December 2013

HAMMOND REEF GOLD PROJECT
Executive Summary

VERSION 2

Submitted to:
Osisko Hammond Reef Gold Ltd.
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Project Number: 13-1118-0010

Distribution:

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Table of Contents

TABLES

FIGURES

GLOSSARY OF TERMS

Term	Definition
Abiotic	The absence of living organisms. (U.S. Department of the Interior 2012)
Aeolian	Materials carried, deposited, produced, or eroded by the wind. (U.S. Department of the Interior 2012)
Aggregate	Crushed rock or gravel screened to sizes for use in road surfaces, concrete, or bituminous mixes. A mass or cluster of soil particles, often having a characteristic shape. (U.S. Department of the Interior 2012)
Alkaline	Having a pH of 7.0 or above. The condition of water or soil which contains a sufficient amount of alkali substances to raise the pH above 7.0. The quality of being bitter due to alkaline content. (U.S. Department of the Interior 2012)
Ambient	Surrounding natural conditions or environment at a given place and time. Environmental or surrounding conditions. (U.S. Department of the Interior 2012)
Anoxic	Without oxygen. (U.S. Department of the Interior 2012)
Anthropogenic	Generated by humans. Used to indicate soil conditions, disturbances, or stresses that are created by people. (USDA 2012)
Baseline	Conditions that would prevail if no actions were taken. (U.S. Department of Interior 2012)
Basin	An area having a common outlet for its surface runoff. (NOAA 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)
Bench	A working level or step in a cut. (U.S. Department of the Interior 2012)
Benthic	Bottom of rivers, lakes, or oceans; organisms that live on the bottom of water bodies. Bottom- or depth-inhabiting. (U.S. Department of the Interior 2012)
Berm	A horizontal strip or shelf built into an embankment or cut to break the continuity of the slope, usually for the purpose of reducing erosion or to increase the thickness of the embankment at a point of change in a slope or defined water surface elevation. A horizontal step in the sloping profile of an embankment dam. A shelf that breaks the continuity of a slope, or artificial ridge of earth. A ledge or shoulder, as along the edge of a road or canal. An artificial ridge of earth.
Biophysics	A branch of biology that applies the methods of physics to the study of biological structures and processes
Biota	Plant and animal life of a region.

Glossary of Terms (Continued)

Term	Definition
Carcinogen	A substance capable of inducing cancer in an organism. (FAO 2012)
Carnivore	Any flesh-eating or predatory organism.
Catchment	Unit watershed; an area from which all the drainage water passes into one stream or other body of water.
Channel	Natural or artificial watercourse of perceptible extent, with a definite bed and banks to confine and conduct continuously or periodically flowing water. Rivers and streams. A general term for any natural or artificial facility for conveying water.
Conifer	Cone-bearing trees or shrubs, mostly evergreens such as pine, cedar, and spruce.
Cyanidation	A method of extracting exposed gold or silver grains from crushed or ground ore by dissolving it in a weak solution of sodium- or calcium cyanide. Also known as cyanide leaching. May be carried out in tanks inside a mill or in heaps of ore outdoors. (INAP 2012)
Dam	A barrier built across a watercourse to impound or divert water. A barrier that obstructs, directs, retards, or stores the flow of water. Usually built across a stream. A structure built to hold back a flow of water. (U.S. Department of Interior 2012)
Delta	An alluvial sediment deposit normally formed where a river or stream enters a lake or estuary. Flat land mass of sediment deposit formed at the mouths of streams where they enter larger bodies of water. Sediment deltas are usually triangular in plan view, narrow at the upstream end and relatively wide at the downstream end. The sediment particles deposit because the river velocity and gradient are too low to keep the particles in motion. Active deltas contain diverging multiple channels that continually deposit sediment and migrate back and forth across the delta surface. The sediment particles of the delta deposit are usually well sorted such that the coarser particles (gravel and sand) deposit first at the upstream end, while finer particles (silt and clay) deposit farther downstream. A fan-shaped area at the mouth of a river.
Discharge	The release or extraction of water from an aquifer. Typical mechanisms of natural discharge are evapotranspiration by phreatophytes, springs, and drains to surface water bodies. Pumping is a man-caused discharge. (University of Idaho 2012)
Drawdown	Lowering of a reservoir's water level; process of depleting a reservoir or ground water storage. The drop in the water table or level of water in the ground when water is being pumped from a well. Vertical distance the free water surface elevation is lowered or the reduction of the pressure head due to the removal of free water. The difference between a water level and a lower water level in a reservoir within a particular time. The amount of water used from a reservoir.
Dyke (Dike)	A low embankment, usually constructed to close up low areas of the reservoir rim and thus limit the extent of the reservoir. Embankment for restraining a river or a stream. Embankments which contain water within a given course. Usually applied to dams built to protect land from flooding
Effluent	Partially or completely treated wastewater flowing out of a treatment facility, reservoir, or basin.

Glossary of Terms (Continued)

Term	Definition
Erosion	A gradual wearing away of soil or rock by running water, waves, or wind. Concrete surface disturbance caused by cavitation, abrasion from moving particles in water, impact of pedestrian or vehicular traffic, or impact of ice floes. Surface displacement of soil caused by weathering, dissolution, abrasion, or other transporting. The gradual wearing away of material as a result of abrasive action.
Evaporation	Water vapor losses from water surfaces, sprinkler irrigation, and other related factors. Loss of water to the atmosphere. The process by which water is changed from a liquid into a vapor. Water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapor.
Faulting	The movement which produces relative displacement along a fracture in rock.
Flocculant	A chemical agent that causes small particles to aggregate. (FAO 2012)
Flotation	A milling process using surface active chemicals to selectively modify some mineral surfaces causing them to become attached to air bubbles and float, while others do not and sink. This process allows the selective concentration and recovery of the valuable minerals. Pre-treatments include grinding and addition of the reagents. (INAP 2012)
Fluvial	Pertains to streams and stream processes.
Forage	Vegetation used for animal consumption.
Geochemistry	A science that deals with the chemical composition of and chemical changes in the solid matter of the earth.
Grubbing	Removal of stumps, roots, and vegetable matter from the ground surface after clearing and prior to excavation.
Headwater	The source and upper part of a stream; water upstream of a dam or powerhouse.
Herbivore	Animal that feeds on plants
Hummock	A hillock of broken ice which has been forced upward by pressure. (NOAA 2012)
Hydraulic Conductivity	A quantitative measure of how easily water flows through soil.
Hydrogeology	The geology of ground water, with particular emphasis on the chemistry and movement of water.
Hydrograph	A graphical representation of the stage or discharge as a function of time at a particular point on a watercourse; a time-discharge curve of the unsteady flow of water. A graph showing, for a given point on a stream, river, or conduit, the discharge, stage, velocity, available power, rate of runoff, or other property of water with respect to time. This can be measured or modeled.
Impermeable	Having a texture that does not permit water to move through quickly. Not easily penetrated. The property of a material or soil that does not allow, or allows only with great difficulty, the movement or passage of water.
Inflow	Water that flows into a body of water. The amount of water entering a reservoir expressed in acre-feet per day or cubic feet per second.
Invertebrate	All animals without a vertebral column.
Leach	To remove components from the soil by the action of water trickling through.
Leachate	A liquid that results from water collecting contaminants as it trickles through wastes, agricultural pesticides or fertilizers. Leachate may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.

Glossary of Terms (Continued)

Term	Definition
Leaching	Removal of soluble material from soil or other permeable material by the passage of water through it. The removal of soluble soil material and colloids by percolating water. The process by which soluble substances are dissolved and transported down through the soil by recharge
Lentic	Standing waters, such as lakes, ponds, and marshes.
Lichen	A composite of fungi and algae or cyanobacteria. The fungi capture and cultivate photosynthetic organisms which together provide themselves needed water and nutrients. Lichen species occur in many colors including black, brown, dark olive green, red, yellow and white. (USDA 2012)
Lineament	A rectilinear topographic feature.
Littoral	Pertaining to the shore
Lotic	Flowing water, such as rivers and streams.
Low-grade ore	Extracted ore with a lower gold content.
Mineralization	The process by which minerals of interest are geologically or organically formed.
Mulch	Material spread on the ground to reduce soil erosion and evaporation of water. Any substance spread or allowed to remain on the soil surface to conserve soil moisture and shield soil particles from the erosive forces of raindrops and runoff.
Oligotrophic	Reservoirs and lakes which are nutrient poor and contain little aquatic plant or animal life.
Ore	Rock or earth containing workable quantities of a mineral or minerals of commercial value.
Overburden	Soil or other unconsolidated materials overlying bedrock.
Pathogenic	A disease-causing organism (generally microbial: bacteria, fungi, viruses; but can extend to other organisms: e.g. nematodes etc.). (FAO 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.
Perennial	A plant that flowers continuously for several years. (FAO 2012)
Permeability	The measure of the flow of water through soil. The ease (or measurable rate) with which gasses, liquids, or plant roots penetrate or pass through a layer of soil or porous media. The capacity or ability of a porous rock, sediment, or soil to allow the movement of water through its pores.
Permeable	Having pores or openings that permit liquids or gasses to pass through.
Potable water	Water that is safe and satisfactory for drinking and cooking.
Precipitation	As used in hydrology, precipitation is the discharge of water, in a liquid or solid state, out of the atmosphere, generally onto a land or water surface. It is the common process by which atmospheric water becomes surface, or subsurface water. The term "precipitation" is also commonly used to designate the quantity of water that is precipitated. Precipitation includes rainfall, snow, hail, and sleet, and is therefore a more general term than rainfall. (NOAA 2012)
Profundal	Deepest part of the ocean or lake where light does not penetrate. This layer usually has fewer nutrients, more silt, and fewer organisms than the surface.
Propane farm	A designated area used for the storage of propane tanks

Glossary of Terms (Continued)

Term	Definition
Recharge	Mechanisms of inflow to the aquifer. Typical sources of recharge are precipitation, applied irrigation water, underflow from tributary basins and seepage from surface water bodies. (University of Idaho 2012)
Reservoir	A body of water impounded by a dam and in which water can be stored. Artificially impounded body of water. Any natural or artificial holding area used to store, regulate, or control water. Body of water, such as a natural or constructed lake, in which water is collected and stored for use. Dam design and reservoir operation utilize reservoir capacity and water surface elevation data. To ensure uniformity in the establishment, use, and publication of these data, the following standard definitions of water surface elevations shall be used.
Runoff	The portion of precipitation, snow melt, or irrigation that flows over the soil, eventually making its way to surface water supplies. Liquid water that travels over the surface of the Earth, moving downward due to the law of gravity; runoff is one way in which water that falls as precipitation returns to the ocean.
Sedimentation	Deposition of waterborne sediments due to a decrease in velocity and corresponding reduction in the size and amount of sediment which can be carried.
Seep	A spot where ground water oozes slowly to the surface, usually forming a pool.
Seepage	The slow movement or percolation of water through soil or rock. Movement of water through soil without formation of definite channels. The movement of water into and through the soil from unlined canals, ditches, and water storage facilities. The slow movement or percolation of water through small cracks, pores, interstices, etc., from an embankment, abutment, or foundation.
Sluiceway	An opening in a diversion dam used to discharge heavy floating debris safely past the dam.
Slurry	Watery mixture of insoluble matter which is pumped beneath a dam to form an impervious barrier. Cement grout.
Spawning	To lay eggs, refers mostly to fish.
Spillway	A structure that passes normal and/or flood flows in a manner that protects the structural integrity of the dam. Overflow channel of a dam or impoundment structure. A structure over or through which flow is discharged from a reservoir. If the rate of flow is controlled by mechanical means such as gates, it is considered a controlled spillway. If the geometry of the spillway is the only control, it is considered an uncontrolled spillway. Any passageway, channel, or structure designed to discharge surplus water from a reservoir.
Stratification	Thermal layering of water in lakes and streams. Lakes usually have three zones of varying temperature, the epilimnion, the metalimnion, and the hypolimnion. The formation of separate layers (of temperature, plant, or animal life) in a lake or reservoir.
Substrate	Surface on which a plant or animal grows or is attached. The base on which an organism lives; a substance acted upon
Tailings	Second grade or waste material separated from pay material during screening or processing.
Thermocline	The middle layer of a lake, separating the upper, warmer portion (epilimnion) from the lower, colder portion (hypolimnion). The middle layer in a thermally stratified lake or reservoir. In this layer there is a rapid decrease in temperature with depth.

Glossary of Terms (Continued)

Term	Definition
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.
Topsoil	The topmost layer of soil, usually containing organic matter. Usually refers to soil containing humus which is capable of supporting plant growth.
Transmissivity	The ability of an aquifer to transmit water.
Tributary	River or stream flowing into a larger river or stream.
Trophic Level	Levels of the food chain. The first trophic level includes photosynthesizers that get energy from the sun. Organisms that eat photosynthesizers make up the second trophic level. Third trophic level organisms eat those in the second level, and so on. It is a simplified way of thinking of the food web. In fact, some organisms eat members of several trophic levels.
Vascular	Plant tissue specialized for the conduction of water or nutrients.
Waste rock	Rock that does not contain economically recoverable gold that must be fractured and removed in order to gain access to ore.
Watercourse	An open conduit either naturally or artificially created which periodically, or continuously contains moving water, or forms a connecting link between two bodies of water. (NOAA 2012)
Watershed	Surface drainage area above a specified point on a stream. Area which drains into or past a point. A geographical portion of the Earth's surface from which water drains or runs off to a single place like a river. The area of land that drains its water into a stream or river. All the land and water within the confines of a certain drainage area. Vertically, it extends from the top of the vegetation to the underlying rock layers that confine water movement. An area of land that contributes runoff to one specific delivery point.
Wetland	Lands including swamps, marshes, bogs, and similar areas such as wet meadows, river overflows, mudflats, and natural ponds. An area characterized by periodic inundation or saturation, hydric soils, and vegetation adapted for life in saturated soil conditions. Any number of tidal and nontidal areas characterized by saturated or nearly saturated soils most of the year that form an interface between terrestrial and aquatic environments; including freshwater marshes around ponds and channels, and brackish and salt marshes.

LIST OF ABBREVIATIONS, ACRONYMS AND INITIALISMS

Acronym	Definition
AANDC	Aboriginal Affairs and Northern Development Canada
ABA	Acid-Base Accounting
ADMGO	Air Dispersion Modelling Guideline for Ontario
AEDC	Atikokan Economic Development Corporation
AERMOD	An Air Emissions Dispersion Modeling Software
AGS	Atikokan Generating Station
ALS	ALS Environmental
AMIRA	AMIRA International Ltd
ANFO	Ammonium Nitrate Fuel Oil
AP	Acid Potential
API	Area of Potential Impact
ARD	Acid Rock Drainage
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	All-Terrain Vehicle
AUT	Atikokan ON Airport
BCR	Bird Conservation Region
BIC	Benthic Invertebrate Community
BLM	Biotia Ligand Model
BRH	Borehole
BSC	Bird Studies Canada
CAA Process	Connection Assessment and Approval Process
CAMA	Canadian Aboriginal Minerals Association
CCME	Canadian Council of Ministers of the Environment
CDA	Canadian Dam Association
CEA Agency	Canadian Environmental Assessment Agency
CEAA	Canadian Environmental Assessment Act
CEAC	Cooperative Environmental Assessment Committee
CHER	Cultural Heritage Evaluation Report
CIM	Canadian Institute of Mining
CIP	Carbon in Pulp
CIPRP	Critical Incident Preparedness and Response Plan
CO	Carbon Monoxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
CPP	Canadian Pension Plan

List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
CWQG	Canadian Water Quality Guidelines
DEM	Digital Elevation Model
DFO	Fisheries and Oceans Canada
DNA	Deoxyribonucleic Acid
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DPM	Diesel Particulate Matter
EA	Environmental Assessment
EAA	Ontario Environmental Assessment Act
EAB	Environmental Approvals Branch
EC	Environment Canada
ECA	Environmental Compliance Approval
EDS	Environmental Storm Design
EEM	Environment Effects Monitoring
EH&S	Environmental Health and Safety
EI	Employment Insurance
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
EMP	Environmental Management Plan
END	Endangered
EPA	US Environmental Protection Agency
EPRP	Emergency Preparedness and Response Plan
EPT	Ephemeroptera, Plecoptera, and Trichoptera
ERA	Ecological Risk Assessment
ESA	Electrical Safety Authority
ESMP	Environmental and Social Management Plan
ETP	Effluent Treatment Plant
EW	Electrowinning
FFCS	Fort Frances Chiefs Secretariat
FMP	Forest Management Plans
FN	First Nations
FTE	Full-Time Equivalent
FWCA	Fish and Wildlife Conservation Act
GIS	Geographical Information System
GMS	G Mining Services Inc.
GDP	Gross Domestic Product
GNP	Gross National Product

List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
GPS	Global Positioning System
GRT	Government Review Team
GS	Generating Station
HA	Highly Annoyed
HADD	Harmful Alteration, Disruption or Destruction
HC	Hydrocarbons
HCII	Specific Critical Noise Level
HCN	Hydrogen Cyanide
HCS	Highway Capacity Software
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HRWQ	Hammond Reef Gold Project surface water/sediment stations
HRWQP	Hammond Reef Gold Project water column profile stations
HS&E	Health, Safety and Environment
ICP	Inductively Coupled Plasma Mass Spectrometry
IESNA	Illuminating Engineering Society of North America
IESO	Independent Electricity System Operator
ILCR	Incremental Lifetime Cancer Risks
IR	Information Request
IRS	Internal Responsibility System
ISO	International Organization for Standardization
ITIS	Integrated Taxonomic Information System
JHSC	Joint Health and Safety Committees
ISQG	Interim Sediment Quality Guideline
LDMLFN	Lac de Milles Lacs First Nations
LEL	Lowest Effect Level
LIO	Land Information Ontario
LISA	Linear Infrastructure Study Area
LOS	Level of Service
LP	Limited Partnership
LSA	Local Study Area
MAC	Mining Association of Canada
MDC	Marmion Deformation Corridor
MDL	Minimum Detection Limit
MIBC	Methyl Isobutyl Carbinol
MISA	Municipal Information Systems Association

List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
ML	Metal Leaching
MMER	Metal Mining Effluent Regulation
MNDM	Ministry of Northern Development and Mines
MNDMF	Mines and Forestry's Project Definition Template for Advanced Exploration and Mine Development Projects
MNO	Métis Nation of Ontario
MNR	Ontario Ministry of Natural Resources
MODFLOW	3d Groundwater Flow Modelling System
MOE	Ontario Ministry of the Environment
MOEE	Ministry of Energy and the Environment
MOL	Ontario Ministry of Labour
MPMO	Major Projects Management Office
MSA	Mine Study Area
MSDS	Material Safety Data Sheets
MTC	Ontario Ministry of Culture, Tourism and Sport
MTCS	Ministry of Tourism, Culture and Sports
MTO	Ministry of Transportation of Ontario
NAG	Net Acid Generation
NAPS	National Air Pollutant Surveillance
NNLP	No Net Loss Plan
NOX	Oxides of Nitrogen
NP	Neutralization Potential
NPR	Neutralization Potential Ratio
NRVIS	Natural Resources and Values Information System
NWHU	Northwest Health Unit
NWTAB	Northwest Training and Adjustment Board
OBBA	Ontario Breeding Bird Atlas
OCAP	Ontario Coalition of Aboriginal People
ODWS	Ontario Drinking Water Quality Standards
OFAH	Ontario Federation of Anglers and Hunters
OHRG	Osisko Hammond Reef Gold Ltd
OMA	Ontario Mining Association
OMEDT	Ontario Ministry of Economic Development and Trade
OMNR	Ontario Ministry of Natural Resources
OMOE	Ontario Ministry of the Environment
OMS	Operations Management and Surveillance
OPP	Ontario Provincial Police
ORP	Oxygen-Reduction Potential

List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
OSHA	Occupational Health and Safety Act
OSK	Osisko Mining Corporation
Osisko	Osisko Mining Corporation
OTR	Ontario Typical Range
PAH	Polycyclic aromatic hydrocarbons
PAX	Potassium Amyl Xanthate
PDAC	Prospectors and Developers Association of Canada
PEL	Probable effect level
PIF	Partners in Flight
POI	Point of Impingement
POR	Points of Reception
PPCP	Process Plant Collection Pond
PPV	Peak Particle Velocity
Project	Hammond Reef Gold Project
PSQG	Ontario Provincial Sediment Quality Guidelines
PTTW	Permit to Take Water
PWQO	Provincial Water Quality Objectives
QA/QC	Quality Assurance/Quality Control
RRDSB	Rainy River District School Board
RRDSSAB	Rainy River District Social Services Administration Board
RRSA	Resource Sharing Agreement
RSA	Regional Study Area
SAG	Semi-autogenous Grinding
SAR	Species at Risk
SARA	Canada Species at Risk Act
SDI	Simpsons Diversity Index
SEI	Simpsons Evenness Index
SEL	Severe Effect Level
SFE	Shake Flask Extraction
SMP	Social Management Plan
SOCC	Species Of Conservation Concern
SPM	Suspended Particulate Matter
SSWQO	Site-Specific Water Quality Objective
STP	Sewage Treatment Plant
TBRHSC	Thunder Bay Regional Health Sciences Centre
TGS	Thermal Generating Station
TIA	Tailings Impoundment Area

List of Abbreviations, Acronyms and Initialisms (Continued)

Acronym	Definition
TIS	Traffic Impact Study
TKN	Total Kjehldahl Nitrogen
TMF	Tailings Management Facility
TOC	Total Organic Carbon
TSD	Technical Support Document
TSE	Toronto Stock Exchange
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TSX	Toronto Stock Exchange
TUS	Traditional Use Study
ULR	Upward Light Ratio
UTM	Universal Transverse Mercator (coordinate system)
VEC	Valued Ecosystem Component
VSC	Valued Social Component
WHMIS	Workplace Hazardous Materials Information System
WHO	World Health Organization
WMU	Wildlife Management Unit
WQ	Water Quality
WRMF	Waste Rock Management Facility
WRS	Waste Rock Stockpile
WTF	Water Treatment Facility
YOY	Young of the Year

LIST OF UNITS

Unit	Abbreviation
centimetre	cm
cubic megametre	Mm^3
cubic megametres per year	Mm^3/yr
cubic metre	m^3
cubic metres per day	m^3/day
cubic metres per day	m^3/d
cubic metres per hour	m^3/hr
cubic metres per second	m^3/s
cubic metres per year	m^3/y
days per year	d/y
decibel	dB
decibel A	dBA
degrees Celsius	°C
grams	g
grams per cubic centimetre	g/cm^3
grams per cubic metre	g/m^3
grams per second	g/s
grams per square metre per year	$g/m^2/y$
grams per tonne	g/t
hectare	ha
horsepower	hp
Hounsfield Unit	HU
hour	hr
hours per day	h/d
kilogram	kg
kilograms per cubic metre	kg/m^3
kilograms per tonne	kg/t
kilometre	km
kilometres per hour	km/hr
kilopascal	kPa
kilovolt	kV
kilowatt	kW
linear decibel	dBL

List Of Units (Continued)

Unit	Abbreviation
litres per day	L/day
litres per second	L/s
litres per second per square kilometre	L/s/km^2
megatonne	Mt
megawatt	MW
metre	m
metres above sea level	masl
metres below ground surface	mbgs
metres per kilometre	m/km
metres per second	m/s
micrograms per cubic metre	µg/m^3
micrograms per gram	µg/g
micrograms per litre	µg/L
micrometre	µm
microSiemens per centimetre	µS/cm
milligrams	mg
milligrams per cubic metre	mg/m^3
milligrams per kilogram	mg/kg
milligrams per kilogram per day	mg/kg/d
milligrams per litre	mg/L
milligrams per litre as calcium carbonate	mg($CaCO_3$)/L
millilitre	mL
millimetre	mm
millimetres per second	mm/s
ounce	oz
parts per million	ppm
percent	%
square kilometres	km^2
square metre	m^2
square metres per day	m^2/d
thousand	k
thousand per year	K/yr
tonne	t
tonnes of calcium carbonate equivalent per thousand tonnes	t $CaCO_3$/1000t
tonnes per cubic metre	t/m^3

List Of Units (Continued)

Unit	Abbreviation
tonnes per day	tpd
Tonnes per year	t/y
volt	V
weight percent	wt %
weight percentage	wt %
year	y
year	yr
years	yrs

INTRODUCTION

This Environmental Impact Statement/Environmental Assessment Report (EIS/EA Report) has been prepared for the proposed Hammond Reef Gold Project (Project) with the objective of meeting provincial requirements for an Individual Environmental Assessment, and federal requirements for a Comprehensive Environmental Assessment. The following Executive Summary provides an overview of the EIS/EA Report, including key figures and tables of the Report.

The EIS/EA Report meets both provincial and federal requirements provided in the Project's Terms of Reference (ToR) approved by the Ontario Minister of the Environment (July 2012) (Appendix 1.I), and with the Environmental Impact Statement Guidelines (EIS Guidelines) issued for the Project by the Canadian Environmental Assessment Agency (CEA Agency) (December 2011) (Appendix 1.II).

Project Location

The location of the Project is shown on Figure ES-1. The Project is located within the Thunder Bay Mining District in Northwestern Ontario, approximately 170 km west of Thunder Bay and 23 km northeast of the Town of Atikokan. Thunder Bay is the closest major transportation hub. Atikokan is located immediately north of the Trans-Canada Highway.

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 Project is located within Treaty 3 lands. Treaty 3 includes approximately 55,000 square miles in Ontario west of Thunder Bay running along the Canadian/American border to the south, and extending slightly into Manitoba in the west. It includes 28 First Nations communities and the Towns of Atikokan, Fort Frances, Dryden and Kenora. The First Nations group governing these lands is the Grand Council of Treaty 3, the historic government of the Anishinabe Nation of Treaty 3.

The Project is also located within an area recognized by the Métis Nation of Ontario as the Treaty 3/Lake of the Woods/Lac Seul/Rainy River/Rainy Lake traditional harvesting territories, also named Region 1.

Project Coordinates

The location of the Project Site (centred on the open pits) is:

- UTM Coordinates (UTM NAD83 15N):
  - Easting: 612648.06.
  - Northing: 5421549.37.
- Latitude and longitude:
  - Latitude: 48° 56' 11.799" North.
  - Longitude: 97° 27' 42.5124" West.

Project Site Address

The legal description of the Project Site is:

Rainy River District
Sawbill Bay Township

The Project Site address and contact information is:

Osisko Hammond Reef Gold Ltd.
101 Goodwin Avenue
Box 2020
Atikokan, Ontario
Telephone: 807-597-4481
Facsimile: 807-597-2254

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

0 100 200 300 400 500
SCALE 1:10,000,000 KILOMETRES

Golder Associates
Mississauga, Ontario

PROJECT No.	13-1118-0010
SCALE	AS SHOWN
VERSION	2
DATE	2 Dec. 2013
DESIGN	CGE
GIS	JO
CHECK	CC
REVIEW	THW

TITLE

PROJECT LOCATION, SCALE OF 1:10,000,000

PROJECT HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

FIGURE: 1-1a

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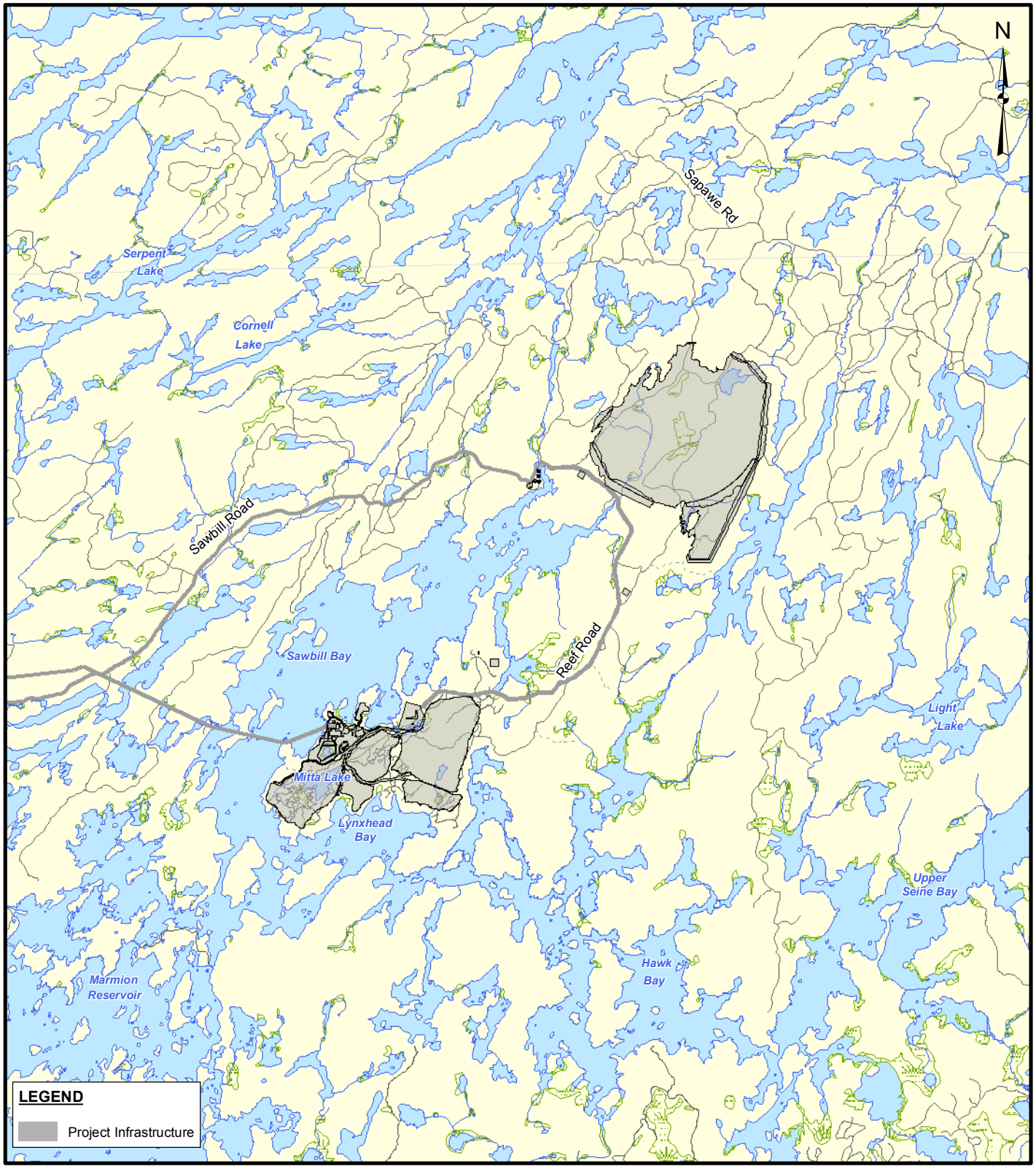

REFERENCE

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

0 1 2 3 4 5
SCALE 1:100,000 KILOMETRES

Golder Associates
Mississauga, Ontario

PROJECT No.	13-1118-0010
SCALE	AS SHOWN
VERSION	2
DATE	2 Dec. 2013
DESIGN	CGE
GIS	JO
CHECK	CC
REVIEW	THW

TITLE

PROJECT LOCATION, SCALE OF 1:100,000

PROJECT HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

FIGURE: 1-1b

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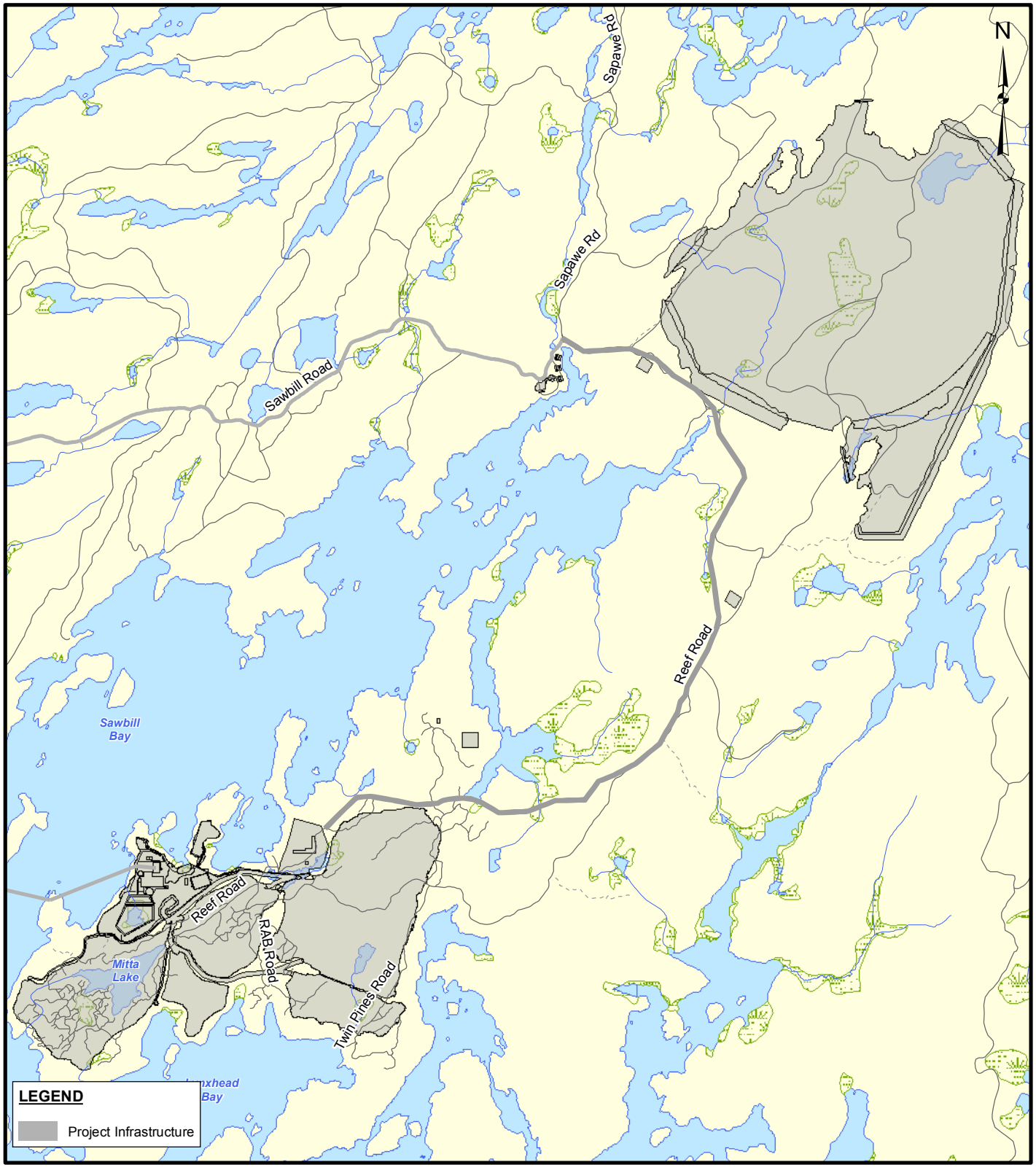

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Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 15N

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SCALE 1:50,000 KILOMETRES

Golder Associates
Mississauga, Ontario

PROJECT No.	13-1118-0010	CHECK	CC
SCALE	AS SHOWN	VERSION 2	REVIEW THW
DATE	2 Dec. 2013		
DESIGN	CGE		
GIS	JO		

TITLE

PROJECT LOCATION, SCALE OF 1:50,000

PROJECT HAMMOND REEF GOLD PROJECT
ATIKOKAN, ONTARIO, CANADA

FIGURE: 1-1c

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The Proponent

The proponent for the Project is Hammond Reef Gold Ltd. (OHRG). OHRG is a subsidiary of Osisko Mining Corporation (Osisko) and is 100% owned by Osisko. There are no co-proponents for the Project. Osisko is the Project sponsor, through OHRG.

Osisko's corporate contact information is:

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Osisko Mining Corporation

Osisko Mining Corporation is a mining company based in Montreal, Quebec. The Company is focused on acquiring, exploring, developing and mining gold properties, with the aim of becoming a leading mid-tier gold producer. Its flagship project is the Canadian Malartic gold mine located in the Abitibi mining district of Quebec. Because the Hammond Reef Gold Project has many similarities to the Canadian Malartic Mine, much of the design and planning for the Hammond Reef Gold Project has drawn on the successful planning and implementation of the Canadian Malartic Mine.

Osisko has completed its construction of the Canadian Malartic gold mine in the heart of the Abitibi mining district. The first gold bar was poured on April 13 2011, and commercial production began in May 2011. The Canadian Malartic deposit currently represents one of the biggest gold reserves in production in Canada with Proven and Probable Reserves of 10.1 million ounces of gold (February 2013), and is still growing through ongoing drilling on adjacent mineralized zones.

Summary of New Work

Some additional work has been undertaken based on the comments received from Aboriginal groups, the public and the government review team on the Draft EIS/EA Report. This work includes new and ongoing field studies, new design and modelling calculations, desktop studies, publication of new reports and revisions to existing reports. The summary of new work undertaken as a result of the comments received on the Draft EIS/EA report includes:

- **Environmental Field Studies**
  - Bat surveys
  - Water quality sampling
  - Water level and flows collection
  - Climate data collection
- **Environmental Monitoring Plan**
  - Revised to clearly meet guidelines
  - Expanded to include more detail and commitments
- **Water Quality Modelling**
  - Additional definition of mixing zone
  - Conceptual design of effluent diffuser
- **Mine Waste Alternatives**
  - Alternatives TSD revised substantially to reflect the requirements of the regulatory agencies
- **Closure Planning**
  - Provided a draft of the Certified Closure Plan to Ministry of Northern Development and Mines (MNDM) for review and feedback
  - Revisions to pit filling predictions
  - A memorandum summarizing Closure Alternatives
  - Ongoing discussions about reclamation details

Report Versions

A Draft version of this EIS/EA Report was published for public comment on February 15, 2013. OHRG received approximately 700 comments from Aboriginal groups, the public and the Government Review Team. The comments were considered, discussed and incorporated into this Final EIS/EA Report as appropriate. The document provided herein is the Final version of the EIS/EA Report. Technical Support Documents (TSDs) were not revised in their entirety; however for each of the TSDs the latest version (Version 2) includes:

- Part A: Introduction
- Part B: Supplemental Information Package (attached) that provides additional detail on any new work, updated components, and clarification on any items raised as part of the Information Request process, as related to the specific TSD.
- Part C: Version 1 of the TSD. The Version 1 document should be reviewed within the context of the 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.

Appendix 1.IV provides a copy of each comment received and OHRG's response to the comment. A detailed description of major revisions undertaken to the EIS/EA Report is included in the Executive Summary, Chapter 7, Consultation and Chapter 12, Conclusions.

ENVIRONMENTAL ASSESSMENT METHODS

The environmental assessment was undertaken to meet the requirements detailed in the provincial and federal guidelines. The overall assessment approach is described below.

An initial Project was scoped and a Project Site was defined, within which development activities are planned to take place. Initial study areas were defined for each EA component based on the geographic range over which potential effects of the Project are anticipated to occur.

Baseline studies were conducted within the defined study areas. Studies are focussed on potential interactions with mine development activities. These studies provide an understanding of the existing environment, and provide the baseline conditions against which potential effects of the Project are assessed.

Alternative means for carrying out the Project were described and evaluated through an alternatives assessment.

A Project Description was developed that describes the activities to be undertaken during each Project phase. Project phases include construction, operations, closure and post-closure. The activities to be undertaken in each phase are described in Chapter 5, Table 5-1.

Likely effects of the Project on the environment were assessed for those components where there is a direct or indirect linkage between Project activities and an environmental or social component. The effects assessment followed a stepwise methodology:

- Screening of Project activities with the potential to have interactions with Valued Ecosystem Components (VECs) of the physical, biological or socio-economic environment.
- Prediction (i.e., identification and description) of likely effects of the Project.
- Identification of suitable mitigation measures to reduce or eliminate the identified adverse effects.
- Assessment of whether adverse effects are likely after mitigation (i.e., residual effects).
- 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.

Consultation with Aboriginal communities, government regulators and Project stakeholders is ongoing throughout the environmental assessment.

Preliminary or conceptual environmental and social management plans were developed to enhance benefits to local communities and minimize potential effects.

Selection of Valued Ecosystem Components

The potential effects of the Project are considered with respect to specific criteria and indicators that can be used to measure changes to attributes of the environment. These include both ecological and socio-economic attributes, and are referred to as Valued Ecosystem Components and Valued Social Components respectively. These are collectively referred to Valued Ecosystem Components (VECs).

The VECs provide structure and focus for the environmental assessment. A VEC can be an individual component of the environment (e.g., a species), or a collection of components that represent one aspect of the environment (e.g., a wetland ecosystem). VECs for the Project were selected through an issues scoping exercise that identified the particular components of the environment for which there is public, Aboriginal, regulatory or scientific concern.

Since the VECs are assessment endpoints, it is important that the selected VECs as evaluated will provide an appropriate and meaningful indication of the potential effects of the Project. The VECs were selected based on the following considerations:

1. What major or special ecological features of the Project Site or surrounding area should be protected from adverse effects from the Project?
2. What aspects of the physical environment (i.e., air, water or land) could be sensitive to the effects of the Project?
3. What individual species or range of species, of wildlife and plants could be sensitive to the effects of the Project?
4. What aspects of the socio-economic environment should be considered in assessing the Project?

From an ecological perspective, VECs can represent features of the natural environment considered to be culturally or scientifically important (e.g., a local wetland or stream). These ecological feature VECs are complex, comprising several ecological aspects, and affected by a range of pathways (i.e., routes of exposure or effect). Thus, ecological feature VECs may include:

- An aspect of the physical environment (e.g., air or water quality).
- An individual plant or animal species (e.g., wild rice or snapping turtle).

VECs are characterized using indicators; where indicators are the attributes of the VEC that might be affected by the Project. Each indicator requires specific measures that can be quantified and assessed.

Table ES-1 provides a list of the VECs and VSCs selected for the Project. As noted, the table also includes a summary of the rationale for selection of each VEC/VSC and the indicators which were used to measure and predict potential effects of the Project on the identified VEC/VSCs.

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Table ES-1: Hammond Reef Gold Project Valued Ecosystem Components/Valued Social Components

VEC/VSC		Rationale for Selection	Indicators
TERRESTRIAL ENVIRONMENT			
Habitat VECs			
Wetlands		■ Support's the ecological integrity of the boreal region ■ Important as wildlife habitat ■ Support migratory waterfowl breeding ■ Supports critical habitats for beaver, moose, others ■ Hydrological functions ■ Supports traditional use plants (e.g., wild rice)	■ Extent of wetland habitat ■ Composition/diversity of wetland plant communities ■ Hydrological function
Forest Cover		■ Dominant forest plant community that supports the ecological integrity of the boreal region ■ Important as wildlife habitat ■ Supports populations of large carnivores such as black bear, wolves and lynx, as well as prey animals such as hare, marten and red squirrel ■ Abundance of migratory birds utilize habitat for breeding ■ Socio-economic importance	■ Extent of forested habitat ■ Composition of forest plant community ■ Suitability of habitat in supporting wildlife populations
Group VECs			
Species at Risk	Bald Eagle	■ Observed in the vicinity of the Project Site ■ Cultural significance ■ Provincially, bald eagles are designated as Special Concern under Ontario's *Endangered Species Act*	■ Habitat suitability and availability for bald eagle
	Common Nighthawk	■ Bird SAR observed on and in the vicinity of the Project Site ■ Provincially, Common nighthawk is designated as Special Concern under Ontario's *Endangered Species Act* ■ Breeding habitat occurs on the Project Site	■ Habitat suitability and availability for common nighthawk
	Canada Warbler	■ Bird SAR observed on and in the vicinity of the Project Site ■ Provincially, Canada warbler is designated as Special Concern under Ontario's *Endangered Species Act* ■ Breeding habitat occurs on the Project Site	■ Habitat suitability and availability for Canada warbler
	Little Brown Myotis	■ Observed in the vicinity of the Project Site ■ Cultural significance ■ Provincially, little brown myotis are designated as Special Concern under Ontario's *Endangered Species Act*	■ Habitat suitability and availability for little brown myotis
	Northern Myotis	■ Observed in the vicinity of the Project Site ■ Cultural significance ■ Provincially, northern myotis are designated as Special Concern under Ontario's *Endangered Species Act*	■ Habitat suitability and availability for northern myotis

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC		Rationale for Selection	Indicators
TERRESTRIAL ENVIRONMENT (CONTINUED)			
Group VECs (Continued)			
Species at Risk (Continued)	Snapping Turtle	■ Herpetofaunal SAR observed on and in the vicinity of the Project Site ■ One of few reptile species in this northern ecosystem ■ Indicator of wetland function	■ Habitat suitability and availability for snapping turtle
Furbearers	Marten Muskrat	■ Common and abundant in the Project Site ■ Important prey species for many carnivores in northern environments ■ May be tolerant of human activities, but may be affected by habitat loss ■ Traditional and non-traditional uses	■ Presence/persistence of furbearers ■ Habitat suitability and availability for furbearers
Upland Breeding Birds		■ Small territory size and high bird density means large numbers of upland birds may be affected by habitat loss ■ Migratory birds are susceptible to population declines as a result of changing environmental conditions on breeding and overwintering habitats	■ Relative abundance of breeding birds ■ Habitat suitability and availability for upland breeding birds
Species VECs			
Moose		■ Observed on and in the vicinity of the Project Site ■ Important subsistence and cultural species ■ Large herbivorous mammal requiring a large home range ■ Prey species for large carnivores	■ Presence/persistence of moose in the area ■ Habitat suitability and availability for moose
Wild rice		■ Traditional use plant (culturally significant to Aboriginal communities) ■ Sensitive to fluctuating water levels	■ Potential presence/persistence of wild rice in the area ■ Habitat suitability and availability for wild rice
AQUATIC ENVIRONMENT			
Lower reaches (e.g., downstream) of small streams draining footprint including any mainstem ponds, and stream crossings		■ Potentially affected (altered, diverted) by Project infrastructure ■ Alteration may result in loss of fish and productivity (e.g., critical habitats, food resources for fish) ■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)	■ Benthic invertebrate community ■ Fish habitat suitability ■ Fish community (resident assemblages/species present)
Upper Marmion Reservoir (receiver)		■ Socio-economic importance (tourism, angling) ■ Sensitive receiving water environment ■ Receiving Bays (mouths of small streams) potentially affected (altered, diverted) by Project infrastructure ■ Receiving Bays may represent significant habitat for locally important fish species. Alteration of habitats may result in loss of fish and productivity (e.g., critical habitats, food resources for fish) ■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)	■ Benthic invertebrate community ■ Fish habitat suitability (receiving bays) ■ Fish community (resident assemblages/species present in receiving bays) ■ Contaminants in fish tissue.

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC	Rationale for Selection	Indicators
AQUATIC ENVIRONMENT (CONTINUED)		
Lizard Lake (receiver)	■ Socio-economic importance (tourism, angling) ■ Sensitive receiving water environment ■ Receiving Bays (mouths of small streams) potentially affected (altered, diverted) by Project infrastructure ■ Receiving Bays may represent significant habitat for locally important fish species. Alteration of habitats may result in loss of fish and productivity (e.g., critical habitats, food resources for fish) ■ Changes can be measured using a variety of standard indicators available (e.g., provincial and federal government criteria)	■ Benthic invertebrate community ■ Fish habitat suitability (receiving bays) ■ Fish community (resident assemblages/species present in receiving bays) ■ Contaminants in fish tissue
Walleye	■ Socio-economic importance (angling) ■ Traditional resource use (First Nation concern ■ Long lived, top predator species (piscivorous), will accumulate contaminants ■ Human health; consumed by anglers, subsistence fishers	■ Walleye habitat ■ Contaminants in walleye flesh
Smallmouth Bass	■ Socio-economic importance (angling, Bass Classic fishing derby)	■ Smallmouth Bass habitat
Northern Pike	■ Socio-economic importance (angling) ■ Long lived, top predator species (piscivorous), will accumulate contaminants ■ Human health; consumed by anglers, subsistence fishers	■ Northern Pike habitat
Baitfish species	■ Socio-economic importance (commercial baitfish fishery) ■ Important food resource for large fish species (e.g., walleye)	■ Baitfish habitat
CULTURAL HERITAGE RESOURCES		
Archaeological Sites	■ Possible affect to archaeological sites	■ Project related changes to archaeological sites and artifacts
Built Heritage	■ Possible affect to late 19th and early 20th century mine sites	■ Project-related changes to 19th to mid-20th century mine sites
Cultural Heritage Landscapes	■ Possible affect to cultural heritage landscapes	■ Project-related changes to cultural heritage landscapes
ABORIGINAL INTERESTS		
Aboriginal community characteristics	■ Potential changes to economic base and educational attainment of Aboriginal communities	■ Project Aboriginal employment ■ Project contracts awarded to Aboriginal businesses ■ Education and training of Aboriginal people
Aboriginal heritage resources	■ Importance of Aboriginal heritage resources such as archaeological sites ■ Importance of specific cultural or spiritual sites	■ Identified archaeological sites and artefacts ■ Identification of Cultural or spiritual sites
Traditional use of land and resources	■ Aboriginal people have traditionally made use of lands and resources for their personal and community needs ■ Importance of plants, animals and fish that have been traditionally harvested and consumed by Aboriginal people	■ Changes or effects identified on the aquatic environment ■ Changes or effects identified on the terrestrial environment ■ Availability and quality of country foods

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC	Rationale for Selection	Indicators
SOCIO-ECONOMIC ENVIRONMENT		
Population and demographics	■ Direct job opportunities will attract workers to area for short-term (i.e. construction) and longer term (i.e. operations) ■ Population change may result in changes in demand on social and physical services and infrastructure ■ The influx of workers due to the Project could benefit long-term economic and community development, supporting community vibrancy and improved social infrastructure (e.g., housing, organized recreation, support for local business, etc.)	■ Population change (historical and projections) ■ Mobility ■ Age and Gender ■ Dependency ratios
Economics		
Labour market (employment and training)	■ Sustainable employment and training opportunities can develop transferable skills, and long-term regional and local economic benefits ■ Communities are interested in local recruitment, training and employment ■ Timing and number of employment opportunities could offset layoffs in other sectors ■ Loss of employment and income generation at closure may require mitigation measures to avoid adverse effects	■ Labour force by industry and occupation ■ Employment and Unemployment rates ■ Median Income ■ High school/post-secondary completion rates
Economic development	■ The Project would contribute to diversification of the regional and local economies and either directly or indirectly encourage investment in other business activities, namely through: ■ Creation of opportunities for local contractors and suppliers ■ Encouraging new investment in service capacity ■ Encouraging business creation and expansion ■ Creation of competitive local suppliers ■ Loss of business opportunities at closure (~2030) may require mitigation measures to avoid adverse effects	■ Regional and local economic base ■ Regional and local supplier base
Local government finances	■ Governments will benefit through increased tax and fee for service revenues ■ Governments may incur costs related to the provision of services	■ Local government revenues and expenditures

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC	Rationale for Selection	Indicators
SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)		
Services and Infrastructure		
Public services and infrastructure	■ Population increase in the LSA may increase demand on services (health, emergency and protection, education, recreation) and water and waste infrastructure ■ Project activities may increase demand for health, emergency services and waste/water infrastructure	**Protection and Emergency:** ■ Police capacity ■ Ambulance capacity ■ Fire protection capacity **Health Services:** ■ Number/type of facilities, services and programs ■ Number of medical practitioners per population ■ Capacity/capacity utilization **Social Services:** ■ Capacity/capacity utilization **Education:** ■ School enrolment ■ Capacity utilization **Recreation:** ■ Number/type of recreational facilities ■ Capacity utilization **Water, Wastewater and Waste Management:** ■ Capacity and capacity utilization of infrastructure ■ Solid waste management sites and capacity utilization **Utilities:** ■ Capacity and capacity utilization
Housing and accommodation	■ Influx of workers and families may lead to changes in demand for, availability and cost for temporary and permanent housing, and tourism accommodation	■ Permanent and temporary housing supply ■ Occupancy rates ■ Housing costs and availability
Transportation	■ The Project may strain existing road and transportation network due to movement of Project workers, equipment, supplies and products	■ Traffic volumes (average annual daily traffic counts) and levels of service on relevant access roads and intersections (traffic study to be completed) ■ Existing transportation network
Land Use and Resources		
Outdoor tourism and recreation	■ The Project may affect tourism and recreation activities and opportunities ■ Loss of employment and income generation by tourist operators may require mitigation measures to avoid adverse effects	■ Crown land and other tenures ■ Tourism activities and specific-use areas ■ Number and types of visitors to the study area ■ Tourism revenue generation

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC	Rationale for Selection	Indicators
SOCIO-ECONOMIC ENVIRONMENT (CONTINUED)		
Land Use and Resources (Continued)		
Hunting	■ The Project may occupy or affect the land base which supports hunting ■ Loss of employment and income generation by hunters may require mitigation measures to avoid adverse effects	■ Hunting areas ■ Wildlife management (e.g., moose, deer, bear) management areas ■ License sales ■ Harvest volumes
Trapping	■ The Project may occupy or affect the land base which supports trapping ■ Loss of employment and income generation by trappers may require mitigation measures to avoid adverse effects	■ Tenured trapline areas ■ Harvest volumes
Fishing	■ The Project may occupy land base which supports fishing activities ■ Loss of fishing opportunity may require mitigation measures to avoid adverse effects	■ Recreational fishing participation (e.g., Atikokan Bass Classic) ■ Recreational and commercial fishing areas, licence sales and harvest volumes ■ Baitfish areas and harvest volumes ■ Conduct a biannual fishing questionnaire of the project workforce to estimate the level of fishing pressure resulting from the Project
Water use and access	■ The Project has the potential to influence the use of and access to water bodies such as the Marmion Reservoir ■ The Marmion Reservoir is an important resource for recreational fisheries and tourism, hydro-electric power and other commercial and industrial uses	■ Recreational fishing participation (e.g., Atikokan Bass Classic) ■ Water use for hydro-electric power and other industrial and commercial uses
Mining	■ The Project may affect current and future mining and aggregate resource activity	■ Exploration and development projects (current and potential resources) ■ Mining land use, plans
Forestry	■ The Project occupies forested land ■ Disrupting access to existing or future harvest land may require mitigation measures to avoid adverse effects	■ Timber harvesting land base (harvest area, tenure)
ATMOSPHERIC ENVIRONMENT		
Air Quality		
Ambient air quality	■ Air quality is selected as a VEC since it has been identified as an important aspect of the environment by both public and regulators. In addition, emissions from the Site activities have the potential to alter the existing air quality	The following compounds have been identified, which are expected to be emitted in measureable amounts from the Site, and for which air quality criteria against which the Site effects can be compared are available: ■ Particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 µm in aerodynamic diameter (PM10), and particles nominally smaller than 2.5 µm in aerodynamic diameter (PM2.5) ■ Oxides of nitrogen (NOX) and the resulting nitrogen dioxide (NO2) ■ Sulphur dioxide (SO2) ■ Carbon monoxide (CO) ■ Metals, including antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, tellurium, tin and vanadium

Table ES-1: Hammond Reef Gold Project Valued Ecosystem/Social Components (Continued)

VEC/VSC	Rationale for Selection	Indicators
ATMOSPHERIC ENVIRONMENT (CONTINUED)		
Noise		
Ambient noise levels	■ Noise levels are selected as a VEC since it has been identified as being important to regulators and stakeholders. In addition, Site activities have the potential to affect existing noise levels.	■ The effect of the on Site noise sources will be evaluated using the 1-hour equivalent noise level (Leq). The 1-hour Leq is the energy equivalent continuous sound level, which has the same energy as the time varying signal over a one hour period at the same location. ■ Other noise indicators are available that are not appropriate for the evaluation of the Site noise levels, but are appropriate for evaluating the indirect effects of changes in noise levels on other VECs (e.g., ecological effects).
Vibration from Blasting		
Vibration Levels	■ Vibration levels are selected as a VEC since they have been identified as being important to regulators and stakeholders. In addition, Project Site activities have the potential to affect existing vibration levels.	■ The effect of blasting on air vibrations will be evaluated using Peak Air Pressure Level in dBL. ■ The effect of blasting on ground vibrations will be evaluated us Peak Particle Velocity in mm/s
HYDROLOGY		
Surface water quantity	■ The Project may result in changes to surface water quantity within the MSA.	■ Seasonal stream flow in creeks ■ Seasonal water levels in Marmion Reservoir and Lizard Lake ■ Catchment areas
Navigability	■ The Project may result in the partial obstruction or change to navigable watercourses or waterbodies. ■ Potential for changes in flow, width, depth or gradient of watercourses or waterbodies.	■ Presence of obstruction. ■ Flow, width, depth or gradient of waterbody or watercourse.
HYDROGEOLOGY		
Groundwater quantity	■ Potential of groundwater flow change within the MSA.	■ Changes in groundwater levels.
WATER QUALITY		
Surface Water Quality and Quantity	■ Potential changes in surface water quality due to water intake and discharge and/or from alteration of runoff processes within the MSA.	■ Substrate metal content. ■ Amount of organic material. ■ Dissolved oxygen. ■ pH. ■ Temperature. ■ Total phosphorous. ■ Total and dissolved metal concentrations in water. ■ Nutrient content in water. ■ Total Dissolved Solids. ■ TKN, TP. ■ Anions, cations. ■ Conductivity.

EXISTING CONDITIONS

Geology, Geochemistry and Soils

The Project Site is underlain by 2.6 billion to 3 billion year old bedrock of the Superior Province of the Canadian Shield in the Marmion Batholith of the Central Wabigoon Subprovince. The Marmion batholith is a diverse assemblage of felsic intrusive rocks, varying from granite to tonalite (quartz diorite) with a gneissic tonalite predominating, and including late stage pegmatite dykes. The Marmion Batholith is transected by a major structural feature, the 1 to 6 km wide Marmion Deformation Corridor (MDC) (also known as Marmion Lake Fault) that trends northeast to southwest through the area. The MDC is variably faulted, sheared and altered, and exhibits a complex braided structure of brecciated and veined granitoid and tonalite rock. This rock mass has been overprinted with a quartz stockwork that hosts gold mineralization.

The bedrock is overlain by a thin discontinuous veneer of overburden including glacial deposits that accumulated in low points on the bedrock surface during the progressive retreat of the ice sheet during the end of the Wisconsinan glaciations. These glacial deposits include glacio-lacustrine (near shore beach deposits, ice contact deposits and basin/quiet water deposits) and tills that are overlain by younger fluvial deposits (modern flood plains) and organic (peat) deposits. Bedrock, which is situated at or near the ground surface throughout much of the area, controls the topography, shallow groundwater and surface drainage conditions.

Extensive geochemical laboratory testing of 123 samples of waste rock obtained from boreholes drilled in the area of the mine showed that only one sample could be considered as possibly acid generating. The conclusions of the completed analysis show that the waste rock will be non-acid generating with excess neutralization potential primarily resulting from carbonate minerals. The results of the short term leach testing and kinetic testing support this classification. Samples of potential tailings materials are also classified as non-acid generating with excess neutralization potential.

Short term and long term leach test results show that pH may be initially alkaline but is near neutral over the longer term and that concentrations of aluminum, copper, cadmium, iron and zinc have the potential to be slightly elevated in short term testing relative to comparison criteria with sporadic arsenic, selenium and vanadium concentrations slightly greater than the comparison criteria in waste rock leach testing. Where these sample values are above the comparison criteria, additional water quality evaluation within an overall site-wide context has been conducted as described in the site water quality evaluation.

Gentle topography is characteristic of the area. The granitic rocks of the site are characterized by rounded hills and shallows slopes. Overburden is generally thin and discontinuous. The geology in which the ore deposit is located is characterized by granitic rocks. Geochemical testing has shown that the rock types in and around the proposed open pits are not acid generating, and testing has shown that there is little potential for leaching of metals.

Atmospheric Environment

The Project Site is located in a typical boreal climate region, which is characterized by long, usually very cold winters, and short, cool to mild summers. With no major mountain ranges blocking Arctic air masses, winters are generally very cold. The first snowfall often comes in October and the last snow can come as late as May.

There are no industrial applications within the air quality study area, thus air quality is not impacted by local sources. The Atikokan Generating Station (AGS) was considered however it is located about 15 km southwest of the Project site outside the air quality Local Study Area (LSA). The AGS is also currently undergoing construction to retrofit the former coal plant for burning biofuel. Due to the distance between the AGS and the Project, there will likely be limited interaction between the AGS and the Project activities.

Northern Ontario does not typically have air quality issues because much of the landscape is natural and undisturbed. Field studies were not undertaken to characterize the existing air quality conditions, since available data from Northern Canada stations were used to characterize the existing air quality. Background measurements are not available for all indicator compounds. Further, it is expected that in remote locations such as the study area, background air quality values will be lower than the available measured values and that for indicator compounds such as ammonia the background value will be zero. Therefore, the available air quality data for particulate matter and combustion gases is considered reasonable and is used to describe the existing conditions.

Based on the remote nature of the Project and Points of Reception (PORs), the existing noise conditions have been assumed to be unimpacted by man-made sources and therefore onsite measurements were not required.

Effects of energy released from the Project in the form of air and ground vibrations are most likely to be experienced by those living in close proximity to the Project. As there are currently no blasting operations within the study area, an assessment of background conditions is not necessary for this assessment.

Hydrology

The Project is located on a peninsula bordered to the east by Lizard Lake, and to the south and west by Upper Marmion Reservoir. Upper Marmion Reservoir is part of the Seine River system, which originates in the Savanne River at Raith, flows east-west for about 250 km and empties into Rainy Lake near Fort Frances and the Canada-U.S. border. The Hammond Reef deposit is located on a peninsula of land extending into the north end of the Upper Marmion Reservoir, one of three managed reservoirs within the Seine River watershed.

A number of small intermittent and permanent streams occur within the areas to be developed as part of the Project (the Project footprint). As well, a small waterbody and a number of small intermittent and permanent watercourses occur in the area where the Tailings Management Facility (TMF) will be constructed. Collectively, the small streams, ponds and lakes that will be eliminated by the Project contribute less than 1% of the flow into Upper Marmion Reservoir.

The Upper Marmion Reservoir is currently managed for flood control and hydro-electric power generation. As part of broad changes to the river systems in the area that began in the 1920's, the Upper Marmion Reservoir was created by damming and flooding the existing Seine River. The original flow of the river was altered such that the system currently drains through a constructed cut (Raft Lake Cut) at the western end of the Reservoir.

The water level in Upper Marmion Reservoir is maintained by a dam, the Raft Lake Dam, at the western end of the Raft Lake Cut. From the Raft Lake Dam, the system drains west into Finlayson Lake, where water then flows south through a constructed channel to the Valerie Falls Generating Station.

As a result of both flood control and hydro-electric power generation requirements, the water level in Upper Marmion Reservoir fluctuates up to 2.5- 3 m annually as water is drawn down in the spring to provide flood control capacity.

Hydrogeology

Hydrogeological investigations show that groundwater flow from the Project area is outwards towards Upper Marmion Reservoir. However, there appears to be little direct connection such that as the Reservoir is drawn down, groundwater levels at most locations do not change. Groundwater flow appears to also contribute little flow to Upper Marmion Reservoir. The most significant contributor to lake levels in the Project area appears to be upstream flows from the Seine River and surface runoff from the Seine River/Upper Marmion Reservoir watershed. These flows are channelled to the Reservoir through a number of small and mid-sized streams that drain to the Reservoir from outside of the Project area. These water sources are in turn influenced by rainfall and snowmelt.

Water and Sediment Quality

Water quality data indicate that similar conditions exist throughout the waterbodies and watercourses in the Mine Study Area (MSA), and that the observed water quality is influenced by local geological conditions, and the presence of wetlands that contribute to fluctuations in pH.

Geochemical testing, soils quality data, and groundwater quality data all show that aluminum and iron, as well as some other metals are present in leachate samples from all rock types, in soils at above average concentrations for aluminum, and also present in groundwater samples. All of these are potential sources that can and likely have influenced water quality in Project Site lakes and streams.

The larger lakes within the system receive natural tributary inflows of slightly lower pH waters that are also slightly enriched in aluminum and iron, and in some cases, silver and mercury. The combination of local geologic sources and natural stratification of these lakes determines the fluctuations in aluminum and iron levels in these waterbodies. The lakes show distinct thermal stratification during the summer months that results in a decrease in bottom oxygen levels that in turn drives mobility of the major metals, aluminum, iron and manganese from sediments during periods of low oxygen as a consequence of redox changes in the bottom waters. None of the larger bodies of water, such as Sawbill Bay, Lynxhead Bay and Lizard Lake appear to experience anoxic conditions in the deeper basins. This is likely a combination of two influences: the larger surface area that promotes wind-driven mixing of the water column, and the flow of water through these systems. These lakes also show evidence of oxygen reduction during the winter months when ice cover prevents mixing of the water column.

Conditions in Mitta Lake differ in that oxygen concentrations in the bottom waters of the lake decrease to very low levels both during summer stratification, and in winter under-ice conditions. The small surface area of the lake limits wind-driven mixing of the water column, and as a result this lake is more susceptible to oxygen depletion.

Occasional exceedances of the Canadian Water Quality Guidelines (CWQG) and/or Provincial Water Quality Objectives (PWQO) for mercury were noted in some waterbodies. Since the geochemical testing has indicated that the rock types present do not leach mercury, sources related to atmospheric deposition and release from wetlands are postulated as the reasons for the occasional detection of mercury at concentrations above detection limits. Similarly, there were occasional exceedances of the PWQO for cobalt and cadmium, though these are likely from geological sources. The geochemical testing has shown that both can leach from some of the rock types tested.

Sediment quality in Mitta Lake, Sawbill Bay, Lynxhead Bay, Lizard Lake, as well as upstream in Hawk Bay was characterized by concentrations of arsenic, cadmium, copper, manganese, lead, nickel and zinc that in one or more samples exceeded the Ontario Provincial Sediment Quality Guidelines Lowest Effect Level. None of the metals exceeded the Severe Effect Level, and therefore present minimal risk to aquatic life. Given the similarity in sediment quality between basins, and since (with the exception of Sawbill Bay) there has historically been no development in the up-stream bays within the Upper Marmion Reservoir watershed, the values observed are considered to be natural levels due to the characteristics of the local geology of the region. Concentrations of these metals were similar in all of the larger waterbodies, and no areas of higher concentrations that could be related to specific anthropogenic or natural geologic anomalies were noted. Since similar concentrations occurred in Hawk Bay, upstream of the proposed site in the Seine River, the sediment concentrations likely reflect general sources to the watershed.

Aquatic Environment

Aquatic habitats in the area of the Project include a range of habitat types and sizes. Lentic (still water) habitats ranged from small wetland ponds to large lakes such as Marmion Reservoir while lotic (moving water) habitats included small intermittent streams and larger permanent streams. No large rivers occur in the MSA. While Marmion Reservoir is part of the Seine River system, in the area of the Project it behaves more like a lake, and is considered as such for the environmental assessment.

Aquatic habitats within the MSA and LSA can be considered as two connected units:

- Small waterbodies and watercourses that occur on the upland areas (i.e., the MSA) in which the Project will be located. The upland area is defined as the area bounded by Lizard Lake to the east, and Upper Marmion Reservoir, comprised of Lynxhead Bay and Sawbill Bay, to the south and west. These typically drain to the larger waterbodies.
- The larger waterbodies of Lizard Lake and As part of broad changes to the river systems Reservoir into which the smaller watercourses drain (i.e., the LSA).

The Marmion Reservoir has been identified by the Ministry of Natural Resources as an important walleye sports fishery. Within the Marmion Reservoir, Lynxhead Bay Narrows is a potential walleye spawning area. The Marmion Reservoir also provides habitat for a healthy small mouth bass population.

Headwater drainage systems and associated fish communities that exist within the mine footprint (upstream of the lower reaches in the watercourses) contribute indirectly to the quality and quantity of fish habitat. The associated habitat includes predominantly intermittent streams and small waterbodies (beaver impoundments and some larger ponds), with occasional small lakes and permanent streams. Associated fish communities are predominantly limited to baitfish and other small-bodied fish. Northern Pike were present in two of the larger waterbodies within the footprint of the proposed TMF. Upstream passage of fish from the lower reaches is blocked by natural barriers; however, some downstream movement of fish may occur. Headwater ponds and streams occur in both the northern area of the Project site where the TMF will be located, and in the southern section of the site where the mine and associated infrastructure will be located. In these small headwater ponds and streams fish communities were typically reduced, or in the case of intermittent watercourses and waterbodies were typically absent. In those waterbodies that had fish populations, these typically were comprised of northern redbelly dace, finescale dace and fathead minnows.

The lower reaches of the watercourses within the MSA include permanent streams and small waterbodies (beaver impoundments and larger ponds), with some small lakes that are accessible by fish from Lizard Lake, Sawbill and Lynxhead Bays. Fish communities are more diverse than headwater drainage systems and include a greater diversity of small-bodied fish, and commonly support species such as northern pike, white sucker and yellow perch. Fish passage to and from these features occurs throughout the year, however it may be impeded by the fluctuating water levels in Sawbill and Lynxhead Bays. There is no documented use of these features by walleye and smallmouth bass.

Two small lakes would be eliminated by the Project. At the northern end of the site, within the footprint of the TMF is a small unnamed lake (identified as Area of Potential Impact [API] #2). This lake has a surface area of approximately 122,000 m^2 (12.2 ha), and a maximum depth of 5 m. The range of species encountered in this lake included adults and juveniles of pumpkinseed, yellow perch, northern pike, white sucker, as well as small-bodied forage fish such as Iowa darter and blacknose shiner. The lake drains via a small stream to another small lake (this lake lies outside of the footprint of the Project), that in turn drains to Lizard Lake. Within the small stream draining from the lake, no fish were obtained, though the presence of fish in the small lake indicates that fish likely can pass up this stream on occasion. The second lake, Mitta Lake, lies directly over the gold deposit, and will be eliminated when mining commences. Mitta Lake is a small irregularly shaped lake within the MSA perched on the peninsula on which the Project will be located. Mitta Lake is a small waterbody of 17.1 ha in size. The lake is steeply sided, and consists of three deeper basins, which reach a maximum depth of 16 m. The lake supports populations (both adults and juveniles) of white sucker, brook stickleback, fathead minnow, Iowa darter, mottled sculpin and finescale dace. No sport fish were encountered in the lake during sampling. Mitta Lake is drained by a small stream that flows south to Upper Marmion Reservoir.

Terrestrial Environment

The Project lies within the boreal forest region of Ontario, near the transition zones with the Great-Lakes-St. Lawrence mixed forest region and the prairie grasslands. The forest communities of the area are dominated by black spruce, jack pine, trembling aspen and white birch. The area supports a range of wildlife species typical of the boreal forest. A limited number of species-at-risk have been recorded from this area of Northwestern Ontario, though only the Canada warbler, the common nighthawk, the bald eagle and the snapping turtle were found to occur within the Project area.

The rolling landscape gives way to wetlands varying in morphology, nutrient content and species richness. Fens and bogs are present where there is isolation from groundwater; and swamps and marshes are in closer proximity to groundwater or the shallows of lakes and rivers. The richer wetlands support more species diversity, while some of the poor, acidic wetlands support few species, those of which are specially adapted to restricted nutrients. A variety of species were observed throughout the LSA reflecting this variability of habitat types.

Many traditional use plants such as black spruce, willow (*Salix* spp.), bog cranberry (*Vaccinium vitis-ideae*), Labrador tea (*Ledum groenlandicum*), and blueberry (*Vaccinium myrtilloides)* are common in a number of different ecosite types. However, there are a few traditional use species that are more restricted in their distribution and tend to only be associated with a single ecosite type, though they may be locally abundant within that ecosite type. Wild rice (*Zizania palustris*) has been raised as a species of Aboriginal value but was not observed in the LSA during field surveys conducted in 2012.

A total of 82 bird species were identified during all breeding season field surveys throughout the MSA and LSA. The majority of bird species were detected during morning breeding bird point counts. White-throated sparrow (*Zonotrichia albicollis*), a habitat generalist (Falls and Kopachena 2010), was the most abundant species observed. Additional common species included mixed/deciduous forest species such as red-eyed vireo; coniferous forest species such as Swainson's thrush (*Catharus ustulatus*) and wetland (e.g., bog and fen) species such as yellow-bellied flycatcher (*Empidonax flavienventris).* The species composition and density is typical of a boreal hardwood forest bird community, with a diversity of warblers, thrushes, sparrows and vireos. Species at Risk (SAR) observed during the breeding bird surveys were the Common nighthawk (*Chordeiles minor*) and Canada warbler (*Wilsonia canadensis*). No secretive marsh birds were identified during the Marsh Bird Surveys. However, 11 species were observed including wetland species such as Wilson's snipe, Eastern kingbird (*Tyrannus tyrannus*), and Ring-necked duck (*Aythya collaris*). The only potential Least bittern habitat (e.g., large emergent marshes) was located on Snail Bay in Marmion Reservoir. However, habitat was marginal and no Least bitterns were observed or responded to playback.

A total of 12 mammal species were observed either during targeted surveys or incidentally during the conduct of other baseline studies completed between 2010 and 2012. Based on range maps and knowledge of current distribution, an additional 35 species of mammals potentially occur in the LSA. Of the observed and potentially occurring mammal species, one is classified as a Species at Risk, Gray fox. However, no Gray foxes were observed in the LSA, nor is suitable habitat available in the LSA for this species. The reptiles and amphibians in the LSA and MSA are generally those considered typical of the boreal forest. There is no indication that the species or habitats at the study site are unique relative to the surrounding area. Snapping turtle is the one reptile SAR that was identified as occurring in the area. During various field surveys, 28 species of dragonfly

and butterfly species have been identified in the MSA and LSA. All the species observed are common to the area and there are none designated under provincial or federal legislation.

In January 2013, several species of bats were added to Ontario's Species-at-risk list and were, therefore, considered in the Final EIS/EA Report. Range maps indicate that six species of bats have known home ranges in the area, all of which were recorded during the 2013 bat field surveys at Hammond Reef.

Socio-economic Environment

The Project is located 30 km north of the Town of Atikokan (population ~2,800), within the Rainy River District in Northwestern Ontario. The City of Thunder Bay (population ~120,000) is located approximately 170 km east and the Town of Fort Frances (population ~8,000) is located about 150 km to the west.

The Town of Atikokan is a beautiful community, dubbed the Canoe Capital of Canada. The Town is known regionally for its popular fishing tournament, the Atikokan Bass Classic. The Town also has a history of resource development including mining and forestry. In 2011, the Town Council passed a resolution in support of the Hammond Reef Gold Project. The potential influx of workers to the Town of Atikokan could affect housing, services and infrastructure. The Project also represents potential business opportunities for community members.

Historically, the local economy centred around two iron ore mines: Steep Rock Iron Mines and Caland Ore. T. Both mines commenced operations in the early-1950s and remained the main local employers for the next three decades. During the peak years of production, the Steep Rock Mine employed more than 700 workers and produced 1.0-1.5 million tonnes of ore annually. For every 100 jobs in the mine an additional 65 jobs were reportedly generated in the community, resulting in 40,000 person years of employment (Summary of Woods Gordon Report 1986). Both mines closed in 1979 and the land was deeded back to the Ministry of Natural Resources. The closing of the mines led to a major local economic downturn in the 1980s.

Forestry has traditionally been an important industry in Northwestern Ontario, including Atikokan. In the early 1900s there were numerous lumber mills in the area around Atikokan. Many lumber companies logged the Quetico area extensively, Atikokan Forest Products operated a mill in the Sapawe Lake area, and Fibratech operated in Atikokan as one of North America's innovative engineered wood producers – manufacturing and designing quality orientated fibreboard panels. Both of these industries closed in 2007. Currently the only forestry-related industry in the Town of Atikokan is engaged in manufacturing fuel pellets.

The City of Thunder Bay acts as the centre for regional mining activity. Thunder Bay could potentially provide a large amount of goods and services required by the Project and may also have a pool of qualified specialized workers that are not necessarily available locally. The Town of Fort Frances is the main public service and infrastructure hub of the Rainy River District and may also be a source of goods and services for the Project.

The total population of the Regional Study Area (RSA) is 224,034. The Thunder Bay District represents more than half of the RSA population, with the majority of the District's population concentrated in the City of Thunder Bay. The second largest population centre in the RSA is the City of Kenora with 15,348 followed by the Town of Fort Frances (7,952) and the City of Dryden (7,617).

The population of the RSA has decreased comparatively in 2006 and 2001 (235,046 and 234,771 respectively) relative to the population in 1996 (244,117) (StatsCan 2007; StatsCan 2012). This population fluctuation has resulted in an overall decrease of 8.2% since 1996. In 2011, the population of Atikokan was 2,787, representing a 31% decline since 1996 and a 15.4% decline between 2006 to 2011. This decline can be attributed mostly to the downturn of the local economy resulting from the closure of a number of mining and forestry-related employers in the town. Conversly, the population of Ontario has demonstrated a growing trend since 1996, with a population increase of 19.5% over this period.

The economy of Northwestern Ontario has been declining over the past decade. The Gross Domestic Product for Northwestern Ontario declined by 6.7% between 2001 and 2006, while it increased by 3.5% and 13.6% for Northeastern Ontario and the rest of Ontario respectively over the same period of time (Rosehart 2008).

The economy of Northwestern Ontario has traditionally been dominated by a small number of large companies that hire large numbers of workers, which in turn has created service industries dependent on large employers and their employees (Rosehart 2008). Approximately 76% of employment in Northwestern Ontario (excluding Thunder Bay) is in the service sector (Northwest Training and Adjustment Board 2010). The decline of the forestry sector in Ontario in recent years and the subsequent closures of pulp and paper and lumber mills have had a negative effect on the region's economic conditions.

Historically, the Town of Atikokan developed around the mining and forestry industry, and remained heavily dependent on these sectors. With the closing of the community's most recent mines in 1979, major economic downturn followed in the 1980s and the forestry sector became the primary employer in the community. However, with the recent downturn in regional forestry, only one firm, which manufactures fuel pellets, remains active in the Town of Atikokan.

In 2006, the RSA had an experienced labour force of 117,865 (1.8% of the provincial labour force). In 2006, the LSA had an experienced labour force of 1,650. Primary industries of employment are forestry and mining; however many workers are employed outside of Atikokan while their families still reside in Atikokan. Tourism constitutes approximately 15% of Atikokan's employment.

Outdoor recreational tourism operators in the LSA host remote camping, hunting and fishing vacations. These tourism outfitters provide a variety of services including remote fly-in, and drive in wilderness retreats, guided fishing tours, hunting expeditions, and trapper cabins, as well as accommodations. The Atikokan Tourist Bureau tracks Atikokan visitors during peak season (May-September). In 2011, 3,697 tourists visited the Tourist Bureau, 30% of which were only passing by. The most popular reasons for visiting Atikokan were recreation (approximately 20%), followed by fishing, and visiting friends or family (approximately 10% each).

Aboriginal Interests

The Project is located within the Treaty 3 lands. Treaty 3 is a written agreement between the Saulteaux Tribe of the Ojibway Indians and Her Majesty the Queen of Great Britain and Ireland signed in 1873 (Chiefs of Ontario 2005).

Upon signing, each Chief received a British flag and a treaty medal. Treaty 3 includes an 1875 adhesion (addition to the Treaty) that extends all rights and benefits to the "Half-breeds" (Métis) of Rainy River and Rainy Lake. The Métis were absorbed into the Little Eagle Band and are now part of the Couchiching First Nation (Chiefs of Ontario, 2005).

The Métis assert harvesting and trapping rights throughout most of Ontario. Their hunting and harvesting activities are organized by territories that represent large areas within which the Project is situated.

Each territory has a Captain of the Hunt, designated by the Métis Nation of Ontario (MNO). The Captain of the Hunt has authority over Métis hunts, issues harvesting certificates and gathers information on the number, species and location of animals taken. The RSA includes part of two hunting territories, the Rainy Lake/ Rainy River and the Lake of the Woods/Lac Seul. The LSA includes a small part of the Rainy Lake/Rainy River harvesting territory.

Aboriginal engagement for the Project focussed on nine identified First Nations communities. These nine communities have been identified by the Crown as having an interest in the Project and having triggered the duty to consult on the Project. The Project is located in MNO Region 1. Region 1 includes four Métis communities that may be affected by the Project through employment, business, and education and training opportunities.

The following Aboriginal communities have been identified as having an interest in the Project:

- Métis Nation of Ontario:
  - Atikokan Métis Council
  - Kenora Métis Council
  - Sunset Country Métis Council
  - Northwest Métis Nation of Ontario Council
- First Nations:
  - Fort Frances Chiefs Secretariat:
    - Couchiching First Nation
    - Lac La Croix First Nation
    - Mitaanjigamiing First Nation
    - Naicatchewenin First Nation
    - Nigigoonsiminikaaning First Nation

  - Rainy River First Nation
  - Seine River First Nation
- Lac des Milles Lacs First Nation
- Wabigoon Lake Ojibway Nation

The Fort Frances Chiefs Secretariat (FFCS) is a regional governing body comprised of the seven chiefs of the Rainy River District; with the collective authority, granted by the people, to represent the Anishnaabe of the region. Representing seven individual First Nations, the FFCS identifies issues of common interest, and collectively determines solutions through advocacy and partnership.

The traditional language of the Anishnabe Nation is Ojibway, although English is also a predominant language. Knowledge of their Aboriginal language is still present in close to 40% of the population in many communities within the RSA. The Fort Frances Chiefs Secretariat has been working on an Education Jurisdiction Transfer that will create a separate school board and enable a culturally-focussed curriculum, including an Ojibway immersion program. The Ojibway language continues to be used during prayers, oral history and traditional story telling.

Current unemployment rates reported by the identified First Nations communities are all higher than the unemployment rate for the Province of Ontario. The median income reported by the identified First Nations communities, are all lower than the median income for Northwestern Ontario and the Province of Ontario.

Special sites were identified through two separate Traditional Use Studies carried out with First Nations and Métis people. Special sites were identified for both First Nations and Métis. These sites were identified and locations were provided to allow OHRG to avoid disturbing any sites from land clearing activities or placement of Project infrastructure.

ASSESSMENT OF ALTERNATIVES

Revisions to the Alternatives Assessment TSD and Chapter 4 of the EIS/EA Report are considered substantial between the draft report published in February 2013 and this final report. Environment Canada requested that OHRG undertake a more detailed mine waste alternatives assessment by including additional sub-accounts and indicators in the multiple accounts analysis. Mine waste includes the TMF and the waste rock stockpiles. Environment Canada and OHRG worked together to develop a detailed list of suggested sub-accounts and indicators for Environment, Economic and Socio-economic accounts based on consultation and other similar projects. OHRG incorporated all these revisions to the report as detailed in Chapter 4.

Additional changes to the Alternatives Assessment TSD and Chapter 4, outside of mine waste alternatives, included a stronger link to VECs and an overall revision for consistency and clarity. Some new discussion regarding the on-site workers accommodation alternative was also provided.

A full range of non-mine waste alternative methods of carrying out the Project were examined and assessed. Alternatives that meet the Project objectives were identified in the ToR and an initial screening process was completed. The alternatives that were deemed reasonable were carried forward for further evaluation and were investigated in greater detail. Comparative summaries of the features of the alternatives, environmental and social impacts, cost requirements, and discussions of the degree to which the alternative fulfills the need identified were used to determine which option is best overall. A summary of the preferred alternative for each Project component is presented in the following table.

Table ES-2: Summary of Preferred Alternative Means of Carrying out the Hammond Reef Gold Project

Project Component	Preferred Alternative
Ore processing method	Processing using cyanide including a cyanide destruction circuit
Project transmission line	Transmission line along Hardtack/Sawbill Road and crossing Sawbill Bay
Sewage treatment facility location	Dedicated facilities for the worker accommodation camp and the Mine
Sewage treatment technology	Package sewage treatment plant
Water discharge location	Overland pipeline to the south with discharge to the south end of Sawbill Bay
Access road	Hardtack/Sawbill Road
Worker accommodation camp	On-site worker accommodation camp
Tailings Deposition	Thickened tailings

A full range of mine waste alternatives have been examined and assessed. Alternatives that met the Project objectives were identified in the ToR and an initial screening process was completed. The alternatives that were deemed reasonable were carried forward for further evaluation and were investigated in greater detail. A multiple accounts analysis including a qualitative/quantitative assessment and value-based decision process was applied to each alternative in accordance with Environment Canada's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (Environment Canada 2011), leading to the selection of the best overall option. The preferred mine waste alternatives are "Alternative 3" for the Waste Rock Management Facility (WRMF) – located immediately east of the open pit and mine processing plant and the "Optimized Base Case," for the TMF which is located approximately 9 km northeast of the processing plant.

PROJECT DESCRIPTION

The Hammond Reef Gold Project (Project) consists of an open pit gold mine and associated processing and support facilities. The mine will consist of two open pits, a processing facility, a TMF, a WRMF and supporting infrastructure that includes a worker accommodation camp for workers. The mine has a projected operating life of 11 years at an average production rate of approximately 60,000 tonnes of ore per day. The production rate may be improved or increase over time.

The Project represents a major investment of capital into Ontario and Canada's economy. Based on capital costs of OHRG's Canadian Malartic Mine, it is estimated that the total capital cost of the proposed Hammond Reef Gold Project would be $1.4 billion ($2012 Canadian). Total output of refined gold is expected to be 369,000 ounces per year.

The Project is expected to support approximately 34,736 Person Years (PYs) of direct, indirect and induced jobs in Canada over its construction and operations phases, a period of 14 years. Total benefits to Atikokan and local First Nation communities would be 3,129 jobs over the construction and operations periods, and $456.7 million in wages and salaries to construction workers, mine operators and workers in the supply industries.

Over the 14 year analysis period, the Project is expected to generate $490.8 million in federal and provincial income tax revenues. During the 11-year operations period the Project would contribute approximately $3.2 billion to national Gross Domestic Product (GDP).

The Project will be completed through four phases: the construction phase during which the necessary infrastructure will be built; the operations phase during which the mine is developed and the ore is processed; the closure phase during which production ceases and the site is decommissioned; and the post-closure phase during which the Project site is monitored.

The Project was defined through consideration of a number of alternatives for developing specific Project components. Three different alternative locations for the TMF were assessed from which the final location was selected based on environmental and engineering considerations. Similarly, alternative means for waste rock management, ore processing, water management, and other site facilities were considered. The Project as described below represents the selected alternatives for each component based on an assessment of the potential environmental effects of each alternative together with engineering requirements.

The open pits (located immediately adjacent to one another) will be developed in stages. Initially, overburden (consisting mainly of top soils) will be removed and stockpiled for later use in reclaiming the site. The waste rock, (defined as rock that does not contain economically recoverable gold), will be removed by blasting and trucking to the WRMF. Ore will be extracted from the pits by blasting and will be trucked to the processing facility for production of gold doré bars. The tailings will be thickened to remove some of the excess water and will be pumped via an above-ground pipeline to the TMF, to permanently store the tailings. With the exception of the TMF and the worker accommodation camp, all Project support infrastructure will be located close to the open pits.

The TMF will be located approximately 9 km to the northeast of the open pit. The TMF will be constructed of rock and earthen dams that are progressively raised as tailings accumulate in the TMF. The tailings will be pumped as a thickened slurry from the processing plant to the TMF. Excess water in the tailings will be collected in the TMF reclaim pond, and then pumped back to the processing plant for re-use. At the base of

the tailings dams, seepage collection ponds will be constructed to collect seepage water to be pumped back into the TMF.

Water is required for the processing operation, and the necessary water for processing plant start-up will be obtained from Upper Marmion Reservoir. Once the processing plant is in operation, process water will be reused to minimize taking of additional water from Upper Marmion Reservoir. The reused water will be stored in the Process Plant Collection Pond (PPCP) until it is needed in the processing plant. In addition, storm water and seepage will be collected from around the WRMF and other facilities and conveyed to the PPCP. Water in the PPCP will be supplemented with reclaimed tailings water. Under this arrangement, requirements for fresh water from the Upper Marmion Reservoir will be minimized.

Excess water will be treated through an effluent treatment plant if required and released to the south end of Sawbill Bay of Upper Marmion Reservoir. Due to Project water needs during years with average or below average precipitation, all water would be reused, and there should be no discharge from the site. During years of above average precipitation, some excess water would be produced, which would be treated, if required and released intermittently to Upper Marmion Reservoir.

In addition to the processing plant, a number of support facilities will be constructed on the site. These include a truck servicing area to maintain the mine vehicles, a fuel storage area and fuelling facilities for the vehicles, firefighting equipment facilities, water storage and treatment facilities, and offices. The mine and support facilities will be located close together near the pits. The mine worker accommodation camp will be located approximately 10 km to the north, near the location of the existing exploration camp. Workers will be transported in and out of the worker accommodation camp on a rotational shift basis. It is expected that some workers will move into the area, taking up residence in the Town of Atikokan while workers from more distant locations will likely return to their home communities at the end of their shift rotations.

The existing Hardtack-Sawbill Road that leads north from Highway 622 will be widened and straightened in some places in order to accommodate heavy truck traffic that will bring in construction supplies during the construction phase and mine operating supplies (such as diesel fuel, processing chemicals, and worker accommodation camp supplies) during mine operations. Electrical power will be brought to the site via a transmission line, which follows the same general route as the road alignment for 14.3 km until it crosses over Sawbill Bay.

Upon completion of mining, the mine will be closed as per regulations under the Ontario Mining Act. The buildings will be decommissioned, the TMF will be graded and revegetated, and drainage from the Project infrastructure will be directed to the open pits until such time as water quality indicates that normal runoff flow directions can be restored. The pits will be left to fill naturally, and it is estimated that approximately 218 years after operations cease, the pits will overflow to Upper Marmion Reservoir.

Figure ES-4 provides the general arrangement of the Project Site during the operations phase. Table ES-3 outlines the Project activities for each key Project component by Project phase.

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615000
620000
5430000
5425000
5420000
N
Serpent Lake
Cornell Lake
Long Hike Lake
Vista Lake
Lizard Lake
Sawbill Bay
Mitta Lake
Marmion Reservoir
Lynxhead Bay
Turtle Bay
ACCOMMODATION CAMP
PUMPING STATION
TAILINGS MANAGEMENT FACILITY
FRESHWATER INTAKE - CAMP SITE POTABLE
CAMP SITE EFFLUENT DISCHARGE POINT
PUMPING STATION
DETONATOR STORAGE
EMULSION PLANT
CONCENTRATOR
PEBBLE CRUSHING STATION
PARKING LOT
FRESHWATER INTAKE - PROCESS AND PLANT POTABLE
LIVE ORE STOCKPILE
SECURITY STATION
TRUCK SHOP / MINE OFFICE
POWER SUBSTATION
PROPANE FARM
EFFLUENT TREATMENT PLANT
FUEL BAY
PARKING LOT
PROCESS PLANT COLLECTION POND
EFFLUENT DISCHARGE POINT
EAST PIT
GYRATORY CRUSHER PAD
WEST PIT
WASTE ROCK STOCKPILE
LOW-GRADE ORE STOCKPILE
OVERBURDEN STOCKPILE
Highway 622
2,500 0 2,500
METERS

LEGEND

- Freshwater Intake - Camp Site Potable
- Freshwater Intake - Process and Plant Potable
- Discharge Location
- Effluent Discharge Point
- Lake
- Wetland
- Mine Site Road
- Access Road (Hardtack / Sawbill)
- Project Transmission Line
- Fibre Optic Line and Auxiliary Power 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. 13-1118-0010			SCALE AS SHOWN	VERSION 2
DESIGN	CGE	14 Nov. 2008		
GIS	JO	2 Dec. 2013		
CHECK	SP	2 Dec. 2013		
REVIEW	SP	2 Dec. 2013		

FIGURE: 5-1

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Table ES-3: Project Activities

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 and electrical substations (tie-in and on-site substation). ■ Construction of fibre optic line. ■ Clearing and grubbing. ■ Drill and blast.	■ 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. ■ Return applicable portions of access road (Hardtack/Sawbill) to MNR control.	■ Work with MNR to allow for appropriate road use and access.
Aggregate	■ Nearby aggregate 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 aggregate 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 aggregate 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.

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
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 manufacturing facilities. ■ Fuel storage area. ■ Explosive storage and preparation. ■ On-site 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, including drill and blast and site preparation. ■ 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 support and ancillary infrastructure (explosive storage area, , fuel storage areas, natural gas farm, parking areas, sewage, worker accommodation 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 manufacturing, 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. ■ 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	■ Ore crushing. ■ Crushed ore stockpile. ■ Processing plant (including ore grinding and processing). ■ Conveyor.	■ Site grading. ■ Construction of foundation, superstructure and process components including delivery and assembly. ■ Construction and surfacing of ore pad. ■ Construction of ore crushers, grinding mills and conveyors. ■ Ditching where necessary.	■ 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.

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Mine	■ East pit. ■ West pit. ■ Haul roads. ■ Service roads. ■ Ramps. ■ 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). ■ Ditching 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. Implement contingency plan for in-pit or passive treatment of water, 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 part of overburden and topsoil for progressive reclamation.	■ Excavation and use of part of overburden and topsoil for reclamation. ■ Allow surface to revegetate naturally. ■ Provide erosion protection and drainage channels as necessary.	■ None
Waste Rock Management Facility (WRMF)	■ Waste Rock Area. ■ Transfer Area.	■ Clearing and grubbing as necessary. ■ 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. ■ Ditching where necessary.	■ 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.

Component	Facilities	Construction Phase Activities	Operations Phase Activities	Closure Phase Activities	Post-closure Phase Activities
Water Management System	■ On-site water containment. ■ Effluent treatment plant (ETP). ■ Ditches and seepage collection ponds (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 an ETP, if necessary, potable water treatment and sewage treatment facility. ■ Construction of pumping stations (mine water, surface water, fire water, potable water). ■ Construction of site discharge lines and diffuser (if required).	■ Operation of seepage collection ponds, pumping water to open pits until water is suitable for direct discharge. ■ Operation of ETP, if necessary. ■ Operation of potable water treatment and sewage treatment facility.	■ 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.

EFFECTS ASSESSMENT

The potential impacts of the Project were assessed through an understanding of the Project components, and the ways in which these could interact with the natural environment to produce changes. The changes are then assessed against specific features of the environment, known as VECs to determine the significance of these changes to biological and socio-economic features of the environment.

Physical and Biological Environment

Changes in physical components in and of themselves are not considered to be significant unless they result in a measurable adverse effect on biological receptors. Therefore, residual effects are considered for significance assessment only with respect to changes in ecological receptors that could affect the survival of populations.

Based on the application of this approach, an adverse environmental effect would be categorized as low, moderate or high according to the following definitions:

- **Low:** Environmental effects which, taking into account mitigation measures, would not result in measurable changes in terrestrial or aquatic species populations in the LSA or RSA. The assessment recognizes that there may be localized effects within the MSA, typically related to habitat loss and displacement of individuals, but that these would not affect the viability of terrestrial or aquatic populations in the LSA or RSA. No risks to human health would be predicted.
- **Moderate:** Environmental effects which, taking into account mitigation measures, could result in measurable changes in terrestrial or aquatic species populations that could affect the viability of the species in the LSA or RSA. Predicted risks to human health could occur under prolonged exposure.
- **High:** Environmental effects which, taking into account mitigation measures, would result in measurable changes in terrestrial or aquatic species populations that would likely severely affect the viability of the species in the LSA or RSA. Predicted risks to human health would be likely under prolonged exposure.

A summary of the assessment of the significance of the predicted environmental effects for each major project component, and for each project phase, is provided below. As noted above, residual effects are considered for significance assessment only with respect to changes in ecological receptors that could affect the survival of populations. As a result, the summary tables assess changes in physical components (e.g., surface water flows, lake levels, water quality) with respect to the effects of these changes on ecological receptors.

Further discussion of potential effects to the physical and biological environment, as well as planned mitigation measures to minimize those potential effects are also described by component below.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Preparation (clearing and grubbing, site levelling, etc.)	Air quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Confined to initial stages of construction phase	Continuous activity during construction	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Confined to initial stages of construction phase	Continuous activity during construction	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Soil stockpiles will be protected against erosion.	Soils will be re-used at closure to promote revegetation.	Confined to Mine Study Area	Confined to initial stages of construction phase	Intermittent as sites are developed.	Partly reversible at closure	Low: Soils will be re-used	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Construct ditching and sediment and erosion controls prior to commencing construction.	TSS will be managed through sediment and erosion controls that will be implemented prior to construction.	Can extend into Local Study Area	Confined to initial stages of construction phase	Could occur intermittently throughout construction	Immediately reversible upon cessation of activities	Low: TSS increase is not predicted in local watercourses and waterbodies	Low: no impacts predicted to surface water and aquatic life.
	Hydrology	Alteration of drainage	Habitat loss will be addressed through a fish compensation plan	Changes in drainage will affect aquatic life in some habitats.	Can extend into Local Study Area	Changes in drainage will be permanent.	Occurs once.	Changes to site drainage are not reversible	Low: Flow reductions and changes in lake levels are minor.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Groundwater	Change in recharge area	None required	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in drainage will be permanent	Occurs once	Change in infiltration areas will be permanent in most areas.	Low: Minor increases or decreases in groundwater levels are confined to small areas around infrastructure..	Low: no effects on terrestrial or aquatic life.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA. Extensive areas of similar habitat are available.	Confined to Mine Study Area	Vegetation removal will occur continuously during construction.	Continuous activity during construction.	Loss of vegetation will be reversible in most areas at closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of terrestrial habitat will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning. Compensation will be provided for lost bat habitat, if necessary.	Some species will be displaced but most will find alternate habitat in LSA and RSA. No effect in LSA or RSA.	Can extend into Local Study Area	Habitat loss will occur continuously during construction.	Loss of habitat will occur continuously as the site is developed.	Most habitat will be restored in closure.	Moderate: small mammals and nesting birds will be displaced	Low: loss of terrestrial habitat will displace some species. small areas of bat habitat lost in MSA will be addressed through compensation, if necessary.
	Aquatic Biota	Loss of habitat	Mitigation is not possible for most areas, and compensation will be provided for lost habitat.	Small waterbodies and watercourses will be affected in the MSA, some permanently. These comprise a small amount of the aquatic habitat within the LSA. No effects on fish populations within the LSA are expected	Can extend into Local Study Area	Loss of habitat in will occur continuously during construction.	Intermittent as sites are developed.	Some habitat will be restored in closure, but loss of habitat in other areas will be permanent.	Moderate: Some aquatic habitat in MSA will be lost permanently. Flow reductions may affect some habitats in adjacent areas of LSA.	Low: small areas of habitat lost in MSA will be addressed through compensation.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
TMF Construction	Air Quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Stockpiles will be protected against erosion.	Removal is confined to the footprint of the containment berms.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of the TMF	Reversible in closure as TMF is graded and soil amendment is added.	Low: Soils will be removed and stockpiled for re-use.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Mitigation measures will be implemented prior to commencing construction.	Ditching and erosion control measures will limit TSS in adjacent surface waters.	Can extend into Local Study Area	Will occur only during construction phase.	Intermittent during construction.	Immediately reversible upon cessation of activities	Low: TSS levels predicted to be low and within guidelines.	Low: no impacts predicted to surface water and aquatic life
	Hydrology	Alteration of drainage	Compensation plan will be developed for effects on fish and fish habitat.	Loss of drainage affects fish habitat in on-site waterbodies and in watercourses downstream. Loss of drainage has negligible affect on lake levels in Lizard Lake and Upper Marmion Reservoir.	Can extend into Local Study Area	Changes in drainage persist throughout all project phases	Continuous	Not reversible.	Low: Loss of drainage area has minimal effect on lake levels.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Groundwater	Loss of recharge area	None possible	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in infiltration persist throughout all project phases	Continuous	Not reversible.	Low: Geology and lack of soil cover limit infiltration capacity	Low: no effects on terrestrial or aquatic life are predicted.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Throughout construction persisting through operations.	One time activity.	Some restoration is possible in closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of terrestrial habitat will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Throughout construction persisting through operations.	One time activity	Some restoration of habitat is possible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of terrestrial habitat will displace some species.
	Aquatic Biota	Loss of habitat and effects on water quality and quantity	Effects of habitat loss cannot be mitigated. A compensation plan will be developed to address habitat loss.	Some aquatic features are lost entirely. Others will experience changes to natural hydrographs that can limit available habitat. Negligible effect on lake water levels with no affect on lake dwelling aquatic species. No effects on fish populations within the LSA are expected Sediment and erosion controls will minimize impacts of TSS on aquatic life in downstream habitats.	Loss of habitat confined to Mine Study Area. Water quality and quantity effects can extend into Local Study Area	Loss of habitat extends through all project phases. Water quality effects are confined to construction and operations phases.	One time activity for habitat loss. Intermittent for water quality depending on climatic conditions.	Habitat loss in some areas is not reversible.Water quality effects are reversible at closure	Moderate to High: Partial to complete loss of habitats in local waterbodies in MSA. Loss of drainage areas may affect some habitats in adjacent areas of LSA. No changes predicted in Upper Marmion Reservoir.	Low: compensation plan will address loss of small habitat areas affected. No effects on aquatic life due to water quality.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Infrastructure Construction	Air Quality	Dust and emissions from equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Removal and stockpiling	Soils will be stockpiled for later re-use. Stockpiled will be protected against erosion.	Removal is confined to the footprint of the infrastructure.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of the infrastructure	Reversible in closure in some areas as site is decommissioned.	Low: Soils will be removed and stockpiled for re-use.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Mitigation measures will be implemented prior to commencing construction.	Ditching and erosion control measures will limit TSS in adjacent surface waters.	Can extend into Local Study Area	Will occur only during construction phase.	Intermittent during construction.	Immediately reversible upon cessation of activities	Low: TSS levels predicted to be low.	Low: no impacts predicted to surface water and aquatic life
	Groundwater	Alteration of infiltration	None possible	Changes in groundwater contribution to surface waters will have a negligible effect on lake water levels and aquatic life.	Confined to Mine Study Area	Changes in infiltration persist throughout all project phases	Continuous	Not reversible in most areas. Decommissioning will restore natural infiltration in some areas.	Low: Geology and lack of soil cover limit infiltration capacity	Low: loss of infiltration will not affect terrestrial or aquatic life.
	Hydrology	Alteration of drainage	Effects cannot be mitigated. to address habitat loss. A compensation plan will be developed	Some habitats are lost entirely. Others will experience water levels reductions that can limit available habitat.	Can extend into Local Study Area	Changes in drainage persist until closure.	Occurs once only.	Decommissioning in closure will restore natural drainage in most areas.	Low: Drainage changes have minor effect on lake levels.	Low: small areas of aquatic habitat lost will be addressed through compensation.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within LSA and RSA.	Confined to Mine Study Area	Throughout construction persisting through operations.	One time activity.	Some restoration is possible in closure.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of vegetation will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning. Temporary bat habitat replacement.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Throughout construction persisting through operations.	One time activity	Some restoration of habitat is possible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species. small areas of bat habitat lost in MSA will be addressed through compensation, if necessary.
	Aquatic Biota	Loss of habitat and effects on water quality and quantity. ; Blast Vibration.	Effects of habitat loss cannot be mitigated. A compensation plan will be developed to address habitat loss. Sediment and erosion controls are included in Project design.	Some aquatic features are lost entirely. Others will experience changes to natural hydrographs that can limit available habitat. Negligible effect on lake water levels will not affect on lake dwelling aquatic species. No effects on fish populations within the LSA are expected Sediment and erosion controls will minimize impacts of TSS on aquatic life in downstream habitats. Distance from shoreline will limit effects of blasting.	Can extend into Local Study Area	Loss of habitat extends through all project phases.	Throughout construction phase	Not reversible.	Moderate to High: Partial to complete loss of habitats in lsome MSA waterbodies. No predicted effects on aquatic habitats or aquatic life in LSA.	Low: compensation plan will address loss of small areas of habitat affected. No effects on aquatic life due to water quality. No predicted effects on habitat in the LSA.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Access Roads	Air quality	Dust and emissions from equipment	Dust suppression as required	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Removal and stockpiling	Soil stockpiles will be protected against erosion	Soils will be stockpiled for reclamation in closure. Stockpile will be protected against erosion to protect aquatic habitats.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Partly reversible in closure		Low: localized impacts on terrestrial habitat. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Road design will have ditching and sediment controls.	Sediment controls will be implemented to minimize TSS generated during construction. Short construction period minimizes potential impacts on aquatic life.	Can extend into Local Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Immediately reversible upon cessation of activities	Low: short term increase in TSS as crossing is constructed	Low: no impacts predicted to surface water or aquatic life.
	Hydrology	Alteration of drainage	Flow will be maintained during construction	Road will not alter drainage system since channels will not be altered or blocked.	Can extend into Local Study Area	Throughout construction and operations phases.	Continuous	Fully reversible	Low: Minor restriction of flow during construction..	Low: temporary construction works will have minimal effect on aquatic life.
	Groundwater	Loss of recharge area	None required	Road surface will divert runoff to margins where infiltration can occur.	Confined to Mine Study Area	Throughout construction and operations phases.	Continuous	Partly reversible in closure	Low: small areas affected.	Low: changes in groundwater levels will not affect terrestrial or aquatic habitats.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Partly reversible in closure as some road are decommissioned	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat in small areas may displace some species
	Terrestrial Biota	Loss of habitat and disturbance of wildlife	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Continuous through construction and operations.	Loss of habitat occurs once only. Disturbance of wildlife is continuous.	Partly reversible in closure	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat in small areas and disturbance will displace some species.
	Aquatic Biota	Disturbance during construction of stream crossings	Flows will be maintained during construction. Sedimentation will be minimized by constructing during low flow conditions.	Crossing construction will be timed to occur in low flow conditions and to avoid critical periods to minimize impacts on aquatic life.	Can extend into Local Study Area	Short term disturbance, limited to a few days at each crossing.	Once only at each crossing..	Immediately reversible upon completion of construction.	Low: small areas and short term disturbance.	Low: disturbance will be temporary and confined to non-critical periods for aquatic life.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Main Access Road	Air Quality	Dust and emissions from equipment	Dust suppression as required	No predicted effects on human health or terrestrial life.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors.
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Removal and stockpiling	Stockpiles will be protected against erosion.	Soils will be stockpiled for mine site reclamation in closure. Stockpile will be protected against erosion to protect aquatic habitats.	Confined to Linear Infrastructure Study Area	Will occur only in construction phase	Continuous during construction.	Partly reversible in closure	Low: soils will be re-used where practicable.	Low: localized impacts on terrestrial habit. Soils will be reused to restore habitat.
	Water Quality	Erosion and sedimentation	Design includes ditching and sediment traps that will minimize runoff to local streams.	Sediment controls will be implemented to minimize TSS generated during construction. Short construction period minimizes potential impacts on aquatic life.	Confined to Linear Infrastructure Study Area	Will occur only during construction phase.	Continuous during construction of roads.	Immediately reversible upon cessation of activities	Low: short term increase in TSS as crossing is constructed	Low: no impacts predicted to surface water or aquatic life.
	Hydrology	Alteration of drainage	Flow will be maintained during construction	Road will not alter drainage system since channels will not be altered or blocked.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Continuous	Fully reversible	Low: Road will not alter drainage patterns.	Low: temporary construction works will have minimal effect on aquatic life.
	Groundwater	Loss of recharge area	None required	Road surface will divert runoff to margins where infiltration can occur.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Continuous	Not reversible since road will not be decommissioned	Low: small areas affected.	Low: changes in groundwater level will nto affect terrestrial or aquatic life.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Not reversible since road will not be decommissioned	Low: loss of habitat is restricted ot margins of road	Low: loss of habitat in small areas will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. No predicted effects in LSA or RSA	Confined to Linear Infrastructure Study Area	Throughout construction and operations phases.	Removal occurs once only as road is constructed.	Not reversible since road will not be decommissioned	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat may displace some species.
	Aquatic Biota	Disturbance and sedimentation during construction of stream crossings	Flows will be maintained during construction. Sedimentation will be minimized by constructing during low flow conditions.	Crossing construction will be timed to occur in low flow conditions and to avoid critical periods to minimize impacts on aquatic life. Fish passage will be maintained.	Confined to Linear Infrastructure Study Area	Short term disturbance, limited to a few days at each crossing.	Once only at each crossing..	Immediately reversible upon completion of construction.	Low: small areas and short term disturbance.	Low: disturbance will be temporary and confined to non-critical periods for aquatic life.

Table ES-4: Environmental Impacts Assessment Matrix for Construction Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Drainage of Mitta Lake	Air Quality	Emissions from pumping and excavating equipment	None required	No predicted effects on human health or terrestrial life. Emissions are considered within bounding estimates.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during draining operation.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no effects on human health or terrestrial receptors.
	Noise	Noise from equipment	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area	Will occur only during construction phase.	Continuous during draining operation.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no effects on human health or terrestrial receptors.
	Soils	No soils present			Not applicable					
	Water Quality	Changes in water quality in Upper Marmion Reservoir	Water from final stages of pumping will need to be held on–site prior to release to allow for settling of entrained sediment.	No impact predicted on aquatic life since water quality is similar to Upper Marmion Lake.	Can extend into Local Study Area	Confined to pumping period	One time occurrence	Reversible upon cessation of pumping	Low: Water quality in Mitta Lake is similar to background levels in Upper Marmion Reservoir.	Low: no predicted effects on surface water and aquatic life.
	Groundwater	Alteration of groundwater flows	None possible	Alteration of groundwater flow to Upper Marmion Reservoir will have a negligible effect on aquatic habitats.	Can extend into Local Study Area	Extends throughout all project phases.	Occurs continuously once lake is pumped out	Not reversible	Low: groundwater flow to Mitta Lake is minor.	Low: no predicted effect on terrestrial or aquatic life.
	Hydrology	Alteration of drainage to Upper Marmion Reservoir	None possible	Mitta Lake contributes minor flow to Upper Marmion Reservoir. No effect predicted on aquatic habitats in Upper Marmion Lake.	Can extend into Local Study Area	Extends throughout all project phases.	One time occurrence	Not reversible	Low: Loss of outflow to Upper Marmion Reservoir has minor effect on lake levels.	Low: negligible effect on aquatic habitats in Upper Marion Reservoir.
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area	Extends throughout all project phases.	One time occurrence	Not reversible	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat will displace some species to LSA and RSA
	Terrestrial Biota	Loss of habitat in staging areas	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. No predicted effects in LSA or RSA.	Confined to Mine Study Area	Confined to construction phase.	One time occurrence	Not reversible	Moderate: small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species to LSA and RSA.
	Aquatic Biota	Loss of habitat	No mitigation possible. Loss will be compensated for in compensation plan.	Complete loss of lake habitat.	Confined to Mine Study Area	Extends throughout all project phases.	One time occurrence	Not reversible	High: All habitat will be removed.	Low: compensation will be provided for loss of habitat.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Development of Open Pits	Air Quality	Dust and emissions from blasting and equipment	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise from blasting and equipment	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Soil removal and stockpiling	Soils will be stockpiled for later re-use. Stockpiled will be protected against erosion.	Removal is confined to the footprint of the pits.	Confined to Mine Study Area	Progressive soil removal will occur as pits are developed during operations phase.	Intermittent as pits are expanded	Not reversible.	Soils will be removed and stockpiled for re-use.	Low: loss of habitat will displace some species.
	Water Quality	Pumping of water from the pits.	Re-use of water and treatment of excess water prior to discharge will mitigate any adverse effects on aquatic life in receiving waterbodies.	Water will be re-used in processing plant or treated prior to discharge. No effects predicted on lake water quality or aquatic life.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations	Reversible at end of mine operations.	Any water discharged to surface waters will meet guidelines or background levels.	Low: no predicted effects on surface water and aquatic life.
	Hydrology	Alteration of drainage to Upper Marmion Reservoir	None possible	Loss of drainage areas has minor impact on lake water levels and aquatic life.	Can extend into Local Study Area	Occurs progressively as pits are developed during operations phase.	Intermittent as pits are expanded.	Mainly not reversible, but some drainage will be restored in post-closure when pits overflow.	Water course in pit footprints contribute minor flows to adjacent waterbodies.	Low: no predicted effect on lake levels and aquatic life.
	Groundwater	Effect on local groundwater levels from seepage into pit	None possible	Inflow to pits is not predicted to affect water levels in adjacent waterbodies or aquatic life.	Can extend into Local Study Area	Throughout all project phases	Continuous	Some reduction in inflow to pits in post-closure as pits fill	Groundwater flow to pits is predicted to be low.	Low: no predicted effect on terrestrial or aquatic habitats.
	Vegetation	Removal of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within LSA and RSA.	Confined to Mine Study Area.	Throughout operation and into post-closure	Progressively during closure as pits are expanded.	Not reversible	Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: loss of habitat in pit areas will displace some species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Confined to Mine Study Area.	Throughout operation and into post-closure	Progressively during closure as pits are expanded.	Not reversible	Small mammals and nesting birds will be displaced	Low: loss of habitat will displace some species.
	Aquatic Biota	Vibrations from blasting.	Blast intensities may need to be modified at locations close to sensitive habitats in Upper Marmion Reservoir, depenmding on transmissivity and habitat studies.	Blasting will be monitored during initial stages of pit development to understand vibration transmissivity on a site-specific basis. Habitat assessment will be undertaken to assess sensitive habiats and critical use periods.	Can extend to Local Study Area	In later stages of pit development	Intermittent	Immediately reversible	To be determined through testing during initial stages of pit development.	Residual impacts will be managed to result in low impacts.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Operation of Processing Plant	Air Quality	Dust and emissions	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life for most receptors. Predicted risks to some human receptors close to site.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health or terrestrial life for most receptors.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	No additional impacts to soils.								
	Water Quality	Effects on surface water quality	None required. Re-use of water and treatment prior to release are inherent in the project design.	Water will be treated as required prior to discharge. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: discharged water will meet guidelines and/or background water quality.	Low: no predicted effects on surface water or aquatic life.
	Hydrology	Effects on lake water levels from water taking	None required. Re-use of water is inherent in project design.	Water taking will be minimized by re-use of water. Lake levels predicted to change by less than 9 cm. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: minor effect on lake levels	Low: no predicted effects on aquatic habitats
	Groundwater	Changes in groundwater quantity and quality	None required	Groundwater quality and quantity are not predicted to change.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: negligible change in groundwater levels predicted.	Low: no predicted effect.
	Vegetation	Effects of emissions on vegetation	None required	No incremental increase in soil concentrations due to emissions. No predicted increase in uptake in vegetation or effects on vegetation.	Confined to Mine Study Area.	Throughout operations phase	Continuous during operations	Reversible at closure	Low: predicted soil concentrations are below guidelines and background levels.	Low: no predicted risk to vegetation.
	Terrestrial Biota	Effects of emissions on wildlife	None required	On incremental increase in soil concentrations and no predicted increase in vegetation. No incremental increased risk to wildlife form soil or vegetation ingestion.	Confined to Mine Study Area.	Throughout operations phase	Continuous during operations	Reversible at closure	Low: predicted soil concentrations are below guidelines and background levels.	Low: no predicted risks to terrestrial biota.
	Aquatic Biota	Discharges to aquatic habitats	A treatment facility has been included in the project design.	No effects predicted on aquatic life form any discharges.	Can extend into Local Study Area	Throughout operations phase	Intermittent depending on need for re-use water	Reversible at closure	Low: discharge water will meet guidelines or background	Low: no predicted risks to aquatic life.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Operation of TMF	Air Quality	No air emissions since tailings will be wet.								
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted risks to human health or ecological receptors.
	Soils	Loss of soils	None feasible	Soils in TMF footprint will be covered over permanently. Soils will not be salvaged under the TMF.	Confined to Mine Study Area	Progressive covering of soils throughout operations.	Continuous during operations	Not reversible. Soils will be covered over permanently.	Low: area of loss is relatively small within the RSA.	Low:
	Water Quality	Effects on surface water quality	Design includes seepage collection and reclaim pipeline from TMF to PPCP to eliminate direct release of TMF water to the environment..	Collection of seepage and re-use of tailings water will eliminate discharge of water from the TMF to receiving environments. No effects predicted on aquatic or terrestrial life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in post-closure	Low: water quality guidelines/background levels in receiving water will not be exceeded	Low: no effects predicted on surface water or aquatic life.
	Groundwater	Effects on groundwater quality	None require. Low ARD potential in tailings minimizes metals leaching and mobility.	Water quality in TMF seepage is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Throughout operations and into post-closure	Continuous	Not reversible	Low: water quality in TMF seepage not predicted to affect groundwater quality	Low: no predicted effects on terrestrial or aquatic life.
	Hydrology	No additional effects on drainage over construction phase								
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Moderate loss within LSA but insignificant loss of habitat within RSA.	Confined to Mine Study Area	Progressive loss of vegetation in operations phase as TMF is filled	Continuous during operations phase.	Not reversible. Terrestrial habitat in footprint will be permanently lost.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: habitat loss will displace some terrestrial wildlife species.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA. Low effect in RSA.	Can extend into Local Study Area	Progressive loss of habitat in operations phase as TMF is filled.	Continuous during operations phase.	Not reversible. Habitat loss in footprint of TMF is permanent.	Moderate: small mammals and nesting birds will be displaced	Low: habitat loss will displace some species.
	Aquatic Biota	Effects on surface water quality	Design includes seepage collection and reclaim pipeline from TMF to PPCP to eliminate direct release of TMF water to the environment..	Collection of seepage and re-use of tailings water will eliminate discharge of water from the TMF to receiving environments. No effects predicted on aquatic or terrestrial life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations.		Low: water quality guidelines/background levels will not be exceeded in receiving waters.	Low: no effects predicted on aquatic life.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Waste Rock and Ore Stockpiles	Air Quality	Dust	Emissions controls are inherent in Project design. Receptors will be relocated.	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no impacts predicted for human health or ecological receptors.
	Noise	Noise	Noise controls are inherent in Project design. Receptors will be relocated	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no impacts predicted for human health or ecological receptors.
	Soils	Loss of soils	None	Soils in waste rock stockpile will be covered over permanently. Soils will not be salvaged under either the waste rock or the ore stockpiles.	Confined to Mine Study Area.	Progressive covering of soils throughout operations.	Continuous during operations	Not reversible in waste rock disposal facility	Low: area of loss is relatively small within the RSA.	Low
	Water Quality	Effects on surface water quality	None required. Project design includes ditching and holding ponds for stormwater management. Water will be treated as required prior to discharge	Runoff and seepage will be collected by ditching and routed to the PPCP for re-use or treatment prior to discharge. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible at closure	Low: water quality guidelines/background levels in receiving water will not be exceeded	Low: no predicted effects on aquatic life.
	Hydrology	Loss of drainage area	Drainage to Upper Marmion Reservoir will be restored in closure	The small drainage area affected will not affect water levels in adjacent waterbodies. No effects predicted on aquatic life.	Can extend into Local Study Area	Throughout operations and into closure.	Continuous during operations phase.	Not reversible	Low: small drainage area affected	Low: no predicted effects on aquatic life.
	Groundwater	Effects on recharge	None	Changes in infiltration are not predicted to result in changes in lake levels and effects on aquatic life. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area.	Throughout operations and into post-closure	Continuous.	Not reversible	Low: permeability of subsurface is low.	Low: no predicted effects on aquatic life.
	Vegetation	Loss of vegetation	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Mine Study Area.	Progressive loss of vegetation throughout operations.	Continuous during operations.	Not reversible.	Moderate: Overall loss from all development is 21% of wetland habitat and 15% of forest habitat in area of LSA	Low: some species will be displaced.
	Terrestrial Biota	Loss of habitat	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Can extend into Local Study Area	Progressive loss of habitat during operations.	Continuous during operations	Not reversible	Moderate: small mammals and nesting birds will be displaced	Low: some species will be displaced during operations.
	Aquatic Biota	Loss of habitat and water quality.	Mitigation for habitat loss is not possible. Loss will be addressed in compensation plan.	Small areas of aquatic habitat will be eliminated. Water will be directed to the PPCP and will be treated as required prior to discharge. No effects predicted on aquatic life.	Confined to Mine Study Area.	Progressive loss of habitat during operations.	Continuous during operations	Not reversible	Moderate: Some aquatic habitats will be eliminated.	Low: habitat loss will be compensated. No predicted effects from water quality.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Operation of Site Water Management System	Air Quality	No predicted emissions from WTF								
	Noise		None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health.
	Soils	No additional effects on soils								
	Water Quality	Effects on surface water quality	None required. Treatment of discharge is inherent in the Project design.	Discharge will not affect aquatic life. No risks to wildlife from exposure to water in TMF reclaim pond.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Discharges will meet guidelines and/or baseline conditions.	Low: no predicted effects on aquatic life.
	Hydrology	Water taking and discharge	None required. Project has been designed to minimize taking of freshwater from surface waters by re-use of water wherever possible.	Water taking will be modified by discharge. Net change will result in minor change in lake level. Change will not adversely affect aquatic life.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Minor decrease in lake levels	Low: no predicted effects on aquatic life.
	Groundwater	Effects on water quality	None required. Project design includes partial lining of the PPCP to limit infiltration and collect seepage from the TMF reclaim pond	Part of PPCP will be lined to minimize seepage to groundwater and migration to surface waters. No impacts predicted on aquatic life Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Mine Study Area	Throughout operation phase	Continuous during operations	Reversible at closure	Low: design minimizes seepage to groundwater	Low: no predicted effects on terrestrial or aquatic life.
	Vegetation	No additional effects on vegetation								
	Terrestrial Biota	Wildlife exposure to site water impoundments	None required. Measures may be required to keep wildlife away from PPCP if future monitoring shows wildlife are accessing the ponds.	Wildlife exposure to water in the TMF reclaim ponds do not result in predictions of risk. Wildlife exposure to water in the PPCP is not expected due to proximity to processing plant. Noise and activity will discourage wildlife in this area.	Mine Study Area	Throughout operations phase	Continuous	Reversible in closure	Low: concentrations in TMF reclaim pond are below effects levels.	Low: no predicted effects on terrestrial biota.
	Aquatic Biota	Effects on surface water quality and quantity	None required. Treatment of discharge is inherent in the Project design.	Small change in lake levels would not affect aquatic life. Discharge water will meet guidelines and/or baseline conditions in receiving waterbodies. No effects predicted on aquatic life. No increase in fish tissue residues predicted.	Can extend into Local Study Area	Throughout operations phase	Continuous during operations	Reversible in closure	Low: Minor change in lake levels. Discharges will meet guidelines and/or baseline.	Low: no predicted effects on aquatic life.

Table ES-5: Environmental Impacts Assessment Matrix for Operations Phase (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Accommoda-tions Camp	Air Quality	Emissions	None required	No predicted effects on human health or terrestrial life.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.
	Soils	No additional impacts on soils over those noted for construction phase.								
	Water Quality	Domestic wastewater	Treatment facility is inherent in the Project design	No effect on aquatic life is predicted	Can extend into Local Study Area	Throughout operations phase	Continuous	Reversible at closure	Low: discharges will meet regulations	Low: no predicted effects on surface water or aquatic life.
	Groundwater	No additional impacts on groundwater. Potable water will be sourced from surface water.								
	Hydrology	Water taking	None required	Minor change in lake levels not predicted to affect aquatic life	Can extend into Local Study Area	Throughout operations phase	Continuous	Reversible at closure	Low: effect on lake levels is included in bounding scenario.	Low: no predicted effects on aquatic life.
	Vegetation	No additional impacts on vegetation. Impacts on vegetation occurred during construction.								
	Terrestrial Biota	Disturbance and hunting pressure	Restrictions on hunting by camp personnel will be implemented	Hunting could affect local populations of some species, and affect Aboriginal use of these resources.	Regional Study Area	Throughout operations phase	Occasional	Fully reversible at closure	Moderate: could affect local populations of some species.	Low: effects on wildlife will be regulated.
	Aquatic Biota	Fishing pressure	Restrictions on fishing by camp personnel will be implemented.	Fishing in local waterbodies could deplete stocks of some species, with potential socio-economic impacts as well.	Local Study Area	Throughout operations phase	Occasional	Fully reversible at closure	Moderate to High: could affect local populations of some species.	Low: effects on fish population will be regulated.
Access Road (Hardtack-Sawbill)	Air Quality	Dust and emissions	Dust supprsion as required	No predicted effects on human health or terrestrial life.	Confined to Linear Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors.
	Noise	Noise	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Linear Study Area.	Will occur throughout operations phase.	Continuous during operations.	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	No additional impacts on soils. Soils removal will occur in construction phase.								
	Water Quality	Road runoff	Regular maintenance of sediment control measures along road.	Road maintenance will include maintenance of sediment and erosion controls (e.g., sedimentation ponds). TSS concentrations are not expected to affect aquatic life.	Confined to Linear Study Area.	Throughout operations phase	Intermittent depending on precipitation events	Not reversible since road will remain after closure	Low: TSS concentrations are predicted to be low.	Low: no predicted effect on aquatic life.
	Groundwater	No additional impact above those noted for construction phase.								
	Hydrology	No flow alterations or obstruction will occur during operations								
	Vegetation	Brush clearing along ROW	Merchantable timber will be harvested.	Insignificant loss of habitat within RSA.	Confined to Linear Study Area.	Throughout operations phase	Intermittent: removal will be seasonal	Not reversible since road will remain after closure	Low: Habitat loss is confined to margins of road.	Low: some species may be displaced.
	Terrestrial Biota	Brush clearing along ROW. Wildlife-vehicle collisions	Clearing will avoid sensitive periods, such as nesting and denning.	Displaced species will find alternate habitat in LSA and RSA.	Confined to Linear Study Area.	Throughout operations phase	Intermittent: removal will be seasonal	Not reversible since road will remain after closure	Low: Habitat loss is confined to margins of road.	Low: some species may be displaced.
	Aquatic Biota	Road drainage effects on water quality	Regular maintenance of sediment control measures along road.	Road maintenance will include maintenance of sediment and erosion controls (e.g., sedimentation ponds). TSS concentrations are not expected to affect aquatic life.	Confined to Linear Study Area.	Throughout operations phase	Intermittent depending on precipitation events	Not reversible since road will remain after closure	Low: TSS concentrations are predicted to be low.	Low: no predicted effects on water quality or aquatic life.

Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Site Decommissioning	Air Quality	Dust and emissions from equipment	None required	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment.	None required	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	Restoration of disturbed areas	None	Some disturbed areas can be restored.	Confined to Mine Study Area	Confined to closure phase	Intermittent as areas are decommissioned	Reversibility is not desirable.	Low positive: restoration of some disturbed areas.	Low: habitat resporation wil permit return of some species.
	Water Quality	Erosion and sedimentation.	None	Erosion and sediment controls will be in place during closure. In post-closure revegetation of site will minimize TSS in runoff.	Can extend into Local Study Area	Confined to closure phase	Intermittent depending on precipitation events.	Reversible upon cessation of events.	Low: TSS increase is expected to be low and within guidelines.	Low: no predicted effect on water quality or aquatic life.
	Hydrology	Alteration of drainage	None	Natural drainage in some disturbed areas can be restored during closure. Minimizes lake level changes in post-closure due to the project, minimizing impacts on aquatic life.	Can extend into Local Study Area	Confined to closure phase	One time occurrence	Reversibility is not desirable	Low positive: natural drainage will be restored where feasible.	Low positive: minor changes in lake levels will be reversed as drainage is restored.
	Groundwater	Alteration of infiltration	None	Restoration of groundwater infiltration will assist in restoring some habitats such as wetlands. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Confined to closure phase	One time occurrence	Not reversible	Low: groundwater infiltration will be restored in some areas.	Low positive: localized effects on habitats will be reversed in some areas.
	Vegetation	Effects of site restoration on vegetation	None	Restoration of small areas of habitat lost during construction an operations will promote return of wildlife.	Confined to Mine Study Area	Confined to closure phase	Intermittent as areas are decommissioned and restored	Reversibility is not desirable	Low positive: Moderate gain in vegetated areas lost.	Low positive: wildlife habitat will be progressively restored.
	Terrestrial Biota	Effects of site restoration on habitat	None	Restoration of small areas of habitat lost during construction and operations will promote return of wildlife.	Can extend into Local Study Area	Confined to closure phase	Intermittent as areas are decommissioned and restored	Reversibility is not desirable	Low positive: Moderate gain in habitat lost.	Low positive: wildlife habitat will be progressively restored.
	Aquatic Biota	Effects of site restoration on aquatic life	None	Sediment and erosion controls will be in place until end of closure. Re-vegetation will minimize sediment erosion in post-closure, minimizing effects on aquatic life.	Can extend into Local Study Area	Confined to closure phase	Intermittent depending on precipitation events.	Reversible at end of closure	Low: site runoff will be controlled to minimize TSS.	Low: no predicted effects on aquatic life.

Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Closure of TMF	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low;: no predicted effects on human health or ecological receptors
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effects on human health or ecological receptors.
	Soils	No additional impacts on soils								
	Water Quality	Effects on water quality	TMF will be sculpted to promote runoff and minimize infiltration. Soil amendment will promote vegetation growth minimizing TSS in runoff to local waterbodies. Excess water will be diverted to open pit until water quality is acceptable for aquatic life.	Seepage from TMF in post-closure is not predicted to affect aquatic life. Runoff will be released to local waterbodies when quality is acceptable for aquatic life.	Can extend into Local Study Area	Confined to closure phase	Continuous during closure	Reversible at end of closure	Low: Discharges will meet guidelines/background levels.	Low: no predicted effects on surface waters or terrestrial or aquatic life.
	Hydrology	Alteration of drainage	Drainage will be routed to Sawbill Bay when water quality is acceptable.	Drainage from the TMF will be routed to surface waters, reducing effects of construction and operation on lake levels.	Can extend into Local Study Area	Extends into post-closure	Continuous	Not reversible	Low: drainage from TMF in post-closure will be routed to surface waters.	Low: restoration of drainage will restore lake levels minimizing effects on aquatic life.
	Groundwater	Effects on groundwater quality and quantity	None	Sculpting of TMF will reduce infiltration, reducing groundwater levels under the TMF. Reducing seepage of TMF water to local aquifer will minimize effects of TMF seepage on groundwater quality. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Throughout closure and post-closure	One time occurrence	Not reversible	Low: reduced infiltration due to sculpting of TMF	Low: no predicted effects on surface waters or ecological receptors.
	Vegetation	Effects on vegetation	None	Addition of soil amendment to TMF will promote vegetation growth on TMF in post-closure, restoring some habitat lost during construction and operations.	Confined to Mine Study Area	During closure phase	Throughout closure and post-closure	Reversibility is not desirable	Low positive: Moderate increase in vegetated area.	Low positive: some habitat will be restored permitting return of some species.
	Terrestrial Biota	Effects on habitat	None	Addition of soil amendment to TMF will promote vegetation growth on TMF in post-closure, restoring some habitat lost during construction and operations and facilitating return of some wildlife.	Can extend into Local Study Area	During closure phase	Throughout closure and post-closure	Reversibility is not desirable	Low positive: Moderate increase in vegetated area.	Low positive: some habitat will be restored permitting return of some species.
	Aquatic Biota	Effects on surface water quality and quantity	TMF will be sculpted to promote runoff and minimize infiltration. Soil amendment will promote vegetation growth minimizing TSS in runoff to local waterbodies. Excess water will be diverted to open pit until water quality is acceptable for aquatic life.	Seepage from TMF in post-closure is not predicted to affect aquatic life. Runoff will be released to local waterbodies when quality is acceptable for aquatic life.	Can extend into Local Study Area	During closure phase	Continuous during closure	Reversible at end of closure	Low: Discharges will meet guidelines and/or background levels.	Low: no predicted effects on aquatic life.

Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Closure of Waste Rock Stockpile	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Can extend into Local Study Area	Confined to closure phase. No emissions in post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Can extend into Local Study Area	Confined to closure phase. No sources of noise in post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.
	Soils	No additional impacts								
	Water Quality	Effects on water quality	None	Water will be routed to open pits at closure until seepage water is of acceptable quality to discharge to local waterbodies. No predicted impact on aquatic life.	Can extend into Local Study Area	Closure phase into post-closure	Continuous during closure	Reversible in post-closure	Low: water discharged to local waterbodies will meet guidelines and/or background levels.	Low: no predicted effects on surface waters or aquatic life.
	Hydrology	Effects on drainage	None	Small reduction in drainage area until water is of acceptable quality to release to surface waters.	Can extend into Local Study Area	Closure phase potentially into post-closure	Continuous during closure	Reversible in post-closure	Low: drainage area contribution to lake levels is small.	Low: effects on lake levels and aquatic habitat will be progressively reversed.
	Groundwater	Effects on groundwater quality and quantity	None	Shallow groundwater will be intercepted by ditches minimizing impacts of seepage via groundwater to surface waters. Loss of groundwater contribution to surface waters will be restored in post-closure when drainage can be directed to surface waters. Water quality is not predicted to result in risks to aquatic life where groundwater expresses to surface waters	Confined to Mine Study Area	Closure phase potentially into post-closure	Continuous during closure	Reversible in post-closure.	Low: ditches will intercept shallow groundwater.	Low: effects on lake levels and aquatic habitat will be progressively reversed.
	Vegetation	Restoration of vegetation	None	The waste rock stockpile will be left to re-vegetate naturally. Vegetation may not revert fully to pre-development habitat.	Confined to Mine Study Area	Into post-closure	Continuous	Reversibility is not desirable	Low positive: Some species are expected to colonize the stockpile	Low positive: some habitat will be restored permitting return of some species.
	Terrestrial Biota	Restoration of habitat	None	Wildlife will gradually move in as the stockpile re-vegetates. Habitat may not revert fully to pre-development habitat.	Can extend into Local Study Area	Into post-closure	Continuous	Reversibility is not desirable	Low positive: some habitat lost in construction will be restored.	Low positive: some habitat will be restored permitting return of some species.
	Aquatic Biota	Effects on surface water quality and quantity	None	At closure seepage and runoff water will be directed to the open pits until water is of acceptable quality to discharge directly to local waterbodies. No effects are predicted on aquatic life.	Can extend into Local Study Area	Into post-closure	Continuous until water quality is acceptable	Not reversible	Low: Water quality will be acceptable for aquatic life upon release to surface waters	Low: no predicted effects on aquatic life.

Table ES-6: Environmental Impacts Assessment Matrix for Closure and Post-Closure Phases (Continued)

Activity	VEC Affected	Potential Effect	Proposed Mitigation	Residual Environmental Effect	Predicted Degree of Impact after Mitigation					Significance of Residual Effect
					Extent	Duration	Frequency	Reversibility	Magnitude	
Open Pits	Air Quality	Dust and emissions from equipment	None	No predicted effects on human health or terrestrial life.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates of emissions and meet provincial regulations.	Low: no predicted effect on human health or ecological receptors.
	Noise	Noise from equipment	None	No predicted effects on human health. Wildlife will avoid the area due to noise and activity.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous during closure	Immediately reversible upon cessation of activities	Low: Effects are considered within bounding estimates and meet provincial regulations	Low: no predicted effect on human health or ecological receptors.
	Soils	No effect on soils predicted since no soils will be in the open pit								
	Water Quality	Effects on water quality	Water quality will be monitored during post-closure to verify that overflow will not affect aquatic life	Pits will overflow after approximately 218 years and drain to Upper Marmion Reservoir. Pit water quality at overflow is predicted to be acceptable for aquatic life.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Pit water quality at overflow will be acceptable for aquatic life	Low: no predicted effect on human health or ecological receptors.
	Hydrology	Effects on drainage	None	Pit overflow will restore some of the drainage to Upper Marmion Reservoir that was lost due to the project.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low positive: Some restoration of original drainage	Low: effects on lake levels and aquatic habitat will be progressively reversed.
	Groundwater	Effects on groundwater quality and quantity	None	Loss of groundwater contribution to adjacent surface waters is minor. Groundwater contribution to surface waterbodies will be restored when pits overflow. Groundwater quality is not predicted to be affected.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: groundwater flow to Marmion Reservoir will be restored in post-closure. Quality is not predicted to be affected.	Low: effects on lake levels and aquatic habitat will be progressively reversed.
	Vegetation	No effects on vegetation predicted since pits will be aquatic habitat								
	Terrestrial Biota	Effects on habitat and wildlife	None	Pit water quality will be of acceptable quality for consumption by wildlife.	Confined to Mine Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Water quality in pits will be acceptable quality for wildlife consumption	Low: no predicted effects on ecological receptors.
	Aquatic Biota	Effects on surface water quality and quantity	None	Water quality at overflow is predicted to meet background levels in Upper Marmion Reservoir and/or guidelines for protection of aquatic life. No impacts are predicted on aquatic life.	Can extend into Local Study Area	Throughout closure and post-closure	Continuous	Not reversible	Low: Overflow water quality will meet guidelines and/or background levels.	Low: no predicted effects on aquatic life.

Potential Effects to the Physical Environment

Geology, Geochemistry and Soils

No adverse effects to geology, geochemistry or soils are predicted to occur from the Project. Geochemical testing was conducted to confirm whether the waste rock and tailings deposits could be potentially acid generating and metal leaching. The conclusions of the completed analysis show that the waste rock will be non-acid generating with excess neutralization potential primarily resulting from carbonate minerals. The results of the short term leach testing and kinetic testing support this classification.

Relative to comparison criteria, waste rock and tailings samples leachate concentrations were slightly elevated for aluminum with sporadic concentrations of other metals such as arsenic, copper cadmium, iron, selenium, vanadium and zinc slightly greater than the comparison criteria. Where these sample values are above the comparison criteria, additional water quality evaluation within an overall site wide context has been conducted as described in the site water quality evaluation. Cyanide was considered separately as part of the water quality analyses as it is introduced as a result of processing.

Construction of the Project will result in vegetation removal which will expose the soil and increase the risk of erosion. Project activities will also include the potential for spills, leaks and seepage of substances, which could alter the chemistry of soils and reduce soil capability.

Soil erosion may influence slope stability and water quality, spills may degrade soil quality, and the direct loss of soil and alteration of terrain may have implications with respect to wildlife use of the LSA and with respect to the use of the area as a timber resource.

Further assessment of the effects of the Project on soils and terrain was considered as an indirect effect to wildlife under the terrestrial biology assessment and land use under the socio-economic assessment.

Atmospheric Environment

The potential effects of the Project to the atmospheric environment focused on air quality, noise, light and vibration.

Forty PORS were originally identified in the air quality and noise assessment. Twenty of these PORs (POR 5-19, POR 34, POR 36-38 and POR 40) were identified in the Ontario Ministry of Natural Resources (MNR) mapping data as designated campsites. These locations are simply suggested areas within Crown Land that could be used for camping by the public. No amenities or services are provided and no payment is required to camp there, just as is the case with all Crown Land. OHRG does not have the ability to restrict access to Crown Land, and these identified PORs are not considered specific sites that are required to be included in air and noise modeling predictions.

Based on this, the number of PORs considered in the air quality and noise assessment has been reduced from 40 to 20. The PORs considered in the revised air quality and noise evaluation are the Town of Atikokan, local tourism establishments, trapper's cabins and cottages. Of the 20 possible campsites that were originally considered in the air quality and noise assessment, three locations were identified as having potentially high noise levels and six were identified as potentially exceeding particulate matter guidelines. OHRG plans to post signs at crown land locations in the vicinity of the Project site that, in the past, may have been known to be used

for camping to indicate the potential for campers to become annoyed by noise levels. A further assessment on health effects due to the potential increase in particulate matter is presented in the Human Health Risk Assessment TSD. Human health risks are not considered to be increased significantly by the Project.

Air dispersion modelling was carried out for the Ontario compliance assessment using defined emission rates to determine the point of impingement concentrations along the Project property boundary and receptors. Ambient concentrations resulting from Mine Site emissions were predicted at selected groups of receptors and at other locations of interest in order to provide a better understanding of the potential effects of the Project. In addition, discrete human health locations within the LSA were identified for assessment under the Human Health Risk Assessment.

The results of air modelling show that the Project can operate in compliance with s.20 of Ontario Regulation 419/05 for the Operations Phase in the peak production year as defined by the worst-case operating conditions. This is considered to be a conservative assessment since not all scenarios comprising worst-case conditions are likely to be active at any given time. The effects of air emissions on human health are assessed in the human health risk assessment.

A noise assessment was carried for 20 potentially sensitive PORs which were identified within the vicinity of the Project. These PORs included tourist establishments, cottages and cabins within the LSA. The modelling results predicted that noise levels associated with the Project would comply with Ontario Ministry of the Environment (MOE) noise guidelines.

Fish habitat is sensitive to vibration, particularly active spawning beds and nurseries. Vibration during blasting and excavation of open pits could cause blast-induced water overpressure level changes at the shoreline, potentially effecting sensitive fish species during critical life stages.

It is not possible to realistically assess potential effects on fish without site-specific data on peak particle velocity (PPV) values since this depends to a great extent on the nature of the rock, and the transmissivity. Therefore, operational blasting monitoring to assess the intensity of blast vibrations at the receptor locations will be required. During the initial stages of pit development, blast intensities will be monitored and site-specific PPV will be calculated in order to more accurately predict potential vibration intensities in adjacent aquatic habitats.

The lighting on the Project Site will be positioned in a manner as to not directly illuminate the surrounding areas or the sky. During the detailed engineering for the Project, options will be selected to avoid or reduce negative effects and will be considered for incorporation into the Project's design. As a result, it is expected that the Project will have limited effects through light trespass and sky glow.

Water Quantity and Quality

The potential effects of the Project to water quantity and quality focused on hydrology, water and sediment quality and hydrogeology.

The Project could affect hydrology through changes to streamflows, lake water levels and navigability of water courses and waterbodies during all four phases of the Project.

The greatest changes to streamflows as a result of Project activities during the Operations phase are expected to occur in MSA watercourses as a result of changes to their tributary drainage areas. Of the 29 watersheds evaluated, five will be unaffected.

The expected changes in flows in local scale watercourses include a reduction in flows in Lumby Creek of approximately 7% to 8%. Changes to the outflows from the Marmion Reservoir and flows in the Seine River downstream of the Raft Lake Dam may occur due to the Project. Total net reduction in annual mean inflows to the Reservoir is estimated to be 0.190 m^3/s in an average year. Changes in monthly mean outflows from Upper Marmion Reservoir are expected to be in the range of -3.10% to -0.21% based on single-year lake water balance modelling.

Changes to water levels will occur in two lakes, and the Upper Marmion Reservoir. Water levels in Unnamed Lake 5 located to the east of the TMF are expected to be in the range of -2.1 cm to 0.0 cm during the Operations phase. Changes in water levels in Lizard Lake are expected to be in the range of -2.7 cm to 0.0 cm. Changes in water levels in the Upper Marmion Reservoir due to Project activities are expected to be in the range of -9.0 cm to -0.4 cm based on single-year water balance modelling. In an average year, the predicted maximum reduction in water levels of the Upper Marmion Reservoir is 8.1 cm.

The Project could result in changes to water quality in site, local and regional scale watercourses in all four phases of the Project. The water quality assessment considers the operations phase to be the worst case scenario and the focus is on this phase. The presence of a flooded open pit also will also have an influence on water quality and, thus, a post-closure assessment was also completed. The water quality models were developed based on the physiography of the area, project description, geochemical test results, process test results and baseline monitoring data and were used to predict and evaluate potential water quality influences from the site and impacts in the receiving waters. For lakebed sediment quality the potential Total Suspended Solids (TSS) discharge from the site and air deposition was considered at the end of mine life.

All parameters are below Municipal/Industrial Strategy for Abatement (MISA) levels and Metal Mining Effluent Regulation (MMER) discharge guidelines at the point of discharge to the Upper Mamion Reservoir (the diffuser ports). Site Specific Water Quality Objectives for cyanide and copper are predicted to be reached within distances of 29 m and 18 m, respectively, from the diffuser ports. Following initial mixing, (i.e. within 100 m of the diffuser ports), all predicted concentrations during average site discharge conditions during operations are lower than the CWQG, PWQO and MISA criteria. In general, the predicted results after initial mixing are the same as or marginally greater than baseline concentrations. The sulphate concentrations in the water column during average conditions are predicted to increase marginally from 1.6 mg/L as measured in the baseline studies to 1.8 mg/L.

The Project could result in changes to groundwater levels. No groundwater users were identified in the vicinity of the Project that could potentially be affected by changes in groundwater levels from Project activities. The

cone of depression from pit dewatering extends about 700 m from the pit perimeter and underlies a portion of the WRMF and overburden stockpiles. Within the area of the cone of depression, groundwater levels could potentially result in a reduction or even elimination of flows in some local streams should there be a significant connection to the deeper bedrock flow system, however most groundwater flow occurs in more permeable sediments above the bedrock, thus there is potential for development of a perched water table, or flow above the de-watered bedrock. Also within this area, seepage losses from the stockpiles could result in flow increases in some local streams. A seepage collection system is included as an in-design mitigation measure.

Mitigation Measures for the Physical Environment

Geology, Geochemistry and Soils

Mitigation for potential effects to terrain and soils will include minimizing the amount and extent of surface disturbance at any one time. Soil quality changes will also be minimized through implementation of standard practices for erosion protection during construction and operation and the development and implementation of an Erosion Management Plan and Spill Management Plan. A geochemical monitoring plan will also be developed as further outlined in Chapter 8 Environmental Monitoring.

Existing pre-construction topography, elevations and drainage patterns have been documented and will be used to inform reclamation planning. Throughout all project phases, site drainage will be managed to ensure that runoff does not cause erosion, flooding or contamination in downstream areas. The water management system will include collection of runoff and seepage from the WRMF and TMF which will be captured and directed to the PPCP.

An Erosion Management Plan will be developed prior to construction and implemented throughout all phases of the Project. The Plan will include topsoil salvage procedures, soil stabilization measures such as the construction of temporary berms, and a progressive rehabilitation plan. Changes to terrain will be further mitigated by the development of a reclamation plan that will be prepared to meet regulatory requirements. Topsoil and overburden will be stockpiled, protected against erosion and used in reclamation of sites where possible. Waste rock and tailings will be stored appropriately to minimize erosion.

A Spill Management Plan will be developed to mitigate the potential effects of spills. The Spill Management Plan is further outlined in Chapter 8. A standard spill response procedure and protocol will be developed and roles and responsibilities will be communicated through the environment department and management teams. Worker training on spill response protocols will be implemented and a spill response database will be maintained.

Atmospheric Environment

With appropriate mitigation measures in place, the Project will operate in compliance with all applicable air, noise and vibration regulations and guidelines.

In estimating the air emissions associated with the Project certain mitigation measures were considered to be integral to the design and implementation of the works and activities. These mitigation measures, which are considered to be typical and consistent with best practices, were incorporated into the emission estimates, and therefore were incorporated in the effects predictions. These included implementation of appropriate management practices to control fugitive particulate emissions from haul roads, management of exhaust emissions from non-road vehicles through regular and routine maintenance of vehicles, and use of enclosures at the Ore Processing Facility to reduce fugitive emissions.

The noise assessment of the Project included tourism establishments, communities and trapper cabins as the twenty (20) PORs. Noise levels were deemed to be potentially high at one tourism establishment. OHRG has an agreement in place with the owner of the tourism establishment to restrict access during the Construction and Operations phases of the project. Three potential camping areas within the Crown Land surrounding the Project site were also identified as having potentially high noise levels. OHRG plans to post signs at crown land locations in the vicinity of the Project site that, in the past, may have been known to be used for camping to indicate the potential for campers to become annoyed by noise levels.

An adaptive management approach is the proposed mitigation for blasting activities, especially as excavation approaches the pit perimeter. This approach will include on-site measurements of ground and air vibration as well as overpressure to develop actual separation distances needed between environmental receptors in order to meet regulations. The mitigation of vibration effects on sensitive fish habitats could include increasing the distances between environmental receptors, or reducing the weight of explosive charge detonated per delay period. The actual location of the pit perimeter (and therefore between environmental receptors) will be determined during the detailed design stage of the Project.

Water Quantity and Quality

Mitigation that has been included in the water quality predictions include in-design mitigation measures, ongoing monitoring and data collection, development and implementation of management plans, contingency plan of treatment as needed and ongoing consultation and discussion with other local water users.

The Project will be designed to an appropriate factor of safety relating to slope stability. Interception wells will be used to maintain pit wall pressure if necessary. The design of facility and flow patterns of the water management system will be optimized for the local environment.

A Spill Management Plan will be implemented which will include preventative measures and methods for appropriate reporting and clean-up of any spills that occur. An Erosion Management Plan will be developed to identify ongoing measures to be put in place during construction activities to limit TSS discharge. Additionally, water will be collected and stored if necessary until it can be appropriately treated and discharged.

An Effluent Treatment Plant will be included as a contingency measure. A treatment facility for suspended solids, nutrient loading or metals would be operated if necessary. Treatment for suspended solids may be required as a contingency measure if the water within the reclaim pond and PPCP do not naturally allow for solids to settle. Nutrient loading will be mitigated through the implementation of management controls such as

explosives management, or use of phosphate-free soaps or solvents. Treatment for metals is not anticipated to be required.

The Project design will include a Water Management System. The water collection system will operate through the use of seepage collection ponds, ditches and active pumping. Water management will be implemented throughout the Project life cycle to capture runoff and seepage. At closure and post closure, pumping will cease and direct drainage from Project Site will be re-establish natural drainage patterns to lakes and reservoirs.

Discussion with water users and members of the Seine River Watershed Management Plan will be ongoing throughout the Project. Water quality, climate and hydrology data will be collected and used to inform Project design and management. Precipitation records will be used for design and flow management.

Water quality, hydrology and hydrogeology monitoring programs will be implemented as further detailed in Chapter 8, Environmental Management.

Potential Effects to the Biological Environment

Potential effects to the terrestrial environment were evaluated through identified VECs including wetlands, forest cover and wildlife species. Specific attention was given to Species at Risk. Consideration was also given to those physical components that have been identified as having potential changes and how these physical changes would affect terrestrial biology VECs.

Potential effects to the terrestrial environment could result mainly through the physical loss and fragmentation of terrestrial habitat, including birds' nests. Other physical changes include alteration of flows and drainage patterns described by the hydrology component that can affect wildlife habitat or habitat suitability. Changes to surface water and groundwater quality based on the discharge of treated effluent, runoff from WRMF and other mine facilities may also affect vegetation, soils, sediments and wildlife habitat.

Some terrestrial biology effects could occur due to water use and Project emissions to water and air. Changes to water levels in Marmion Reservoir due to planned water taking from Upper Marmion Reservoir for process and potable water supply could affect vegetation in wetlands and wildlife habitat. Air emissions and dust deposition can cause changes to the chemical and physical properties of surface water, soils and vegetation, which in turn affect wildlife health.

Activities during operations which have the potential to effect the biological environment include introduction of invasive plant species which could out-compete native vegetation and accidental spills on the mine site or along the access road can affect soils and vegetation. Sensory disturbance during construction and operations including noise, vibrations and proximity to humans can also cause the disturbance and displacement of wildlife. The Project will also result in improved access to the area which could affect wildlife population sizes through increased hunting activities.

Species at risk identified in the Project area include birds, reptiles and mammals. Canada warbler was observed to nest in the Project Site. The preferred habitat of the Canada warbler that would be affected by the Project was estimated as 11% of the habitat in the Project Site. As a result, some individuals may be displaced to adjacent habitats. The reptile SAR that has been identified as occurring in the area is the snapping turtle. Snapping turtles were considered to be unaffected by a change in water level in Lizard Lake of less than 3 cm.

Range maps indicate that six species of bats have known home ranges in the area, all of which were recorded during the 2013 bat field surveys. Loss of habitat for maternity roosting and hibernation is considered moderate.

Potential effects to the aquatic environment were evaluated through identified VECs including headwaters, lower reaches, receiving water bodies and identified fish species. Consideration was also given to those physical components that have been identified as having potential changes and how these physical changes would affect aquatic biology VECs.

During construction, the main effect of the Project on the aquatic environment will be habitat loss. A summary of habitat losses is provided in the aquatic biology effects assessment and includes 0.8 ha of Sawbill Bay, 4 ha of inlet streams, 0.5 ha of baitfish ponds in the lower reaches, 1.8 ha of headwater streams, 30 ha of lakes and 3.7 ha of baitfish and northern pike ponds in the headwaters. There are also 14 stream crossings or crossing upgrades on the proposed access road that will result in the loss of habitat within the footprint of the culvert/bridge structure. All of these habitat losses will be offset by compensation projects outlined in the No-Net Loss Plan (NNLP) prepared for the project, and as a result, there will be no residual effects from these losses.

In addition to habitat loss, construction activities have the potential to cause mortality of fish present in these water bodies, thus a fish rescue plan will be developed and implemented as part of the construction phase of the Project.

During operations, there are a number of potential effects to the aquatic environment. Water withdrawal and water discharge, vibrations from blasting, groundwater flow and dust creation all interact with the aquatic environment.

Water withdrawal from Sawbill Bay will result in a reduction in water levels ranging from -9.0 cm to -0.4 cm in Upper Marmion Reservoir, which can be accommodated within the current operating regime of the reservoir. As a result there are no significant effects. The discharge of mine waste water from the PPCP will be intermittent and is predicted to meet water quality guidelines and objectives (PWQOs or CWQGs) or site-specific water quality objectives. Therefore, there is no predicted effect on aquatic life and this impact is considered to be negligible. Sewage discharge to Sawbill Creek from the worker accommodation camp upstream of Sawbill Bay will meet MOE regulatory requirements, and, therefore, there will be no impact on the receiving waterbodies or VECs.

Operational blasting of the east and west pits will be monitored for vibration effects to fish and fish habitat. A mitigation management program will be implemented to ensure that Fisheries and Oceans Canada (DFO) guidelines are met, and, therefore, there will be no impact on fish life cycle stages.

As the open pits are excavated, there is potential for lake water to enter the pits through rock fissures. A Mine water collection system will be in place to ensure that water levels in Upper Marmion Reservoir are maintained. As a result, there will be no impact on water levels in Upper Marmion Reservoir. There is potential for groundwater from the Project Site to migrate to Sawbill Bay and Lizard Lake. Water balance predictions under worst case conditions are not predicted to result in adverse effects to these receivers.

There is potential for atmospheric deposition of contaminants from mining activities; however, predictive modeling studies carried out in the Atmospheric TSD have concluded that the effects of atmospheric deposition of dust and contaminants on aquatic life will be negligible.

During Project closure groundwater flow, and dust creation will continue to interact with the aquatic environment. As the open pits begin to fill, there is potential for lake water to enter the pits through rock fissures. During the closure phase, the Mine water inflow will be monitored. It is estimated that in about 218 years, the open pits will overflow into Sawbill Bay at which time any inflows to the pit would be balanced by pit overflows to Upper Marmion Reservoir. There is no anticipated effect on Upper Marmion Reservoir water levels.

During the closure phase, the seepage collection system will remain in place to ensure that contaminated seepage does not migrate to receivers until such a time as monitoring shows that the seepage is acceptable for direct release. Although there may be some atmospheric deposition during closure there is no expected atmospheric contamination of aquatic habitats during closure activities.

Mitigation for the Biological Environment

Mitigation measures were developed for the terrestrial and aquatic environment. These mitigation measures are closely linked to the Environmental Monitoring Plan and Objectives outlined in Chapter 8 of the EIS/EA Report. Mitigation measures for the biological environment are focussed on potential residual effects and consider both indirect physical effects and direct biological effects.

Mitigation measures for potential effects to the terrestrial environment will include in design measures, planning and management measures, compensation projects, training and education measures, and monitoring strategies.

The Project design and layout of the mine footprint and linear corridor was created to limit the amount of vegetation that is disturbed. Some of the disturbed overburden and topsoil will be stockpiled as a potential seed source. This measure will increase re-vegetation success of temporary work spaces. Limiting the use of all-terrain vehicles on trails and maintaining major transportation routes will also reduce habitat disturbance.

Clearing of vegetation shall take place outside of the nesting bird season (May 15th-July 30th), where possible. If clearing must take place within this period, a biologist will undertake a nest search to determine if there are any active nests in the habitat being cleared. If a nest is observed a protected buffer is placed around the nest until the bird and its young have left the nest.

The Processing Plant will be designed with emission controls, as will the construction and operations equipment. Operating procedures will be developed to reduce dust generation and emissions. Noise will be mitigated by housing stationary equipment in buildings and incorporating baffles and/or noise suppressors on equipment.

Hazardous materials and fuel will be stored according to regulatory requirements to protect the environment and the workers and demarked areas will be established for the storage and handling of hazardous wastes.

Water taking for the processing and make-up water will be minimized by reusing the on-site water supply for multiple undertakings. Runoff from the Project site and processing facility will be captured and diverted to the PPCP for re-use. Sewage will be treated prior to discharge.

The water management system will be designed to have enough capacity to store both operating flow and storm events. Installation of culverts will minimize alteration of flows and drainage patterns along linear corridor. Creation of wetlands as described in the No Net Loss Plan will attenuate flows.

Development and implementation of management plans will include an Invasive Species Management Plan, an Emergency spill management program, Dust management plan and the implementation of a strict “no hunting, harvesting, trapping or fishing” policy for workers while at the onsite worker accommodation camp.

Loss of bat habitat for maternity roosting and hibernation is considered moderate and will be offset by the creation or enhancement of other habitats for bats. The details of the compensation plan have yet to be determined, however preliminary concepts include the installation of bat condos and boxes as well as the improvement of other mine adits for use a hibernation sites.

Workforce training and education measures are also important mitigation measures. Enforcing speed limits on access roads and mine road, proper cleaning and maintenance of equipment and Species at Risk worker education are all important measures to reduce potential effects to the terrestrial environment.

Mitigation measures for potential effects to the aquatic environment include the development of a No Net Loss Plan, water quality modelling and effluent diffuser design, the implementation of a water management system and ongoing monitoring of the aquatic environment.

The following is a summary of the fish habitat compensation projects identified as part of No Net Loss Plan:

- Fish salvage and rescue operations: during the construction phase.
- Stream restoration works at 15 culvert crossings
- Stocking of four fishless headwater lakes/ponds.
- Constructing berms to create three new headwater ponds.
- Creating northern pike spawning habitat adjacent to the mouth of Sawbill Creek

The loss of fish communities in Lizard Lake and Upper Marmion Reservoir includes loss of indirect fish habitat and genetic diversity. Loss of indirect fish habitat will be offset by projects included in the No Net Loss Plan. Effects to genetic diversity will be mitigated through fish salvage protocols during which the majority of impacted fish will be released in other waterbodies in the area, including Lizard Lake, API #8 and Upper Marmion Reservoir. In addition, fish salvaged from these operations will be used to stock a number of fishless lakes as part of the NNLP. As a result, this residual effect is considered to be negligible.

The mixing zone at the effluent discharge point was modelled for water quality predictions and mixing potential. This analysis included preliminary diffuser design work, and concluded the mixing zone will be small. The Project design will include locating the diffuser in an area of low fish use. As a result, the potential for exposure of fish to this area will be low and the concentration/duration of effect will be very low. As a result, there will be no effect of this discharge on fish populations in Upper Marmion Reservoir. No effects are expected on smallmouth bass, northern pike, walleye or baitfish populations in Upper Marmion Reservoir.

During Mine operations, closure and post-closure, there is potential for “piping” of surface water in Upper Marmion Reservoir to move via cracks and fissures in the bedrock into the open pits. Once the pits are full and overflow into Upper Marmion Reservoir, there will be a small net increase in flow into Marmion Reservoir. As a result, there is no impact on Upper Marmion Reservoir water levels and the effect on VECs is considered negligible.

During the operations phase, a Mine water collection and pumping system will ensure that there is no impact on Upper Marmion Reservoir water levels. Once the Mine is closed and the Mine water intake from Sawbill Bay is decommissioned, this inflow of water to the pits can easily be accommodated within the current operating regime for Upper Marmion Reservoir.

An Environmental monitoring program to assess the performance of fish compensation measures will also be undertaken, as further detailed in Chapter 8 Environmental Monitoring Plan.

Social Environment

Social environment included an assessment of socio-economics, Aboriginal interests, Cultural heritage and Human health. The socio-economic assessment and Human health risk assessment both identified the potential for residual effects as described below.

Socio-Economics

The socio-economic impact assessment of the Project has yielded detailed results that are presented in the Socio-Economic TSD. The overall effect of the Project is summarized in Table ES-7.

Table ES-7: Summary of Overall Socio-economic Effects Assessment Results

Valued Ecosystem Component	Overall Residual Effect	Description
Population and Demographics	Positive	The population increase associated with the Project will first stem the decline and then augment the population of the Town. This will have an overall beneficial effect on the community.
Labour Market	Positive	The increase in employment and training and corresponding decrease in unemployment will bring additional income into the LSA, which will contribute to the overall economic wellbeing of the community.
Government Finance	Positive	Beyond additional revenue to the federal and provincial governments, new construction in the LSA will generate additional property assessment for the Town of Atikokan resulting in revenues that can be applied to the provision of services.
Public Services and Infrastructure	Neutral	There is sufficient capacity for existing infrastructure and service delivery to absorb the increases in demand associated with the Project.
Housing and Accommodation	Positive	The vacancy rate in the Town of Atikokan will be reduced by the influx of workers and their families, and new housing will be constructed. This will help stabilize the local housing market.
Transportation	Low-level adverse effect	The local transportation network currently operates well below capacity levels; hence the increase created by the Project can readily be absorbed.
Outdoor Tourism and Recreation	Low-level adverse effect	Upon the application of mitigation measures required for air quality and/or noise compliance, residual adverse effects on tourism and recreation are unlikely. The overall attractiveness of Atikokan and environs is not likely to be affected by the Project; however a low-level effect through loss of visual aesthetics is anticipated. Of note is that given the mining history in the vicinity of Atikokan, many people coming to Atikokan understand that mining activities take place in this area.
Hunting	Low-level adverse effect	No effect is anticipated on the number of hunting licences issued or on general hunting activity in the area. A relatively small amount of land will no longer be available for hunting, which will have a low-level effect on hunting in the LSA.

Valued Ecosystem Component	Overall Residual Effect	Description
Trapping	Neutral	Upon the application of mitigation for the loss of some portions of tenured trapline areas, no residual adverse effect on trapping is anticipated.
Fishing	Neutral	Overall fishing activity in the study areas is not likely to be affected.
Mining	Positive	Beyond the positive effects of the Project described in this TSD, the Project would likely have net beneficial effects on local or regional exploration and development in this sector.
Forestry	Neutral	Upon the application of mitigation, no residual adverse effect on forestry is likely.
Water Use and Access	Neutral	Ongoing discussions with the downstream hydro-electric facilities to further understand the potential financial implications of the predicted changes to outflows from the Raft Lake Dam. Upon the application of mitigation, no residual adverse effect other commercial or industrial water users is likely.

The Project will have a positive economic effect through jobs and increased government revenues during the construction and operations phase. On an annual basis, the operations phase will involve a project workforce of 550 people and over the 11 year operations phase, the estimated direct, indirect and indirect employment is 25,179 FTE or person-years, 13,002 of which will come from Ontario.

The tax revenues from the Project are a positive effect and they represent a major contribution of approximately $340 million to federal and provincial revenues over the 11-year operations phase. The Project's municipal tax contribution to the Town of Atikokan will be indirect through the potential construction of new housing, new local businesses and an increased population.

The effect on population and demographics is expected to be small during construction and moderate during operations. Overall, population increase is expected to contribute to the net benefits of the Project. An increase in the number of Atikokan residents (workers and their families) should serve to reverse the current population decline in the LSA.

The existing public services and infrastructure in the LSA, including the Town's plans for a new waste management facility, are capable of accommodating the small additional demand from the Project and increased population as a result of the construction phase. Accordingly, no adverse effects are anticipated on this VEC.

Overall, the effect of the Project on housing and worker accommodation is positive. The Project is anticipated to result in an increase in the demand and cost of housing in the LSA which should contribute to the stabilization of the local housing market.

The Project is anticipated to result in an increase in traffic, resulting in a Category "C" level of service on Highway 11B, and an increased volume-to-capacity ratio. The increase still provides for service levels well within acceptable ranges and the Project should not result in unacceptable traffic congestion.

The Project could result in effects to hunting because of loss of habitat. The magnitude of the effect is low because the amount of land removed is less than 5% of the wildlife management unit. The frequency and reversibility are both high since the effect occurs continuously and is reversible; therefore, the overall assessment of significance of this effect is assessed as low.

Outdoor tourism and recreation could be affected by the Project because of changes in perception caused by effects to the visual landscape. This is a permanent change that will be mitigated through ongoing consultation with tourism operators and OHRG's commitment to invest in advertising to promote the local industry.

Aboriginal Interests

Effects on Aboriginal Community Characteristics are anticipated to be positive namely those effects on Employment, Business Activity, and Training and Education. The Project will contribute to the economic opportunities and development of Aboriginal communities.

Effects on Aboriginal Heritage and Resources through Project-related disturbance of archaeological sites or restricted access or disturbance of cultural or spiritual sites were identified as being unlikely to occur. The Project will not result in any physical disturbance of any known sites. As part of the Cultural Heritage studies for the environmental assessment, Stage 1 and 2 archaeological assessments were conducted on the area likely to be affected by Project physical activities. No Aboriginal archaeological sites or artefacts were found.

Effects on Traditional Use of Land and Resources, specifically loss of fishing opportunities, hunting opportunities and plant harvesting opportunities were assessed as being negligible because any effects would be limited to the Aboriginal Interests LSA and would not measurably reduce the overall land use opportunities provided within the RSA. Effects on the consumption of country foods was determined to be unlikely since neither their source nor safety would be affected. The removal of land base within traplines in the Aboriginal Interests LSA will be mitigated through agreements with the trapline holders.

Physical and Cultural Heritage Resources

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 north of the east end of the proposed East Pit. 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 since both sites lie outside of the mine footprint. While potential effects include the destruction, alteration, disturbance, exposure or isolation of attributes or features of these sites, they are unlikely to be affected by mining activities.

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 was conducted.

Human Health Risk Assessment

Residual effects to human health were determined to include noise and increased particulate matter.

Increased noise has the potential to result in an increased risk of hypertension or sleep disturbance to nearby recreational users or trapline holders. Best management practices will be implemented to minimize activities that may generate noise (e.g., mine and materials handling, vehicle movement) in particular close to the property boundaries adjacent to identified receptor locations. To the extent possible, noise will be minimized at night in these areas as well, to reduce the potential for sleep disturbance.

The particulate matter assessment identified the potential for a residual effect of increased cancer risk for trappers at two trapper cabins.

Residual effects were evaluated using the assessment criteria identified. The direction of all the residual effects is negative (i.e., decrease in health from baseline conditions).

No Contaminants of Potential Concern (COPCs) were identified following the conservative screening process. Therefore, no adverse health effects are expected as a result of changes in soil and water concentrations.

There are no residual effects from the acute inhalation assessment based on comparison of chemical-specific predicted maximum 1-hour air concentrations from all receptor locations against the lowest available health-based screening thresholds.

The chronic inhalation assessment considered anticipated exposure times for each receptor as well as receptor-specific parameters such as inhalation rate and body weight. All of the HQs were well below MOE target levels, indicating negligible health effects.

In the particulate matter assessment, concentrations of $PM_{2.5}$ were below guidelines, indicating negligible adverse health effects from $PM_{2.5}$. Annual concentrations of PM_{10} were also below guidelines and not expected to cause adverse health effects.

Concentrations of Diesel Particulate Matter (DPM) exceeded the screening threshold for carcinogenic effects; therefore, DPM was evaluated following the chronic inhalation assessment method. The calculated levels were less than the target cancer risk of 1×10^{-6} for all receptors except for one trapper cabin, which was 1.6×10^{-6}. These predictions assume that the trapper spends 105 days per year, 8 hours a day for 15.5 years at the trapper cabin. It was also assumed that the maximum annual DPM concentration modelled for the Project exists for the entire life of the Project. These conservative assumptions contribute to potentially overestimating the cancer risk. The magnitude of this risk is considered low.

In the noise assessment, measures prescribed by Health Canada for assessing exposure to noise and potential human health effects were utilized. At receptor locations surrounding the Project, noise levels are within the ranges reported for increased risk of hypertension and sleep disturbance. The magnitude of effect for noise is considered to be low based on comparison to Health Canada targets and considering that predicted levels are in the lower end of ranges for hypertension effects.

Mitigation for the Social Environment

The Town of Atikokan is currently planning to construct a new waste management facility and is undergoing the permitting process for this facility. OHRG is committed to working with the Town of Atikokan to support the licensing, construction and operation of this new landfill site. The new site will be designed to accommodate any construction-related waste from the Project.

Mitigation is required for the adverse effects on outdoor tourism and recreation resources that have been directly affected by the restriction of site access/removal of land as part of the construction of the Project.

Because there may be some perception of negative effects on outdoor tourism and recreation due to construction of a mine project in the area, and associated effects on visual aesthetics, OHRG has begun to take steps to reinforce the positive outdoor tourism and recreational reputation of the LSA. As outlined in Chapter 7, Public Consultation, communications with Tourist Operators has been ongoing including a workshop which discussed concerns. As a result of this workshop, OHRG has committed to providing support for advertising efforts to promote the local tourism industry. OHRG also plans ongoing sponsorships of community events such as the Atikokan Bass Classic.

Effects to hunting were determined to be a potential residual adverse effect of the Project. In order to mitigate any increase in hunting pressures that could occur as a result of the Project OHRG will implement a firearms policy to restrict hunting for workers while staying at the worker accommodation camp. OHRG will also administer a bi-annual hunting and fishing questionnaire to its workforce in cooperation with MNR.

Mitigation is required for the adverse effects on trapline areas, bait fish blocks and bear management areas that will be directly affected by the restriction of site access/removal of land as part of the construction of the Project. The approach to mitigation is compensation and/or relocation based on negotiation with the land user. Mitigation for adverse effects on trapping, bait fishing and bear hunting will involve negotiated agreements and benefits upon approval of the EA and a decision to construct. Agreements are currently in place with the adjacent tourism operator, overlapping trap line holder, bait fish block holder. Satisfactory completion of negotiations and execution of agreements fully mitigate this effect.

Mitigation to forestry will involve discussions facilitated by MNR between OHRG and Atikokan Forest Products and Abitibi Consolidated to negotiate compensation, as required. Satisfactory completion of these negotiations should mitigate any adverse effects of the Project on timber harvest land base.

During the closure phase, OHRG will help communities transition into the loss of Project-related employment and opportunities for businesses to provide goods and services to the Project. Similar programs have been in place for changes in workforce when the exploration phase came to a close and included employee transition planning, training and placement support to assist employees in finding other employment in the community or elsewhere in the resource extraction sector.

The Aboriginal Interests effects assessment did not identify any adverse effects of the Project that could not be mitigated or compensated on any of the selected VECs. The following sections discuss a number of preliminary plans that seek to enhance the positive benefits and/or ensure that implementation of the Project will occur in harmony with Aboriginal Interests to the extent possible. These initial plans will serve to enhance the continuing relationship between OHRG and the Aboriginal communities.

OHRG plans to continue its practice of informing Aboriginal communities about the nature and timing of the skills required for site workers. Existing Aboriginal workers will be encouraged to share their working experiences within their own communities, thereby helping to overcome some of the barriers to Aboriginal participation in the wage economy. OHRG will make the workplace a welcoming environment to Aboriginal people by providing cultural sensitivity training to all members of the Project workforce.

Although no Aboriginal heritage sites or artefacts are identified with the area likely to be affected by the Project physical activities, there remains the low possibility that a heritage site or artefacts could be encountered during excavation or earth moving activities. Accordingly, a protocol will be established between OHRG, the First Nations and Métis regarding actions to be taken in the event, however unlikely, a heritage sire and/or artefacts are discovered during the construction phase.

Because Aboriginal people will likely continue to occupy the land after mine closure, and because of their continued stewardship of the land, they will be included in remediation and closure planning for the Project Site.

Additional consideration of benefits to the public and Aboriginal communities is detailed in Chapter 8, Social Management Planning. This plan includes the use of structured committees for two-way information sharing and the ongoing inclusion of Aboriginal communities and public stakeholders in the Project planning process.

Two historic mine sites were identified within the Project area. 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, the Ministry of Tourism and Culture recommended that a Cultural Heritage Evaluation Report be undertaken for the two historic mining operations. Mitigation for potential human health effects includes private agreements that are in place with local land users for temporary restriction of land access during the Project phases.

Cumulative Impacts

The approach to assessing potential cumulative effects uses the results of the impact assessment to assess the potential effects of the Project on the same physical, biological and socio-economic factors in consideration with the effects of other past, existing and reasonably foreseeable projects and activities in the same geographic region as the Project. Appropriate past, existing and proposed projects and activities that could potentially interact with the project were selected for inclusion in the assessment in consideration of the following:

- The predicted effects of the Project;
- The spatial and temporal extent of the predicted effects;
- The location, timing, size and nature of other projects and their potential effects; and,
- The availability of existing data and knowledge of the projects and their potential effects.

Identified projects or activities considered in the cumulative effects assessment include:

- The former Steeprock Iron Mine site near Atikokan;
- Existing hydro-electric facilities on the Seine River system downstream of the Raft Lake Dam, the closest of which being the Valerie Falls Generating Station;
- Ontario Power Generation's Atikokan Generating Station near Atikokan;
- Planned wood processing facilities, including the Resolute Forest Products Sawmill near Atikokan and the Rentech Wood Pellet Production Facility in Atikokan (formerly known as the Atikokan Renewable Fuels Mill);
- The former Atiko-Sapawe Gold Mine near Atikokan;
- Rainy River Resources proposed Rainy River Gold Project near Fort Frances, Ontario;
- Bending Lake Iron Group proposed Josephine Cone Iron Mine project near Ignace, Ontario; and,
- Treasury Metals proposed Goliath Gold Project near Dryden, Ontario.

The predicted effects of the Project were then considered against each other project or activity to determine if there is potential for interaction. If a potential for interaction is identified, an assessment of potential cumulative effects was performed.

The predicted environmental impacts from the Project components are confined to the mine footprint and immediately adjacent areas of the LSA. Within the area of impact, the changes in the environmental components are minor and none of these are predicted to adversely affect local plant or animal populations beyond the MSA, nor adversely affect surface or groundwater quality beyond the MSA.

Since the predicted effects are being managed and mitigated such that only local changes will occur that will have no predicted significant impact on the environmental components, the cumulative effects assessment is conducted as a limited scope assessment. The lack of physical or biological effects from the Project beyond the immediate area of the mine development precludes far-reaching environmental effects that could interact with other projects, and reduces the need for a detailed assessment of cumulative effects against the VECs considered in the EA.

Accidents and Malfunctions

The assessment considered a number of potential health and safety, accident and contingency scenarios that require planning and preparation in the event that they occur during the operating phase including:

- Road accident on main access road resulting in a spill.
- Fuel tank rupture on Mine Site.
- Hazardous material spill
- Tailings pipeline rupture.
- Spill of tailings water from TMF reclaim pond.
- TMF tailings dam failure.
- Flyrock from blasting
- Medical emergency
- Pit slope failure or water inflow to pit
- Fires (on site and forest fire)
- Floods and Droughts
- Explosion

Emergency preparedness planning will be undertaken and training in emergency response will be provided for key site staff during construction, operations and closure. The assessment concluded that planning, training, in-design mitigation measures, monitoring measures and response measures implemented at the Project site would minimize the environmental effects of potential accidents.

PUBLIC CONSULTATION AND ABORIGINAL ENGAGEMENT

The following six regulatory milestones and associated information sharing were carried out with the public, non-governmental organizations (NGOs), government (local, provincial and federal) and Aboriginal communities. The first three milestones were documented in the Record of Consultation published as part of the ToR.

1) Project Description

2) Commencement of Terms of Reference

3) Submission of Terms of Reference

4) Commencement of the EA Report

5) Submission of the EA Report

6) Review of Decommissioning Plans (ongoing)

Government

Provincial and federal government agencies have been working together to provide a streamlined consultation process where possible. Key contacts for the environmental assessment from provincial and federal governments have been identified as Ministry of Northern Development Mines, Ministry of Environment – Environmental Assessment and Approvals Branch and the Canadian Environmental Assessment Agency. Regular meetings took place with the lead agencies and they were kept informed of consultation with others, particularly with a focus on Crown Oversight of Aboriginal consultation.

The identified Government Review Team (GRT) was proactively engaged in the Project and invited to comment on OHRG's approach throughout the environmental assessment process. The GRT was provided the Project description overview and baseline studies results prior to report publications. A Draft EIS/EA Report was published and presentations of the EIS/EA results were delivered to the GRT. Discusssions took place on clarification of details, description of assumptions and justification of approach.

The GRT provided over 700 comments on the Draft EIS/EA Report. These comments were reviewed, responses were prepared and presentations were provided to the GRT with draft responses to comments. Additional discussion took place on recommended report revisions and requests for new work. Formal responses to comments on the Draft EIS/EA Report were compiled and are issued as part of the Final EIS/EA Report.

Some additional work has been undertaken based on the comments received. This work includes new and ongoing field studies, new design and modelling calculations, desktop studies, publication of new reports and revisions to existing reports.

A summary of key concerns from the Government Review Team and corresponding report revisions undertaken is provided below. These concerns and revisions are further detailed in Chapter 7.

Ministry of Natural Resources (MNR)

On April 4, 2013 approximately 290 comments on the Draft EIS/EA Report were received from Ministry of Natural Resources (MNR). Several meetings and discussions took place on areas of concern or where draft responses were deemed to need further clarification. Several revisions to the EIS/EA Report were recommended by MNR, as provided in the detailed meeting notes.

The following provides a summary of completed and planned discussions to be undertaken with Project stakeholders based on MNR's recommendations.

Environmental Monitoring: OHRG hosted a meeting about environmental monitoring including a presentation which summarized the changes made to Chapter 8 of the EIS/EA Report and a discussion of ongoing concerns regarding planned environmental monitoring for the Project.

Closure Planning: OHRG undertook a further assessment of closure alternatives, which is provided as a supplemental to the Conceptual Closure Plan TSD.

Fishery Management: MNR collects data on fishing estimates and would like OHRG to participate in this information collection. MNR recommended a site specific count of fishing boats on the lake. Further discussion is required on the need for clear objectives of undertaking a fishing study.

Water Users: MNR has recommended ongoing discussions and follow up with power producers regarding water level impacts during drought conditions. OHRG plans to engage the local water users for further discussion and participate in the Seine River Watershed Management Committee.

Site Specific Water Quality Objectives: Ongoing discussions with MOE are required to discuss specific values and water quality management plans for the closure phase.

Water Quality

On April 4, 2013, approximately 55 comments regarding water quality were received on the Draft EIS/EA Report which were mainly focussed on clarification of baseline data, the need for site specific water quality objectives and requests for new mixing model work to clarify the extent of the effluent mixing zone. Comments from the GRT also recommended that the on-site worker accommodation camp discharge location be moved downstream of the intake location. This recommendation has been acted upon and the revised location is presented in Chapter 5 of the Final EIS/EA Report.

Two meetings took place with regulators to discuss comments received on water quality. The discussion was focused on potential changes or clarifications needed to finalize the initial water quality results presented in the Draft EIS/EA Report.

In response to comments and information from the Ministry of Natural Resources that the proposed effluent discharge location from the accommodation camp is in an area containing potential walleye spawning and nursery habitat, the effluent discharge and freshwater intake locations have been relocated to an area where there is no perceived influence on the spawning habitat or other environmental impacts.

Several comments were received from the Ontario Ministry of Environment regarding effluent mixing in Marmion Reservoir. In response, a conceptual effluent diffuser design and preliminary mixing zone assessment was completed for the full range of anticipated discharge rates (as predicted in the Site Water Quality TSD) to estimate the potential extent and anticipated effluent concentration gradients within the near-field mixing zone at the mine effluent discharge location. The results of this assessment, including a figure showing the concentration gradients and extent of the mixing zone are provided in the Supplemental Information Package attached to Version 2 of the Lake Water Quality TSD.

Aquatic Biology

A series of meetings/workshops were held with the GRT to discuss a number of issues specifically related to Aquatic Biology including collection of baseline data, development of fish habitat accounting methodology, discussions regarding federal and provincial regulatory requirements and preliminary discussions regarding compensation for loss of fishing opportunities. OHRG worked with the government review team to finalize a Fish Habitat Accounting methodology for use in the No Net Loss Plan included in the Aquatic Biology TSD Supplemental Information Package.

The following summarizes the key changes:

- Habitat losses and compensation projects are categorized based on the applicable legislation or regulatory Act (i.e., the Metal Mining Effluent Regulations (MMER) and Subsection 35 of the *Fisheries Act*)
- The potential for development of aquatic habitat within the flooded pits at closure is evaluated and considered;
- Additional detail is provided on dissolved oxygen concentrations in the fishless lakes that are proposed to be stocked as part of the compensation plan;
- Additional detail is provided on the access road watercourse crossings and associated compensation projects; and,
- Additional detail is provided on the fish salvage and rescue plan for the fish bearing water bodies that will be impacted by the Project.

Closure Planning

OHRG has maintained open communication with the GRT throughout the environmental assessment process. Communications will be ongoing throughout the Project phases and the completion of the environmental assessment. One key outstanding government consultation requirement is ongoing discussions with MNDM to ensure the Certified Closure Plan for the Project meets all requirements and expectations. On November 2012, MNDM provided a letter to OHRG stating they had received a Notice of Project Status for the Hammond Reef Project. In this letter the Director of Mine Rehabilitation stated that a Closure Plan must be submitted for the Project prior to mine construction, but that the Closure Plan would not be accepted as filed until the completion of the provincial and federal environmental assessment processes.

Public

OHRG has used a variety of methods to engage with the public including publication of Community News Briefs, Community Open Houses, meetings and presentations. Draft and Final Reports have been circulated and responses have been provided to comments from public stakeholders. Throughout communications and consultation events OHRG has received many questions about Project design details. Many members of the public have stated their support for the Project and their interest in employment with OHRG. Concerns about potential effects to the environment and in particular the aquatic environment have also been raised by public stakeholders.

The public consultation log provided in Appendix 7.III provides details of written issues or concerns received from the public, OHRG's response to the issue or concern, and whether follow up action is required to resolve the issue.

OHRG has provided immediate detailed responses to many questions received from the public. Public comments were considered during the preparation and revision of the EIS/EA Report. Fishing is an important

recreational activity and is also the source of income for local tourism operators. Two of the public stakeholders who submitted written comments on the Draft EIS/EA Report listed potential effects to fish as their key concern. The Atikokan Sportsmen's Club and the Ontario Federation of Anglers and Hunters both requested further sampling of fish tissue and benthic invertebrates in the area would be warranted.

Notwithstanding the fact that the fish tissue sampling undertaken for the EA was sufficient for EA purposes, OHRG has committed to providing capacity support to Seine River First Nation to collect additional fish tissue and benthic samples in the Spring of 2014 in conjunction with an environmental study being undertaken with their community. Data collected will be shared with Seine River First Nation, Ontario Federation of Anglers and Hunters and the Sportsmen's Club.

The Marmion Reservoir is a regulated water body that is subject to the Seine River Watershed Management Plan. The Plan includes target outflow rates at specified dams and target water elevation levels at certain times of year. The hydrology assessment has concluded that the Hammond Reef Gold Project can operate within these target rates. Ongoing discussion with existing water users is required to allow for cooperation and understanding of each other's seasonal water needs.

Overlapping land users were engaged and mutually beneficial agreements were reached with the identified bait fish block and bear management area license holder, trapline holders and adjacent tourist operator. Land use agreements include restriction of access as required for safety during identified Project phases. All agreements are contingent on the Project moving forward.

In addition to the tourism industry's concern about aquatic health, the changes to the visual landscape and the potential effects to the tourism industry was a key concern. A local monitoring committee, the Atikokan/OHRG Committee, will be established to allow for communication and information sharing between OHRG and the local public population. The details of the planned committee structure and potential meeting topics are provided in Chapter 8 under Social Management Planning.

Aboriginal Engagement

The Project is located within Treaty 3 lands, the traditional territory of the Anishinaabe people. OHRG has developed a relationship with the local First Nations people through ongoing information sharing and the signing of a Resource Sharing Agreement. The First Nations communities with an interest in the Project include the seven member nations of the Fort Frances Chiefs Secretariat, the Lac de Mille Lacs First Nation and the Wabigoon Ojibway Nation. The closest First Nations community is located approximately 40 km away from the Project site.

The Project is also located within an area recognized by the Métis Nation of Ontario as the Treaty 3/Lake of the Woods/Lac Seul/Rainy River/Rainy Lake traditional harvesting territories. In March 2012, OHRG signed a Memorandum of Understanding with the Métis Nation of Ontario, including four identified Métis community councils (Kenora, Sunset Country, Northwest and Atikokan). The agreement allowed for the formation of a Métis consultation committee for the Project. As of November 2012, the deliverables identified in the agreement were fulfilled and committee members agreed that adequate consultation on the Project had taken place. OHRG is actively planning ongoing communications and partnerships with the Métis Nation of Ontario.

All three key Aboriginal groups have provided letters to government stating that OHRG has provided clear and ongoing communications throughout the Project planning process. OHRG has used a variety of methods to

engage with interested Aboriginal groups including publication Community Visits, Presentations to Chiefs, Elders Forums, Committee Meetings and Community Feasts. Draft and Final Reports have been circulated and responses have been provided to comments from Aboriginal groups.

Summary of Aboriginal Concerns

Throughout communications and engagement events, OHRG heard many concerns about potential long term effects of the Project on the environment. Although the focus of these comments is often expressed through the importance of the whole and interconnected environment, environmental concerns are largely related to potential effects to water quality, ricing areas and the health of fish, and animals that live near the Project Site.

Environmental concerns raised by Aboriginal communities have been addressed in a fulsome way in the EIS/EA Report and associated TSDs. Specific concerns have also been and will continue to be addressed in plain language presentations provided to Aboriginal communities.

Many comments have also been received with regards to Project closure, environmental monitoring and OHRG's ability to assure the Project Site will not be abandoned as has occurred in past mining projects within the region. OHRG has included Aboriginal communities in the closure planning process through a series of presentations and ongoing information sharing. The long term monitoring plan for the Project will include direct participation of Aboriginal communities, as described further in Chapter 8 of the EIS/EA Report.

A summary of environmental concerns from First Nations communities and OHRG's response to the concerns provided below. OHRG will continue to engage with Aboriginal communities, with a focus on specific identified issues. Appendix 7.V provides a detailed record of communications and a comment response table which clearly outlines each comment, when it was received, and Osisko's response to addressing the comment.

Water Quality

Concerned with release of sulphate at above ambient levels into Marmion Lake

While CWQGs and PWQOs are not available for sulphate, the State of Minnesota has developed a water quality guideline of 10 mg/L specifically for protection of wild rice (MPCA website 2013). The water quality predictions under the different Project phases described in Section 6.1.3.5 show that worst case concentrations of sulphate are predicted to reach 3.7 mg/L at the Raft Lake Dam during the operations phase. Predicted concentrations under average operating conditions and in post-closure are the same as under baseline conditions (<2 mg/L). The predicted concentrations are well below the guideline developed by Minnesota and as a result there is no identified potential effect on wild rice downstream in the Seine River. Since the other water quality parameters as predicted at the Raft Lake Dam are similar to background levels, there is no predicted effect on wild rice or other aquatic vegetation in the Seine River from operation of the mine.

To assist in the prediction of effluent quality, will Osisko be sampling internal (Pre effluent) reclaim pond water quality?

On-going sampling of all water discharged from the mine site will be required as part of the Environmental Compliance Approval for effluent release to ensure the effluent is compliant with appropriate standards. The frequency of this sampling will be determined based on the provincial and federal permit requirements. Osisko may conduct additional sampling prior to effluent release to confirm the suitability of the water for use at the process plant.

Concerned about current levels of both water and sediment adequately describing conditions in Marmion Lake and connecting water bodies

Additional studies of the existing aquatic environment, including fish tissue, sediment and benthic studies is planned to be undertaken with Seine River First Nation and the Atikokan Sportsmens' Club in Spring 2014.

Groundwater

Concerned that there may be some temporary minor adverse effects due to pond seepage water escaping into the lake waters. Concerned about potential migration of effluent from the planned Tailings Management Facility to Long Hike Lake.

Seepage from the TMF to Lizard Lake during operations will be managed through a seepage collection system that will direct seepage from the TMF back to the TMF. However, it is expected that under worst case conditions, up to 10% of the seepage may bypass the collection system and will flow to Lizard Lake. Predictions of worst case conditions resulted in free cyanide concentrations in Lizard Lake of up to 0.006 mg/L. Since the predicted concentration is only slightly above the guideline of 0.005 mg/L and below the SSWQO of 0.01 mg/L, there are no predicted adverse effects due to free cyanide.

Seepage from waste rock and ore stockpiles will be routed via ditching to the PPCP, from where it will be re-used in the processing facility or treated and discharged. As a result, there is no predicted effect on aquatic life.

Fish and Fish Habitat

Concerned with level of mercury in fish.

Mercury is of particular concern in fish tissues, and some walleye currently exceed consumption restrictions for some sensitive groups, such as women of child-bearing age and children under 15 years of age (discussed in Chapter 3). Water quality modeling (Section 6.1.3.5) predicts no change in mercury concentrations in surface water or sediments during operation and into post-closure. Therefore, concentrations of mercury in walleye or other fish species are not predicted to increase as a result of discharges from the site (concentrations in geologic material are currently below detection limits). The slight increases in sulphate levels are also not predicted to result in increases in methyl mercury production. As described in Section 6.1.3, conditions in Sawbill Bay would not favour net methyl mercury production due to oxygenated conditions that appear to persist throughout the water column.

Mercury analyses for benthic invertebrates should also be done as it would provide an assessment of mercury uptake at specific locations.

Notwithstanding the fact that the fish tissue sampling undertaken for the EA was sufficient for EA purposes, OHRG has committed to providing capacity support to Seine River First Nation to collect additional fish tissue and benthic samples in the Spring of 2014 in conjunction with an environmental study being undertaken with their community. Data collected will be shared with Seine River First Nation, Ontario Federation of Anglers and Hunters and the Sportsmen's Club.

How will Osisko implement the envisioned restricted fishery for camp employees without conflicting with aboriginal treaty rights?

Introduction of a large workforce could exert unsustainable pressure on the local fishery, affecting the sustainability of fish populations. As a result, fishing by camp personnel while on-site will be restricted to help maintain fish stocks. The policy regarding restricted fishing for camp employees will not extend to Aboriginal people, unless they are on shift at the mine site or currently staying at the workers accommodation camp.

Atmospheric Environment

Concerned about impact of possible airborne fugitive dust emissions originating from the Tails Management facility on the environment.

Fugitive dust throughout the project will be managed through the implementation of a comprehensive fugitive dust Best Management Practices Plan (BMPP), which will include practices for managing wind erosion from tailings during Operations and re-vegetation during Closure as described in Section 4.2 of the Conceptual Closure and Rehabilitation Plan TSD. Some typical steps to be included in the BMPP for managing dust generation from the tailings areas are ensuring a minimum moisture content of the tailings to keep the area wet and/or installing wind screens. Wet or moist tailings would have little in the way of dust generation potential. As stated in the Conceptual Closure and Rehabilitation Plan TSD, the "closure measures are designed to physically stabilize the tailings surfaces to prevent erosion and dust generation." The types of closure measures include covering and vegetating these areas, which would eliminate the dust generation.

The combination of the closure plan activities and the implementation of the BMPP, which includes facility engagement and accountability, will ensure that the potential emissions from tailings are an insignificant source.

Therefore, they have been excluded from the assessment as a potential source of particulate matter. This is standard practice and follows the guidance in Section 7.4 of the Ontario Ministry of the Environment "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" document dated March 2009.

Once the final design of the Osisko project is confirmed, a comprehensive site-specific BMPP, as described in Section 3.3 of the Atmospheric Environment TSD, will be created for the site which will include specific objectives to control fugitive emissions from tailings.

Métis Nation of Ontario

On May 24, 2013 OHRG received a letter from the Métis Nation of Ontario requesting notifying OHRG that an MNO Negotiations Team had been appointed and requesting the first negotiations meeting take place. Since receipt of the letter from MNO, ongoing communications have taken place to discuss Shared Interests between MNO and OHRG. These discussions have included two meetings, for which OHRG prepared presentations as provided in Appendix 7.V. The nature of the discussion at these meetings is confidential and therefore some presentation slides have been removed and meeting notes have not been published.

A summary of main points that have been addressed through ongoing discussions include Project and corporate updates, identification of mechanisms that could increase Project benefits to the Métis community, structure of future committees and schedule for future meetings.

OHRG's approach to resolving the concerns listed by the MNO in their April 2012 letter is to arrive at a private and mutual beneficial agreement that addresses all MNO's listed concerns. OHRG plans to work with the Métis Nation of Ontario on an ongoing basis to ensure the communities benefit from the Project. OHRG is committed to optimizing business opportunities for Métis community members, including the Métis in environmental monitoring programs and supporting the Métis Way of Life through ongoing investment in Métis culture.

Cultural Concerns

Throughout consultation, OHRG has heard from Aboriginal communities that Aboriginal culture is important. OHRG has worked with Aboriginal communities to respect customs and provide capacity for traditional ceremonies at the Project site and within the communities.

Throughout the construction and operations phases of the Project, the established Social and Cultural Committee will provide oversight and direction for appropriate ceremonies that should take place during Project meetings. The committee will also promote cross cultural awareness and bring forward suggestions for cultural investment opportunities.

Traditional knowledge has been incorporated into the environmental assessment through the provision of capacity for traditional protocols during the consultation process and the consideration of information provided into the Project design. OHRG has routinely followed advice provided by elders to include drumming and dancing in Project meetings.

Information provided by First Nations and Métis have allowed OHRG to avoid placing infrastructure in areas that are recognized as being special or sacred sites. The effluent treatment plant discharge location and TMF location have both been adjusted to minimize potential impacts to areas with environmental value as identified by Aboriginal communities. OHRG also plans to use traditional knowledge to inform the development of appropriate fish relocation plan for Mitta Lake and other fish-bearing water bodies that will be affected by the Project.

OHRG recognizes that speaking and hearing the Ojibway language is an important part of Aboriginal culture in the identified Aboriginal communities. OHRG is committed to incorporating Ojibway information materials into its consultation program for the Project. OHRG engaged Ojibway translators for the Elders forums, including traditional use study meetings, and worked with the several individuals from First Nations communities to translate a Project Overview into Ojibway. This Ojibway-language video has been shared with the First Nations in community meetings and workshops.

OHRG will continue to communicate with Aboriginal communities about environmental concerns through the sharing of environmental studies results and assessments. To date, OHRG has provided detailed information to communities, Chiefs and Elders. Throughout the construction and operations phases of the Project, the established Environmental Committee will provide a mechanism for sharing environmental information with First Nations communities.

OHRG is committed to providing economic benefits to Aboriginal communities. Initiatives to maximize the benefits the Project will have on Aboriginal communities include:

- Scholarships.
- Partnerships with local academic institutions.
- On the job training.
- A hire local priority policy.
- Targeted employment, training and business opportunities.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANNING

Revisions to Chapter 8, the Environmental Monitoring portion of the EIS/EA Report, have been substantial to include further details and provide a closer link to government guidelines. The revised Chapter 8 is organized by Physical, Biological and Social environmental components. The Chapter includes a narrative explaining potential effects by component and providing justification for the focus of the proposed monitoring plan. The Chapter includes clear presentation of management and monitoring plans through the use of a Management Planning table and Monitoring Plan table for each physical and biological component considered in the environmental assessment.

The Management Planning table lists the Project interaction and the potential effect to the environment. It includes proposed mitigation measures and clear monitoring objectives. The Management Planning table also includes lists of applicable regulations and guidelines that relate to monitoring objectives. Contingency planning is included in the Management Planning tables in the event that actual effects differ from predicted effects.

The Monitoring Plan tables bring forward the potential effects listed in the Management Planning tables and further define indicators to meet the stated monitoring objective. Monitoring Plan tables also include a description of planned sampling location, sampling method, and estimated frequency and duration of monitoring plan for each physical and biological component. The biological monitoring tables also provide a direct link to the VECs described and assessed in Chapter 6 of the EIS/EA Report.

Chapter 8 of the EIS/EA Report represents the Environmental Management Plan (EMP) for the Hammond Reef Gold Project. The EMP was created to reduce the risks to the environment through consideration of predictions and development of a plan that allows the predictions to be confirmed. The EMP also includes contingency planning should the case arise that that actual effects differ from predicted effects.

Once construction and operations commence, environmental monitoring will be an integral part of evaluating the effectiveness of the EMP.

The objective of the EMP is to ensure that negative impacts on the physical and biological environments are mitigated; benefits that will arise from the development of the Project are enhanced; and compliance with existing legislation and consistency with provincial guidelines and best practice is achieved.

Conceptual plans to monitor the effectiveness of mitigation measures, and verify the predicted changes to the environment have been developed. These include water quantity and quality, groundwater quantity and quality, terrestrial and aquatic biological monitoring plans, and social management plans. Detailed plans will be developed in cooperation with Project stakeholders including government and public, as well as with Aboriginal communities.

Both provincial and federal agencies are anticipated to be included in monitoring plan development and in the provision of ongoing advice for the environmental management plan. It is anticipated that a lead agency will be identified to provide direction and review reports.

Health and Safety

The Health and Safety management system in place for the OHRG exploration project will be applied directly to the constructions and operations phases of the Project. The management system was developed with the intent of meeting, as a minimum, the legislative requirements within the Occupational Health and Safety Act and Regulations for Mines and Mining Plants. The Internal Responsibility System in place at Hammond Reef includes provisions for the Health and Safety Responsibilities of all levels of management, employees and contractors.

Physical Environment

The air quality and vibration monitoring and follow-up program is designed to be appropriate to the scale of the Project and the effects identified through the environmental assessment process. The program is intended to confirm the methods used to estimate the Project emissions and the effectiveness of in-design mitigation measures, and in doing so, assess if alternative mitigation strategies are required to minimize emissions from the Project and their impacts.

OHRG will prepare a comprehensive water monitoring program that will include groundwater quality, surface water quality, levels and flows along with meteorology and flow metering of all pumped water. With respect to the Hydrology monitoring program, the objectives will be to verify the accuracy of the predicted changes, confirm the assumptions underlying the predicted changes, support the implementation of adaptive management measures and satisfy compliance monitoring requirements included in the Metal Mining Effluent Regulation, Environmental Compliance Approvals and Permits to Take Water issued by the Ontario Ministry of the Environment pursuant to the Ontario Water Resources Act and in Fisheries Act Authorizations issued by Fisheries and Oceans Canada and authorizations issued pursuant to the Navigable Waters Act (if applicable).

Hydrology field studies will consist of flow and water level monitoring in site, local and regional scale watercourses and water bodies identified as potentially being affected by Project activities and at key points in the Project's water management system to confirm and update estimates of water takings, effluent discharges and water recycling. Field monitoring activities for Hydrology will be coordinated with monitoring activities for other disciplines where appropriate, to reduce costs and increase efficiency.

The hydrogeology component of the water monitoring program is designed to allow for long-term monitoring of the effects of Project activities on groundwater levels and groundwater quality within the LSA throughout all stages of the Project. The recommended program will comprise the measurement of groundwater levels (or water pressures) at a number of locations within the Project Site. Data logging pressure transducers will be used to obtain a continuous record of groundwater level fluctuations at select monitoring locations that will be supported by quarterly manual depth to water measurements. Groundwater level/pressure monitors will be located within and adjacent to the open pits and integrated with the program to monitor pit slopes during excavation.

The water quality monitoring program initiated during the baseline studies will be continued through the construction, operations and closure phases. The purpose of the program is to verify predictions made during the impact assessment, evaluate regulatory compliance with the permitting requirements, and provide a basis for effective water quality management on-site. The number of locations monitored will be reduced from the

baseline studies to focus on Lizard Lake, Sawbill Bay and Lynxhead Bay, and the watercourses draining from the Project Site (i.e., the MSA). A more focused list of parameters will be monitored quarterly, including metals and ions that the baseline studies and modeling have indicated may increase during construction and operations. This will include TSS, sulphate, chloride and a suite of metals (Inductively Coupled Plasma Mass Spectrometry scan), as well as arsenic, selenium and mercury. The sampling program (locations sampled, parameters included and frequency of sampling) may be modified depending on other monitoring requirements that may be identified under any approvals or permits and will be coordinated with hydrogeology and hydrology sampling efforts and locations where possible to ensure there is minimal duplication.

A geochemistry monitoring plan will be developed and implemented by OHRG to confirm the characteristics of the materials mined, placed or otherwise used in construction. The plan will include confirmation samples at a rate that considers the mine schedule, existing geochemical data, and follows appropriate guidance documents such as MEND (2009) or INAP (2012) as required under O.Reg 240/00 under the Mining Act of Ontario. Samples will be analyzed using appropriate test methods for assessment of acid rock drainage/metal leaching potential, to confirm that the samples fall within the range identified, tested and described in the Geochemistry, Geology and Soils TSD.

Biological Environment

OHRG will prepare a comprehensive Terrestrial Ecology monitoring program based on the residual effects predicted in the Terrestrial Ecology assessment. The objectives of the Terrestrial Ecology monitoring program will be to verify the accuracy and predictions of the EIS/EA Report and confirm the effectiveness of mitigation measures, and in doing so, determine if new mitigation strategies are required.

Loss of bat habitat for maternity roosting and hibernation is considered moderate and will be offset by the creation or enhancement of other habitats for bats. The details of the compensation plan have yet to be determined, however preliminary concepts include the installation of bat condos and boxes, as well as the improvement of other mine adits for use a hibernation sites.

An Aquatic Environment monitoring program will be designed and implemented to confirm water quality, flow and water level alteration predictions generated during surface water modelling. If the monitoring program establishes that Project-related effects on the aquatic environment are greater than predicted, fish habitat suitability and utilization studies will be triggered on aquatic features (APIs) and/or specific VECs.

The environmental monitoring program will include an Environment Effects Monitoring (EEM) program to during operations through to closure, details of which will follow Environment Canada/MOE requirements. The EEM will be developed when the Project becomes subject to the Regulations.

The majority of the monitoring activities will be completed as part of the monitoring of habitat offset projects included in the No Net Loss Plan and/or the Environmental Effects Monitoring Plan.

Emergency Planning

In addressing emergency preparedness and response, the EMP will identify the environmental risks, evaluate the risks and provide risk management measures to minimize negative effects. Some additional aspects that are considered for contingency purposes and planning include medical emergencies, fire safety, pit slope failure, excessive pit inflow, floods and droughts, loss of communication and explosions.

Together the potential accidents, contingency measures and associated environmental risks will form the basis for development of a Risk Management Plan that will be developed for the Project following EA approval. The items listed are not intended to provide a comprehensive listing, but rather provide an example of aspects that will be included in the plan.

Social Management Planning

The overall objectives of the Social Management Plan are to provide the means for OHRG to work together with the Local and Aboriginal Communities to:

- Understand community needs.
- Clarify community expectations.
- Communicate OHRG's development plans.
- Identify mutually beneficial business opportunities.
- Identify potential independent business opportunities.

The Social Management Plan was developed to address the avoidance of, minimization of, and/or compensation for negative socio-economic effects and the enhancement of positive benefits that could result from the Project.

Three separate committees will be engaged and consulted throughout the ongoing Project planning process: First Nations, Métis and Public (Atikokan/OHRG Committee). The First Nations Resource Sharing Committee has already been formed, and consultation with Métis and the public has also been ongoing throughout the exploration and permitting phase of the Project.

A local monitoring committee will be established which will be modelled after the existing Canadian Malartic Monitoring Committee. The mandate of the Atikokan/OHRG Committee will be to provide a direct link for communications between community members and OHRG. Information about the Project will be shared with the Committee, and Committee members will disseminate this information to the community at large. In turn, community members can approach the Committee with their concerns, and the Committee can share these community concerns with OHRG.

The First Nations Resource Sharing Committees will provide focussed communications between OHRG and the First Nation communities, and identify ways that the Project can provide ongoing benefits to identified Aboriginal communities. The Métis Consultation Committee has met regularly throughout the Project planning process, and OHRG plans ongoing communications and identification of shared interests to continue through the Committee.

COMMITMENTS

Commitments are listed by EIS/EA Report Chapter and are directly related to mitigation of potential effects and enhancement of benefits. Many commitments include in-design considerations and the development of management plans. The following management plans will be developed and implemented:

- Health and Safety Management Plans
- Erosion Control Management Plan
- Invasive Species Management Plan
- Waste Management Plan
- Spill Management Plan
- Contingency and Risk Management Plan
- Hazardous Materials Management System
- Emergency Preparedness and Response Plan
- Fish salvage and relocation plan
- Critical Incident Preparedness and Response Plan
- Remediation plan
- Nutrient Management Plan

Numerous new commitments have been made between February 2013 when the Draft EIS/EA Report was published and December 2013 when the Final EIS/EA Report is published. As a result of feedback from consultation with the Aboriginal groups, the public and the government, OHRG is committed to:

- Providing support for advertising for recreation in Atikokan (commitment to Tourism Operators)
- Separating topsoil from overburden during stockpiling when possible
- Preparing information materials regarding closure phase and undertaking consultation on closure
- Enhancing habitat for common nighthawk
- Completing a bi-annual workforce fish questionnaire
- Completing and a fish tissue study with Seine River First Nation
- Adding new water quality sampling locations in deeper basins
- Developing and implementing a Greenhouse Gas Management Plan

OTHER APPROVALS

Chapter 10 represents a preliminary list of anticipated permits and approvals required to implement the Project and additional details regarding each anticipated permit/approval including the agency with jurisdiction, the applicable Act or Regulation, and the Project activity that will likely trigger the requirement for a permit/approval. The list of permits/approvals presented is not intended to be a comprehensive list of all permits/approvals required, and OHRG will consult with federal, provincial and municipal agencies to refine this list as the Project design is developed.

BENEFITS OF THE PROJECT

The environmental assessment of the Project has been carried out early in the Project planning and enables mitigation to be incorporated into Project design and procedures, thereby limiting likely adverse effects. In addition, the environmental assessment allows the positive effects of the Project to be identified.

The environmental assessment also provided increased scientific knowledge in the area. The baseline studies conducted by OHRG included two to three years of information collection on the physical and biological environment in the local and regional study areas. This information has been published and is publically available. OHRG also contributed to the collection of traditional land use by First Nations and Métis in the area through either capacity funding or direct participation in information collection.

The environmental assessment process contributed to the sustainable development of the region by providing a structured planning process whereby OHRG considered potential environmental effects of the Project and designed mitigation and management strategies to minimize these effects. The consideration and assessment of potential cumulative effects in the region assured that natural resource development is carried out in a sustainable manner.

The environmental assessment provided for Aboriginal consultation, government and public participation in the Project. Consultation for the Project was carried out at key milestones directly linked to the environmental assessment process. Public comments received as part of the EIS/EA consultation process were directly considered throughout the EIS/EA Report finalization process.

Some additional work has been undertaken based on the comments received from Aboriginal groups, the public and the Government Review Team on the Draft EIS/EA Report. This work includes new and ongoing field studies, new design and modelling calculations, desktop studies, publication of new reports and revisions to existing reports. The summary of new work undertaken as a result of comments on the Draft EIS/EA report includes environmental field studies, development of the Environmental Monitoring Plan, additional water quality modelling, further assessment of alternatives and further definition of mine waste alternatives accounts. Closure planning is still underway and is anticipated to be ongoing until the submission of a Certified Closure Plan subsequent to EA Approval.

The active and ongoing participation of Aboriginal groups, the public and the government review team in the project planning process is a significant benefit to Canadians that is provided by the EA Process. OHRG's commitment towards ongoing engagement with Aboriginal communities and the public through information sharing and formation of committees is directly tied to the environmental assessment process.

The Project provides benefits by creating economic activity within the local Aboriginal communities, the Town of Atikokan and the Rainy River District and by generating tax revenues for federal and provincial governments. The Project will provide short-term employment during the construction phase and is expected to provide long term employment on an annual basis during the operations phase by employing a project workforce of 550 people. Over the 11 year operations phase, the estimated direct, indirect and indirect employment is 25,179 FTE or person-years, 13,002 of which will come from Ontario.

The benefits of the Project are primarily economic and include employment, economic activity, government revenues and workforce training. The Project is also expected to create a better quality of life for local community members by OHRG involvement in improving education, culture and recreation activities in the community.

The Project is anticipated to provide substantial long term social benefits through workforce training. This includes the enhancement of existing skills and the opportunities that will be provided to train and develop the skills necessary to gain employment on the Project. Workforce training will occur mainly through on-job and on-site training programs carried out by OHRG as part of daily operations, but will also include focused off-site training for specific jobs and task and community-based training.

The economic benefits of the Project will occur within a challenging economic environment. The economy of Northwestern Ontario has been declining over the past decade. For example, the gross domestic product for Northwestern Ontario declined by 6.7% between 2001 and 2006, in contrast with an increase of 13.6% for the rest of Ontario, respectively, over the same period. This economic environment makes the benefits of the Project even more significant. The Canadian GDP generated by the Project is estimated to be $291.4 million annually, totaling $3.205 billion over 11 years.

The Project is anticipated to provide substantial long term social benefits through workforce training. This includes the enhancement of existing skills and the opportunities that will be provided to train and develop the skills necessary to gain employment on the Project. The development of a skilled workforce will also enhance the population’s future employability beyond the Project life.

CONCLUSIONS

An assessment of Project alternatives was completed based on a comparison of environmental, socio-economic, economic and technical criteria and indicators together with engineering requirements. Based on this assessment of alternatives for each of the Project components, the set of preferred alternative means of carrying out the Project was chosen.

Key aspects of the Project that were considered with respect to the environmental assessment include, a Mine with two open pits, an Ore Processing Facility which includes a processing plant, a TMF, a WRMF, Linear Infrastructure including an access road and a transmission line, a Water Management System, and supporting infrastructure that includes a worker accommodation camp.

Physical Effects

The noise assessment of the Project included tourism establishments, communities and trapper cabins as the twenty (20) PORs. Noise levels were deemed to be potentially high at one tourism establishment. OHRG has an agreement in place with the owner of the tourism establishment to restrict access during the Construction and Operations phases of the Project. Three potential camping areas within the Crown Land surrounding the Project site were also identified as having potentially high noise levels. OHRG plans to post signs at crown land locations in the vicinity of the Project site that, in the past, may have been known to be used for camping to indicate the potential for campers to become annoyed by noise levels.

Changes to water levels will occur in two lakes, and the Upper Marmion Reservoir. Water levels in Unnamed Lake 5 located to the east of the TMF are expected to be in the range of -2.1 cm to 0.0 cm during the Operations phase. Changes in water levels in Lizard Lake are expected to be in the range of -2.7 cm to 0.0 cm. Changes in water levels in the Upper Marmion Reservoir due to Project activities are expected to be in the range of -9.0 cm to -0.4 cm based on single-year water balance modelling. In an average year, the predicted maximum reduction in water levels of the Upper Marmion Reservoir is 8.1 cm.

The Project could result in changes to groundwater levels, but is not expected to result in any change to groundwater quality. No groundwater users were identified in the vicinity of the Project that could potentially be affected by changes in groundwater levels from Project activities. The cone of depression from pit dewatering extends about 700 m from the pit perimeter and underlies a portion of the WRMF and overburden stockpiles. Within the area of the cone of depression, groundwater levels could potentially result in a reduction or even elimination of flows in some local streams should there be a significant connection to the deeper bedrock flow system, however most groundwater flow occurs in more permeable sediments above the bedrock, thus there is potential for development of a perched water table, or flow above the de-watered bedrock. Also within this area, seepage losses from the stockpiles could result in flow increases in some local streams.

Biological Effects

The total Project footprint will require clearing of approximately 1205.73 ha of vegetation. The direct loss of wetlands due to the Project footprint is 381.22 ha. This is 21.09% of the wetlands occurring in the Terrestrial Ecology LSA and approximately 0.06% of the wetlands in the Terrestrial Ecology RSA. With implementation of mitigation measures, the residual effect of wetland habitat loss is considered to be of low significance. The direct loss of forest cover due to the Project footprint is 772.15 ha. The overall forest cover loss is approximately 15% of forest available in the Terrestrial Ecology LSA and 0.21% of the forest occurring in the Terrestrial Ecology RSA.

OHRG has identified many mitigation and planning measures to reduce the significance of biological effects. These include development of a Soil Salvage Plan, Invasive Species Management Plan, Waste Management Plan and Conceptual Closure and Rehabilitation Plan. With implementation of the identified mitigation measures, the residual effect of wetlands and forest habitat loss is considered to be of low significance.

Loss of bat habitat for maternity roosting and hibernation is considered moderate and will be offset by the creation or enhancement of other habitats for bats. The details of the compensation plan have yet to be determined; however, preliminary concepts include the installation of bat condos and boxes as well as the improvement of other mine adits for use a hibernation sites.

The Project will result in a loss of aquatic habitat. Fish habitat losses include 0.8 ha of Sawbill Bay, 4 ha of inlet streams, 0.5 ha of baitfish ponds in the lower reaches, 1.8 ha of headwater streams, 30 ha of lakes and 3.7 ha of baitfish and northern pike ponds in the headwaters. There are also 14 stream crossings or crossing upgrades on the proposed access road that will result in the loss of habitat within the footprint of the culvert/bridge structure. All of these habitat losses will be offset by compensation projects outlined in the NNLP being prepared for the project, and as a result, there will be no residual effects from these losses.

The following is a summary of the fish habitat compensation projects identified as part of No Net Loss Plan:

- Fish salvage and rescue operations: during the construction phase.
- Stream restoration works at 15 culvert crossings
- Stocking of Four fishless headwater lakes/ponds.
- Constructing berms to create three new headwater ponds.
- Creating northern pike spawning habitat adjacent to the mouth of Sawbill Creek

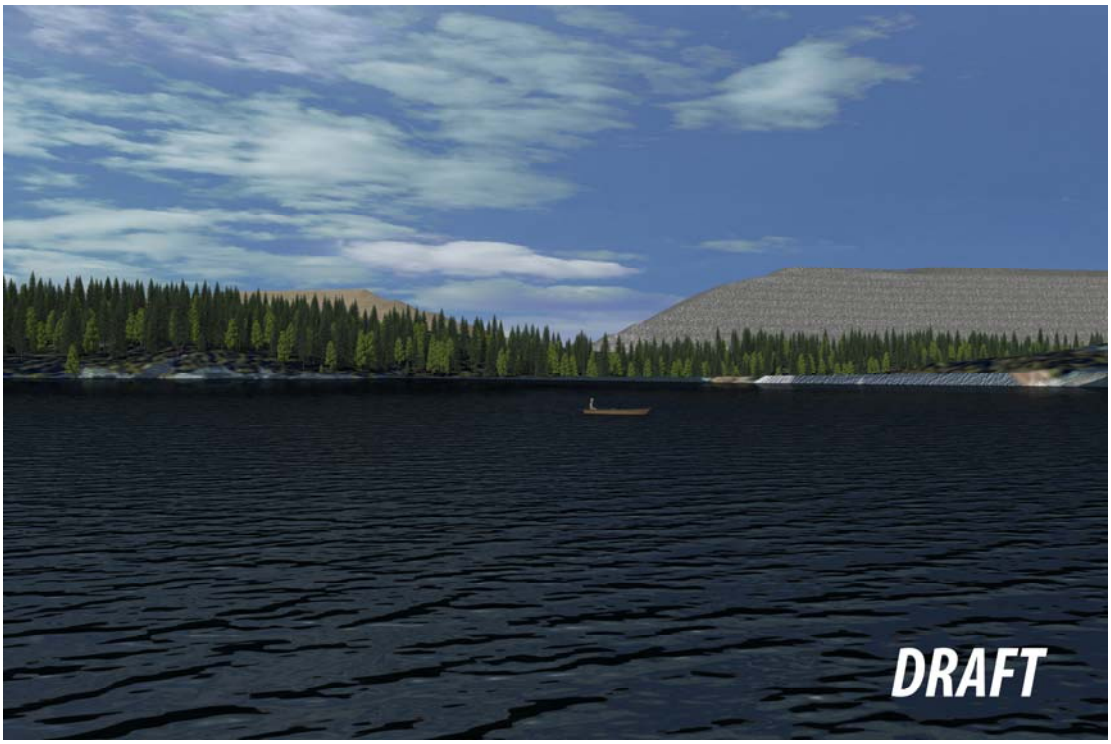
The loss of fish communities in Lizard Lake and Upper Marmion Reservoir includes loss of indirect fish habitat and genetic diversity. Loss of indirect fish habitat will be the No Net Loss Plan. Effects to genetic diversity will be mitigated through fish salvage protocols during which the majority of impacted fish will be released in other waterbodies in the area, including Lizard Lake, API #8 and Upper Marmion Reservoir. In addition, fish salvaged from these operations will be used to stock a number of fishless lakes as part of the NNLP. As a result, this residual effect is considered to be negligible.

Social Effects

The Project could result in effects to hunting because of loss of wildlife habitat. The magnitude of the effect is low because the amount of land removed is less than 5% of the Wildlife Management Unit. The frequency and reversibility are both high since the effect occurs continuously and is reversible; therefore, the overall assessment of significance of this effect is assessed as low.

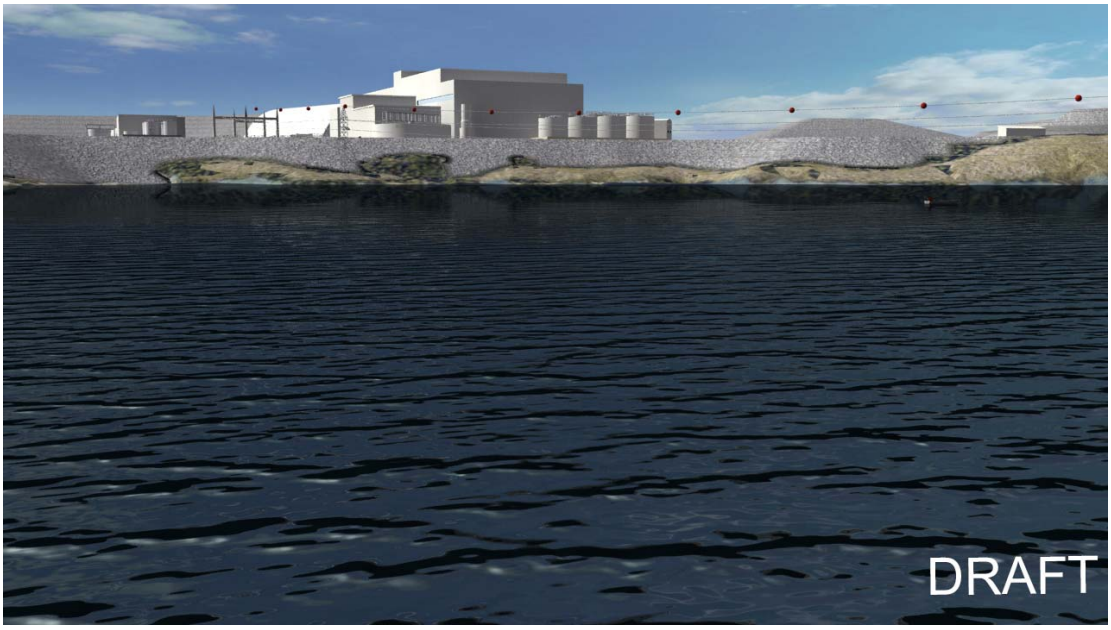
Outdoor tourism and recreation could be affected by the Project because of changes in perception caused by effects to the visual landscape. This is a permanent change that will be mitigated through ongoing consultation with tourism operators and OHRG's commitment to invest in advertising to promote the local industry.

A Visual Assessment was undertaken and the results were shared with the public and local Tourist Outfitters. Several examples of the visual renderings that were generated are shown below.



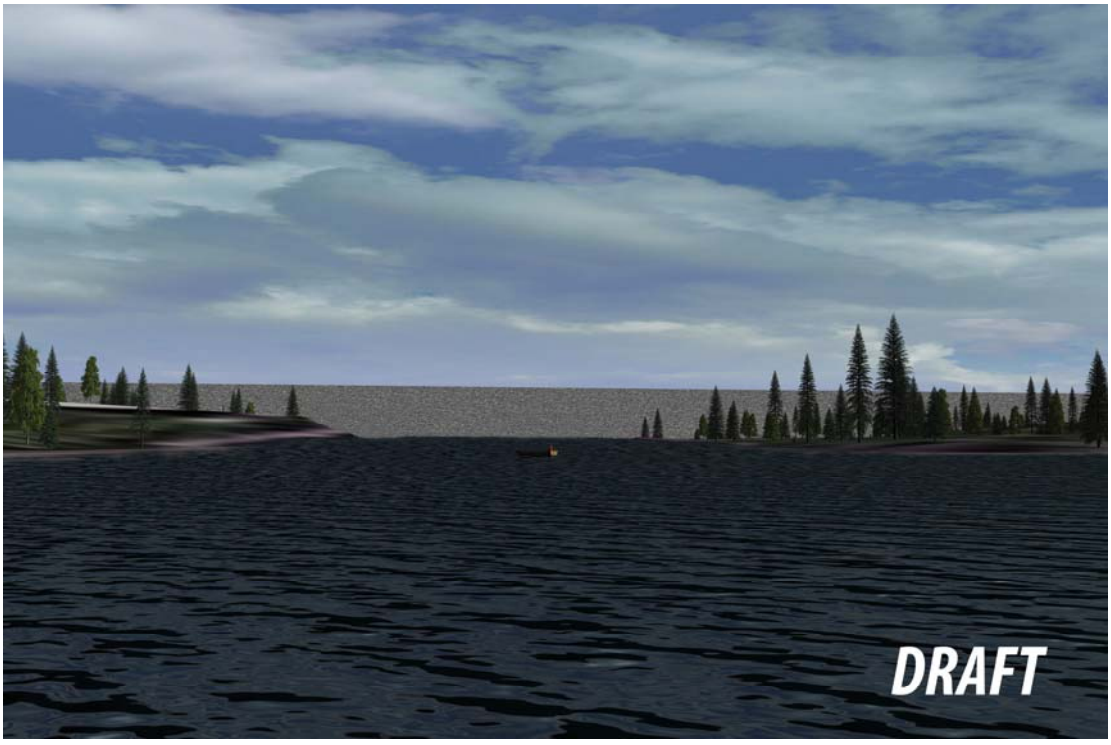
Source: Genivar 2013.

Figure ES-5: View 1 Visual Simulation – View of Overburden and waste Rock Stock Piles from Trap Bay of Upper Marmion



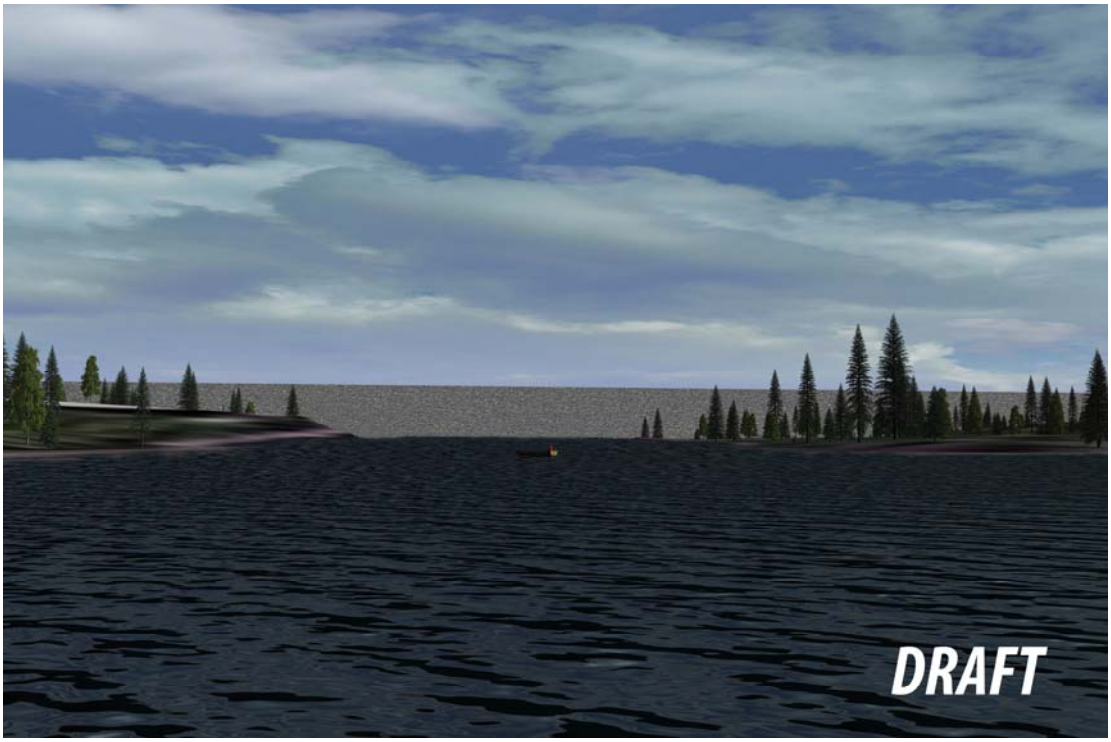
Source: Genivar 2013.

Figure ES-6 View 3 Visual Simulation – View of Process Plant from Sawbill Bay



Source: Genivar 2013.

Figure ES-7: View 8 Visual Simulation – View of Tailings Management Facility from Trapper Cabin



Source: Genivar 2013.

Figure ES-8 View 6 Visual Simulation – View of Tailings Management Facility from Trapper Cabin

The Human Health Risk Assessment showed that concentrations of DPM exceeded the screening threshold for carcinogenic effects; therefore, DPM was evaluated following the chronic inhalation assessment method. The calculated levels were less than the target cancer risk of 1×10^{-6} for all receptors except for one trapper cabin. OHRG has an agreement in place with the trapline holder to restrict access to the cabin during the Construction and Operations phases of the Project as required.

Mitigation is required for the adverse effects on trapline areas, bait fish blocks and bear management areas that will be directly affected by the restriction of site access/removal of land as part of the construction of the Project. The approach to mitigation is compensation and/or relocation based on negotiation with the land user. Mitigation for adverse effects on trapping, bait fishing and bear hunting will involve negotiated agreements and benefits upon approval of the EA and a decision to construct. Agreements are currently in place with the adjacent tourism operator, overlapping trap line holder, bait fish block holder. Satisfactory completion of negotiations and execution of agreements fully mitigate this effect.

In the noise assessment, measures prescribed by Health Canada for assessing exposure to noise and potential human health effects were utilized. At receptor locations surrounding the Project, noise levels are within the ranges reported for increased risk of hypertension and sleep disturbance. The magnitude of effect for noise is considered to be low based on comparison to Health Canada targets and considering that predicted levels are in the lower end of ranges for hypertension effects.

Socio-Economic Benefits

The Project is anticipated to provide substantial socio-economic benefits to Aboriginal people, the local community and the region and has garnered significant community support through ongoing partnerships and information sharing.

The construction phase will involve a project workforce of 1,040 FTE or person-years of direct employment on the Project, 780 of which will come from Ontario. The supplier/service industry will add 4,044 FTE or person-years of direct employment, 2,335 of which will come from Ontario. Using standard industry multipliers for indirect and induced employment, the total employment during the construction phase is estimated to be 9,557 FTE or person years, 4,287 of which will come from Ontario.

On an annual basis, the operations phase will involve a project workforce of 550 FTE or person-years of direct employment on the Project, 440 of which will come from Ontario. The supplier/service industry will add 642 FTE or person-years of direct employment, 428 of which will come from Ontario. Using standard industry multipliers for indirect and induced employment, the total annual employment during the operations phase is estimated to be 2,289 FTE or person years, 1,182 of which will come from Ontario. Over the 11 year operations phase, the estimated direct, indirect and indirect employment is 25,179 FTE or person-years, 13,002 of which will come from Ontario.

Table ES-8: Employment Opportunities for the Construction and Operations Phases of the Project

Phase	Provincial Direct	National Direct	Provincial direct & indirect	National direct, indirect & induced
Construction Phase				
Project workforce (FTE over 30 months)	780	1,040		
Supplier/service industry employment	2,335	4,004		
Total Employment (Years 1-3)	**3,115**	**5,044**	**4,287**	**9,557**
Operations Phase				
Average annual Project workforce (FTE per year)	440	550		
Average annual supplier/service industry employment	428	642		
Annual Total Employment	**868**	**1,192**	**1,182**	**2,289**
Total Employment over 11 years	**9,548**	**13,112**	**13,002**	**25,179**

OHRG is committed to providing economic benefits to Aboriginal communities. Initiatives to maximize the benefits the Project will have on Aboriginal communities include:

- Scholarships.
- Partnerships with local academic institutions.
- On the job training.
- A hire local priority policy.
- Targeted employment, training and business opportunities.

OHRG aims to promote the utilization of Aboriginal enterprises whenever possible in supplying goods and/or services required during each phase of the project. The criteria used for the evaluation and awarding of all contracts by OHRG include cost competitiveness, continuity of supply, quality of work and timeliness.

OHRG will provide employment opportunities for the Project where possible and commercially reasonable. Members of the surrounding local Aboriginal communities will take priority respecting employment opportunities so long as they meet the requisite skills, education, experience and other job qualifications of a particular position. Employment opportunities, and the corresponding job postings, will be communicated to the local Aboriginal communities in a timely manner.

OHRG provided approximately $22,050 in direct investments to Aboriginal communities in 2012. A variety of events and organizations were sponsored by OHRG to encourage the promotion of Aboriginal values and way of life. Sponsorships of sports events and community gatherings were also provided. These investments represent opportunities for ongoing cultural support of the identified Aboriginal communities throughout Project operations.

Closing Statement

The project will result in permanent changes to the landscape in the MSA, including a permanent WRMF, TMF and Flooded Pit that will remain in Post-Closure. That considered, based on the findings of the environmental assessment and planned mitigation measures, as documented in this EIS/EA Report, the Hammond Reef Gold Project can be developed such that there is no significant residual impact to the biophysical environment. That is to say, habitat will be compensated for, where necessary, and the lands of the LSA and RSA, excluding the MSA, will be suitable for continued recreational enjoyment with no project related impacts to overall ecological or human health.

Furthermore, it is considered that the Project provides substantial socio-economic benefits to Aboriginal people, the local community and the region and has garnered significant community support through ongoing partnerships and information sharing. The Project represents a major investment of capital into Ontario and Canada's economy. Based on capital costs of OHRG's Canadian Malartic Mine, it is estimated that the total capital cost of the proposed Hammond Reef Gold Project would be $1.4 billion ($2012 Canadian). The Project is expected to return $36.2 million in personal income tax revenues to the province of Ontario over the 30 month construction phase. Federal government income tax revenues during the construction phase are estimated to be another $115.5 million. Throughout the 11 year operations phase, annual provincial personal taxes paid would be approximately $12.7 million, while federal taxes would amount to another $18.1 million, for an annual total of $30.8 million.