage

APPENDIX B

Test Pit Locations

Test Pit Number	Waypoint Number	Easting	Northing	Zone	Dimensions (m)
1	tps1	613563	5422461	15U	15 (N-S) X 10 (E-W)
2	tps2	613610	5422524	15U	15 (N-S) X 20 (E-W)
3	Camp	616308	5426805	15U	400 (SW-NE) X 150 (NW-SE)
4	60	616238.54	5423207.99	15U	15 (N-S) X 20 (E-W)
5	97	615203.35	5420712.9	15U	20 (N-S) X 12 (E-W)
6	98	614633.55	5420546.01	15U	50 (N-S) X 15 (E-W)
7	99	614511.62	5420813.24	15U	30 (SW-NE) X 250 (NW-SE)
8	101	613202.58	5420891.6	15U	35 (N-S) X 10 (E-W)
9	102	613001.13	5420974.4	15U	15 (N-S) X 15 (E-W)
10	103	611473.62	5421092.89	15U	10 (N-S) X 10 (E-W)
11	104	611448.01	5421235.9	15U	40 (N-S) X 30 (E-W)
12	105	611893.24	5422267.99	15U	50 (N-S) X 20 (E-W)
13	106	612114.03	5421946.49	15U	15 (N-S) X 20 (E-W)
14	107	617894.69	5426684.63	15U	15 (N-S) X 15 (E-W)
15	108	617916.52	5426292.74	15U	100 (N-S) X 50 (E-W)
16	109	617797.71	5425079.89	15U	50 (N-S) X 25 (E-W)
17	31	612966	5422578	15U	30 (SW-NE) X 60 (NW-SE)
18	32	613007	5422533	15U	30 (N-S) X 30 (E-W)
19	33	612708	5422908	15U	15 (N-S) X 30 (E-W)
20	34	612604	5422792	15U	100 (SW-NE) X 25 (NW-SE)
21	35	612558	5422397	15U	40 (SW-NE) X 25 (NW-SE)
22	36	612460	5422258	15U	20 (SW-NE) X 15 (NW-SE)
23	37	613493	5422487	15U	15 (N-S) X 15 (E-W)
24	148	614822.18	5423302.65	15U	50 (N-S) X 25 (E-W)
25	150	614812.32	5423123.27	15U	15 (N-S) X 20 (E-W)
26	152	618150	5428286	15U	20 (N-S) X 15 (E-W)
27	183	611112.77	5426065.99	15U	400 (SW-NE) X 75 (NW-SE)
28	184	614987.03	5427512.61	15U	20 (N-S) X 15 (E-W)
29	185	612147.01	5426317.16	15U	75 (N-S) X 25 (E-W)
30	188	610830.23	5425848.79	15U	50 (N-S) X 50 (E-W)
31	189	610848.81	5425814.81	15U	200 (SW-NE) X 50 (NW-SE)
32	190	609803.74	5424536.63	15U	100 (SW-NE) X 50 (NW-SE)
33	192	608869.22	5423578.84	15U	150 (SW-NE) X 50 (NW-SE)
34	194	608916.45	5423091.87	15U	150 (SW-NE) X 50 (NW-SE)

Test Pit Number	Waypoint Number	Easting	Northing	Zone	Dimensions (m)
35	193	608914.16	5423244.51	15U	125 (SW-NE) X 50 (NW-SE)
36	153	618304.91	542876.72	15U	20 (N-S) X 15 (E-W)
37	155	613903	5422625	15U	50 (N-S) X 50 (E-W)
38	218	620060.63	5428960.82	15U	20 (N-S) X 15 (E-W)
39	na	598760	5416598	15U	20 (N-S) X 20 (E-W)
40	tp1	619138	5426196	15U	20 (N-S) X 15 (E-W)
41	PH1	614666	5421677	15U	15 (N-S) X 20 (E-W)
42	WRTP2	614741	5421795	15U	20 (N-S) X 10 (E-W)
43	WRTP3	614740	5421611	15U	25 (N-S) X 12 (E-W)
44	WRTP4	614709	5421200	15U	15 (N-S) X 12 (E-W)
45	WRTP5	614602	5421547	15U	8 (SW-NE) X 20 (NW-SE)
46	WRTP6	614562	5421488	15U	15 (N-S) X 10 (E-W)
47	WRTP7	614579	5421294	15U	40 (N-S) X 10 (E-W)
48	WRTP8	614590	5421231	15U	25 (SW-NE) X 8 (NW-SE)
49	TAILTP1	618968	5428427	15U	15 (N-S) X 20 (E-W)
50	TAILTP2	618661	5428285	15U	35 (N-S) X 10 (E-W)
51	TAILTP3	618918	5428158	15U	40 (N-S) X 7 (E-W)
52	TAILTP4	619104	5426179	15U	45 (SW-NE) X 6 (NW-SE)
53	TAILTP5	619167	5426372	15U	25 (SW-NE) X 8 (NW-SE)
54	TAILTP6	619293	5426389	15U	25 (SW-NE) X 6 (NW-SE)

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solutions@golder.com
www.golder.com

Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario, L5N 7K2
Canada
T: +1 (905) 567 4444

APPENDIX 3.I

Summary List of Project Activities for the Assessment of Environmental Effects

TABLE 1
Summary List of Project Activities for the Assessment of Environmental Effects

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Management, Permitting and Employment	N/A	Source and hire construction workforce Source operational workforce Source and obtain equipment and materials Maintain construction permits/monitoring Finalize operational permits/plans and monitoring Restrict Project Site access	Maintain operational workforce Maintain and manage Project Site Maintain operational permits and monitor Implement and adjust plans as necessary Restrict Project Site access	Change workforce activities Manage closure process Implement closure Implement monitoring programs Restrict Project Site access	Monitor and maintain as necessary Maintain post-closure workforce if necessary Restrict Project Site access if necessary
Linear Infrastructure	Access road (Hardtack/Sawbill) Project transmission line Fibre optic line	Upgrading/construction of access road (Hardtack/Sawbill) Construction of project transmission line Construction of fibre optic line	Maintaining access road (Hardtack/Sawbill) Maintain project transmission line Maintain fibre optic line	Maintaining appropriate access Decommission project transmission line when no longer necessary Decommission fibre optic line when no longer necessary	Maintain appropriate access
Borrow Sites	Nearby borrow sites	Clearing, grubbing and installation of temporary sediment control measures Stripping and stockpiling of topsoil and overburden as necessary Operation of mobile crushing and screening plant Excavation crushing and screening borrow material Hauling and transporting material as required	Clearing, grubbing and installation of temporary sediment control measures Stripping and stockpiling of topsoil and overburden as necessary Operation of mobile crushing and screening plant Excavation crushing and screening borrow material Hauling and transporting material as required Decommission following appropriate guidelines once they are no longer required	Closure and decommission following appropriate guidelines once they are no longer required	None
Support and Ancillary Infrastructure	Mine site road and on-site roads Worker accommodation camp Office and support facilities Warehouses, workshops and maintenance facilities Chemicals, fuel and explosives storage facilities Fuel storage area Explosive storage and preparation On-ste power distribution (grid) Off-site waste disposal Other ancillary and support infrastructure	General operation of support and ancillary structure and facilities Operation fuelling and maintenance of vehicles Transportation of people and materials Operation and maintenance of backup power generation facilities Hazardous and non-hazardous waste management Control of dust Fuel and chemical transportation handling and storage Clearing and grubbing of development areas Stripping and stockpiling of topsoil Preparation of construction facilities (offices, shops, dry, cafeteria and nursing station) Grading and granular surfacing of laydown areas Grading of development areas Operation of concrete batch plant Construction of facilities Construction of on-site roads Construction of piping and electrical between buildings Construction of diversion ditching and linking water management systems from various facilities Construction of suppot and ancillary infrastructure (explosive storage area, assay laboratory, fuel storage areas, propane farm, parking areas, sewage, permanent worker camp, truck shop, warehouses, backup power generation, other facilities to be determined as part of detailed design) Haulage of waste from Project Site to disposal in appropriately licensed facilities when required	General operation of support and ancillary structure and facilities Operation fuelling and maintenance of vehicles Transportation of people and materials Operation and maintenance of backup power generation facilities Hazardous and non-hazardous waste management Control of dust and erosion Fuel and chemical transportation handling and storage Explosive preparation, handling and storage Haulage of waste from Project Site to disposal in appropriately licensed facilities when required	Decommissioning of Project facilities Operation of temporary offices during closure Operation fuelling and maintenance of vehicles during closure activities Transportation of people and materials Hazardous and non-hazardous waste management Control of dust Fuel transportation handling and storage Removal of re-useable supplies and materials Salvage of equipment and sale of scrap where economical Remediation of hydrocarbon impacts as per applicable guidelines if necessary Demolition of facilities and disposal in licences landfills Project Site reclamation Close (scarify and vegetate) all non-essential site roads Return applicable portions of access road (Hardtack/Sawbill) to MNR control Implement closure monitoring programs Haulage of waste from Project Site to disposal in appropriately licensed facilities when required	Periodic Project Site access only No additional waste materials will be placed on-site Haulage of waste from Project Site to disposal in appropriately licensed facilities when required
Ore Processing Facility	Processing plant Ore crushing Crushed ore stockpile Ore grinding Ore processing	Site grading Construction of foundation, superstructure and process components including delivery and assembly Construction and surfacing of crushed ore pad Construction of ore crushers, grinders and conveyers	Crushing, grinding and concentration of ore Leaching of concentrate Electro-winning and smelting of gold Operation of cyanide destruction plant and tailings thickener	Decommissioning of processing plant as per general activities	None
Mine	East pit West pit Haul roads Ramps Conveyors Pumping stations	Clearing and grubbing Strip haul and stockpile topsoil and overburden Construction of haul roads Blasting and excavation of pre-strip material and haul to WRMF Set up open pit dewatering system (including use of portable generators where necessary)	Ongoing removal and stockpile of topsoil and overburden Ongoing dewatering of open pits Drilling, loading of explosives and blasting Loading of ore, low-grade ore, and waste rock Hauling of ore to the crusher Hauling of waste rock to the WRMF	Undertake appropriate studies to establish a "safe line" around open pits Construct a fence or boulder wall around safe line to prevent inadvertent public access Cease pumping and allow the open pits to flood back Pump water from the TMF reclaim pond and seepage collection to the open pits Excavate a trench (spillway) connecting the east pit, west pit, and Marmion Reservoir such that the flooded open pits will eventually overflow through a spillway to Marmion Reservoir	Periodically maintain fence or boulder wall if necessary Monitor open pits water quality Allow the flooded open pits to discharge to Marmion Reservoir, with in-pit or passively treatment if necessary
Stockpiles	Overburden/topsoil stockpile Low-grade ore stockpile	Clearing and grubbing Set up seepage collection ditches sumps and pump system Trucking, dumping and dozing of overburden	Trucking dumping and dozing of material Excavation and trucking of marginal ore to the mill Use overburden and topsoil for progressive reclamation	Excavation and use of overburden and topsoil for reclamation Allow surface to revegetate naturally Provide erosion protection and drainage channels as necessary	
Waste Rock Management Facility (WRMF)	Waste Rock Area Transfer Area	Clearing and grubbing Set up seepage collection ditches sumps and pump system Trucking, dumping and dozing of waste rock	Trucking dumping and dozing of material	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge Construct erosion protection drainage channels as necessary	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge Monitor for erosion and repair if necessary
Tailings Management Facility (TMF)	Tailings containment TMF service road and pipeline access roads Pipelines (tailings and water reclaim)	Construction of TMF service road and pipeline access roads Clearing, grubbing and installation of temporary sediment control measures Construction of pipelines (tailings and water reclaim) Installation of pump stations and power to pump stations Strip topsoil from dam foundations and truck to stockpile Construct first stage perimeter containment (include construction of coffer dams, dewatering of foundation, and preparation of dam foundations) Construction of seepage collection system and pumping stations Installation of tailings distribution system	Deposition of tailings from processing plant Staged raising and extension of TMF dams Pumping of water from the reclaim pond back to the processing plant Operation of the seepage collection ponds and pump back to TMF	Decommission Decommissioning and removal of tailings pumping and pipeline system Direct revegetation to stabilize the tailings surface in the TMF Providing erosion protected drainage channels in TMF as necessary Monitoring and maintaining the TMF dams Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge Decommissioning and removal of reclaim pumping and pipeline system	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge Monitor for erosion and repair if necessary
Water Management System	On-site water containment Effluent treatment Sewage treatment Ditches (TMF, WRMF, stormwater, stockpiles) Pumping stations from water containment ditches/sumps	Dewatering of Mitta Lake including fish rescue and discharge of water to Marmion Reservoir Construction of ditches, and ponds (processing plant collection pond, emergency spill pond, seepage collection ponds) Construction of treatment facilities including effluent treatment, potable water treatment and sewage treatment Construction of pumping stations (mine water, surface water, fire water, potable water) Construction of site discharge lines and diffuser	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge	Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge

Notes:
N/A = Not applicable.