MARATHON GOLD

Environmental Assessment Registration/ Project Description

Valentine Gold Project
Newfoundland and Labrador

April 5, 2019

Valentine Gold Project Registration / Project Description

Submitted by:
Marathon Gold Corporation
10 King Street East, Suite 501
Toronto, ON, Canada, M5C 1C3

Prepared with the assistance of:
Stantec Consulting Ltd.
141 Kelsey Drive
St. John's, NL A1B 0L2
Tel: (709) 576-1458
Fax: (709) 576-2126

April 5, 2019

Table of Contents

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOS

Executive Summary

Marathon Gold Corporation (Marathon) is planning to develop the Valentine Gold Project (the Project), a gold mine near Valentine Lake, located in the west-central region of the Island of Newfoundland, approximately 55 km southwest of the town of Millertown, NL. The Project is comprised of four potential mining areas: the Leprechaun, Sprite, Marathon, and Victory Deposits. Standard surface mining techniques will be used to mine material from open pits. High-grade material (9,000 t of material per day) will be processed through a mill where it will be crushed, milled and put through gravity, floatation, and cyanidation processes to recover the gold. Tailings will be treated to remove cyanide prior to disposal in an engineered tailings storage facility. Low grade material from the open pits (9,000 t of material per day) will be sent to the heap leach process area where it will be crushed, and the gold will be recovered through heap leaching and carbon in column gold adsorption. Gold doré will be shipped from site to market in secured trucks.

In addition to the open pit mines, waste rock disposal piles, crushing and stockpiling areas, heap leach processing and conventional milling and processing facilities, and tailings management area, the Project will include personnel accommodations, and supporting infrastructure including roads, power lines, buildings, and water and effluent management facilities. Construction of the Project is expected to take place over a period of 18 to 24 months. This would be followed by an estimated mine operation life of 13 years. The Project will operate 24 hours a day, seven days a week on a 12-hr shift basis. Rehabilitation and closure planning are a requirement under the Newfoundland and Labrador *Mining Act* (Gov NL 1999). A plan will be developed as part of the environmental assessment process and will describe the methods to restore the site to as close to pre-development conditions as practicable or to a suitable condition for an alternate use upon Project closure.

Given the nature and planned production rate of the Project, it is subject to environmental assessment requirements under both the federal *Canadian Environmental Assessment Act,* 2012 (CEAA 2012) and the provincial *Environmental Protection Act*, 2002. Submission of this Registration / Project Description will initiate both the federal and provincial assessment processes, informing both governments of Marathon's intention to develop this Project. It is also intended to provide regulators with sufficient information regarding the proposed undertaking, the existing baseline conditions and the potential effects of the Project so as to allow a determination regarding the nature of the environmental assessment process required before Project approvals can be granted. A separate Summary of the Project Description has been submitted to the CEA Agency in English and French as per the requirements of the federal EA process.

Marathon has 100% ownership of the Project, and the Project is located on property for which Marathon currently holds mineral licences. Marathon has been actively exploring its licences since 2010, with the goal of developing the site into an active gold mine should the results of exploration and economic assessments demonstrate its financial viability. In October 2018, an updated Preliminary Economic Assessment (Lycopodium 2018) of the Project was completed and showed that the Project has robust economics and has recommended continued development of the Project. Marathon is not seeking federal or provincial funding for the Project.

This Project is anticipated to generate over 1 million person-hours of work during construction and peak employment during operation of 466 people, with an average employment rate of 442 people. In addition to employment benefits, this Project represents a direct benefit to the province through mining, corporate, gasoline, and other taxes over the life of the Project, estimated at over $480 million CDN. In addition, further benefits to the province would result from the Project as a result of the indirect services required for the Project and its employees, including construction, supply and technical services, security and catering services, and the potential for spinoff businesses. Overall, this Project development and operation is consistent with the provincial government's goal of continuing to support and encourage the growth of the mining industry in the province as detailed in their Mining the Future 2030 plan.

Marathon will develop specific protocols as part of an overall Environmental Management System to facilitate the execution of the site development in an environmentally responsible and safe manner. As Marathon moves forward with the Project, it will also develop a Diversity, Gender and Inclusion policy that encompasses all aspects of its business, including but not limited to, the Board of Directors, employees, contractors, and suppliers. This new policy will provide the foundation for a future Diversity, Gender and Inclusion Plan that will be implemented for the development and operation of the Project. Marathon also understands that consultation with all stakeholders who may have an interest in, or be affected by the Project, is key to operating within a sustainable development framework. To date, Marathon has conducted relatively informal stakeholder consultation. However, with a better-defined Project scope and initiation of the environmental assessment process, Marathon will now formally engage stakeholders as part of the Project planning and regulatory stage of Project development.

Since 2010, a number of environmental baseline studies have already been conducted in the area of the Project to help characterize existing conditions relative to fish and fish habitat, songbirds, waterfowl, wildlife, vegetation and rare plants, ecological land classification, hydrology and surface water, hydrogeology, land and resource use and historic resources. Additional work will also be completed to address any remaining data gaps.

Based on the existing baseline information collected to date and Project activities and infrastructure, it is anticipated that should an Environmental Impact Statement be required, it would likely require consideration of the following valued components: Atmospheric Environment, Geology and Landforms, Surface Water Resources, Groundwater Resources, Vegetation and Wetlands, Fish and Fish Habitat, Avifauna, Terrestrial Wildlife, Historic Resources, Land and Resource Use, Community Services and Infrastructure, and Employment and Economy.

The following table indicates how the specific requirements for a Project Description under the federal assessment process have been addressed.

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
General Information				
1	1.2.1	The name of the project	Name of the designated project.	1.1
1	1.1	The nature of the project	Describe the nature of the designated Project, and proposed location	1.0, 2.1, 2.4
1	1.1	The proposed location of the project	Proposed location of the project.	1.0, 2.4
2	1.2	The proponent's name and contact information and the name and contact information of their primary representative for the purpose of the description of the project.	Provide proponent contact information: a) Name of the designated Project. b) Name of the proponent. c) Address of the proponent. d) Chief Executive Officer or equivalent (include name, official title, email address and telephone number). e) Principal contact person for purposes of the Project description (include name, official title, email address and telephone number).	1.1, 1.2
3	1.3	A description of and the results of any consultations undertaken with any jurisdictions and other parties including Aboriginal peoples and the public.	Provide a list of any jurisdictions and other parties including Aboriginal groups and the public that were consulted during the preparation of the Project description. (A description of the result of any consultations undertaken is to be provided in sections 6 and 7).	2.7, 6.0
4	1.4	The environmental assessment and regulatory requirements of other jurisdictions.	Provide information on whether the designated Project is subject to the environmental assessment and/or regulatory requirements of another jurisdiction(s).	1.3, 2.6
4.1	1.5	A description of any environmental study that is being or has been conducted of the region where the project is to be carried out.	Provide information on whether the designated Project will be taking place in a region that has been the subject of a regional environmental study. Proponents are advised to contact the Agency during the preparation of the project description for information regarding any regional environmental studies that may be relevant.	The Project Area has not been subject to regional environmental assessment

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
Project Information				
5	2.1	A description of the Project's context and objectives.	Provide a general description of the project, including the context and objectives of the project. Indicate whether the designated project is a component of a larger project that is not listed in the *Regulations Designating Physical Activities.*	2.0
6	2.2	The provisions in the schedule to the *Regulations Designating Physical Activities* describing the project in whole or in part.	Indicate the provisions in the schedule to the *Regulations Designating Physical Activities* that describe the designated physical activities that are proposed to be carried out as part of the designated project.	1.3
7	2.3.1	A description of the physical works that are related to the project including their purpose, size and capacity.	Provide a description of the components associated with the proposed project, including: Physical works associated with the designated project (e.g., large buildings, other structures, such as bridges, culverts, dams, marine transport facilities, mines, pipelines, power plants, railways, roads, and transmission lines) including their purpose, approximate dimensions, and capacity. Include existing structures or related activities that will form part of or are required to accommodate or support the designated project.	3.1 to 3.3
8	2.3.2	The anticipated production capacity of the project and a description of the production processes to be used, the associated infrastructure and any permanent or temporary structures.	Anticipated size or production capacity of the designated project, with reference to thresholds set out in the *Regulations Designating Physical Activities*, including a description of the production processes to be used, the associated infrastructure, and any permanent or temporary structures. The production capacity does not refer to the planned production capacity of a project but the maximum production capacity based on the project's design and operating conditions	3.3
	2.3.3		If the designated project or one component of the designated project is an expansion, describe the size and nature of the expansion with reference to the thresholds set out in the *Regulations Designating Physical Activities.*	Not Applicable

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
9	2.3.4	A description of all activities to be performed in relation to the project.	A description of the physical activities that are incidental to the designated project. In determining such activities, the following criteria shall be taken into account: • nature of the proposed activities and whether they are subordinate or complementary to the designated project; • whether the activity is within the care and control of the proponent; • if the activity is to be undertaken by a third party, the nature of the relationship between the proponent and the third party and whether the proponent has the ability to "direct or influence" the carrying out of the activity; • whether the activity is solely for the benefit of the proponent or is available for other proponents as well; and • the federal and/or provincial regulatory requirements for the activity.	2.6, 3.1 to 3.3
10	2.4	A description of any waste that is likely to be generated during any phase of the project and of a plan to manage that waste.	Provide a description of any waste likely to be generated during any phase of the designated project and plans to manage that waste, including the following: a) Sources of atmospheric contaminant emissions during the designated project phases (focusing on criteria air contaminants and greenhouse gases, or other non-criteria contaminants that are of potential concern) and location of emissions. b) Sources and location of liquid discharges. c) Types of wastes and plans for their disposal (e.g., landfill, licensed waste management facility, marine waters, or tailings containment facility).	3.1, 3.6

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
11	2.5	A description of the anticipated phases of and the schedule for the Project's construction, operation, decommissioning, and abandonment.	Provide a description of the timeframe in which the development is to occur and the key project phases, including the following: a) Anticipated scheduling, duration and staging of key project phases, including preparation of the site, construction, operation, and decommissioning and abandonment. b) Main activities in each phase of the designated project that are expected to be required to carry out the proposed development (e.g., activities during site preparation or construction might include, but are not limited to, land clearing, excavating, grading, de-watering, directional drilling, dredging and disposal of dredged sediments, infilling, and installing structures).	3.2 to 3.4
Project Location				
12	3.0	A description of the Project's location, including:	A description of the designated project's location, including:	2.4
12(a)	3.1.1	Geographic coordinates;	Coordinates (i.e. longitude/latitude using international standard representation in degrees, minutes, seconds) for the centre of the facility or, for a linear project, provide the beginning and end points	2.4
12(b)	3.1.2, 3.1.3	Site maps produced at an appropriate scale in order to determine the project's overall location and the spatial relationship of the project components;	Site map/plan(s) depicting location of the designated project components and activities. The map/plan(s) should be at an appropriate scale to help determine the relative size of the proposed components and activities.	2.1, 3.1
			Map(s) at an appropriate scale showing the location of the designated project components and activities relative to existing features, including but not limited to:	
			• watercourses and waterbodies with names where they are known;	Figure 2-2
			• linear and other transportation components (e.g., airports, ports, railways, roads, electrical power transmission lines and pipelines);	Figure 2-1
			• other features of existing or past land use (e.g., archaeological sites, commercial development, houses, industrial facilities, residential areas and any waterborne structures);	4.3

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
			• location of Aboriginal groups, settlement land (under a land claim agreement) and, if available, traditional territory;	4.3
			• federal lands including, but not limited to National parks, National historic sites, and reserve lands;	2.4
			• nearby communities;	2.4, 4.3
			• permanent, seasonal or temporary residences;	4.3
			• fisheries and fishing areas (i.e., Aboriginal, commercial and recreational);	4.3
			• environmentally sensitive areas (e.g., wetlands, and protected areas, including migratory bird sanctuary reserves, marine protected areas, National Wildlife areas, and priority ecosystems as defined by Environment Canada);	4.0
			• provincial and international boundaries.	Figure 2-1
	3.1.4		Photographs of work locations to the extent possible.	Appendix A
12(c)	3.2	The legal description of land to be used for the project, including the title, deed or document and any authorization relating to a water lot;	To the extent that is known at this time, describe the ownership and zoning of land and water that may be affected by the project, including the following: zoning designations.	4.3
			legal description of land to be used (including information on subsurface rights) for the designated project, including the title, deed or document and any authorization relating to a water lot.	2.4
12(d)	3.1.5	The project's proximity to: • any permanent, seasonal or temporary residences;	Proximity of the designated project to: • any permanent, seasonal or temporary residences;	2.4, 4.3
12(e)	3.1.5	traditional territories as well as lands and resources currently used for traditional purposes by Aboriginal peoples;	traditional territories, settlement land (under a land claim agreement) as well as lands and resources currently used for traditional purposes by Aboriginal peoples; and	4.3
12(f)	3.1.5	any federal lands.	any federal lands.	2.4

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
	3.2.3		Any applicable land use, water use (including ground water), resource management or conservation plans applicable to or near the project site. Include information on whether such plans were subject to public consultation.	4.3
	3.2.4		Describe whether the designated project is going to require access to, use or occupation of, or the exploration, development and production of lands and resources currently used for traditional purposes by Aboriginal peoples.	4.3
Federal Involvement				
13	4.1	A description of any financial support that federal authorities are, or may be, providing to the project.	Describe if there is any proposed or anticipated federal financial support that federal authorities are, or may be, providing to support the carrying out of the designated project.	2.5
14	4.2	A description of any federal land that may be used for the purpose of carrying out the project.	Describe any federal lands that may be used for the purpose of carrying out the designated project. This is to include any information on any granting of interest in federal land (i.e., easement, right of way, or transfer of ownership).	2.5
15	4.3	A list of the permits, licences or other authorizations that may be required under any Act of Parliament to carry out the project.	Provide a list of any federal permits, licences or other authorizations that may be required to carry out the project.	2.6
Environmental Effects				
16	5.1	A description of the physical and biological setting.	A description of the physical and biological setting, including the physical and biological components in the area that may be adversely affected by the project (e.g., air, fish, terrain, vegetation, water, wildlife, including migratory birds, and known habitat use).	4.1, 4.2
17 (a)	5.2	A description of any changes that may be caused, as a result of carrying out the project, to a) fish as defined in section 2 of the *Fisheries Act* and fish habitat as defined in subsection 34(1) of that Act	A description of any changes that may be caused as a result of carrying out the designated project to: a) fish and fish habitat, as defined in the *Fisheries Act;* b) marine plants, as defined in the *Fisheries Act*;	5.1

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
17(b)		b) aquatic species, as defined in subsection 2(1) of the Species at Risk Act		5.1
17(c)	5.2	c) migratory birds, as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*	a) migratory birds, as defined in the *Migratory Birds Convention Act*, *1994*	5.1
18	5.3	A description of any changes to the environment that may occur, as a result of carrying out the project, on federal lands, in a province other than the province in which the project is proposed to be carried out or outside of Canada.	A description of any changes to the environment that may occur, as a result of carrying out the designated project, on federal lands, in a province other than the province in which the project is proposed to be carried out, or outside of Canada	5.1
19	5.4	Information on the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	A description of the effects on Aboriginal peoples of any changes to the environment that may be caused as a result of carrying out the designated project, including effects on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.	5.1

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
Proponent Engagement and Consultation with Aboriginal Groups				
	6.1		A list of Aboriginal groups that may be interested in, or potentially affected by, the designated project.	4.3, 6.1
	6.2		A description of the engagement or consultation activities carried out to date with Aboriginal groups, including:	6.1
	6.2		names of Aboriginal groups engaged or consulted to date with regard to the designated project;	6.1
	6.2		date(s) each Aboriginal group was engaged or consulted; and	6.1
	6.2		means of engagement or consultation (e.g., community meetings, mail or telephone).	6.1
	6.3		An overview of key comments and concerns expressed by Aboriginal groups identified or engaged to date, including any responses provided to these groups.	6.1
	6.4		A consultation and information-gathering plan that outlines the ongoing and proposed Aboriginal engagement or consultation activities, the general schedule for these activities and the type of information to be collected (or, alternatively, an indication of why such engagement or consultation is not required).	6.1
	6.4		The proponent is encouraged to provide background information on Aboriginal groups' potential or established Aboriginal or treaty rights. The proponent is also encouraged to provide information on the impact area of the designated project and how it overlaps with uses by Aboriginal groups that have potential or established Aboriginal or treaty rights.	6.1
Consultation with the Public and Other Parties (other than Aboriginal Consultation Included Above)				
	7.1		An overview of key comments and concerns expressed to date by stakeholders and any responses that have been provided.	6.1
	7.2		An overview of any ongoing or proposed stakeholder consultation activities.	6.1
	7.3		A description of any consultations that have occurred with other jurisdictions that have environmental assessment or regulatory decisions to make with respect to the project.	6.1

Table ES-1 Concordance with CEAA Regulation SOR 2012-148 and the Guide to Preparing a Description of a Designated Project under CEAA 2012 (March 2015)

Regulation Clause	Guideline Section	Regulation SOR 2012-148 Requirement	Guidance to Support Regulation Requirement	Project Description Section(s)
Summary				
20	8.0	Summary of the information required under section 1 to 19	Proponents are to include as part of the project description an executive summary that summarizes the information identified in Sections 1 to 7 of [the] Guide. Under CEAA 2012, the Agency is required to consult the public on a summary of the project description that has to be posted on the Agency's Internet site in both of Canada's official languages as required under the *Official Languages Act*. As a result, in order to be in a position to initiate the screening phase in a timely manner, the executive summary is to be prepared and submitted to the Agency in both English and French.	Project Description Summary Document

Abbreviations

AACEI	Association for the Advancement of Cost Engineering International
AARL	Anglo-American Research Laboratory
AC CDC	Atlantic Canada Conservation Data Centre
A_i	Bond Abrasion Index
ARD/ML	Acid Rock Drainage/Metal Leaching
ATV	All-terrain vehicle
dBA	A-weighted decibels
BV	Bed Volumes
BW_i	Bond Ball Mill Work Index
CDA	Canadian Dam Association
CEA Agency	Canadian Environmental Assessment Agency
CIC	Carbon in Column
CIL	Carbon in Leach
cm	Centimeter
CN_{WAD}	Weak acid dissociable cyanide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CW_i	Bond Crusher Work Index
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EEM	Environmental Effects Monitoring
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
EMS	Environmental Management System
EPCM	Engineering, Procurement, Construction Management
EPP	Environmental Protection Plan
ESA	*Endangered Species Act*
FEL	Front End Loader
FNI	Federation of Newfoundland Indians
GHGs	Greenhouse Gas
HADD	Harmful Alteration, Disruption or Destruction of Fish Habitat
HDPE	High Density Polyethylene
hr(s)	Hour(s)
HV	High Voltage
HVAC	high-voltage alternating current
H:V	Horizontal to Vertical

Hz	Hertz
ICR	Intensive Cyanidation Reactor
ISO	International Standards Association
km	Kilometer
kV	Kilovolt
L	Liter
LV	Low Voltage
m^3/h	Cubic Meter per Hour
m	Meter
MAC	Mining Association of Canada
MARC	Maintenance and Repair Contract
mbgs	Meters Below Ground Surface
MCC	Motor Control Centres
min	Minute
Mm	Million Meters
mm	Millimeter
MDMER	Metal and Diamond Mining Effluent Regulations
MSDS	Material Safety Data Sheet
Mtpa	Million Tonnes Per Annum
MV	Medium Voltage
MW	Megawatt
NL	Newfoundland and Labrador
NLDFLR	Newfoundland and Labrador Department of Fisheries and Land Resources
NLDMAE	Newfoundland and Labrador Department of Municipal Affairs and Environment
NLDNR	Newfoundland and Labrador Department of Natural Resources
NLDTCII	Newfoundland and Labrador Department of Tourism, Culture, and Industrial Innovation
NL-EHJV	Newfoundland and Labrador Eastern Habitat Joint Venture
NLOA	Newfoundland and Labrador Outfitters Association
NLOWE	Newfoundland and Labrador Organization of Women Entrepreneurs
NOC	National Occupation Codes
NS	Nova Scotia
OLTC	on-line tap changer
ONAF	Oil Natural Air Forced
ONAN	Oil Natural Air Natural
PAG	Potentially Acid Generating
PAX	Potassium Amyl Xanthate
PDA	Project Development Area
PEA	Preliminary Economic Assessment

POL	Petroleum, Oil, Lubricants
ROM	Run-of-Mine Material
SAG	Semi-Autogenous Grinding
SAEN	Salmonid Association of Eastern Newfoundland
SAR	Species at risk
SARA	*Species at Risk Act*
SMBS	Sodium Metabisulphite
SOCC	Species of Conservation Concern
SPAWN	Salmon Preservation Association for the Waters of Newfoundland
SSAC	Species Status Advisory Council
t	Tonnes
TC	Transport Canada
t/h	Tonnes per hour
tpd	Tonnes Per Day
TSF	Tailing Storage Facility
UPS	Uninterruptible Power Source
V	Volt
VC	Valued Component
VFD	Variable Frequency Drives
VLIC	Valentine Lake Intrusive Complex
VMS	Volcanogenic Massive Sulfide
VSD	Variable-speed Drive

1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) is planning to develop a gold mine at Valentine Lake, located in the west-central region of the Island of Newfoundland, southwest of the town of Millertown, Newfoundland and Labrador (NL). The Valentine Gold Project (the Project) will consist primarily of open pit mines, waste rock disposal piles, crushing and stockpiling areas, heap leach processing and conventional milling and processing facilities, tailings management area, personnel accommodations, and supporting infrastructure including roads, power lines, buildings, and water and effluent management facilities. This document is intended to meet the requirements of a Registration of an undertaking pursuant to the provincial *Environmental Protection Act*, 2002 (Gov NL 2002a) and a Project Description pursuant to the *Canadian Environmental Assessment Act*, 2012 (Government of Canada 2012a).

This report is based in large part on the Preliminary Economic Assessment (PEA) (Lycopodium 2018) prepared for the Project in October 2018 by Lycopodium Minerals Canada Ltd (Lycopodium), with input from John T. Boyd Company (BOYD), Apex Geoscience Ltd., and Stantec Consulting Ltd (Stantec). In addition, a number of environmental baseline studies have been completed for the Project. The information presented in this report draws upon this Project-specific data, as well as publicly-available information.

1.1 Name of Undertaking

Valentine Gold Project

1.2 Proponent Information

Marathon is a Toronto-based gold exploration company, with 100% ownership of the Valentine Gold Project. It is a public, advanced exploration stage company whose common shares trade on the TSX Exchange (MOZ) and OTCQX (MGDPF) in the USA. Marathon was incorporated in 2010 and has its head office in Toronto with satellite offices in Pasadena and Mt. Pearl, NL. Contact information is contained in Table 1-1 and additional corporate information can be found at www.marathon-gold.com.

Table 1-1 Contact Details for Marathon Gold Corporation

Title	Contact Details
President and CEO	Phillip C. Walford, P.Geo. 10 King Street East, Suite 501 Toronto, ON, Canada, M5C 1C3 Phone: +1 (416) 987-0711 pwalford@marathon-gold.com
Principal Contact for the Purposes of the Environmental Assessment (EA)	James Powell, M.Eng. P.Eng. Director of Environment and Stakeholder Engagement P.O. Box 4006, Pearlgate PO, Mt. Pearl, NL, A1N 0A1 Phone: +1 (709) 730-5046 jpowell@marathon-gold.com

Since 2010, Marathon's work has been focused on its Valentine Gold property, which is currently accessible year-round by road. Marathon maintains a fully permitted, 60-person, all-season exploration camp at the 240 km^2 property.

Marathon has two other properties in its portfolio. An exploration property with potential for gold and base metals located on the Baie Verte Peninsula in north-central NL is approximately 13 km south of the currently producing Point Rousse Property operated by Anaconda Mining Inc. The second property is a historic gold producing property in Oregon, USA.

1.3 Project Regulatory Framework

Marathon plans to develop and operate an open pit gold mine with a nominal throughput of 9,000 tonnes (t) of material per day for the milling facility and 9,000 t of material per day for the heap leach facility, equivalent to 6.0 million tonnes per annum (Mtpa). It will therefore be subject to legislative requirements under both the federal *Canadian Environmental Assessment Act,* 2012 (CEAA 2012) and the provincial *Environmental Protection Act*, 2002, as follows:

- The Project is captured under Section 16 (c) of the *Regulations Designating Physical Activities*, 2012 (Government of Canada 2012b) as a gold mine, other than a placer mine, with an ore production of 600 t/d or more and will therefore require a description of the designated project be submitted to the Canadian Environmental Assessment Agency (CEA Agency).
- The Project is included under Section 33(2) of the provincial *Environmental Assessment Regulations*, 2003 (Gov NL 2003a). As a designated undertaking, it must be registered with the Minister of Municipal Affairs and Environment.

Although there is no formal harmonization agreement between the province and the federal government, a proponent is typically permitted to prepare a single set of environmental assessment (EA) documents that address the requirements of both levels of government. The purpose of this Registration / Project Description is therefore to satisfy the federal regulatory requirements pursuant to the *Prescribed Information for the Description of a Designated Project Regulations* (Government of Canada 2012c) and the provincial requirements for a registration of an undertaking pursuant to the *Environmental Assessment Regulations*. Submission of the Registration / Project Description serves to initiate both the federal and provincial EA processes, informing both governments of the proponent's intention to develop a project. It is also intended to provide regulators with sufficient information regarding the proposed undertaking, the existing baseline conditions, and the potential effects of a project so as to allow a determination regarding the nature of the EA process required before Project approvals can be granted. A separate Summary of the Project Description has been submitted to the CEA Agency in English and French as per the requirements of the federal EA process.

2.0 PROJECT INFORMATION

2.1 Overview of the Project

The Project is located in the west-central region of the Island of Newfoundland, approximately 55 km southwest of Millertown, NL (Figure 2-1). The Project Development Area (PDA) is accessed by an existing gravel access road, approximately 80 km in length, south from the Town of Millertown, which is situated approximately 6 km off the Buchans Highway. This access route in turn provides reliable road access to the Trans-Canada Highway, which transects the Island of Newfoundland from east to west and connects the major populated centres, airports, and sea ports. Access to the Project is from the northeast side of the property via the existing Crown Lands access road. Future site access will be via the main security gate near the process plant. The process plant site will be fenced to clearly delineate the mine area and deter unauthorized access.

The proposed development is comprised of four potential mining areas: the Leprechaun, Sprite, Marathon, and Victory Deposits. Standard surface mining techniques will be used to mine gold ore from open pits. High-grade ore material (9,000 t per day or tpd) will be processed through the mill where it will be crushed, milled and put through floatation and cyanidation processes to recover the gold. Tailings will be treated in the process plant area to remove the cyanide and subsequently deposited in an engineered tailings storage facility. Low grade material from the open pits (9,000 tpd) will be sent to the heap leach area where it will be crushed, and the gold recovered through heap leaching and carbon in column gold adsorption. Gold doré bars will be shipped from site to market in secured trucks.

Other Project components and activities that are associated with the primary mining, milling, and processing activities include site and haul road construction and maintenance, mine waste rock management, electrical power supply and distribution, process and potable water supply and distribution, site wide stormwater and effluent management, treatment, and discharge, fuel storage and fueling stations, mine and plant workshops and services, administrative office, personnel accommodations and lunchrooms, and security.

A preliminary layout of mine infrastructure is shown in Figure 2-2. The location of specific components may be altered somewhat based on future regulator and stakeholder engagement, project planning and detailed engineering, however it is currently expected that the Project footprint will be contained within the PDA as shown in Figure 2-2. The Project Area, also shown in Figure 2-2, is defined by Marathon's mineral license boundaries, and this area is considered in the context of a larger study area for some of the environmental baseline work described herein.

The Project components and activities associated with construction, operations, and rehabilitation and closure are further defined in Section 3.

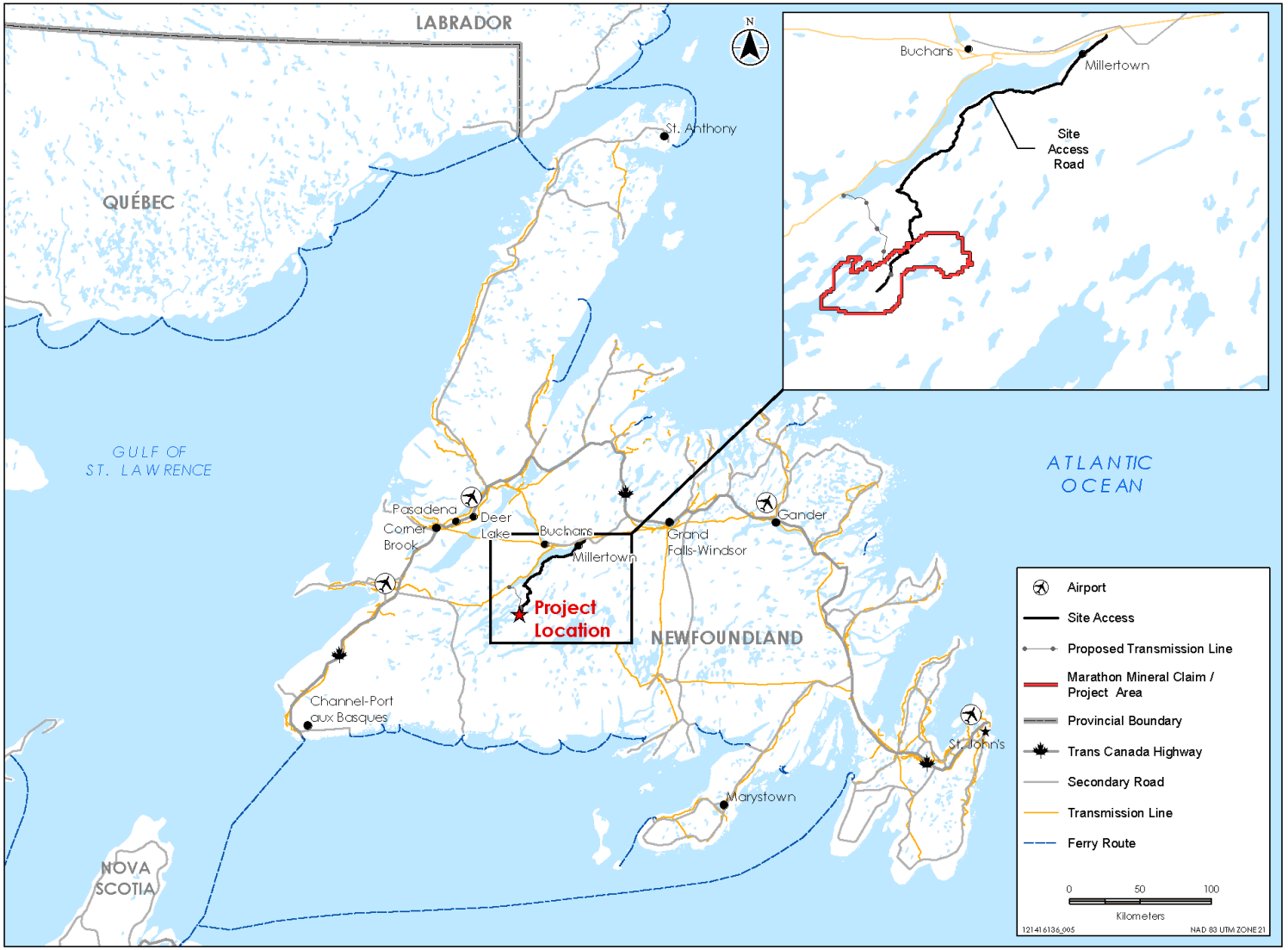

Figure 2-1 Location of Valentine Gold Project

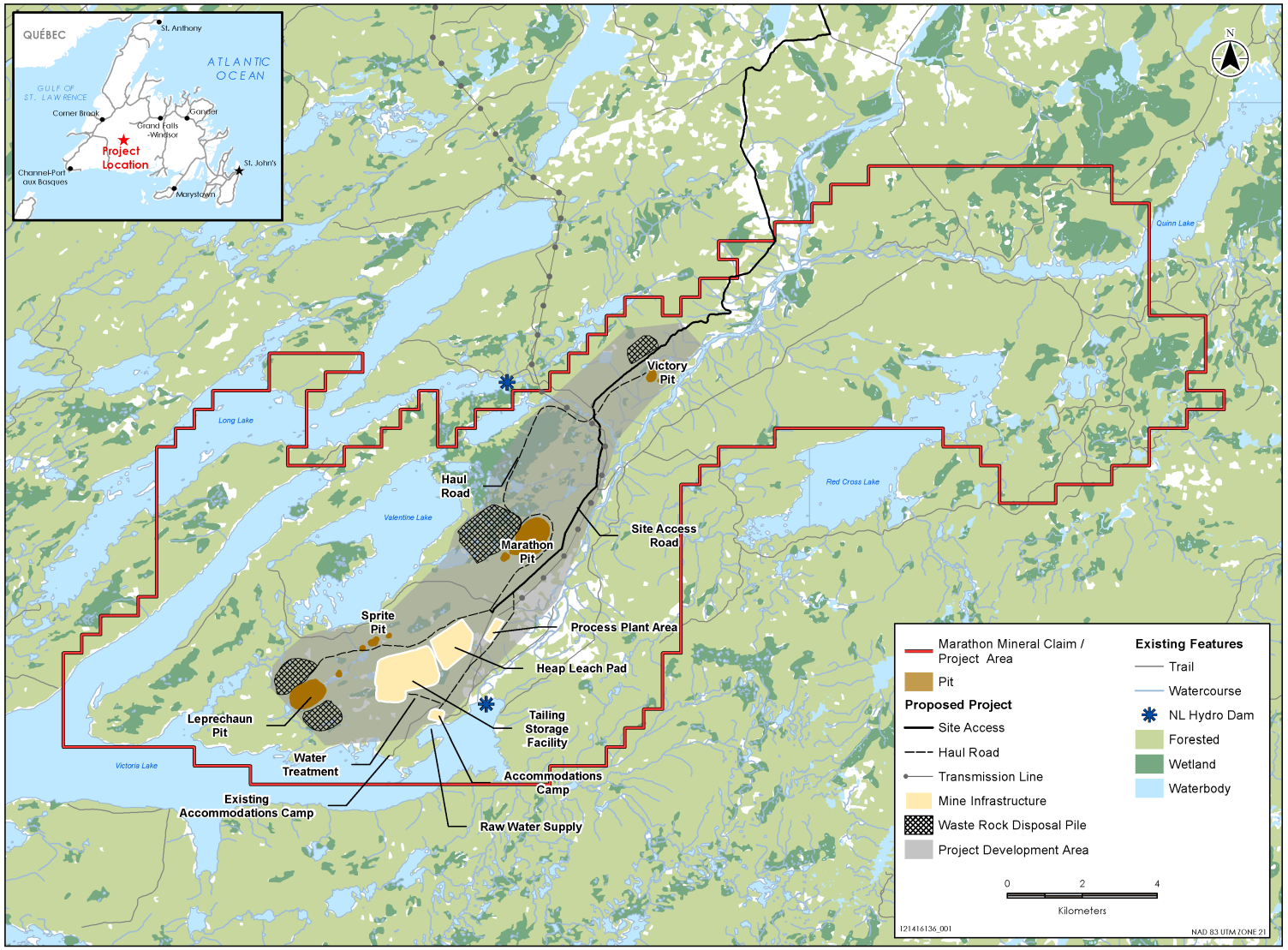

Figure 2-2 Project Development Area / Project Area

Upon cessation of mining, the operation will be closed, and the site components will be rehabilitated in accordance with applicable regulations at the time of closure. Rehabilitation and closure planning is a requirement under the Newfoundland and Labrador *Mining Act* (Gov NL 1999). A Rehabilitation and Closure Plan has not yet been developed for this Project. A formal plan will be completed as part of the EA and progressive engineering, and will describe the methods to restore the site to as close to pre-development conditions as practicable or to a suitable condition for an alternate use upon Project closure. It will outline the methods to be used for progressive and closure rehabilitation, and post-closure monitoring. Further information regarding the general approach to rehabilitation and closure is provided in Section 3.4.

2.2 Purpose, Rationale and Need for the Undertaking

The property has historically been explored by several mining companies since the 1960s, with its first recognition as a gold prospect occurring in 1983. It now comprises 14 contiguous mineral licenses held by Marathon, for a landholding of 240 km^2, also referred to for the purposes of the EA as the Project Area. Under the provisions of the *Mineral Act* (Gov NL 1990), Marathon has the right to conduct exploration for minerals within their licences. Since 2010, Marathon has been actively exploring within these licenses, with the goal of developing the site into an active gold mine should the results of exploration and the PEA (Lycopodium 2018) demonstrate its financial viability. Marathon's exploration work between 2010 and the present included expanding the size of the Leprechaun deposit and making significant new discoveries of the Marathon, Sprite, and Victory deposits. Based on the exploration results, the financial analysis of the PEA (Lycopodium 2018) has demonstrated that the Project has robust economics and recommended the continued development of the Project.

In addition to the return on investment to shareholders and investors, development of this Project would generate substantial employment, expenditures and associated benefits to the province. The mining industry is a major contributor to the provincial economy, particularly in rural areas. The nearby towns of Millertown, Buchans, Badger, Grand Falls-Windsor, and Springdale have been actively supporting the mining industry, with several suppliers and contractors available to support the Project. Skilled mining personnel are available from within the province, as well as elsewhere in Canada. Mineral exploration companies and the provincial government have adopted proactive strategies to attract, recruit, diversify, and retain skilled workers associated with, and committed to, the mining industry.

Based on Project planning to date, the Project is anticipated to generate over 1 million person-hours (hrs) of work during construction, with peak employment during operation of 466 people and an average employment rate of 442 people. Refer to Section 3.7 for additional information on Project employment and expenditures.

In addition to employment benefits, this Project represents a direct benefit to the province through mining, corporate, gasoline, and other taxes over the life of the Project, currently estimated at over $480 million CDN. In addition, further benefits to the province would result from the Project as a result of the indirect services required for the Project and its employees, including construction, supply and technical services, security and catering services, and the potential for spinoff businesses.

Overall, this Project development and operation is consistent with the provincial government's goal of continuing to support and encourage the growth of the mining industry in the province as detailed in their Mining the Future 2030 plan.

2.3 Alternatives to the Project

Marathon has two alternatives to proceeding with the development of this Project. It can:

- continue to conduct exploration and feasibility studies on the Property to further define the prospect, with the goal of developing the Project at a future date; or
- not develop the Project and stop exploration activities.

Given the results of the PEA, Marathon believes it has conducted the exploration activities and studies needed to justify progressing the Project through the EA process at this time. The latter option would not be consistent with corporate goals and objectives and would not provide return on investment to date.

While alternatives to the Project are limited, there are several alternatives within the Project that may be further assessed and refined as the Project proceeds through the EA and permitting processes. These include, but are not limited to, access road routing, production rates and related infrastructure sizing, further consideration of new and emerging technologies, and siting of Project infrastructure within the PDA.

2.4 Project Location and Setting

The Project is located in rural west-central Newfoundland, in the province of NL (Figure 2-1), approximately 45 km south of the nearest community of Buchans, and approximately 55 km southwest of the town of Millertown, or approximately 80 km by road.

The Project is accessed by road via Millertown, with provincial highways connecting Millertown and Buchans to the Trans-Canada Highway. It is anticipated that most materials, equipment, and supplies will be brought to the Project site by road from larger communities in Newfoundland, such as Grand Falls-Windsor and Gander, and ultimately via the Marine Atlantic-operated ferry which connects North Sydney, Nova Scotia (NS) with Port-aux-Basques on the west coast of the Island, approximately 540 km distance by road from the Project, or by ferry to Argentia, approximately 480 km by road. The Project is also located approximately 210 km from the airport in Gander and approximately 320 km from the airport in Deer Lake.

The center of the Property is located at Universal Transverse Mercator 494550 m Easting and 5362789 m Northing, Zone 21, North American Datum 1983, (NAD83 Zone 21). It is located within National Topographic System map sheets: 12A/06 and 12A/07. This part of the Island is boreal forest, characterized by mainly coniferous trees, with cold winters (average -4.5°C) and warm summers (average 16°C). It is a rural area, with a history of past mining exploration and development activities and other land and resource uses, including commercial forestry, outfitting, and recreational land use. The environmental setting of the Project Area is further described in Section 4.

As described in Section 2.2, the Project Area comprises 14 contiguous mineral licenses (Figure 2-3; Table 2-1), for a landholding of 240 km^2.These mineral licenses are 100% controlled by Marathon and are reportedly held in good standing. The PDA hosts four gold deposits, namely Leprechaun, Marathon, Sprite, and Victory, which are the focus of this Project, as well as several other early stage gold prospects. The collective deposits and occurrences are located within a 20 km long northeast trending zone (Figure 2-2). A number of photos of the site are contained in Appendix A.

Table 2-1 Valentine Property License Summary

License ID	Issuance Date	Years Held	Renewal Date	No. of Claims	Area km2	Expenditure Due Date
010899M	27-Apr-04	13	27-Apr-19	246	61.5	28-Apr-25
010943M	27-Apr-04	13	27-Apr-19	256	64	28-Apr-25
013809M	06-Sep-07	10	06-Sep-22	18	4.5	06-Sep-20
013810M	06-Sep-07	10	06-Sep-22	19	4.75	06-Sep-19
017230M	09-Feb-10	7	09-Feb-20	256	64	09-Feb-23
017231M	09-Feb-10	7	09-Feb-20	2	0.5	09-Feb-22
018687M	29-Mar-11	6	29-Mar-21	6	1.5	29-Mar-23
018688M	29-Mar-11	6	29-Mar-21	29	7.25	29-Mar-22
016740M	26-Nov-09	8	26-Nov-19	4	1	26-Nov-24
019443M	17-Oct-11	6	17-Oct-21	6	1.5	17-Oct-23
019444M	17-Oct-11	6	17-Oct-21	6	1.5	17-Oct-23
019628M	29-Dec-11	6	29-Dec-21	21	5.25	29-Dec-25
020482M	08-Oct-12	5	08-Oct-22	77	19.25	08-Oct-20
022477M	06-Nov-14	3	06-Nov-19	14	3.5	06-Nov-22
			Totals	**960**	**240**	

Source: Lycopodium (2018) as taken from DNR website October 29, 2018

Seasonal and temporary dwellings occur within the Project Area; there are 9 registered cabins, and one outfitter operating within the Project Area. Additional information on these seasonal dwellings is available in Sections 4.3.1 and 4.3.2. The PDA is also 120 km from the Miawpukek First Nation federal reserve at Conne River. Traditional land and resource use by Qalipu Mi'kmaq First Nation members has been documented near Victoria Lake (in the vicinity of the Project Area) (FNI 2002). Additional information is available in Section 4.3.4. There are no federal lands located within 200 km of the Project Area.

2.5 Funding and Federal Lands

Marathon has not applied for federal or provincial funding for the development or operation of this Project to date, however potential funding opportunities may be considered in the future. In general, it is anticipated that the bulk of the Project costs will be funded through private investors.

The Project will not occur on or involve the use of federal lands.

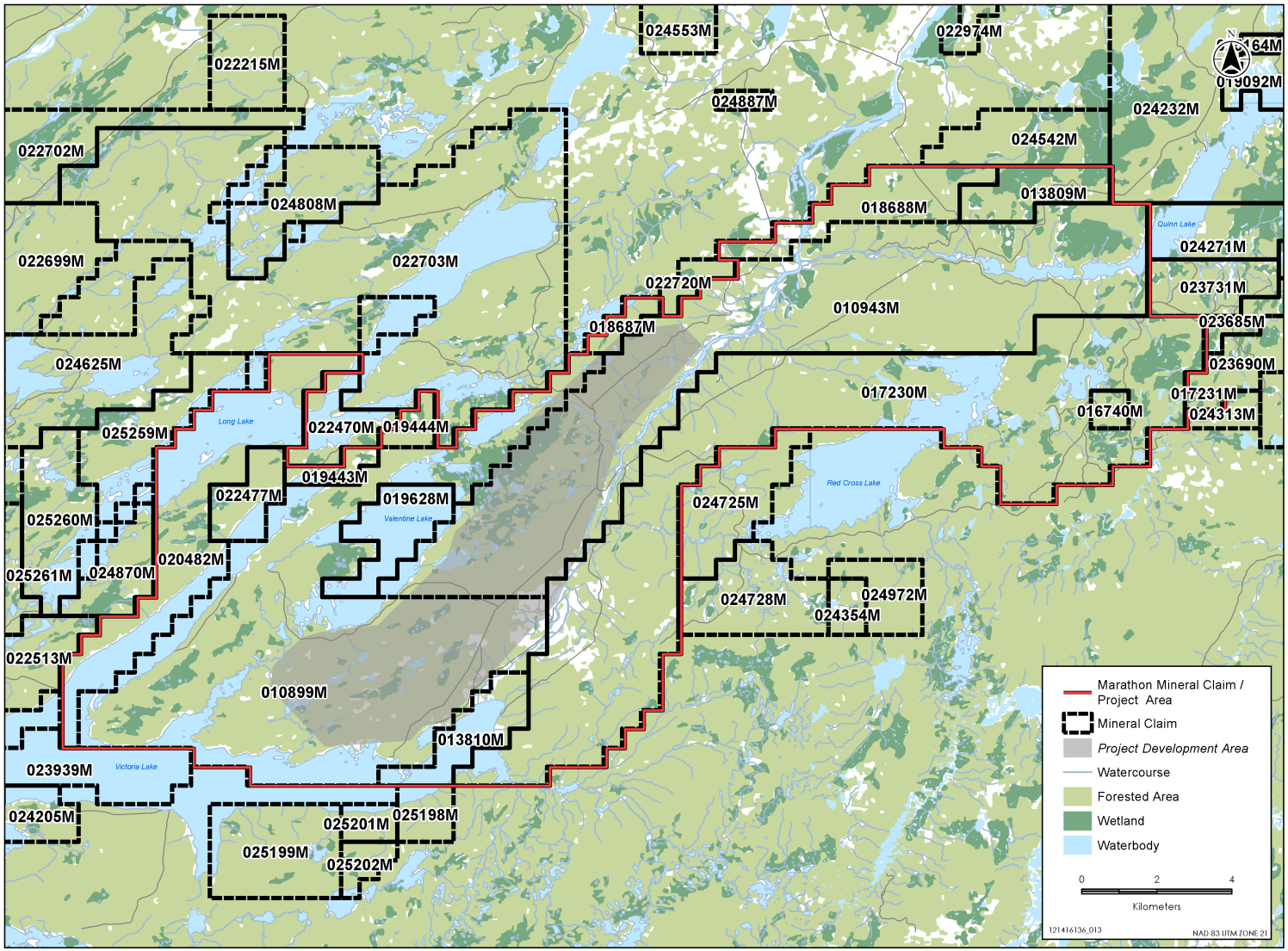

Figure 2-3 Marathon License Boundary and Adjacent Claims

2.6 Other Required Environmental Approvals and Permits

The primary environmental regulatory requirements of the provincial and federal governments is the EA, as discussed in Section 1.3. In addition to EA approval under CEAA 2012, the Project is subject to other federal legislation, including:

- *Canadian Environmental Protection Act, 1999*
- *Fisheries Act*
- *Migratory Birds Convention Act, 1994*
- *Species at Risk Act* (SARA)
- *Navigation Protection Act*

The federal and provincial governments have a responsibility to uphold legislation and regulations related to species at risk, and an EIS for this Project would assess the potential effects of the Project on these species and propose appropriate mitigation measures. It would also assess and propose mitigation for migratory birds, which are protected under the *Migratory Birds Convention Act,* along with their eggs, nests, and young.

Other required environmental permits and approvals are typically fulfilled once a release is granted from the EA review processes. These permits and approvals include water use authorizations, fish and fish habitat authorization, emissions and discharge approvals, approvals for placement of some Project components (e.g., tailings management, water control structures), and other Project development related items. Each of these permits or authorizations are applied for separately with relevant information included in the applications. Permits can only be issued after the Project is released from EA. Specific permits, approvals, and authorizations that may apply to the Project are listed below. Note that municipal approvals, authorizations, and permits are not anticipated, as the Project is not located within a municipality.

Table 2-2 provides a preliminary list of approvals, authorizations, and permits that may be required from various provincial and federal agencies for the Project. It is not considered exhaustive. Marathon currently has mineral licenses and a range of permits in place for their existing exploration activities and accommodations camp.

Table 2-2 Environmental Approvals, Authorizations, and Permits that May Be Required

Environmental Permit, Approval or Authorization Activity	Issuing/Approval Agency
Provincial	
Release from EA Process	NLDMAE – Minister
Approval of Environmental Protection Plan	
Monitoring Plan for Certificate of Approval	NLDMAE – Pollution Prevention Division
Certificate of Approval for Construction and Operation (Industrial Processing Works)	
Certificate of Approval for Generators	
Approval of Environmental Contingency Plan/Emergency Spill Response	

Table 2-2 Environmental Approvals, Authorizations, and Permits that May Be Required

Environmental Permit, Approval or Authorization Activity	Issuing/Approval Agency
Permit to construct a Non-Domestic Well	NLDMAE – Water Resources Management Division
Certificate of Environmental Approval to Alter a Body of Water	
Culvert Installation	
Fording/Bridge	
Pipe Crossing/Water Intake	
Stream Modification or Diversion	
Other Works Within 15 m of a Body of Water	
Water Use License	
Permit to Construct a Potable Water System	
Permit to Occupy Crown Land	NL Department of Fisheries and Land Resources (NLDFLR) – Crown Lands Division
Permit to Control Nuisance Animals	NLDFLR – Wildlife Division
Operating Permit to Carry out an Industrial Operation During Forest Fire Season on Crown Land	NLDFLR – Forestry and Agrifoods Agency
Permit to Cut Crown Timber	
Permit to Burn	
Surface and Mining Leases	NL Department of Natural Resources (NLDNR) – Mineral Development and Mineral Lands Division
Development Plan	
Rehabilitation and Closure Plan	
Financial Assurance	
Mill License	
Quarry Development Permit	
Blasters Safety Certificate	Service NL – Government Service Centre
Approval for Storage and Handling of Gasoline and Associated Products	
Fuel Storage Tank Registration	
Approval for Used Oil Storage Tank System (Oil/Water Separator)	
Certificate of Approval for a Waste Management System	
Certificate of Approval for a Sewage / Septic System	
Application to Develop Land for Septic	
National Building Code –Fire, Life Safety and Building Safety	
Buildings Accessibility Registration and Permit	
Food Establishment License	
Federal	
Release from EA Process	CEA Agency
Fisheries Act Authorization permitting serious harm to fish[1]	Fisheries and Oceans Canada (DFO)
Tailings Impoundment Area Designation	Environment and Climate Change Canada (ECCC)
Initiate Metal and Diamond Mining Effluent Regulations (MDMER) process with ECCC including notification, identification of final discharge point, effluent monitoring, and environmental effects monitoring (EEM)	
Approval of MDMER Emergency Response Plan	

Table 2-2 Environmental Approvals, Authorizations, and Permits that May Be Required

Environmental Permit, Approval or Authorization Activity	Issuing/Approval Agency
Approval to Interfere with Navigation[1]	Transport Canada
License to Store, Manufacture, or Handle Explosives (Magazine License)	Natural Resources Canada

1. The federal government has proposed to amend the *Fisheries Act* and the *Navigation Protection Act*, as early as 2019, renaming the latter, the *Canadian Navigable Waters Act*. As proposed, many of the provisions from a previous version of the *Fisheries Act* will be re-instated, reverting in large part to the concept of fish habitat protection, prohibiting harmful alteration, disruption or destruction of fish habitat (HADD) as prescribed in the *Fisheries Act* prior to 2012. Applications for HADD authorization and proposed compensation in the event of a HADD will likely be required. Other key amendments include strengthening the role of Indigenous peoples in application reviews, introduction of a new permitting framework and codes of practice, and the introduction of new decision-making criteria. The proposed amendments to the *Navigation Protection Act* will apply to all waters that have the potential for navigation, rather than a prescribed list of waterways, and will have provisions for increased Indigenous input into applications for use of navigable waters by project proponents.

2.7 Overview of Consultation and Engagement

Since commencing exploration and environmental baseline activities in 2010, Marathon has and will continue to be committed to sustainable exploration and development of the province's rich resource potential, and realizes the importance of building strong, long-term relationships and investments in people and communities. A key element of this commitment is the need to actively consult with members of the general public and special interest groups, communities, Indigenous groups, associations, and regulators who have interest in or may be affected by the Project. Throughout the life of the Project, Marathon aims to achieve positive and constructive relationships with stakeholders. Further information on Marathon's consultation and engagement policies and activities to date is found in Section 6.

3.0 DESCRIPTION OF THE UNDERTAKING

3.1 Project Components

The key Project components are shown in Figures 3-1 and 3-2, and are further described below. An overview of the construction activities associated with these Project components is provided in Section 3.2 and a general description of the operational components is provided in Section 3.3. Further, a preliminary Project schedule is provided in Section 3.5. The key components of Marathon's Project are as follows:

- Site Access Road
- On Site Access Roads, Plant Site Roads, and Haulage Roads
- Open Pits
- Waste Rock Disposal Piles
- Organics and Overburden Stockpiles
- Stormwater Management Infrastructure
- Run of Mine (ROM) Stockpile
- Heap Leach Process Facilities:
  - Heap Leach Crushing Circuit
  - Heap Leach Pad
  - Heap Leach Solution and Event Ponds
  - Carbon in Column (CIC) Leach Process
- Process Plant Facilities:
  - Crusher and Mill Feed Stockpile
  - Grinding Circuit (Mill)
  - Gravity Recovery Circuit and Intensive Cyanidation Reactor
  - Floatation Circuit
  - Carbon in Leach (CIL) Process
  - Cyanide Destruction
  - Carbon Acid Wash, Elution, and Regeneration Circuit
  - Electrowinning and Goldroom
  - Reagent Storage
- Gold Shipment to Market
- Tailings Storage Facility (TSF)
- Water Treatment Plant
- Substation and Power Distribution
- Water Intake and Distribution
- Other Plant Site Buildings:
  - Plant Administration, Workshop, and Warehouse
  - Laboratory
  - Administration and Lunchroom
  - Mine Services and Workshop
  - Security
- Accommodation Camp
- Plant Site Stormwater Pond and Sanitary Effluent
- Fuel Storage and Fueling Stations

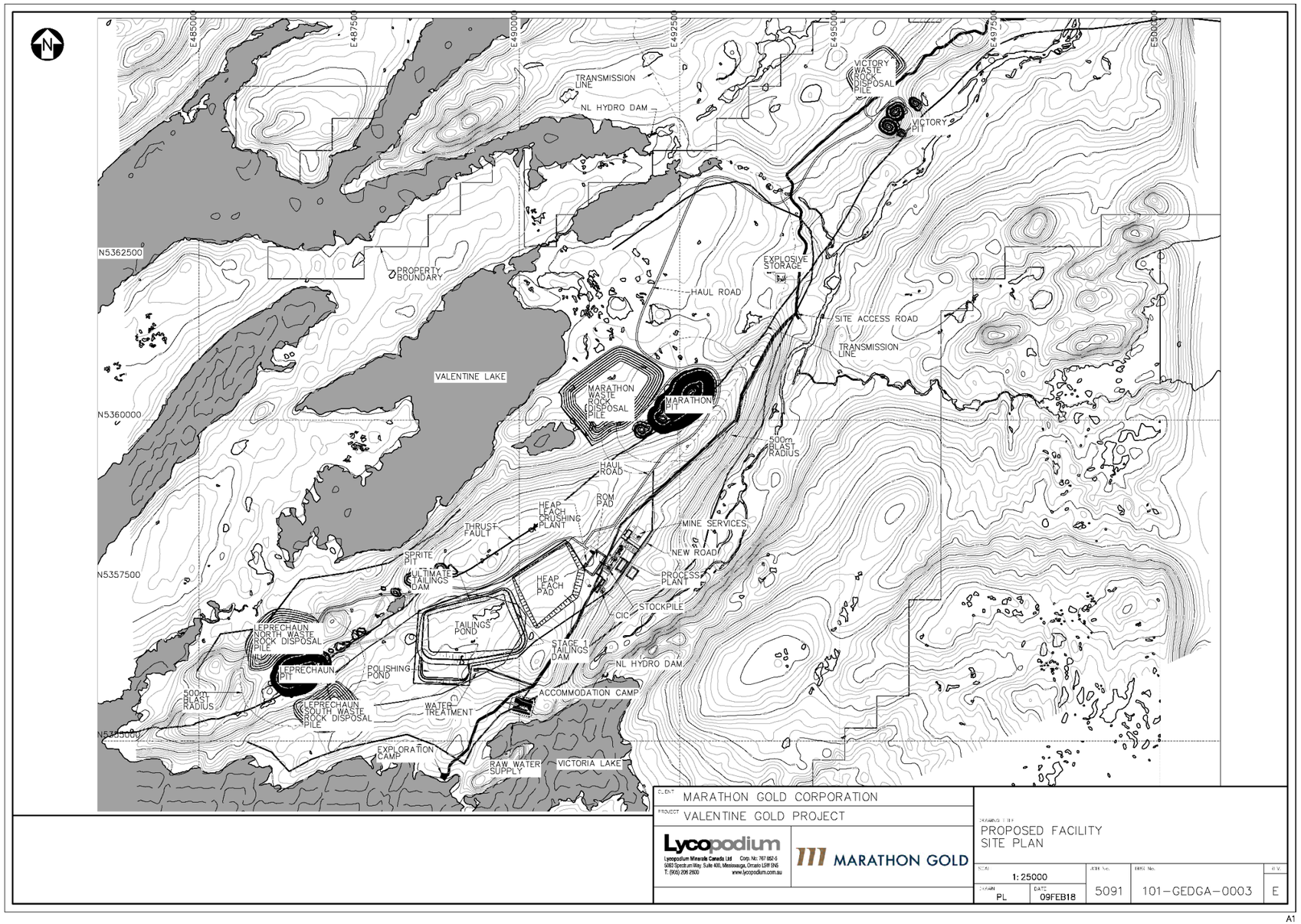

Figure 3-1 Overall Site Plan

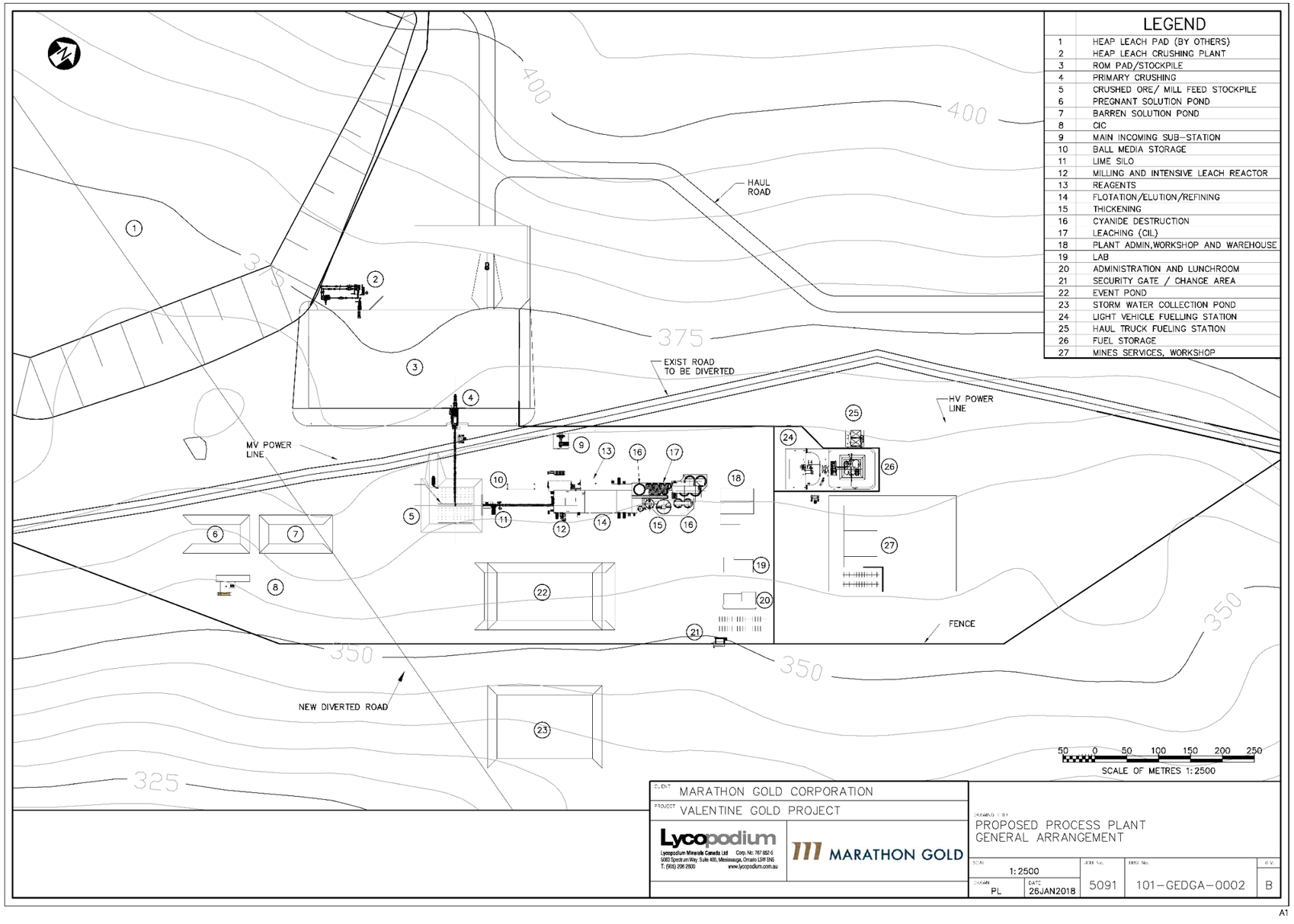

Figure 3-2 Process Plant General Arrangement

3.1.1 Roads

3.1.1.1 Access Road to Site

Access to the Project is via existing gravel access roads from Millertown as shown in Figure 3-3, owned by the Crown and primarily maintained (e.g., grading, snow clearing) by Marathon. The initial 8 km of road leaving Millertown is owned, operated, and maintained by the province. From the turnoff near the Millertown Dam, the following 80 km of class D gravel road extending to Marathon's existing exploration camp will be upgraded to class A standard 7.3 m wide driving surface and will include ditching on both sides and cross drainage by culverts. Rock and gravel for the road upgrade will be sourced from strategically located borrow pits along the 88 km route, the locations of which will be confirmed through field investigation. As Project planning and engineering proceed, evaluation of the existing culverts and bridges along the 80 km stretch of road will be further evaluated to determine if upgrades or replacement are required.

Marathon is currently investigating the possibility of using a different Crown road that is currently being extended towards the Project Area for forestry access. This alternative road will be a shorter, less winding road, passing less cabins, and would overall be a better road for access to the Project. Marathon will continue consultation with the provincial government to determine if this alternative site access road can be used for the Project. Marathon does not currently have the complete route determined to connect this road to the site, and in general, the viability of this alternative will be further assessed as part of the engineering progression and EA process.

3.1.1.2 Plant Site Roads

Plant site roads will provide access to the administration area, process plant facilities, and mine services area. These roads will generally be 6 m wide and will be constructed flush with bulk earthworks pads to allow storm water sheet flow across the site, thereby avoiding the need for deep surface drains and culvert crossings within the plant area.

3.1.1.3 On Site Access and Haulage Roads

A number of on site access roads will be constructed to access infrastructure such as the TSF, open pits, and other site infrastructure. These access roads will be designed for smaller heavy equipment and light vehicles, and pipeline and electrical corridors.

Connections between the open pits, waste rock piles, the ROM stockpiles, and the mine services and fueling areas will be to haulage road construction specifications to accommodate haul truck loads, grades, and passing (2-way traffic) requirements, and will be 25 m in width. The width and grades of these roads will vary accordingly. Where possible, haulage roads will be kept separate from other site access roads for safety reasons.

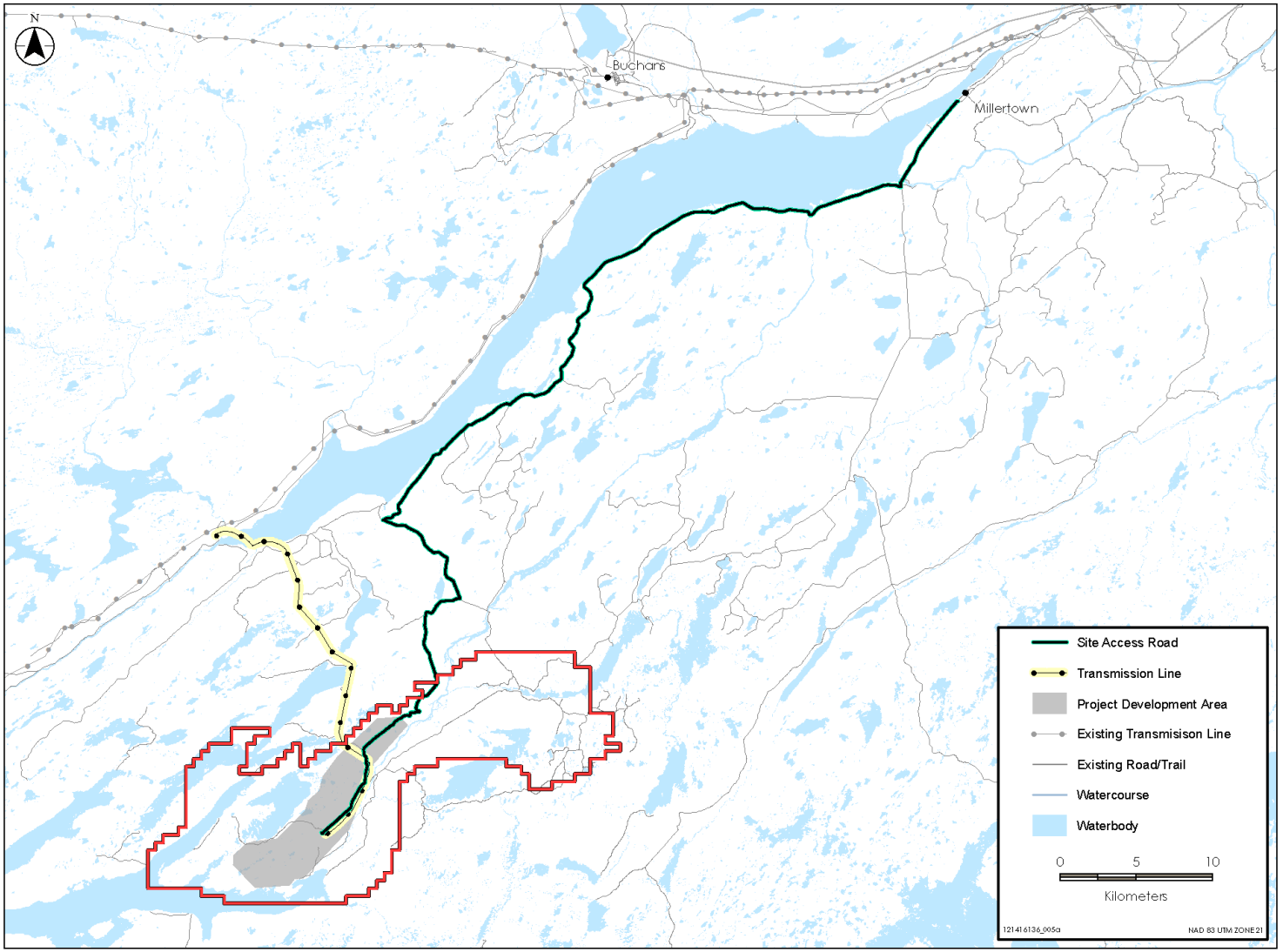

Figure 3-3 Routing of Access Road and Transmission Line

3.1.2 Open Pits

The Project comprises four mining areas: Leprechaun in the southwest, the Sprite Zone adjoining Leprechaun towards the northeast, the Marathon deposit located about 4.1 km northeast of the Sprite Zone, and the Victory Deposit located 5.5 km northeast of the Marathon Deposit. These four mining areas are shown below in Figure 3-4.

Ultimate pit limits were developed for three deposits using a pit optimization process. Based on the initial results, mineral resources for the Sprite Zone have not been sufficiently explored/defined to determine an ultimate pit limit. As Marathon believes that the additional work will be completed in time to include Sprite in the Project engineering and approvals (EA and permitting), a general description is included in this document. The 'downstream' effects of adding ore, waste rock, and adjustments to other Project components are expected to be relatively modest as the open pit at Sprite is anticipated to be small in comparison with the Leprechaun and Marathon pits. For example, the additional waste rock is expected to be accommodated within the Leprechaun waste rock disposal pile with minimal increase to the current footprint. Similarly, the TSF can be raised or expanded in footprint slightly to accommodate this small change. Similar, relatively minor changes may also be required if additional resources are identified within the other three open pits.

Standard surface mining techniques will be used to create an open pit within each of the four mining areas. The Leprechaun pit design comprises four mining phases and has maximum approximate dimensions of 900 m southwest to northeast by 600 m southeast to northwest, and a maximum depth of 300 m below current ground level. The Marathon pit design includes seven mining phases with one phase being a small standalone pit slightly southwest of the main Marathon pit. The Marathon pit has approximate dimensions of 1,200 m southwest to northeast by 700 m southeast to northwest and a maximum depth of 400 m below current ground level. The Victory pit design consists of four mining phases with one small pit located slightly northeast of the main Victory pit. The Victory pit has approximate dimensions of 540 m southwest to northeast by 280 m southeast to northwest, and a maximum depth of 130 m below current ground level. For the Sprite pit, it is assumed that the dimensions will be similar to Victory.

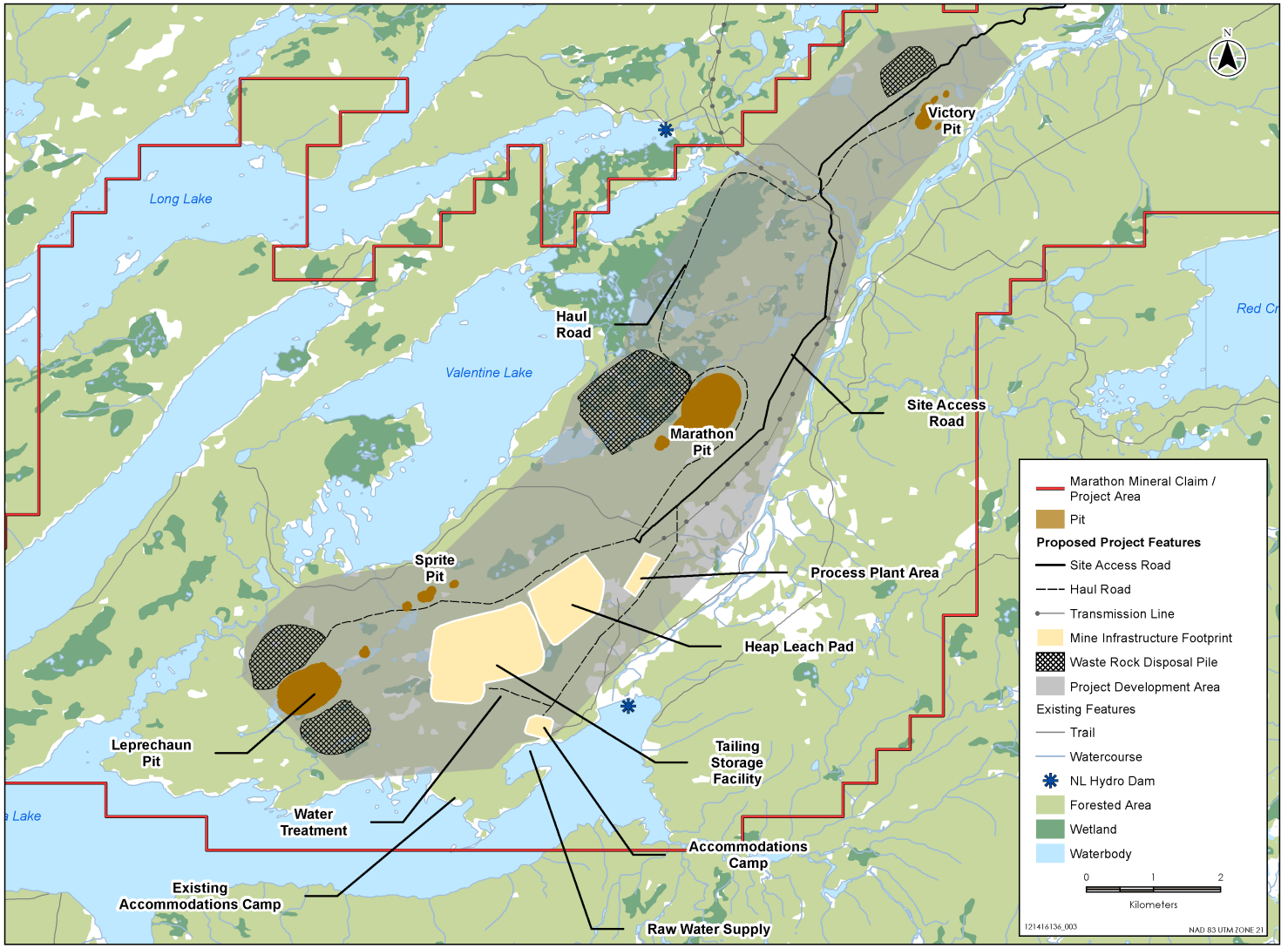

Figure 3-4 Location of Project Deposits

3.1.3 Mine Waste Rock Disposal Piles

Four waste rock disposal piles are envisioned for the Project as shown in Figure 3-1. The Leprechaun waste rock disposal pile is split in two areas located directly north and southeast of the Leprechaun and Sprite pits. Waste rock produced from the Leprechaun and Sprite pits will be stored in this area. The Marathon waste rock disposal pile is located just north of the Marathon pit. The Victory waste rock disposal pile is located north of the Victory pits.

Mine waste disposal piles will be constructed according to design recommendations and assume a final closure slope angle of 30°. To accomplish this, the waste rock disposal piles will be constructed in single lifts with a 35° face angle and a 6.1 m safety bench.

Based on acid rock drainage / metal leaching (ARD/ML) testing to date, mine waste rock is generally expected to be non-acid-generating. Some geological units within the open pits show low potential for ARD/ML, however the majority of the rock is showing to be acid-buffering and therefore with basic materials management, the waste rock disposal piles can be developed to ensure no ARD/ML issues will occur. Further test work is ongoing to confirm the initial test results. Where waste rock will be used for site earthworks and grading during construction and operational development, necessary test work will be conducted to prevent potentially acid-generating materials from being used in construction.

3.1.4 Organics and Overburden Stockpiles

As the open pits are expanded during operations, organic and overburden materials will be excavated. Marathon will develop a detailed material balance for mined materials incorporating strategic planning with respect to the re-use of waste materials for construction, progressive rehabilitation, or longer-term storage for final rehabilitation. This material balance will minimize the Project footprint and re-handling of materials, while maximizing the progressive rehabilitation opportunities related to waste rock disposal piles and other areas of the site.

Similarly, for general site construction and development where excess organic and overburden materials must be stockpiled for future site rehabilitation, these materials may be windrowed along linear corridors (e.g., road, pipelines) or stored in relatively small stockpiles around the site and in close proximity to where these materials will be re-used. Longer term stockpiles will be seeded to reduce erosion due to wind and precipitation.

3.1.5 Stormwater Management Infrastructure

Stormwater management across the site will be implemented and operated as follows:

- Diversion of non-contact water where possible. Channels and berms will be constructed around the crest of the open pits or up-hill of waste disposal piles and other developed areas in order to divert natural precipitation and surface runoff away to natural water drainage areas and away from contact with the mining operations, where possible.
- Precipitation and groundwater entering the open pits will be managed in-pit via sloped pit floors and catchment sumps, as required. These catchment sumps are the first opportunity to reduce

sedimentation and chemistry impacts (e.g. residual ammonia), and appropriately sized sumps with screened intakes and hydrocarbon absorption booms will be employed in-pit. Water collecting in these in-pit sumps will be pumped to the crest of the pit and discharged into an engineered stormwater pond, as required. Stormwater ponds will be appropriately sized for retention and removal (by gravity) of suspended solids (sediment) and discharge from these ponds will be compliant with the applicable regulatory requirements (i.e., MDMER).

- Precipitation runoff from waste rock disposal piles and other developed areas of the site will be collected via ditches and channels and directed to a downstream stormwater management ponds similar to those to be constructed for management of water from the open pits.
- Stormwater ponds will be constructed in-ground, and/or using earthen berms and till, clay, or synthetic liners, if required, for water retention.
- Stormwater ponds will be located based on topography and geotechnical conditions. Where possible, water collected in pit, or in the stormwater ponds will be used for other purposes on site rather than discharged to the environment.
- If dams are required in order to create stormwater management infrastructure, the design, construction, operations, and closure of any dams will be in accordance with the Canadian Dam Association (CDA) and Mining Association of Canada (MAC) guidelines as well as any provincial and federal requirements.

3.1.6 ROM Stockpile

The ROM stockpile is located at the northwest corner of the process plant area and immediately east of the Heap Leach Pad. The stockpile pad is located and sized to allow management of low and high grade ores, destined for the heap leach circuit and process plant circuit, respectively.

3.1.7 Heap Leach Process Facilities

The Heap Leach process is a relatively simple, low-cost method of extracting gold from low grade ore that is not economical to send to the primary process plant circuit. The process has been used in the gold, silver, and copper industries since the 1960's and is estimated to be used to process approximately 12% of the world's gold output today. The components of the Heap Leach process include:

- Heap Leach Crushing Circuit
- Heap Leach Pad
- Heap Leach Solution and Event Ponds
- CIC Leach Process
- Elution Circuit

The heap leach process involves the creation of a large, lined pad on which crushed, low-grade ore will be stacked with perforated pipes laid within the ore material at regular horizontal and vertical intervals. A barren solution is pumped into the pile via the piping network constructed within the stacked ore. The solution drains through the ore, collecting gold, and to the bottom of the pile, where the drainage pipe system, above a double-lined containment system, collects the pregnant solution (containing gold) and sends it to a leach reactor system where the gold is absorbed in carbon. The gold-rich carbon is then sent to the elution circuit

in the process plant for gold extraction and carbon/solution recycling. The heap leach process design criteria are provided in Table 3-1 below.

Table 3-1 Heap Leach Process Design Criteria

Parameter	Units	Value
Plant Throughput	tpd	9,000
Gold Head Grade – Range per Mine Plan	g/t Au	0.41 - 0.57
– Blended Average	g/t Au	0.49
– Design	g/t Au	0.57
Silver Head Grade	g/t Au	Trace (negligible)
Crushing Plant Availability	%	75
Leach and CIC Availability	%	91.3
Bond Crusher Work Index (CWi)	kWh/t	15.0
SMC Axb		87.5
Material Specific gravity	tonne/m^3	2.68
Angle of Repose	degrees	35
Material Moisture Content	%	5.0
Primary Crusher		C140 or Equivalent
Secondary Crusher		Metso HP6 or equivalent
Tertiary Crusher		Metso HP800 or equivalent
Secondary and Tertiary Screen		Metso MF4285-2 or equivalent
Feed Size	F100	800
Crushing Plant Product Size	P80	9.0
Crushing Plant Product Size	P100	13.0
Sodium Cyanide Addition	kg NaCN/t material	0.28[1]
Lime Addition	kg/t material	0.51
Estimated total pad area	m^2	887,364
No. of pads	#	1
Lift Height	m	10
No. of Lifts	#	3
Tonnes Carbon per Column	tonnes	2.5
Number Adsorption Column	#	6
Number of Carbon Strip /Day	#	0.25

3.1.7.1 Heap Leach Crushing Circuit

A three-stage crushing circuit will reduce the ROM material from 800 mm to a P_{80} of 9.0 mm (P_{100} of 13.0 mm). Feed to the crushing plant will be accomplished via a front-end loader dumping into a feed bin. ROM material will be drawn from the feed bin at a controlled rate of 460 t/h via a variable-speed vibrating grizzly

feeder to feed the primary jaw crusher. ROM material that is at the primary crusher product size will bypass the jaw crusher to reduce the load and wear on it. Primary crushing product, together with secondary and tertiary crusher products, will be sent to a double deck screen. The oversize material is further crushed by the secondary cone crusher, midsize material is crushed in a tertiary cone crusher, and the undersize material from the screen is considered as the final crushed product which will be transferred onto a conveyor to the heap leach area for material stacking. A weightometer will be placed underneath the crushing plant product conveyor to track and monitor material tonnage being conveyed. The measurements from the weightometer will also be used to control the speed of the vibrating grizzly feeder and the rate at which lime is added.

The crushing plant will include the following key equipment:

- Feed bin
- Vibrating grizzly feeder
- Primary jaw crusher
- Secondary cone crusher
- Tertiary cone crusher
- Secondary and tertiary crushing screen
- Mill feed apron feeder [variable-speed drive (VSD)]
- Material handling equipment

3.1.7.2 Heap Leach Pad

The heap leach pad is located adjacent to the mill and TSF sites as shown in Figure 3-4, and will be designed to contain the estimated 21.5 Mm^3 of low-grade ore to be treated in the current life of mine plan.

The pad design incorporates natural, local topography, constructed containment berms, and a double-lined containment system to form the pad on which the crushed, low-grade ore will be stacked. The location and layout of the pad were selected primarily based on site topography and proximity to Project infrastructure. The overall design has been developed based on the environmental setting of the Project, and similar operations and designs used within Canada.

Ore Stacking

Crushed ore material from the heap leach crushing plant conveyors will be discharged onto a series of mobile grasshopper conveyors and stacked on the leach pad via a radial stacker. To control pH, pebble quicklime will be added onto the crushing plant conveyor via a lime feeder suspended from a lime silo. The number of grasshopper conveyors in use will vary based on the distance from the end of conveyor to the exact location of material being stacked.

The stacking process will include the following key equipment:

- Material handling equipment (e.g., front end loaders)
- Radial stacker

Heap Leaching

The low-grade ore material will be placed on the pad in lifts of 10 m, and will ultimately be terraced with maximum terrace heights of 30 m. The slopes of the terraces will be 2.5H:1V which fulfil the closure slope stability requirement. A total of three vertical lifts, each 10 m in height, will be placed for heap leaching of the material. The pad will be constructed to approximately 942 m x 942 m in size.

Barren cyanide solution will be injected directly into the barren solution line discharging from the barren solution pond. The barren solution pump will be housed in a weather enclosure and pipeline will be installed below the finished ground surface for frost protection. This solution will be indirectly heated in a barren solution heater before being applied to the heap leach pad. Anti-scalant will also be added to prevent scaling. The cyanide and anti-scalant bearing solution will be applied onto the leach pad at a rate of 5 $L/m^2/h$ through a piping network consisting of drip irrigation systems. A dozer/tractor with an emitter burial attachment will bury the lines below the surface of the crushed material. Based on the preliminary column leach test results, a leach period of 130 days is required for optimal gold recovery. Pregnant solution drains from the leach pad to the pregnant solution pond, which in turn will pump the solution to the adsorption plant for further processing. This pregnant solution transfer pump will be housed in a weather enclosure and pipeline will be installed below surface. Barren solution from the adsorption plant will be returned to the barren solution pond via an insulated line. In the case of a rainstorm event, solution overflowing from the pregnant or barren solution pond will be directed to the storm water pond.

Once the leaching process is complete, water is cycled through the heap leach pile to remove (or “rinse”) all of the process solutions and chemicals from the pipes and the heap leach pile. All rinse water is then treated in the water treatment plant prior to recycling or discharge. The rinse process will be terminated once the water returning from the pile meets environmental discharge criteria.

The heap leaching will include the following key equipment:

- Dozer/tractor with low ground pressure tracks
- Emitter burial attachment
- Barren solution heater
- Distribution pumps and pipes

3.1.7.3 Heap Leach Solution and Event Pond

A series of storage ponds are required to manage the heap leach solution associated with the heap leach process; these include:

- Pregnant Solution Pond
- Barren Solution Pond
- Event Pond

The pregnant and barren ponds are lined storage ponds for the solutions that will be used throughout the heap leach process. The event pond will be used to collect overflow from the heap leach pad during precipitation events. These ponds are sized to handle the 100-year rain event for 24 hrs. These ponds

will be lined to reduce the potential environmental impacts, and measures will be implemented to prevent access by wildlife.

3.1.7.4 Carbon in Column Leach Process

The adsorption circuit will consist of a single train of six open, up-flow columns, each with a 2.5 t carbon capacity, and will operate as an expanded bed contactor (Figure 3-5).

Figure 3-5 CIC Circuit

Pregnant solution containing dissolved gold will be pumped from the pregnant solution pond to the carbon columns to remove gold via carbon adsorption. The adsorption circuit will be operated manually on a daily basis to allow counter-current contact with the carbon to achieve the targeted carbon loading. Solution will enter into the bottom of each column via an annular ring at the center of the column and exit from the top. Dart valves will be used to control flow to a column and to bypass the feed to the next column if required. The first column will contain solution with the highest gold concentration and carbon with the highest gold loading. As the solution passes through the next five columns, the gold concentration will drop off, leaving the weakest solution in contact with the freshest carbon (or most recently stripped carbon) in the last column. Solution exiting the last column will pass over the carbon safety screen to capture, and provide a visual check on, carbon escaping from the columns. The screen underflow will flow to the barren solution pond. This line will be insulated or buried.

Carbon advancement between the columns will be manually controlled by the operator by using carbon advance pumps on each column. Loaded carbon will be transferred from the first column to pass over the loaded carbon screen prior to transport via mobile truck to the acid wash and elution columns at the mill. Subsequently, carbon advancement will progress up the carbon adsorption train from the last column, with regenerated and screened carbon trucked from the mill, added to the last column.

The carbon adsorption circuit will include the following key equipment:

- Six adsorption columns
- Loaded carbon screen
- Carbon safety screen
- Carbon advance pumps

3.1.8 Process Plant Facilities

The process design is comprised of the following circuits:

- Primary crushing of ROM material.
- A covered crushed material (mill feed) stockpile to provide buffer capacity ahead of the grinding circuit.
- Grinding (milling) circuit: semi-autogenous grinding (SAG) mill with trommel screen, ball mill and cyclones.
- Pebble recycle via front end loader (FEL) reclaim.
- Gravity recovery from ball mill discharge by two semi-batch centrifugal gravity concentrators, followed by intensive cyanidation of the gravity concentrate and electrowinning of the pregnant leach solution in a dedicated cell located in the goldroom.
- Trash screen and rougher flotation.
- Thickening of flotation concentrate and flotation tails prior to leaching.
- Regrind mill for the flotation concentrate.
- Flotation concentrate leach and CIL, and flotation tails CIL.
- Acid washing of loaded carbon and elution followed by electrowinning and smelting to produce doré. A doré bar is a semi-pure alloy of gold, which can be transported to a refinery for further purification. Carbon regeneration by rotary kiln.
- Cyanide destruction of tailings using Air/SO_2 process and tailing management facility.

Plant Design Criteria

The key process design criteria for the mill are listed in Table 3-2. A rendering of the mill, flotation and CIL plant is provided in Figure 3-6.

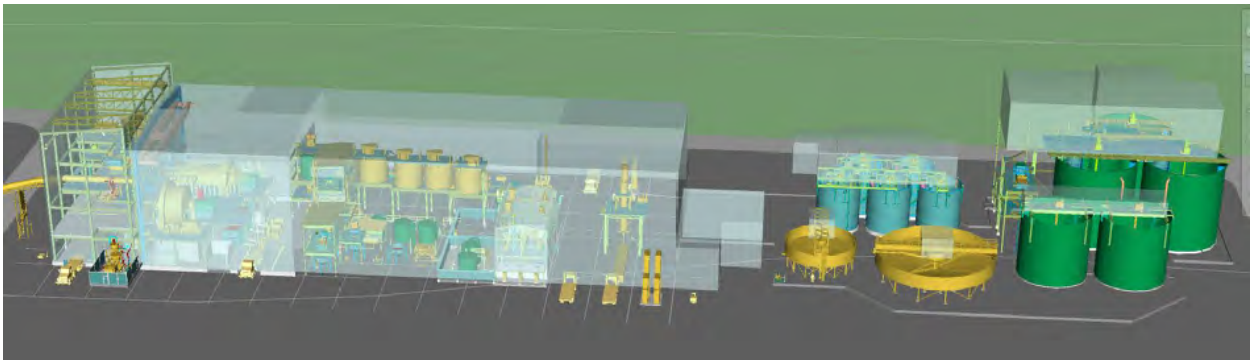

Figure 3-6 Mill, Flotation and CIL Plant

Table 3-2 Key Milling Plant Process Design Criteria

Parameter	Units	Value
Plant Throughput	tpd	9,000
Gold Head Grade – Range per Mine Plan	g/t Au	1.04 – 4.56
– Blended Average	g/t Au	2.2
– Design	g/t Au	3.26
Silver Head Grade	g/t Au	Trace (negligible)
Crushing Plant Availability	%	75
Plant Availability	%	91.3
Bond Crusher Work Index (CWi)	kWh/t	15.0
Bond Ball Mill Work Index (BWi)	kWh/t	15.9
SMC Axb		87.5
Bond Abrasion Index (Ai)	g	0.235
Primary Crusher		C140 or Equivalent
Material Specific gravity	tonne/m^3	2.68
Angle of Repose	degrees	35
Moisture content	%	5.0
SAG Mill		6.70 m dia. x 3.75 m EGL
Ball Mill		Overflow type – 6.10 m dia. x 8.54 m EGL
Grind Size (P_{80})	µm	75
Cyclone Cluster	#	16 operating + 4 stand-by
Cyclone size	mm	400
Sodium Cyanide Addition	kg NaCN/t material	0.98
Lime Addition (90% purity)	kg/t material	0.25
Frother	kg/t material	0.025
Promotor (Aero 208)	kg/t material	0.06
Potassium Amyl Xanthate (PAX)	kg/t material	0.11
Copper Sulphate	kg/t material	0.30
SMBS	kg/t material	0.70
Caustic	kg/t material	0.42
Flocculant	kg/t material	0.032
Flotation Conc. Pre-aer & CIL Tanks	#	1+6
Flotation Tails CIL Tanks	#	4
Tonnes Carbon per Column	t	5
Number of Carbon Strip /Day	#	1.0

3.1.8.1 Crusher and Mill Feed Stockpile

Figure 3-7 provides a rendering of the primary crushing and mill feed stockpile. Material will be hauled from the mine and dumped on the ROM pad for blending and re-handling into the ROM hopper. Provision for direct tipping to the ROM hopper will be provided. Material from the ROM hopper will be crushed by a primary jaw crusher. A ROM hopper apron feeder will be used to regulate feed at 457 t/h into a vibrating grizzly and the jaw crusher. A fixed rock breaker will be used to break oversize rocks at the top of the feed bin. Pebbles from the SAG mill will be dumped on crusher discharge conveyor by a FEL. The crushed material is conveyed to a covered stockpile, which will provide approximately 24-hrs of storage.

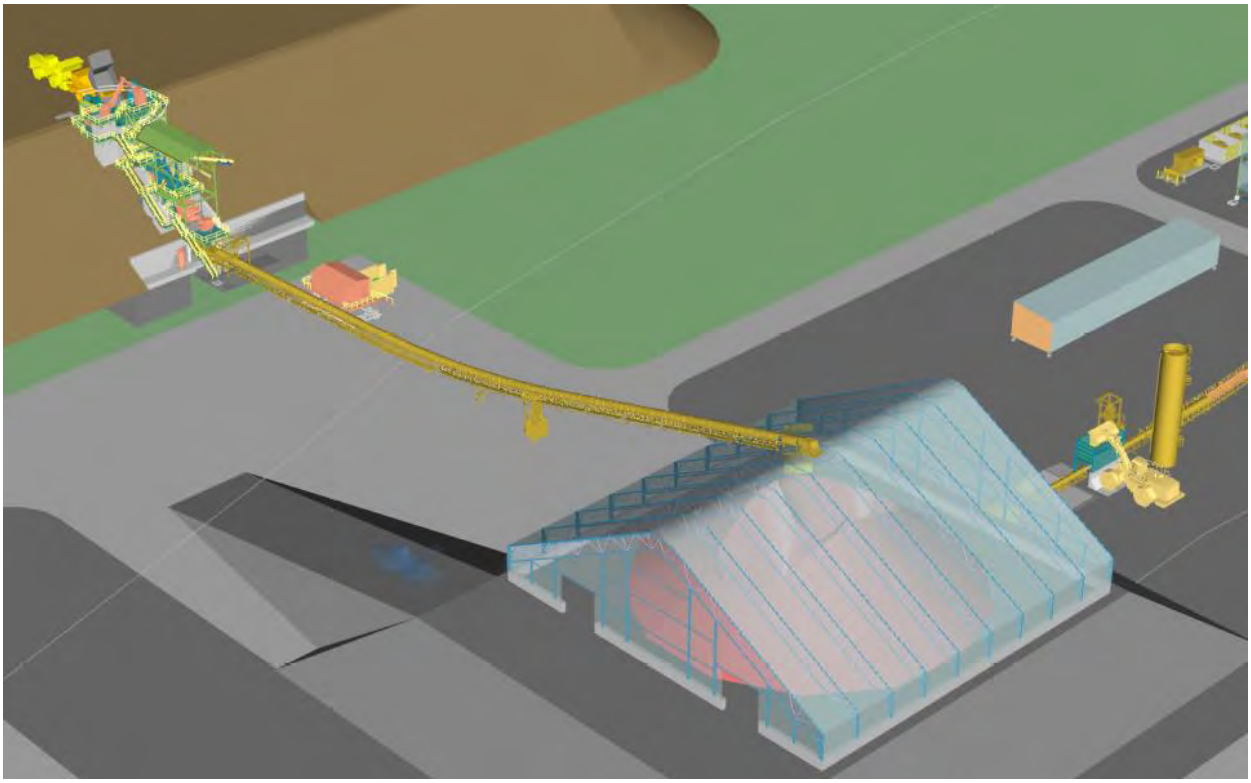

Figure 3-7 Primary Crushing and Mill Feed Stockpile

The mill feed stockpile will be equipped with apron feeders to regulate feed at 375 t/h into the SAG mill. Crushed material drawn from the stockpile will feed the SAG mill and ball mill circuit via the mill feed conveyor.

The material handling and crushing circuit will include the following key equipment:

- ROM hopper
- Apron feeder (with VSD)
- Vibrating grizzly
- Fixed rock breaker
- Primary jaw crusher

- Mill feed apron feeder (VSD)
- Material handling equipment

3.1.8.2 Grinding Circuit (Mill)

The grinding circuit will consist of a SAG mill followed by ball mill in closed circuit with hydro-cyclones. The SAG mill grate aperture size will be 12.5 x 20 mm. The SAG mill will discharge through a trommel where the pebbles will be screened out and carried back to the crusher discharge conveyor via front end loader. Trommel undersize discharges into the cyclone feed pumpbox, along with ball mill discharge material. Water is added to the cyclone feed pumpbox to obtain appropriate density prior to pumping to the cyclones.

Cyclone overflow gravitates to the rougher flotation conditioning tank via a trash screen. Cyclone underflow, together with gravity circuit tails and gravity screen oversize, flow by gravity to the ball mill for further size reduction. The Ball mill product will discharge onto a launder containing a slot to allow a portion of the stream to gravitate into a pumpbox to be pumped to the gravity circuit.

The grinding circuit will include the following key equipment:

- SAG mill – 3,000 kW VSD
- Ball mill – 5,400 kW
- Cyclone feed pumpbox
- Classification cyclones

3.1.8.3 Gravity Recovery Circuit

The gravity circuit comprises two parallel centrifugal concentrators complete with feed scalping screens. Feed to the circuit is extracted from the ball mill discharge launder and pumped to the scalping screens. Gravity scalping screen oversize at +2 mm will report by gravity to the ball mill feed, while the gravity tails will gravitate to the mill discharge pump box. Scalping screen undersize is fed to the centrifugal concentrator.

Operation of the gravity concentrator will be semi-batch and the gravity concentrate will be collected in the concentrate storage cone and subsequently leached by the intensive cyanidation reactor circuit (ICR).

The gravity recovery circuit will include the following key equipment:

- Gravity feed scalping screen
- Gravity concentrators

3.1.8.4 Intensive Cyanidation Reactor

Concentrate from the grinding circuit gravity concentrators will be sent to the intensive cyanidation reactor (ICR) to recover the contained gold by cyanide leaching. The concentrate from the gravity concentrators will be discharged to the ICR gravity concentrate storage cone and de-slimed before transfer to the ICR.

ICR leach solution (2% NaCN, 2% NaOH and Leach Aid) will be made up within the heated ICR reactor vessel feed tank. From the feed tank the leach solution will be circulated though the reaction vessel for approximately 20 hrs, then drained back into the feed tank. The leached residue within the reaction vessel will be washed, with wash water recovered to the reaction vessel feed tank, and then the solids will be pumped to the flotation concentrate regrind mill.

The ICR pregnant leach solution will be pumped from the reaction vessel feed tank to the ICR pregnant solution tank, located near the goldroom.

ICR pregnant solution will be pumped to the goldroom for gold recovery as gold sludge using a dedicated electrowinning cell. The sludge will be combined with the sludge from the carbon elution electrowinning cells and smelted or may be smelted separately for metallurgical accounting purposes.

The ICR circuit will include the following key equipment:

- Gravity concentrate storage cone
- Intensive cyanidation reactor
- Reactor vessel feed tank heater
- Leach Aid screw feeder
- ICR pregnant solution tank
- ICR electrowinning cell

3.1.8.5 Flotation Circuit

Cyclone overflow will gravitate over the trash screen, to remove foreign material prior to flotation. Trash will report to the trash bin which will be periodically removed for emptying. Screen undersize will gravitate to the rougher conditioner tank. Reagents will be added into the rougher conditioner tank and mixed thoroughly.

The rougher flotation cells will consist of eight 70 m^3 forced-air tank cells in series. Rougher concentrate will gravitate into the flotation concentrate thickener. The rougher tailings will gravitate to flotation tailings thickener. Flocculant will be added into each thickener.

Flotation concentrate thickener feed rate is 18.75 t/h while flotation tails thickener feed rate is 356 t/h. Flotation tails thickener underflow will report to number seven CIL tank, and flotation concentrate thickener underflow and ICR residue will report to the concentrate regrind mill. Fine grinding will be achieved via attrition and abrasion of the particles in a vertical, agitated, mill containing small ceramic beads as the grinding medium.

The flotation, thickening and regrinding circuit will include the following key equipment:

- Trash screen
- Rougher flotation tank cells
- Flotation concentrate thickening
- Flotation tails thickening
- Regrind mill

3.1.8.6 Carbon in Leach Process

CIL tanks consist of two sets of adsorption tanks. The first set of CIL tanks accepts regrind mill discharge together with barren solution from electrowinning cells; these streams will be discharged into the leaching circuit pre-leach tank before CIL tanks. The second set of tanks accepts tails from first set of tanks as well as flotation tails thickener underflow. One interim carbon screen is used between these two CIL circuits to prevent slurry from the large CIL tank from going to the small CIL tanks.

The first leach circuit for processing ground concentrate will consist of one pre-aeration tank and five CIL tanks. The CIL tanks will be identical in size, with a total circuit residence time of 48 hrs at 46% w/w density in the tanks with solids flowrate of 18.8 t/h. The second set is three identical CIL tanks, larger in size than the concentrate CIL tanks, with total residence time of 24-hrs at 53% w/w and 375.2 t/h solids flowrate. Air will be sparged to each of the tanks to maintain adequate dissolved oxygen levels for leaching.

Quicklime will be added to ensure that the slurry pH is suitable for cyanidation. Cyanide solution will be added into the first tank of the reground concentrate CIL tanks.

Fresh / regenerated carbon from the carbon regeneration circuit will be returned to the last tank of the CIL circuit, and will be advanced counter currently to the slurry flow by pumping slurry and carbon from last CIL tank to previous CIL tank, and so on. The intertank screen in each CIL tank will retain the carbon whilst allowing the slurry to flow by gravity to the downstream tank. This counter-current process will be repeated until the carbon, by then loaded with gold, reaches the first CIL tank. Recessed impeller pumps will be used to transfer slurry between CIL tanks and from the lead tank to the loaded carbon screen mounted above the acid wash column in the elution circuit.

Slurry from the last CIL tank will gravitate to the vibrating carbon safety screen to recover carbon leaking from worn screens or overflowing tanks. Screen underflow will gravitate to the cyanide destruction unit. Screen oversize (recovered carbon) will be collected in a fine carbon bin for potential return to the circuit.

The leach and carbon adsorption circuit will include the following key equipment:

- Flotation concentrate pre-aeration tank
- Flotation concentrate CIL tanks
- Flotation concentrate and tails CIL tanks
- Loaded carbon screen
- Intermediate carbon screen
- Carbon safety screens

3.1.8.7 Cyanide Destruction

Plant tailings from the CIL circuit is detoxified to a weak acid dissociable cyanide (CN_{WAD}) concentration of <1 ppm, to comply with environmental requirements, prior to deposition in the TSF. The CIL tails at 52% solids will flow by gravity to the cyanide destruction tank. The tank will operate with a total residence time of approximately 120 mins to reduce CN_{WAD} design levels from approximately 150 ppm to less than 1 ppm.

Cyanide destruction is undertaken using the SO_2/air method. The reagents required being air, caustic, copper sulphate, and sodium metabisulphite (SMBS). The cyanide destruction tanks are equipped with air addition points and an agitator to thoroughly mix the air and reagents with the tailings slurry.

Detoxified tailings will be pumped to the TSF for final deposition with decant water from the TSF returned for use as process water. Overflow from the TSF will be discharged to a polishing pond for further treatment and monitoring before discharge into the environment.

The main equipment in this area includes:

- One agitated cyanide destruction tank
- Air supply system
- Reagent supply systems

3.1.8.8 Carbon Acid Wash, Elution, and Regeneration Circuit

Carbon Acid Wash

Prior to carbon stripping (elution), loaded carbon will be treated with a 3% hydrochloric acid solution to remove calcium, magnesium and other salt deposits that would otherwise render the elution less efficient or be 'baked on' in the subsequent elution and carbon regeneration steps and ultimately foul the carbon.

Loaded carbon from the loaded carbon recovery screen will flow by gravity to the acid wash column. Additionally, loaded carbon from the heap leach facility will be brought by truck and hydraulically transferred into the same acid wash column.

Entrained water will be drained from the column and the column then refilled with a 3% hydrochloric acid solution, from the bottom up. Once the column is filled with the carbon, it will be left to soak in the acid for 30 mins after which the spent acid will be rinsed from the carbon and discarded to the cyanide destruction tank.

The acid washed carbon will then be transferred to the elution column for carbon stripping.

The acid wash circuit includes the following key equipment:

- Acid wash column – 5 t capacity.

Carbon Stripping (Elution)

Carbon stripping (elution) will use a split Anglo-American Research Laboratory (AARL) process.

The elution sequence will commence with the injection of a set volume of water into the bottom of the elution column, along with the simultaneous injection of cyanide and sodium hydroxide solution to achieve a 2% w/w NaOH and 2% w/w NaCN solution. Once the prescribed volume has been added, the pre-soak period will commence. During the pre-soak, the caustic/cyanide solution will be circulated through the column and the elution heater until a temperature of 95°C is achieved.

Upon completion of the pre–soak period, the last four bed volumes (BV) of low grade (lean) eluate from the previous elution will be pumped through the heat exchanger and elution heater, then through the elution column to the pregnant eluate tank at a rate of 2 BV/hr. At this stage the temperature of the eluent passing through the column will be raised to 125° - 130°C and the gold will be stripped off the loaded carbon.

Eluate will flow up and out of the top of the column, passing through the heat exchanger via the elution discharge strainers and to the pregnant eluate tank.

Once the lean eluate storage volume is exhausted, heated incoming strip water (4 BV) will be used to continue the strip, followed by 2 BV of water to cool the carbon. The last 4 BV will be directed to the lean eluate tank for use in the next strip.

Upon completion of the cool down sequence, the carbon will be hydraulically transferred to the carbon regeneration kiln feed hopper via a de-watering screen.

The stripping circuit includes the following key equipment:

- Elution column – 5 t capacity.
- Strip solution heater with heat exchangers.
- Strip water, lean eluate and pregnant eluate tanks.

Carbon Regeneration (Reactivation)

Carbon will be reactivated in a diesel fired rotary kiln. Dewatered barren carbon from the stripping circuit will be held in a 10 t kiln feed hopper. A screw feeder will meter the carbon into the reactivation kiln, where it will be heated to 650° - 750°C in an atmosphere of superheated steam to restore the activity of the carbon. Carbon discharging from the kiln will be quenched in water and screened on a carbon sizing screen to remove undersized carbon fragments. The undersize fine carbon will be collected in a filter and bagged to be sold or disposed, depending on its residual gold loading. Reactivated carbon will be returned to the CIL circuit or trucked to the heap leach adsorption circuit.

As carbon is lost by attrition, new carbon is added to the circuit after attritioning in a carbon conditioning hopper to remove fines. The new carbon will then be transferred via the carbon sizing screen into the circuit the same way as reactivated carbon.

The carbon reactivation circuit includes the following key equipment:

- Carbon dewatering screen
- Regeneration kiln including feed hopper and screw feeder
- Carbon quench tank
- Carbon sizing screen
- CIL barren carbon hopper
- Carbon fines hopper
- Carbon fines filter
- Fresh carbon conditioning hopper

3.1.8.9 Electrowinning and Goldroom

Gold will be recovered from the pregnant eluate by electrowinning and smelted to produce doré bars.

The pregnant eluate is pumped through two electrowinning cells with stainless steel mesh cathodes. Gold will be deposited on the cathodes and the resulting barren solution will gravitate back into the barren solution tank for reuse or pumped to the leach circuit. One additional electrowinning cell will be dedicated for processing ICR pregnant solution.

The gold-rich sludge will be washed off the steel cathodes in the electrowinning cells using high pressure water sprays and will gravitate to the sludge hopper. The sludge will be drained, filtered, dried, mixed with fluxes and smelted in an induction furnace to produce gold doré.

The electrowinning and smelting process will take place within a secure and supervised goldroom equipped with access control, intruder detection and closed-circuit television equipment.

The electrowinning circuit and goldroom includes the following key equipment:

- Electrowinning cells with rectifiers
- Sludge pressure filter
- Drying oven
- Flux mixer
- Induction smelting furnace with bullion moulds and slag handling system
- Bullion vault and safe
- Dust and fume collection system
- Goldroom security system

3.1.8.10 Reagent Storage

For the management of unexpected reagent spills, the reagent preparation and storage facilities will be located within containment areas designed to accommodate more than the content of the largest tank, in the event of a leak or spill. Where required, each reagent system will be located within its own containment area to facilitate its return to its respective storage vessel and to avoid the mixing of incompatible reagents. Storage tanks will be equipped with level indicators, instrumentation, and alarms to prevent spills from occurring during normal operation. Appropriate ventilation, fire and safety protection, eyewash stations, and Material Safety Data Sheet (MSDS) stations will be located throughout the facilities. Sumps and sump pumps will be installed for spillage control.

3.1.9 Gold Shipment to Market

Gold product to be exported from site would be limited to armored trucks, owned and operated by a third party, used to transport the doré bars to market via the site access road from Millertown, then via provincial highways.

3.1.10 Tailings Storage Facility (TSF)

3.1.10.1 Design Requirements and Concept

The TSF has a preliminary design to accommodate the estimated 30 Mm^3 of tailings material that will be produced over the life of the mine and is based on an average annual throughput of 3.0 Mtpa for the mill. The preliminary layout for the TSF is shown in Figure 3-8.

The overall design objective of the TSF is to protect the regional groundwater and surface water resources during both operations and long term (post-closure), achieve safe and efficient tailings storage and effluent management during operations, and to achieve effective rehabilitation upon mine closure. The design of the TSF has considered the following:

- Reducing the impact and risks to the surrounding environment
- Permanent, secure, and total confinement of solid waste materials within the engineered TSF
- Control, collection, and removal of effluent from the tailings during operations for recycling as process water to the maximum practical extent
- The inclusion of monitoring features for the facility to demonstrate performance goals are achieved and design criteria and assumptions are met
- Staged development of the TSF over the life of the Project to defer capital cost and allow for efficient use of waste materials from pit stripping as construction materials for the TSF

A conventional downstream embankment construction concept is planned based on the mine plan and assessment of site topography. The TSF is currently sited in the middle of the PDA, southwest of both the mill and heap leach pad sites.

The preliminary design has the TSF embankments being raised in five stages and will be constructed out of mine waste rock, and locally sourced borrow materials.

To date, ARD/ML test work has shown potential for some high grade ore to be potentially acid generating, however based on the geology, further metallurgical testing and ARD/ML testing on source rock, and lab-scale process tailings, is expected to show that the combined tailings will be non-acid-generating. The current TSF design allows for a permanent water cover over the deposited tailings in the event that the results of the detailed test work require this ARD/ML preventative measure.

A polishing pond will be constructed downstream of the tailings impoundment The polishing pond has similar construction as the TSF. The polishing pond will be constructed as part of the initial TSF construction phase and the crest will have an elevation 380.0 m.

The polishing pond will be capable of retaining effluent from the tailings impoundment prior to release to the environment via the water treatment plant. The pond will be engineered to manage the design precipitation and flooding events to maintain the stability of the TSF overall, and prevent unplanned effluent discharge to the environment.

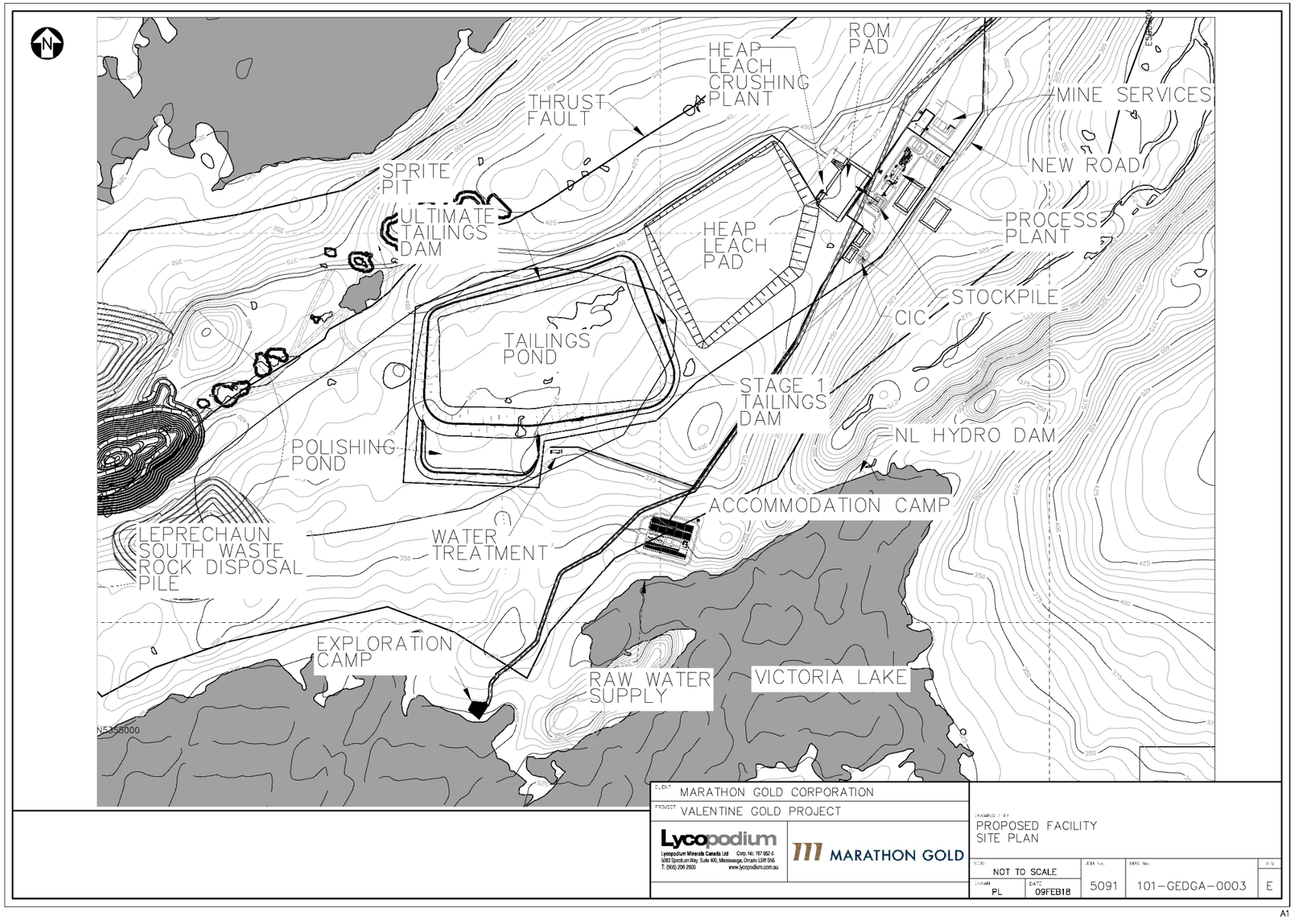

Figure 3-8 Tailings Storage Facility

The dams required for the tailings impoundment will be designed, constructed, operated, and closed in accordance with the CDA and MAC guidelines, as well as all applicable provincial and federal requirements. Where possible, dams will be breached at closure to eliminate the long-term liabilities associated with dam structures.

3.1.11 Water Treatment Plant

A dedicated water (effluent) treatment facility is required for the Project to treat suspended solids, pH, and other water quality issues. Based on the preliminary water balance, the water treatment facility is currently anticipated to treat a nominal flow rate of 997 m^3/h and a peak flow rate of 1,396 m^3/h. It will use proven treatment processes to handle the effluent water to meet the applicable requirements and regulations for environmental discharge water quality. Discharge from the plant will be directed to Victoria Lake.

3.1.12 Substations and Power Distribution

Site power will be provided from a HV line extending from the Star Lake area to the main substation at the Project site, constructed and connected by NL Hydro. A preliminary routing of the HV line is provided in Figure 3-3, as provided to Marathon by NL Hydro. Consultation with NL Hydro is in the early stages and the exact powerline route, connection details, and power purchase agreement will be determined through further consultation.

A peak demand of 23 MW is required for the facility. The semi-autogenous grinding (SAG) and ball mills at the flotation plant are the largest electrical loads. The SAG and ball mills have been specified with a variable frequency drives to reduce the load surge during start-up.

Primary power will be delivered to the site substation, from where it will be stepped down and distributed around to the various equipment and locations required around the site, primarily via overhead power lines.

3.1.12.1 Electrical Distribution

The plant electrical system is based on 13.8 kilovolt (kV), 2,000 A, 60 hertz (Hz) distribution. The 66 kV feed from local power authority will be stepped down to 13.8 kV at the plant main substation, and will supply the plant main 13.8 kV switchgear housed in the switchroom of the plant main substation. The SAG mill, ball mill, and cyclone feed pumps variable frequency drives (VFDs) will have 13.8 kV input, fed by plant main 13.8 kV switchgear, for their phase shifting input transformer and 4.16 kV output. Separate 13.8 kV/600 V distribution transformers at the plant various substations will be fed from the plant main 13.8 kV switchgear.

The following substations with switch rooms will be provided:

- Plant main substation
- Heap leach plant feed preparation substation
- Heap leach plant [CIC] substation
- Flotation plant main substation
- Floatation plant feed preparation substation
- Floatation plant services and buildings substation

Switchrooms will house 13.8 kV switchgear (plant main substation only), medium voltage (MV) VFDs (flotation plant main substation only), 600 V motor control centres (MCCs), low voltage (LV) VFDs, plant control system cabinets, lighting transformers, various distribution boards, and uninterruptible power source (UPS) power distribution.

Overhead power lines of 13.8 kV will provide power to various remote facilities. Pole mounted transformers will step down the voltage at each location, and supply an outdoor 480 V switchboard local to each equipment area.

3.1.12.2 Electrical Buildings

Electrical buildings will be pre-fabricated 'flat pack' panel buildings to reduce installation time on site. Buildings will be installed on a structural framework over 2 m above ground level to allow for bottom entry of cables into electrical cabinets. The electrical buildings will be installed with high-voltage alternating current (HVAC) units and suitably sealed to prevent ingress of dust.

3.1.12.3 Transformers and Compounds

The plant main transformer 66 kV/13.8 kV will be oil natural air natural (ONAN), with provisions for future oil natural air forced (ONAF), cooling configuration and will have either on-line tap changer (OLTC) or external voltage regulators. SAG mill, ball mill and cyclones feed pumps VFD phase shifting input transformers (13.8/4.16 kV) will be dry type and part of concerned VFD panel line-up. All plant 13.8 kV/600 V distribution transformers will be of ONAN, with provisions for future ONAF, cooling configuration and will have de-energized tap changer.

Fire rated concrete walls will be constructed around the oil filled transformers.

3.1.13 Water Intake and Distribution

3.1.13.1 Raw Water Supply System

It is planned that raw water will be obtained from Victoria Lake. Fresh water will be supplied by the raw water pumps to an atmospheric vented fresh water tank. Raw water will be used for all purposes requiring clean water with low dissolved solids, primarily as follows:

- Fire water for use in the sprinkler and hydrant system
- Cooling water for mill motors and mill lubrication systems
- Gland water for pumps
- Reagent make-up
- Feed for the potable water plant
- Raw water will be treated and stored in the potable water storage tank for use in safety showers and other similar applications

3.1.13.2 Fire Water Supply System

Fire water will be piped to the main facilities via buried underground fire water ring mains around each of the facilities. In addition, buildings will be equipped with hose cabinets and supplemented with hand held fire extinguishers of two types—general purpose extinguishers for inside plant areas, and dry type extinguishers for inside electrical and control rooms. Ancillary buildings will be provided with automatic wet sprinkler systems throughout the buildings.

3.1.13.3 Potable Water Supply

The potable water treatment plant will be designed to NL drinking water guidelines. The plant is expected to include multimedia filtration for reduction of turbidity, followed by ultraviolet disinfection for primary disinfection, and the addition of sodium hypochlorite for secondary disinfection. Treatment residuals from the potable water treatment plant (e.g., multimedia filtration backwash) will be sent to the tailings thickener for ultimate disposal within the TSF. Treated potable water from the potable water treatment plant will be stored in the plant potable water tank and the safety shower water tank. Treated potable water from the plant potable water tank will be distributed via the plant potable water pump in a piping ring main to serve potable water users in the facilities. Treated potable water from the safety shower water tank will be distributed via the safety shower water pumps to drinking fountains, eye wash stations, and safety showers.

Potable water piping in the plant area will either be buried below the frost line, routed through heated buildings, or heat traced and insulated. Manual drain points will be included to allow emptying of pipelines, should conditions dictate.

3.1.13.4 Process Water Supply

Process water recycled from the flotation concentrate and tailings thickeners overflow and TSF decant water will meet the main process water requirements. Raw water will provide additional make-up water requirements.

3.1.14 Other Plant Site Buildings

The following plant site buildings are shown in Figure 3-2.

3.1.14.1 Plant Administration, Workshop, and Warehouse

The plant administration, workshop, and warehouse building is located east of the processing plant. The building will be of poured concrete foundation and steel-clad construction, with the building sectioned for the different components required.

3.1.14.2 Laboratory

The laboratory will be of poured concrete foundation and steel-clad construction, and with added ventilation equipment as required by regulation for the types of test work conducted.

3.1.14.3 Administration and Lunchroom

General administration offices and the plant lunchroom will be located in a separate building near the entrance to the plant site. The building is expected to be of poured concrete foundation and steel-clad construction.

3.1.14.4 Mine Services and Workshop

The mines services and workshop will be located east of the process plant and general plant site buildings for ease of access and proximity of common services and infrastructure. Mine heavy equipment (e.g., trucks, loaders), will only be able to travel on the east side of the building, while personnel vehicles will be kept to the east and south, separated by fencing and barriers for safety. The building will consist of sufficient servicing and maintenance bays and equipped with overhead cranes to service the mine heavy equipment fleet. The building will be of poured concrete foundation and steel-clad construction, including in floor sumps for catchment of sediments and hydrocarbons from maintenance activities. Oil/water separation units will be incorporated into the design where required.

3.1.14.5 Security

A security building will be constructed adjacent to the plant site gate where employees and visitors will be required to check in and out. The security building will also serve as the primary health and safety emergency station where the site ambulance and other emergency response equipment will be stationed.

3.1.15 Accommodation Camp

A permanent 200-person accommodation camp with associated services will be located to the south of the process plant and will provide accommodation for construction and later for operating and maintenance staff. A 100-person temporary construction camp will be built for the peak load workforce levels during construction. This camp will use the common facilities in the permanent camp. The temporary construction camp will be decommissioned once construction activities are complete.

3.1.16 Plant Site Stormwater Pond and Sanitary Effluent

Sewage generated within the Project site will be collected via an underground sanitary sewer network to a common location, where it will be treated by an above grade mechanical sewage treatment plant (vendor package). Treated sewage effluent will be discharged to the environment, meeting local permit requirements. Sludge generated as a by-product of the treatment of sewage will be disposed off-site by a licensed contractor.

The plant site stormwater pond is located to the southeast side (and down-gradient) of the plant area. This pond will manage all plant site stormwater runoff prior to pumping to the water treatment plant prior to release.

3.1.16.1 Fuel Storage and Fueling Stations

Diesel fuel will be stored on site near the mine services area for heavy and light vehicle refueling. Diesel fuel storage and supply will be provided by a fuel supplier and include three 90 m^3 fuel storage tanks, offloading pumps, dispensing pumps, associated piping, and electronic fuel control/tracking system. The diesel fuel area will contain the following equipment:

- Diesel unloading pump
- Diesel storage tank
- Diesel supply pumps
- Light vehicle bowsers
- Heavy vehicle bowsers

A vertical spindle sump pump will be provided to remove precipitation from the diesel fuel bund (bermed catchment) area.

3.2 Construction and Development

Marathon will develop specific protocols as part of an overall Environmental Management System (EMS) to facilitate the execution of the site development in an environmentally responsible and safe manner. In addition, Marathon will develop an Environmental Protection Plan (EPP) specific to the construction phase that will outline best management practices for all construction activities. The EPP will be reviewed and approved by government regulators prior to the start of any site-specific construction activities.

General construction activities for the Project include:

- Site preparation – includes cutting and clearing of vegetation and removal of organic materials and overburden over the areas to be developed. Site preparation also includes the development of construction stage water and erosion control (e.g., ditching, sedimentation ponds, etc.) and construction access roads
- Earthworks – for infrastructure development areas, this includes excavation, preparation of excavation bases, placement of structural fill, and grading to facilitate infrastructure construction. For the open pits, earthworks include stripping and stockpiling of organic and overburden materials and development of in-pit quarries to supply site development rock for infrastructure such as structural fill and road gravels
- Construction of infrastructure – placement of concrete foundations, and construction of buildings and infrastructure as required for the Project
- Major equipment installation
- Installation of utilities – construction and connection of power, water, and fuel supply infrastructure
- Open pit pre-production (pre-stripping) and construction of the initial stages of the Heap Leach Pad and TSF

Further details on specific construction and development activities are provided below.

3.2.1 Vegetation Removal

In preparation for earthworks, site development, and infrastructure construction, vegetation removal will be completed over development areas in accordance with the cutting permits issued. Vegetation removal will be planned as per the regulations pertaining to bird breeding seasons, and where/if the schedule requires vegetation clearing during bird breeding seasons, experienced environmental monitors will inspect clearing areas ahead of the work to avoid disturbance of nests.

3.2.2 Earthworks

The Project will require earthworks development throughout the PDA to support infrastructure, such as roads, buildings, camp, tailings dams, heap leach pad, and sedimentation ponds. Based on available mapping information, it is known that the surface elevations across the site vary and the soil conditions vary from boggy areas, thin to thick till layers, and bedrock outcrops.

It is assumed that building foundations will be constructed on dense, natural glacial tills, bedrock, and/or structural fill. In general, the foundations throughout the Project will require a soil cover of 1,800 mm or equivalent for frost protection. Surficial organic materials will be removed from the footprint of the Project structures before placing foundations or structural fills.

Organic and overburden soils will be stockpiled strategically around the site for future site rehabilitation as described in Section 3.1.4.

Building foundations and equipment pads and foundations will be prepared and placed on natural, dense glacial till, bedrock, or compacted, engineered structural fill. Structural fill is expected to be sourced from the mine waste rock excavated during open pit pre-stripping or through cut and fill civil earthworks at the site.

3.2.3 Concrete

Concrete will be required for building foundations and other site construction and development features and is expected to be primarily batched on site. Coarse aggregates are expected to be crushed from mine waste rock and/or site rock quarries. Fine aggregates (sand) are expected to be sourced from local quarries in the area. Some pre-cast of larger building footings may be poured off-site and transported to the site, if the schedule requires.

3.2.4 Fuel Supply

Fuel required for construction will be provided by the contractor(s). Temporary storage and fueling locations and procedures will conform to applicable regulatory criteria.

3.2.5 Materials Shipping and Employee Transportation

Materials required for Project construction will be shipped to site by truck via the main access road. Given the approximately two-hour travel time from Millertown to the site, employees will be transported from nearby communities by bus and would stay in the on-site accommodations camp.

3.2.6 Open Pit Development

During the first year of mining operations, prior to the plant start-up, approximately 3,780,000 t of waste rock is required for construction of the mill area, TSF, and heap leach facilities. During this initial development, some mill feed and heap leach material will be mined and stockpiled as required. A total of 7,000,000 t of waste rock material, 1,580,000 t of millfeed material, and 1,159,000 t of heap leach material will be mined during the preproduction period. At the conclusion of the preproduction period, enough exposed mill feed and heap leach material, as well as stockpiled material, will be available to commence and sustain processing operations.

3.2.7 Heap Leach

The heap leach pad will be constructed in two phases. The first phase will be developed during the construction stage of the Project and will have capacity for 60% of the life of mine heap leach material. The second phase will be constructed during the fifth year of operation for the balance of capacity. The phases will be designed and constructed such that the required containment and leak detection system is fully operational for both phases.

Once the stripping of overburden is completed and sub-grade properly compacted, a layer of local borrow and sand cushion will be installed in preparation for the liner. An 80-mil high density polyethylene (HDPE) liner will be installed over the footprint of the heap facility. Due to the environmental conditions of the site, a double synthetic liner system will be used that will have a leak detection sand layer, a geotextile, and a low permeability soil between the two HDPE liners.

Above the liner system, there will be 0.9 m layer of low-grade crushed material covering the entire footprint of the heap leach pad. There will also be a network of collection pipes installed in a herringbone pattern throughout this layer. The main purpose of this layer is to collect the pregnant solution to the storage pond. It will also protect the liner system and the collection pipes in preparation for heap leach stacking.

3.2.8 Tailings Storage Facility

The TSF embankment will be constructed in five stages by implementing downstream dam raise methods. The TSF will be constructed using mine waste rock materials and local borrow materials as required. Each stage will be raised based on tailings storage requirements and the waste rock production schedule. The final crest elevation of the TSF will be 410.0 m.

The embankment design concept includes layering of rockfill, a coarse filter material, a fine filter material, a clay core, upstream clay blanket, and rip rap protection. A typical cross-section is shown in Figure 3-9.

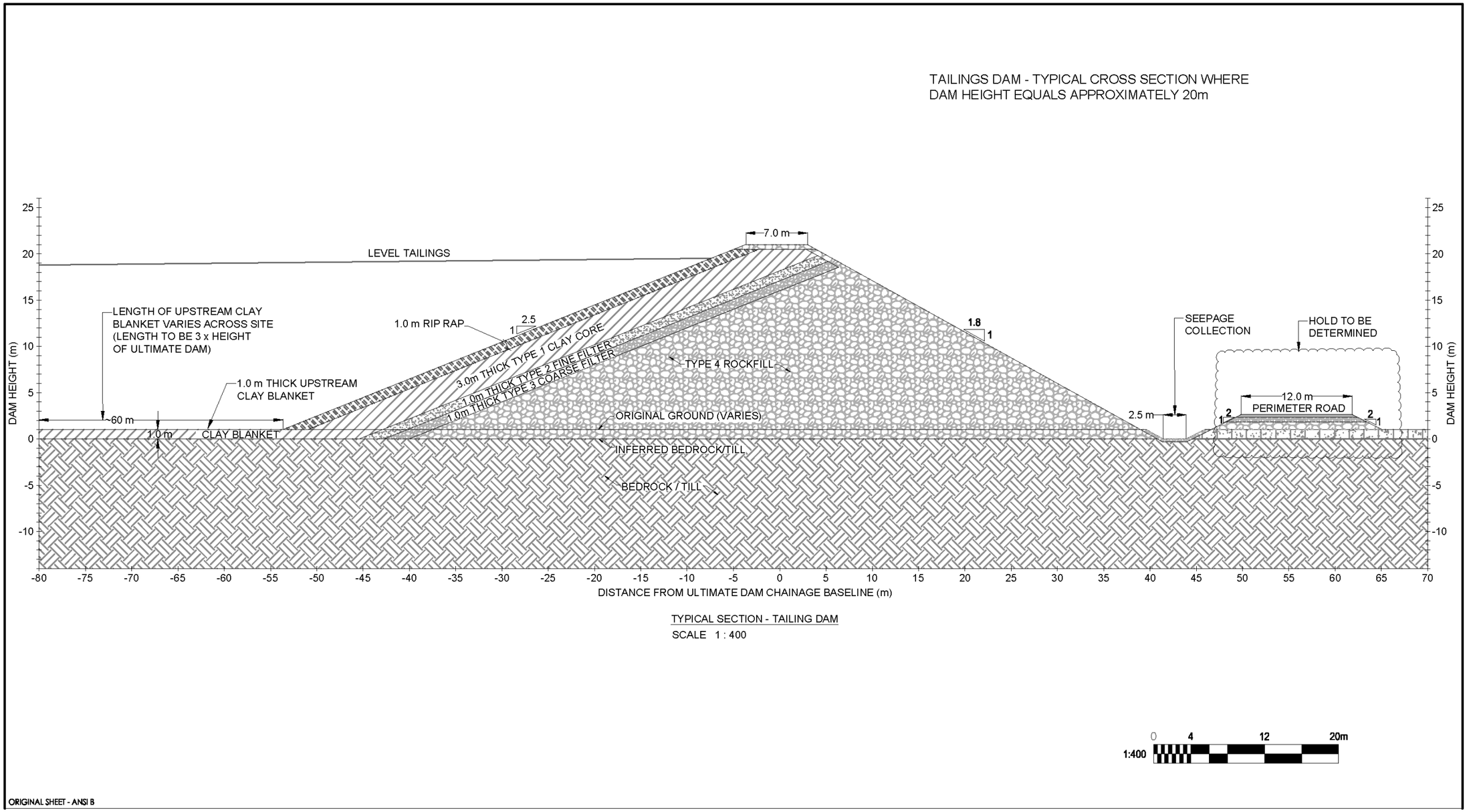

Figure 3-9 Tailings Dam – Typical Cross-Section

A crest width of 7.0 m has been assumed to allow for vehicle and equipment movement around the TSF. The slopes for the embankment are assumed to be 2.5H:1V upstream and 1.8H:1V downstream for stability. It should be noted that the downstream slopes will require re-grading to achieve 2H:1V for long term stability for closure.

Diversion ditches would be placed along the toe of the embankment, as well as a perimeter access road.

3.3 Mine Operations

The following summarizes the operations activities for the Project:

- Open pit mining – blasting, excavation, and haulage of rock from the open pits using conventional mining equipment in sizes and numbers optimized for the operation.
- Rock excavated from the open pits that will not be processed for gold will be used as engineered backfill for site development, maintenance, and rehabilitation, or will be deposited in waste rock disposal piles.
- Ore extracted from the open pits will be hauled to the processing area where it will either be: 1) crushed and stacked for gold extraction via heap leach; or 2) be crushed, ground, and the gold extracted via gravity, floatation, CIL and CIC processes.
- Process waste (tailings) will be pumped to an engineered TSF that will be designed and operated in accordance with applicable regulations and guidelines.
- Site contact water and process effluent will be managed on site and treated to remove sediments and any chemistry prior to discharge to the environment. Where possible, water will be diverted around the site, and recycling of site contact and process water for use on site will be maximized.
- Reagents, hazardous materials, and fuels will be transported, stored, and used in accordance with applicable regulations and guidelines.
- The current planning and design for the Project is based on ‘conventional’ and proven mining and milling techniques and processes. However, Marathon will employ new and modern technologies and equipment and industry best practices to reduce impact on the environment. Where available, Marathon will investigate and consider new and emerging technologies to further improve the environmental footprint of the Project.
- Marathon will update the protocols and plans (developed for construction) under the EMS to address potential environmental impacts associated with mine and mill operations and sustaining development activities (e.g., TSF phased construction). Further, there are numerous environmental plans and monitoring programs required under the operations Certificate of Approval and other permits that Marathon will incorporate into the EMS for the operational phase of the Project.

3.3.1 Mining

3.3.1.1 Open Pit Development

Whittle pit optimization was used to develop ultimate pit and intermediate mining (phase) limits with the exception of Sprite pit, as was previously noted. This software uses the Lerchs-Grossmann algorithm, an industry standard method to determine an optimal pit shape using various economic, geotechnical, and

metallurgical parameters. A number of scenarios were considered and completed in order to determine the conceptual intermediate and final pit shells for each gold deposit.

Geotechnical mine design parameters are shown below in Table 3-3.

Table 3-3 Valentine Gold Project Geotechnical Parameters for Leprechaun, Marathon and Victory Pits

Item	Leprechaun and Marathon		Victory
Geology Domain	Sediments	All Others	All
Inter-Ramp Slope (degrees)	47.5	54.3	54.3
Bench Height (m)	6.0	6.0	6.0
Catch Bench Width (m)	8.1	8.1	8.1
Benches Between Catch Benches	3.0	3.0	3.0
Vertical Distance Between Catch Benches (m)	18.0	18.0	18.0
Face Angle (degrees)	65.0	75.0	75.0

Different mining phases were designed in accordance with the recommended bench configurations as shown in Table 3-3, above. Triple benching of 6 m high production benches was determined to be suitable for all geologic units. Catch or safety benches with a width of 8.1 m were used in all designed phases. These safety benches are applied on every third bench (18 m vertically).

Two-way haul roads, 25 m wide at a 10% grade, were used in most cases where higher traffic may require extra width for safe and efficient passing of trucks. To maximize material recovery at depth, the final benches of each pit floor were designed with single-lane access (17 m width).

3.3.1.2 Mine Production

A life-of-mine production schedule is presented in Table 3-4, below. The production schedule assumes a short pre-production period as well as a reduced mill feed requirement during the first full year of production. Lower-grade mill feed and heap leach material is stockpiled to improve processing feed grades during the early years of the project.

The current production schedule will be modified as further infill drilling, and mine planning progresses. Currently, Leprechaun and Marathon pits will be mined simultaneously, however the sequencing of pit development will be further reviewed, taking into account mine planning, materials movement, and environmental considerations.

Table 3-4 Life of Mine Production Schedule

Period	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	Totals
Millfeed															
Tonnes	0	2,250,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	508,000	*35,758,000*
Gold Grade (g/t)	0	4.554	2.709	2.124	2.256	2.132	1.329	1.213	2.276	2.328	1.929	2.036	2.037	1.042	*2.178*
Recovery	0.00%	95.40%	94.88%	94.53%	94.37%	94.85%	94.75%	94.72%	95.04%	95.05%	94.61%	94.07%	94.19%	94.66%	*94.69%*
Recovered Au (t.ozs)	0	314,800	248,200	194,000	205,600	195,500	121,700	111,000	209,700	213,900	176,400	184,800	185,100	16,100	*2,376,800*
Heap Leach															
Tonnes	0	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	820,000	*36,820,000*
Gold Grade (g/t)	0	0.52	0.542	0.543	0.553	0.468	0.43	0.431	0.462	0.471	0.498	0.565	0.5	0.411	*0.497*
Recovery	0.00%	55.72%	59.16%	61.17%	61.52%	56.38%	55.91%	55.94%	55.09%	56.26%	60.20%	65.09%	62.09%	58.85%	*58.71%*
Recovered Au (t.ozs)	0	27,900	30,900	32,000	32,800	25,500	23,200	23,300	24,600	25,600	28,900	35,500	29,900	6,400	*346,500*
Total Processed															
Tonnes	0	5,250,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	1,328,000	*72,578,000*
Gold Grade (g/t)	0	2.249	1.625	1.333	1.404	1.3	0.88	0.822	1.369	1.4	1.213	1.301	1.269	0.653	*1.325*
Recovered Au (t.ozs)	0	342,700	279,100	226,000	238,400	221,000	144,900	134,300	234,300	239,500	205,300	220,300	215,000	22,500	*2,723,300*
Total Waste Tonnes	7,000,000	50,000,000	45,159,000	49,265,000	40,000,000	40,808,000	36,793,000	31,893,000	25,137,000	35,934,000	37,672,000	23,810,000	4,582,000	0	*428,053,000*
Total Material Tonnes	9,739,000	59,677,000	54,615,000	56,466,000	46,757,000	46,808,000	42,793,000	37,893,000	31,216,000	43,435,000	43,672,000	30,344,000	10,582,000	1,328,000	*515,325,000*
Stripping Ratio (Mined Waste/Mined Mill + Mined Heap)	2.56	5.59	5.07	6.84	5.92	7.47	12.5	10.84	4.14	4.85	7.19	4.67	1.6	-	*5.9*

Notes:
Period -1 is the preproduction period
Mining ceases in year 12 with production continuing into year 13.

The open pit mine operation will operate 24 hrs a day, seven days a week on a 12-hr shift basis. Material and waste will be extracted on all shifts. Blasting operations will be conducted on day shifts only. Productivity estimates are based on an assumed mechanical availability of 85 to 90% (90% for haul trucks, 85% for everything else), and a 90% utilization (for trucks and loaders) of available hours varied to reflect seasonal usage of equipment where appropriate.

A standard day-shift blasting crew will be required while four rotating labour crews will be scheduled to operate production equipment.

Mine Equipment

The Project will be developed using standard open-pit technology, scaled appropriately for the size of the operation. Mobile mining equipment is assumed to be owner-operated under a maintenance and repair contract (MARC). The required mining equipment is shown below in Table 3-5.

Table 3-5 Required Mining Equipment

Description	Anticipated Manufacturer and Model	Units Required
Haul Truck	Cat 777G	37
Wheel Loader	Cat 993K	6
Production Drill	Epiroc Smartroc D65	11
Wheel Dozer	Cat 834K	2
Tracked Dozer	Cat D10T2	3
Tracked Dozer	Cat D8T	2
Motor Grader	Cat 16M	4
Water Truck	Cat 777G	4
Support Excavator	Cat 336D2	1
Skidsteer Loader	Cat 242B	2
Hydraulic Rock Breaker	-	1
Fuel/Lube Truck	-	3
Mechanics Truck	-	2
Welding Truck	-	1
Crane (25 t)	-	1
Pick Up Trucks	-	8
Crew Vans	-	4
Tractor/Trailer with 50 t Lowboy	-	1
Portable Light Towers	-	12
Mine Planning/Surveying Equipment	-	1

Drilling and Blasting

Drilling demands will be met with up to 11 production drills. Explosive quantities are based on a 152 mm blasthole diameter and bench height of 6 m. Drill spacing is dependent on the assumed material properties. Burden and spacing is assumed to be 3.6 m x 4.2 m. Productivity estimations are based on a mechanical availability of 85% and a utilization rate of 85%.

Bulk explosives will be managed by an explosives contractor including the explosive storage facilities, and required explosives delivery and loading trucks. Actual loading and firing of the blasts will be handled by Marathon employees.

Loading and Hauling

A fleet of up to six wheel loaders and up to 37 haul trucks will be required. Millfeed, heap leach, and waste materials are assumed to be mined around the clock. Loading and hauling requirements include rehandle in addition to normal millfeed, heap leach, and waste operations. Using performance data provided by the manufacturer, mechanical availability of 90% and utilization of 90% were used to calculate the loading and hauling equipment requirements.

Support Equipment

An auxiliary fleet of dozers, graders, water trucks, and other support equipment will be required for mine operations, including track dozers for the waste disposal areas, wheel and track dozers to support loading operations, and motor graders to maintain haul roads in and out of the pit.

3.3.2 Processing

The process plant design is based on a metallurgical flowsheet developed for optimum recovery while managing initial capital expenditure and operating costs. The flowsheet is based on unit operations well proven in the industry.

The Project consists of two gold process circuits, i.e., heap leach and process plant operations. Both circuit designs are based on a 13-year mine life.

The process plant (mill) will process 3.0 Mtpa of high-grade ore material from open pit mines. The mill will consist of crushing, milling, gravity recovery, flotation of gravity tails, flotation concentrate regrind, cyanidation of both flotation concentrate and flotation tailings via a CIL circuit, carbon elution and gold recovery circuit. CIL tails will be treated for cyanide destruction and disposed of as tails in the TSF.

The heap leach process will process 3.0 Mtpa of low-grade material from open pit mines and will consist of crushing, heap leaching and CIC gold adsorption. The loaded carbon from this heap leach facility will be sent in carbon transport vessels to the milling facility for further processing in the elution circuit.

The key project design criteria for the process components are:

- Nominal throughput of 9,000 t of material per day for milling facility and 9,000 t of material per day for heap leach facility, equivalent to 6.0 Mtpa
- Crushing plant availability of 75% for both flotation and heap leach plants
- Plant availability of 91.3% for heap leach solution circulation, CIC area, grinding, gravity concentration, flotation, and leach plant and gold recovery operations

An overall process flow diagram depicting the unit operations incorporated in the selected process flowsheet is presented in Figure 3-10. The process plant general arrangement is presented in Figure 3-2. Descriptions of each component or circuit associated with the heap leach and process plant circuits are provided in Section 3.1.7 and 3.1.8.

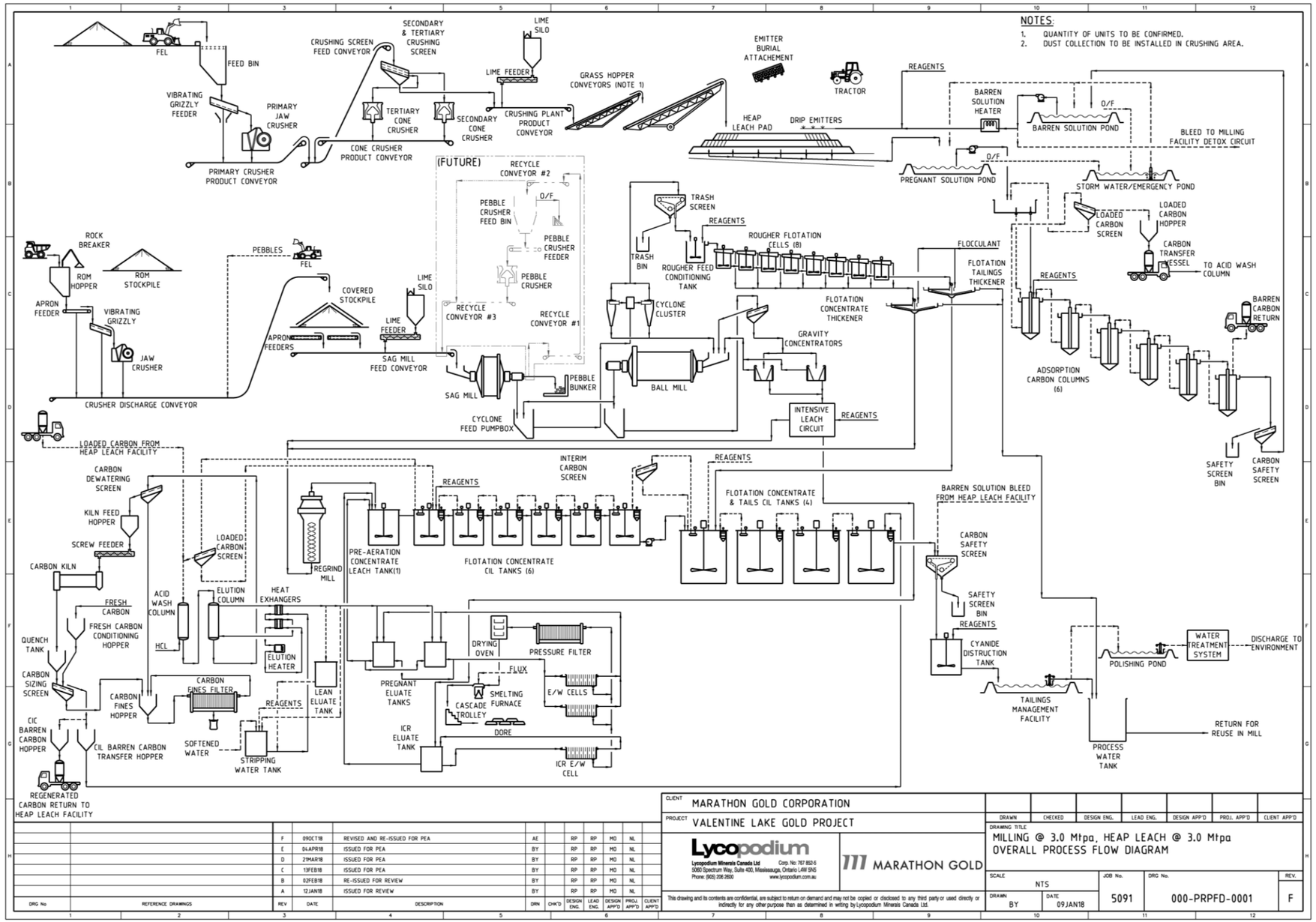

Figure 3-10 Overall Process Flow Diagram

3.3.2.1 Reagent Use

The following reagent systems are required for the process: quicklime, sodium cyanide, frother, promoter, PAX, hydrochloric acid, copper sulphate pentahydrate, sodium metabisulphite, sodium hydroxide, flocculant, activated carbon, and smelting fluxes. These are further described in Table 3-6.

Table 3-6 Reagents Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
Quicklime	There will be one lime silo system at the heap leach facility and another at the milling facility. Quicklime will be delivered to each facility in a tanker and will be pneumatically conveyed from the tanker to the lime silo. Quicklime will be extracted from the lime silo and fed onto the crushing plant product conveyor in the heap leach facility and to the SAG mill feed conveyor in the milling facility. Quicklime will be distributed as solid form.
Sodium Cyanide (NaCN)	Sodium cyanide (dry) will be delivered in a portable International Standards Organization (ISO) container that can contain 18 Mt of solid briquettes. ISO containers are designed with an internal jet mixing system. Raw water will be added to the cyanide mixing tank to the level required for achieving the stock solution concentration. A recirculating pump will be used to transfer cyanide from the ISO container to the mixing tank. The unloading process will require approximately four to six hours to complete to ensure the briquettes are completely dissolved. Plant air will then be used to flush or press out residual cyanide from the ISO container to the mixing tank. Caustic (sodium hydroxide) will also be added to the mixing tank to provide protective alkalinity to avoid generation of hydrogen cyanide gas. After the mixing period is complete, cyanide solution will be transferred to the cyanide storage tank using the same pump as the recirculating pump used in the mixing cycle. Two ISO container mixing systems will be installed, one for the heap leach and one for milling facility. Sodium cyanide will be delivered to the heap leach area, CIL circuit, intensive leach circuit and elution circuit. Automatic control valves will provide the required cyanide flowrates at a number of locations around the two plants.
Frother (MIBC)	MIBC will be delivered as a liquid in drums and stored in the reagent shed until required. A permanent bulk box will be installed to provide storage capacity local to the flotation area. MIBC will be used as-received and without dilution. Diaphragm style dosing pumps will deliver the reagent to the required locations within the flotation circuit. Top-up of the permanent bulk boxes will be carried out manually as required.
Promotor (AERO 208)	Aero 208 will be delivered as a liquid in drums and stored in the reagent shed. Aero will be used as-received and without dilution. Diaphragm style dosing pumps will deliver the reagent to the required locations within the flotation circuit. Top-up of the permanent bulk boxes will be carried out manually as required.
Collector (PAX)	PAX will be delivered in granular powder form in bags and stored in the reagent shed. Raw water will be added to the agitated PAX mixing tank. Bags will be lifted into the PAX bag breaker, located on top of the tank, using a lifting frame and hoist. The solid reagent will fall into the tank and be dissolved in water to achieve the required dosing concentration. PAX solution will be transferred to the PAX storage tank using the PAX transfer pump. Both the mixing and storage tanks will be ventilated using the PAX tank fan to remove carbon disulphide gas. PAX will be delivered to the flotation circuit using the PAX circulating pump and a ring main system. Actuated control valves will provide the required PAX flowrates at a number of locations around the flotation circuit.

Table 3-6 Reagents Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
Copper Sulphate	Copper sulphate will be delivered in solid crystal form in bulk bags and stored in the reagent shed. Raw water will be added to the agitated copper sulphate mixing tank. Bags will be lifted into the copper sulphate bag breaker, located on top of the tank, using the lifting frame and hoist. The solid reagent will fall into the tank and be dissolved in water to achieve the required dosing concentration. Copper sulphate solution will be transferred to the copper sulphate storage tank using the copper sulphate transfer pump. Copper sulphate will be delivered to cyanide destruction circuits using the copper sulphate circulation pump and ring main.
Sodium Metabisulphite (SMBS)	SMBS will be delivered in the form of solid flakes in bulk bags and stored in the reagent shed. Raw water will be added to the agitated SMBS mixing tank. Bags will be lifted into the SMBS bag breaker, located on top of the tank, using a lifting frame and hoist. The solid reagent will fall into the tank and be dissolved in water to achieve the required concentration. After mixing for a pre-set time, SMBS solution will be transferred to the SMBS storage tank using the SMBS transfer pump. SMBS will be delivered to the cyanide destruction circuit using the SMBS circulation pump and ring main. An extraction fan will be provided over the SMBS mixing tank to remove SO_2 gas that may be generated during mixing. The SMBS mixing area will be ventilated using the SMBS area roof fan.
Sodium Hydroxide (NaOH)	Sodium hydroxide (caustic soda) will be delivered as solid pearls/beads in bulk bags and stored in the reagent shed. Raw water will be added to the agitated sodium hydroxide mixing tank. Bags will be lifted into the sodium hydroxide bag breaker, located on top of the tank, using a lifting frame and hoist. The solid reagent will dissolve in water to achieve the required concentration. After mixing for a pre-set time, sodium hydroxide solution will be ready to transfer using the sodium hydroxide transfer pump. Sodium hydroxide will be delivered to gravity concentrate leach circuit, elution circuit, electrowinning, cyanide mixing, acid neutralization, and cyanide destruction circuit using the sodium hydroxide circulation pump and ring main.
Hydrochloric Acid (HCl)	Hydrochloric acid will be delivered in intermediate bulk containers (IBCs) as a solution and stored in a dedicated section of the reagent shed until required. Hydrochloric acid will be mixed with raw water (inline) to achieve the required 3% concentration. Hydrochloric acid will be delivered to the acid wash circuit using the hydrochloric acid dosing pump.
Flocculant	Powdered flocculant will be delivered to site in 50 kg bulk bags and stored in the reagent shed. A vendor supplied mixing and dosing system will be installed, which will include flocculant storage hopper, flocculant blower, flocculant wetting head, flocculant mixing tank, and flocculant transfer pump. Powder flocculant will be loaded into the flocculant storage hopper using the flocculant hoist. Dry flocculant will be pneumatically transferred into the wetting head, where it will be contacted with water. Flocculant solution, at 0.50% w/v will be agitated in the flocculant mixing tank for a pre-set period. After a pre-set time, the flocculant will be transferred to the flocculant storage tank using the flocculant transfer pump. Flocculant will be dosed to the flotation concentrate thickener and flotation tails using variable speed helical rotor style pumps. Flocculant will be further diluted just prior to the addition point.

Table 3-6 Reagents Systems Required During Project Operation

Reagents	Planned Use, Transport and Handling
Activated Carbon	Activated carbon will be delivered as solid granular form in bulk bags. The carbon is introduced into the carbon conditioning tank in the flotation/CIL plant, where it is slurried and agitated to remove the friable edges of the carbon particles and the adhering carbon dust generated in transport. The slurry is pumped over the sizing screen where the carbon fines discharge to the fine carbon hopper, and the coarse carbon particles can be transferred to the CIL circuit in milling or trucked to the heap leach carbon columns.
Anti-scalant	Anti-scalant will be delivered as solution form in bulk boxes and stored in the reagent shed until required. Permanent bulk boxes will be installed to provide storage capacity local to each dosing point. Anti-scalant will be dosed neat, without dilution. Positive displacement style dosing pumps will deliver the anti-scalant to the required locations around the heap and milling plants. Top up of the permanent bulk boxes will be carried out manually as required.
Goldroom Smelting Fluxes	Borax, silica sand, sodium nitrate and soda ash will be delivered as solid crystals / pellets in bags or plastic containers and stored in the reagent shed until required.

3.3.2.2 TSF Operation

The preliminary operational plan for the TSF is to deposit slurry from the embankment, along the perimeter of the storage area. This will optimize tailings storage capacity while reducing other risks, such as stability and seepage. It is anticipated that the TSF will be able to store up to three months' worth of process water, the rest of the water will be reclaimed for re-use in the mill.

The TSF construction and operation should align with the rest of the Project site development and operation. This includes factors such as the storage capacity, accessibility for equipment, distance and elevation from the mill for tailings pumping, and availability of construction materials.

3.3.3 Materials Shipping and Employee Transportation

Materials required for Project operation will be shipped to site via truck on the main access road. Employees would continue to be transported to the site from nearby communities. The volume of truck traffic during operation is anticipated to be much lower than during construction. While supplies may need to be shipped into the site on a weekly basis, the product to be exported would be limited to armored trucks, owned and operated by a third party and used to transport the doré bars to market via the site access road from Millertown, then via provincial highways.

3.4 Rehabilitation and Closure

Rehabilitation is defined as measures taken to restore a property as close to its former use or condition as practicable, or to an alternate use or condition that is deemed appropriate and acceptable by NLDNR. For mining projects, a Rehabilitation and Closure Plan is a requirement under the Newfoundland and Labrador *Mining Act* (Chapter M-15.1 Sections 8, 9 and 10). There are three key stages of rehabilitation activities that occur over the life span of a mine, which include:

- Progressive rehabilitation
- Closure rehabilitation
- Post-closure monitoring and treatment

Progressive rehabilitation involves rehabilitation that is completed throughout the mine operation prior to closure wherever possible or practicable to do so. This includes activities that contribute to the overall rehabilitation effort and would otherwise be carried out as part of the closure rehabilitation at the end of mining life.

Closure rehabilitation involves activities that are completed after mining operations cease, to restore and/or reclaim the Project to as close to its pre-mining condition as practicable. Such activities include demolition and removal of site infrastructure, re-vegetation of disturbed areas, and other activities to achieve the requirements and goals as detailed in the Project's Rehabilitation and Closure Plan.

Once closure rehabilitation activities have been completed, a period of post-closure monitoring is required to show that the rehabilitation has been successful. The post closure monitoring will continue until it has been demonstrated that the rehabilitation of the site has been successful. The site can then be closed out or released by NLDNR and an application to relinquish the property back to the Crown.

A complete Rehabilitation and Closure Plan has not yet been developed for the Project, but the following sections describe the general rehabilitation and closure philosophies that will be used in the development of the Project's Rehabilitation and Closure Plan. This plan will be drafted and finalized in consultation with NLDNR upon release from the EA process. Sections 3.4.1 through 3.4.4 provide a high-level approach to rehabilitation and closure as originally presented in the PEA (Lycopodium 2018).

3.4.1 Approach to Rehabilitation and Closure

As the planning and design stages of the Project continue, consideration for the future closure issues and requirements will be incorporated into final plans. In efforts to be proactive with rehabilitation activities, the following steps will be implemented:

- Disturbances of terrain, soil, and vegetation will be limited to the areas necessary to complete the required work as defined by the Project
- Organic soils, mineral soils, glacial till, and excavated rock will be stockpiled separately where possible, and protected for future use
- Stabilization of disturbances will be completed to reduce erosion and promote natural re-vegetation
- Natural re-vegetation will be encouraged throughout the Project

3.4.2 Progressive Rehabilitation

As the mine advances from development to operational stages, opportunities for progressive rehabilitation are possible. Some such opportunities include but are not limited to the following:

- Demolishing and rehabilitation of construction or exploration related infrastructure (e.g., buildings, roads, and laydown areas)
- Grading and revegetation of completed tailings areas, if possible
- Erosion stabilization and re-vegetation of completed overburden and/or waste rock dump area
- Infilling or flooding of exhausted mining areas
- Completing re-vegetation studies and trials

3.4.3 Closure Rehabilitation

Closure rehabilitation activities will be carried out, as previously described, at the mine site once it is no longer economical to mine, or resources have been exhausted. In general, the closure activities that will be completed for the site include, but are not limited to the following, and will be conducted in accordance with regulations at the time of closure:

- Removal of hazardous chemicals, reagents, and similar materials for re-sale or disposal at an approved facility as per provincial regulations
- Equipment will be disconnected, drained and cleaned, disassembled, and where possible, sold for re-use to a licensed scrap dealer. If this is not achievable, equipment will be removed from site for disposal or recycled at an approved facility
- Dismantling and removal of site buildings and surface infrastructure, for disposal or recycled at approved facilities
- Demolishing concrete foundations to a minimum of 0.3 m below the surface grade and covering with natural materials to promote re-vegetation. The demolished concrete will be removed from site for disposal in an appropriate facility
- Removal and rehabilitation of fuel and explosive storage and dispensing facilities. This may include Environmental Site Assessments, if required
- Breaching of sedimentation, stormwater, and emergency event ponds, to allow drainage to the surrounding areas for natural filtration. Prior to release to the environment, water quality testing will be completed on the pond waters
- Decommissioning of wells on site; includes dewatering wells, groundwater monitoring wells, potable drinking water wells and/or industrial water wells. The decommissioning will be in compliance with the *Guidelines for Sealing Groundwater Wells* (Gov NL 1997)
- Re-establishment of pre-mining site drainage patterns
- Grading and/or scarification of disturbed areas to promote natural re-vegetation. This may include placement and grading of overburden materials in areas where natural re-vegetation is not rapid enough to control site erosion and sedimentation

3.4.3.1 Open Pits

Upon closure, dewatering infrastructure will be removed and the open pit(s) will be allowed to naturally infill with surface water run-off, precipitation and groundwater seepage ultimately flooding the pit(s) and creating ponds. Berms will be constructed along the crest of the open pit(s), as well as across access roads or ramps, barricading access to the open pit(s). Warning signage will be erected at regular intervals along the berm notifying the public of the open pit. The berms will be constructed to promote natural re-vegetation.

3.4.3.2 Waste Rock Piles

Two waste rock piles will be created throughout the operational life of the Project. They will be terraced and constructed to a slope of three horizontal to one vertical (3H:1V) to promote stability upon closure. Where required, the waste rock piles will be graded, and overburden placed to promote natural re-vegetation.

3.4.3.3 Tailings Storage Facility

Upon closure, the TSF will be capped with material to fill in the freeboard on the tailings embankment and a layer of overburden will be placed over the surface and seeded to stabilize the ground surface and to promote re-vegetation. The slopes will be re-graded to achieve the required 2H:1V closure slopes. This may require the placement of additional rockfill material.

3.4.3.4 Heap Leach Pad

Low grade material mined at the Project will be placed on a heap leach pad. Preliminary designs for the heap has slopes of 2H:1V and will be terraced with each terrace being a maximum height of 40 m

Once economic leaching has been completed, the heap leach pad will be rinsed with fresh water to remove residual cyanide and meet the required water quality requirements. The water can be recirculated through the heap leach pad, and it may be necessary for the water to go through the water treatment facility prior to final discharge. It is assumed that the rinsing of the heap leach pad will take a maximum of a year to complete, however further analysis will be required to determine the actual rinsing requirements. Once the rinsing is completed, and where necessary, the slopes will be re-graded to form uniform slopes. Overburden will be placed on the heap leach pad, graded, and seeded to stabilize the ground surface and to promote natural re-vegetation.

3.4.4 Post-Closure and Long-Term Monitoring

The post-closure monitoring program will continue after final closure activities are completed for an estimated ten years. However, the monitoring period could be shortened based on the satisfaction of the regulatory bodies that physical and chemical characteristics are acceptable and stable. When the Project is deemed physically and chemically stable, the site will be relinquished to the Crown.

The post-closure and long-term monitoring plans are yet to be developed. These programs will be developed once the Project is designed and operations have been sufficiently advanced. It is anticipated that the closure monitoring plans will mirror the operational monitoring program to provide continuity of data and a historic baseline. It is also anticipated that as post closure time increases the monitoring requirements will decrease until ultimately, they will no longer be required.

3.5 Project Schedule

Construction of the Project is expected to take place over a period of 18 to 24 months as generally shown in Table 3-7, below.

Marathon's ongoing and future scheduling and planning activities will consider the various environmental guidelines and constraints (e.g., bird breeding seasons) in order to minimize the potential environmental effects of construction.

Project construction would be followed by an estimated mine operation life of 13 years. The Project will operate 24 hours (hrs) a day, seven days a week on a 12-hr shift basis. The Project production schedule is shown in Table 3-4. A preliminary life of mine schedule is shown in Table 3-8.

3.6 Wastes, Discharges and Emissions

3.6.1 Construction

Wastes, discharges, and emissions during construction would be typical of those associated with site clearing and construction operations. They are anticipated to include:

- Noise from generators, vehicles and other construction equipment
- Release of contaminants and greenhouse gasses (GHGs) generators, vehicles and other construction equipment
- Stormwater / run-off from construction areas
- Grey water and domestic solid waste associated with the accommodations camp
- Petroleum, oil, and lubricant (POL) POL waste from maintenance of vehicles and construction equipment on site and potential runoff from refueling and fuel storage areas

These emissions, effluents and discharges will be managed and mitigated through industry standard measures including proper maintenance of equipment, dust suppression measures where appropriate, sediment and erosion control measures and proper handling, storage and disposal of wastes, including hazardous wastes that may results from Project construction activities. A discussion of stormwater and sewage treatment is found in Section 3.1.16. Further discussion on GHG emissions is found in Section 3.6.3.

3.6.2 Operation

During operation, noise sources would include blasting, as well as operation of equipment and generators. Dust and emissions from vehicles, equipment and generators would continue to be the main source of air contaminants. The milling and processing plant will be enclosed, limiting potential for dust and other emissions. Further discussion on GHG emissions is found in Section 3.6.3.

Table 3-7 Preliminary Project Development Schedule

Activity	2019				2020				2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Public & Regulator Consultation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
EA Process	■	■	■	■	■	■	■	■	■	■										
Engineering and Supporting Studies	■	■	■	■	■	■	■	■	■	■	■	■	■							
Early Permits & Approvals										■	■									
Federal, Provincial Permits & Approvals										■	■	■	■	■						
Operational, Environmental Management & Monitoring Plans											■	■	■	■	■	■	■			
Clearing, Site Access and Site Roads, Pre-Stripping												■	■	■						
Civil Earthworks													■	■	■					
Foundations and Subsurface Utilities														■	■					
Heap Leach Pad and TSF Earthworks (Stage 1)														■	■	■	■			
Mill and Infrastructure Construction														■	■	■	■			
Commissioning and Start-Up																	■	■		
Mine and Mill Operations																	■	■	■	■

Table 3-8 Preliminary Life of Mine Schedule

Activity	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Public & Regulator Consultation	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
EA Process	■	■	■																				
Engineering and Supporting Studies	■	■	■	■	■																		
Federal, Provincial Permits & Approvals			■	■																			
Project Construction			■	■	■																		
Commissioning and Start-Up					■																		
Mine and Mill Operations					■	■	■	■	■	■	■	■	■	■	■	■	■						
Closure and Rehabilitation																	■	■					
Post Closure Monitoring																		■	■	■	■	■	■

The major sources of waste and discharges during Project operations have been discussed in the preceding sections. They include: site water management (Section 3.1.5), mine waste management including the potential or ARD/ML (Section 3.1.3), TSF effluent (Section 3.1.10 and 3.2.8), and heap leach pad containment (Section 3.1.7 and 3.2.7).

Grey water and domestic solid waste would continue to be produced and appropriately managed and/or treated during operation. Refer to Section 3.1.16. POL waste from maintenance of equipment and vehicles will also continue through operation.

3.6.3 GHG Emissions

During the construction and operation of the proposed Project, GHGs will be emitted from the combustion of diesel fuel in various equipment including temporary and back-up generators, heavy machinery and other on-site vehicles. As currently designed, the Project will not require on-site electricity generation as power will be supplied through the provincial grid. An estimated 270 million liters of diesel could be consumed on site throughout the life of the Project (construction and operation). A preliminary estimate of GHGs from the construction and operation of the Project, based on the anticipated amount of fuel to be consumed, averages 48,750 tonnes of CO2e annually over the life of the Project (i.e., over 15years). This is a high-level estimate that will be further refined during the development of the environmental assessment. GHG emissions will be mitigated throughout the life of the Project through the use of power from the provincial grid, reducing idling to reduce amounts of fuel consumed, managing haul routes to reduce amount of fuel consumed, and maintaining engines in proper working order.

3.7 Employment and Expenditures

As discussed in Section 2.2, development of this Project will generate employment, expenditures and associated benefits to the province. More details on the anticipated employment and expenditures anticipated for the Project are provided in the following sections.

3.7.1 Construction Employment

Construction will last between 18 and 24 months and will require a peak labour force of 466 people. As most of the work will be contracted, specific breakdowns of employees is not possible at this time. Table 3-9 provides the categories of employment that will be generated during the construction phase of the Project and the related National Occupation Codes (NOC) for Canadian labor classifications.

Table 3-9 Construction-Related Employment

Category	NOC Code
Contractors	
Equipment Operators	9411
Labourers	9611
Trades	9611
Supervisors	9211

Table 3-9 Construction-Related Employment

Category	NOC Code
Management and Administration	0811/1221/1411
EPCM Contractor	
Engineers and Technicians	2143/2212
Management and Procurement	0811/0113/1225/1524
Administration	1221/1411
Marathon	
Management and Administration	0811/1221/1411
Environmental	2113/2131

3.7.2 Operational Employment

During operations, employment will average 442 people and peak at 466. The following Table 3-10 indicates the category of employees, estimated numbers of employees required during Project operation and their corresponding NOC codes.

Table 3-10 Average Annual Employment by Category

Category	Number of Employees	NOC Codes
Management	9	0811
Supervisors	18	9211
Engineers and Technicians	33	2143/2212
Trades	32	9611
Operators	338	9411
Labourers	7	9611
Administrative	5	1221/1411
Total Labour	442	

3.7.3 Capital Costs

The capital estimate for the Project is summarized in Table 3-11. Overall costs are expressed in United States Dollars ($) unless otherwise stated, and are based on Q3 2018 pricing and deemed to have an accuracy of ±35%. The capital cost estimate conforms to Association for the Advancement of Cost Engineering International (AACEI) Class 5 estimate standards as prescribed in recommended practice 47R11. The capital cost estimate was based on an engineering, procurement, and construction management (EPCM) implementation approach and typical construction contract packaging. Equipment pricing was based on quotations and actual equipment costs from recent similar Lycopodium projects considered representative of the Project.

Table 3-11 Capital Estimate Summary by Area (Q3 2018, ±35%)

Area	$ Including Contingency/Excluding Duties and Taxes (CAD*)
000 Construction In-directs	$21,257,000 ($28,271,810 CAD)
100 Treatment Plant Costs - Heap Leach Circuit	$47,626,000 ($6,3342,580 CAD)
100 Treatment Plant Costs - Milling Circuit	$92,739,000 ($123,342,870 CAD)
200 Reagents & Plant Services - Heap Leach Circuit	$4,030,000 ($5,359,900 CAD)
200 Reagents & Plant Services - Milling Circuit	$21,355,000 ($28,402,150 CAD)
300 Infrastructure	$73,192,000 ($97,345,360 CAD)
400 Mining**	$56,231,000 ($74,787,230 CAD)
500 Management Costs	$22,434,000 ($29,837,220 CAD)
600 Owners Project Costs	$16,440,000 ($21,865,200 CAD)
Subtotal Directs	**$355,304,000 ($472,554,320 CAD)**

*Canadian estimates are based on a conversion rate of $0.77

**Mining capital costs are based on leased mining equipment and the initial capital is a 30% down payment of the mine fleet. This cost includes mine services and pre-production stripping.

The infrastructure included in the capital cost includes: camp and catering (for permanent 200 person camp to be used during construction, and a temporary construction camp that will accommodate an additional 100 persons), potable water and wastewater, communications, recreation facilities and mess hall, reagents storage shed, office buildings and control rooms, crushed material stockpile dome (55.4 m diameter), main warehouse and office, medical centre, administration building, wet and dry laboratory, gatehouse, substation buildings, plant ablutions, overhead power line, and access road upgrade. The main access road upgrade consists of an initial upgrade intended to be constructed in pre-production phase. Subsequent road upgrades or maintenance will be assessed within the first two to three years of commercial production.

3.7.4 Diversity and Inclusion Policy

Marathon recognizes that diversity and inclusion must be embedded in all aspects of its business. Marathon has a formal Diversity Policy (https://marathon-gold.com/site/assets/files/4269/diversity-policy.pdf), which was developed to guide the selection of its Board of Directors. As the company has remained small in size, the fundamentals of this existing policy have been extended to the hiring of company personnel to date. As Marathon moves forward with the Project, it will develop a Diversity, Gender and Inclusion policy that encompasses all aspects of its business, including but not limited to, the Board of Directors, employees, contractors, and suppliers. This will provide the foundation for a future Diversity, Gender and Inclusion Plan that will be implemented for the development and operation of the Project.

4.0 ENVIRONMENTAL SETTING

The Project is located in rural central Newfoundland, in the Red Indian Lake Subregion of the Central Newfoundland Forest Ecoregion, which covers most of the central and north-eastern portions of the Island. This part of the Island is characterized by boreal forest with mainly coniferous trees and a continental climate. It experiences colder winters and warmer summers than coastal areas. The Project lies just north of the Maritime Barrens Ecoregion. It is a rural area, with a history of past mining exploration and development activities and other land and resource uses, including commercial forestry, outfitting, and recreational land use.

The landscape in the vicinity of the Project is characterized by remote upland forests dominated by softwood forests (i.e., balsam fir and black spruce), interspersed by lowlands [i.e., wetlands (e.g. peatlands and treed wetlands)], krummholtz, barrens, and open water habitats (Stantec 2015). Hardwood and mixedwood stands are also present, with the dominant species being white birch and trembling aspen (Stantec 2015). Note that a list including common names and scientific names of the species referenced in this report is included in Appendix B.

The region is home to a variety of typical boreal forest wildlife and bird species (PAA 2008) (Section 4.2.3). Mammal species endemic to the boreal forest, such as that in the Red Indian Lake Subregion, include moose, snowshoe hare, muskrat, river otter, mink, black bear, beaver, lynx, woodland caribou, and American marten (PAA 2008, NLDFLR 2019).

Boreal forests provide habitat for diverse and abundant avifauna groups including songbirds, waterfowl and shorebirds, and raptors. Forests in the Central Newfoundland Forest Ecoregion typically include boreal bird species such as Gray Jay, Pine Siskin, Boreal Chickadee, Black-capped Chickadee, Fox Sparrow, White-winged Crossbill, Yellow-rumped Warbler, Blackpoll Warbler, Yellow-bellied Flycatcher, White-throated Sparrow, Pine Grosbeak, Northern Flicker, Osprey, Great Horned Owl, Sharp-shinned Hawk, Ruffed Grouse, and Spruce Grouse. Waterfowl and shorebird species including Green-Winged Teal, Ring-Necked Duck, American Black Duck, Canada Goose, Greater Yellowlegs, and Spotted Sandpiper are also common.

The Project is located in the Exploits River Watershed, the largest watershed on the island of Newfoundland. The total watershed area of the Exploits River is 10,241 km^2; water discharge from the Exploits River is highly regulated by three dams located in Millertown, Grand Falls, and Bishops Falls. The mouth of Red Indian Lake is controlled by a dam located in Millertown. Historically, Victoria Lake drained to Red Indian Lake via the Victoria River, but with the construction of the Victoria Reservoir Dam in 1967, the flow from Victoria Lake was altered to flow in a generally southerly direction to Burnt Lake and Granite Lake, providing flow to the Hydrogeneration Station in Bay D'espoir. In recent years, Victoria Lake has contributed very little flow to the Victoria River, because the Victoria Lake Dam operates as an overflow spillway, and spilling occurs very infrequently.

Atlantic salmon, brook trout, and threespine stickleback are known to occur in the Project Area. The Victoria River, as part of the Exploits River Watershed, feed the Exploits River, one of the most important Atlantic salmon rivers on the Island in terms of numbers of salmon returning. However, based on 2016 population surveys, the returns of Atlantic salmon to the Exploits River system have declined in comparison to previous

five-year means (2011 to 2015). This is consistent with province-wide data, which shows declines in total returns greater than 30% for more than half the rivers monitored in the province in 2016 (DFO 2017).

The following sections summarize the terrestrial and aquatic ecosystems present in the vicinity of the Project and are based on literature reviews and include summaries of baseline surveys carried out in support of the Project. Environmental baseline studies have been completed between 2011 and 2018, with additional work planned for Summer 2019.

This is followed by a summary of the social, cultural, and economic environment in the region.

4.1 Physical Environment

4.1.1 Climate

Average climate data from the closest weather station (i.e., Buchans; 37 km from the Project Area) between 1981 to 2010 (Government of Canada, 2019) are presented in Table 4-1. Average annual temperature is approximately 3.8˚C, ranging from a low of -8.4˚C in February to a high of 16.3˚C in July. The average daily temperature typically drops below freezing in December and remains below zero until March. Average annual precipitation is approximately 1,200 mm, including approximately 360 cm of snowfall. Runoff in the Project Area ranges between 51% to 86% of climate normal precipitation (Stantec 2017a). Due to the relatively warm and dry summers, the Red Indian Lake Subregion experiences a high number of forest fires compared with other parts of the Island (PAA 2008).

Table 4-1 Average Climate Data for Buchans, NL (1981-2010)

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Temperature (°C)	-8.2	-8.4	-4.8	1.0	7.0	12.1	16.3	16.2	11.9	6.0	0.5	-4.5	3.8
Average Rainfall (mm)	33.7	25.6	39.5	59.5	82.2	87.7	95.3	123.0	110.3	92.5	81.5	46.3	877.0
Average Snowfall (cm)	88.3	72.5	55.5	26.2	4.4	0.1	0	0	0.1	5.0	30.4	76.9	359.3
Average Precipitation (mm)	122.0	98.1	95.0	85.7	86.6	87.8	95.3	123.0	110.4	97.5	111.8	123.1	1,236.2
Source: Government of Canada (2019)													

4.1.2 Air Quality and Noise

There are no historical records for air quality and noise in the Project Area, but given its' rural nature, the concentrations of air contaminants are likely to be close to average background concentrations at most locations, most of the time. Occasionally, due to nearby sources, such as dust from traffic on unpaved roads, the concentration of an air contaminant, such as particulate matter, may be temporarily elevated for a short period of time. Ambient air quality is likely to be very good, most of the time.

Similarly, the noise levels in a rural environment are likely to be dominated by natural phenomena or activities, such as wind, rain, and wildlife. The sound pressure levels are likely to be relatively quiet most of the time. Local sources of noise may include forestry and exploration activities, vehicles, generators, snowmobiles / ATVs, or recreational boat engines. These activities and sources are not likely to exceed regulatory thresholds, such as day time noise level of 65 dBA (over 16 hours), or night time threshold value (over 8 hours) of 55 dBA.

4.1.3 Topography and Geology

Topography in the Red Indian Lake Subregion ranges from 150 to 450 m above sea level. The terrain is glacial with rolling hills, dense forest, and domed bogs occurring in valleys and basins (PAA 2008). Water resources are abundant and include large lakes and ponds as well as small streams and rivers. Maximum elevation in the Project Area is 480 m above sea level, with lower ground on the sides of the ridge to the northwest and southeast (Lycopodium 2018). The minimum elevation on the property is 320 m above sea level and represents the level of Victoria Lake in the south-western part of the property (Lycopodium 2018).

The following description of the regional geology was originally prepared for the Project PEA (Lycopodium 2018).

The Project is located within the Newfoundland Appalachians, which formed during closure of the Iapetus Ocean in the Cambrian to Ordovician, resulting in the accretion of Laurentia and Gondwana (Piercey et al. 2014). Newfoundland is divided into four major tectonostratigraphic zones which are juxtaposed by major regional sutures. From west to east, the Zones include the Humber Palaeozoic continental margin, the Dunnage Cambro-Ordovician mobile belt, the Gander Ordovician volcano-sedimentary sequence, and the Avalon Devonian sedimentary group. Granitoid and mafic intrusions were emplaced during the Devonian and intrude the four major tectonic subdivisions.

The Dunnage Zone hosts the Project and is characterized by island arc volcano-sedimentary sequences and ophiolite lenses that formed during the Middle to Late Ordovician, Taconic, and Penobscot orogenies. The Dunnage Zone is subdivided into the Notre Dame and Exploits subzones, which represent the Laurentian and Gondwana margins, respectively. The Dunnage Zone was subjected to later deformation during the Silurian Salinic orogeny and was intruded by Devonian granitoid plutons, and mafic stocks and dykes.

Gold mineralization within the Dunnage Zone occurred coincident with late syn- to post Salinic orogenic events (Murahwi 2015), and is typically spatially related to major structural features and proximal to, or hosted in, intrusive bodies. The Dunnage Zone is also host to the past producing Buchans and Duck Pond copper-zinc volcanogenic massive sulfide (VMS) deposits and several other VMS occurrences.

Four gold deposits and several gold prospects and occurrences at earlier stages of exploration have been discovered to date over a total strike length of 20 km of the property. Mineralization is hosted almost entirely within the Valentine Lake Intrusive Complex (VLIC), and is associated at a project scale with poorly defined second and third order splay faults off the Valentine Lake Thrust Fault. This major fault system appears to have acted as a pathway and loci for gold-mineralizing fluids. The VLIC occurs at a major flexure in the Valentine Lake Thrust Fault, and deformation associated with sinistral shear along this thrust is inferred to have been a major factor in the structural control on gold deposition for the Project.

The Leprechaun, Marathon, Sprite, and Victory gold deposits are the most advanced within the property, with other gold prospects at the Frank, Rainbow, Triangle, Victoria Bridge, Narrows, and Victory NE occurrences located intermittently proximal to the contact between the VLIC and the Rogerson Lake Conglomerate. The gold occurrences share similar general characteristics, where gold mineralization is associated with dominantly extensional and lesser shear parallel quartz-tourmaline-pyrite veins hosted within trondhjemite and quartz porphyry sub-units of the VLIC.

4.1.4 Soils

A soil analysis was completed as part of an Ecological Land Classification (ELC) completed for the Project (Stantec 2015). The study area for the ELC encompassed the Project Area. Overburden material in the vicinity of the Project generally consists of a discontinuous layer of till of variable thickness over exposed bedrock.

In the vicinity of the Project Area, soil map units were mostly complexes of organic and mineral soils, reflecting the varied topography of the underlying till. The most abundant mineral soil unit on well to imperfectly drained soils is that of the Red Indian soil. Gleysols, which are poorly drained transitional soils between organic and upland soils, are less extensive and include mainly Silver Mountain soil units. Soils developed on fen peat parent materials occupy the Deadwolf Pond and Ebbegunbaeg soil units. Anthropogenic or disturbed land is primarily associated with historic mineral exploration and forest management activities in the area. Water occupies a substantial portion of the ELC study area (Stantec 2015).

4.1.5 Hydrology

Baseline hydrology and water quality studies for the PDA were completed by Stantec from 2012 to 2017. The purpose of the program was to establish a series of water flow monitoring stations that could be used to characterize baseline hydrological conditions. In 2012, a suite of three levelogging stations (HS1, HS2 and HS3) and three flow monitoring stations (HS4, HS5 and HS6) were established within the PDA (Figure 4-1). In November 2018, three additional hydrometric monitoring stations (HS7, HS8 and HS9) were established to assess hydrological conditions associated with watercourses in the vicinity of the Marathon Pit. Additional data will be collected throughout 2019 to provide rating curves for these streams. The information gathered from these new sites will be used in addition to the existing data to monitor long-term hydrological trends and assess potential downstream impacts.

The area of the Leprechaun and Sprite Deposits is comprised of two watersheds, each containing two small ponds and connecting streams. ValP1 and ValP2 drain north to Valentine Lake and Vic P1 and VicP2 drain south to Victoria Lake (Figure 4-1). The Marathon Deposit contains a series of small streams that drain east to the Victoria River, and west to Valentine Lake. Valentine Lake drains to the Exploits River via Victoria River and Red Indian Lake (Figure 4-1). The Victory Deposit is located 0.5 km from Victoria River and there is one small pond located to the northeast (Figure 4-1).

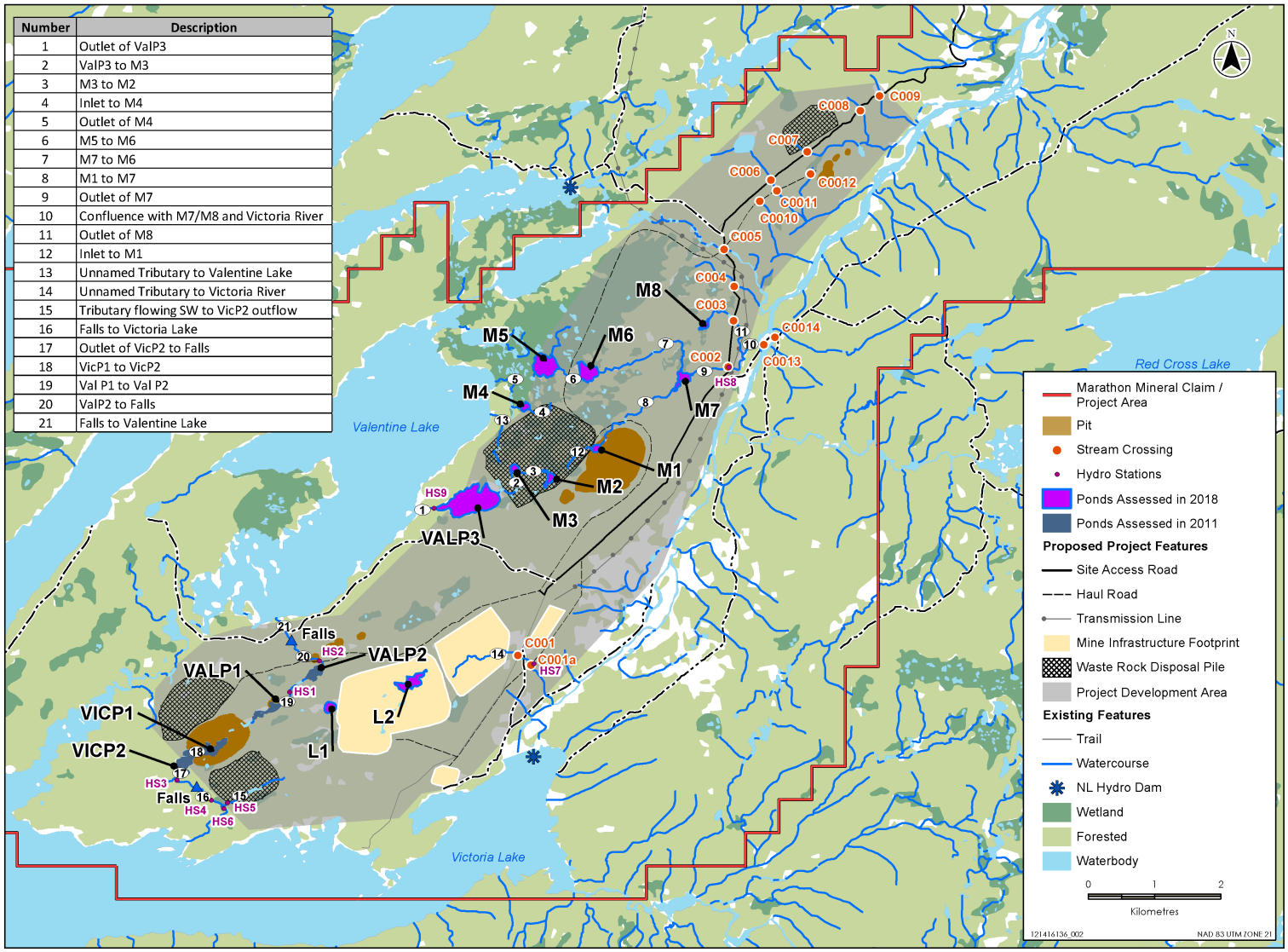

Figure 4-1 Locations of Hydro Monitoring Stations and Baseline Fish Surveys

A regional hydrological assessment was conducted using the Water Survey of Canada hydrometric monitoring stations flow data from the region. Mean annual stream flow ranged from 51 to 86% of climate normal total precipitation. The remaining precipitation was evapotranspiration. The mean annual flow per unit area was 0.028 $m^3/s/km^2$ with standard deviation of 0.003 $m^3/s/km^2$ (range: 0.020 $m^3/s/km^2$ to 0.034 $m^3/s/km^2$) (Stantec 2017a). Stream flow tended to peak twice a year in April to May due to spring freshet, and in November due to autumn rainfall. Lowest flows were observed during winter months (January to February) and late summer (August). Regional relationships were provided for annual flows, low flows, and peak flows.

Local hydrologic conditions were assessed using continuous water level data collected from HS1 to HS6 from October 16, 2012 to July 16, 2017 (Figure 4-1). Data from these stations were used to develop a stage discharge relationship or rating curve for each watercourse. Drainage areas of the monitoring stations ranged from 0.416 to 2.33 km^2 (Stantec 2017a). The mean annual flows ranged from 0.017 to 0.040 $m^3/s/km^2$, which correspond well with regional estimates. Low flows ranged from 0.0001 to 0.008 $m^3/s/km^2$ while peak flows ranged from 0.247 to 1.75 $m^3/s/km^2$ (Stantec 2017a).

4.1.6 Hydrogeology

Initial information on the hydrogeology in the PDA was collected through testing in existing exploration boreholes in 2017 (Stantec 2017b) and 2018 (Stantec 2019). Regional hydrogeological data was collected from “The Hydrogeology of Central Newfoundland” (AMEC 2013). The majority of the Leprechaun, Sprite, Marathon and Victory Deposits are located in what is referred to as hydrogeological Unit 5. The yields of wells drilled in Unit 5 are typically low to moderate, with well yields ranging from 0.1 L/min to 550 L/min with a median value of 9 L/min and averaged 22 L/min. The southeastern section of the PDA, where the process plant area, HLP, and TSF are sited, is mostly located within hydrogeological Unit 3. The yields of wells drilled in Unit 3 are also typically low to moderate, with well yields ranging from 0.1 L/min to 455 L/min, with a median value of 9 L/min and averaged 22 L/min.

The direction of groundwater flow is assumed to follow topography, which regionally would be to the south towards Victoria Lake. Locally, drainage from the Marathon Deposit is expected to travel east to northeast to Victoria River, draining into Victoria Lake to the south. Groundwater is thought to be recharging along the topographic highs and discharging along local surface water bodies including Victoria Lake. It is expected that the shallow groundwater system in the area will be largely controlled by surface runoff and local recharge, while at moderate depths the flow system may be influenced by recharge at higher elevations. Groundwater levels are generally assumed to be close to ground surface and to be a subdued reflection of the topography. Measured groundwater levels at the site ranged from surface (zero meters below ground surface (mbgs)) to approximately 2 mbgs. The movement of groundwater through the underlying bedrock can be expected to mainly occur within secondary openings, such as fractures and joints, and will be variable depending on the frequency and interconnection of these structural features. The underlying bedrock aquifer is likely to be under semi-confining conditions with recharge dominantly from lateral inflow of groundwater from adjacent upland areas.

Field surveys conducted in support of the Project showed depth to groundwater ranged from -0.837 mbgs (flowing artesian well) to 8.928 mbgs. A groundwater elevation change of 100 m was observed between

the topographic highs of the Sprite Deposit down to Valentine Lake and Victoria Lake. Detailed results can be found in the 2017 and 2019 reports referenced above.

4.2 Biological Environment

The following sections summarize the aquatic and terrestrial ecosystems present in the vicinity of the PDA, based on baseline surveys carried out in support of the Project. As described below, some of the baseline studies focused on the PDA, while others considered a broader study area depending on the environmental component being considered.

4.2.1 Fish and Fish Habitat

Two fish and fish habitat baseline studies have been completed to date, focusing on the PDA. The initial 2011 baseline study considered ponds and streams potentially impacted by the development of the Leprechaun Pit, plus nine stream crossings located near the Victoria River (Stantec 2012). A 2018 study focused on additional lakes, ponds and streams potentially impacted within the PDA, plus 14 stream crossings at or near the Victoria River (Stantec 2019). Additional studies will be completed in summer 2019, to collect outstanding aquatic information, as required.

The lakes, ponds and streams assessed during the 2011 and 2018 studies are illustrated in Figure 4-1. Fish species present / absent were assessed by Fyke netting and gillnetting in lakes and ponds and by electrofishing in streams. The following species were identified at sample locations: Atlantic salmon, brook trout, and threespine stickleback (Stantec 2012 and 2019).

An assessment of fish presence for the waterbodies surveyed is included in Table 4-2. Fish presence was assessed based on five categories: confirmed, likely present, unlikely present, absent and not fish habitat (dry). Most of the waterbodies surveyed were given an assessment of confirmed or likely for both salmonids (brook trout or Atlantic salmon) and threespine stickleback. Substantial fishing effort expended in ponds ValP1, ValP2, VicP1 and VicP2 and their associated streams 17, 18 19 and 20 resulted in no salmonids being captured. Substantial barriers (i.e., water falls) are located downstream of ValP2 and VicP2 (see Figure 4-1 for location); upstream from which no salmonids were captured (Stantec 2012).

Table 4-2 Assessment of Fish Presence within the PDA

Fish Status	Salmonids	Threespine Stickleback
Ponds and Lakes		
Confirmed	Val Lake, Vic Lake, Val P3, L1, L2, M1 and M6	Val Lake, Vic Lake, M5 and M6, ValP1, ValP2, VicP1, VicP2
Likely	M3, M4, M5, M7 and M8	Val P3, L1, L2, M1, M3, M4, M7 and M8
Unlikely	M2	M2
Absent	Val P1, Val P2, Vic P1, Vic P2	None

Table 4-2 Assessment of Fish Presence within the PDA

Fish Status	Salmonids	Threespine Stickleback
Streams		
Confirmed	1, 2, 5, 8, 9, 10, 11, 14, 15, 16 and 21	4, 5, 11, 15, 16, 17, 18, 19, 20 and 21
Likely	4, 6, 7, and 13	1, 2, 6, 7, 8, 9, 10, 13 and 14
Unlikely	3	3
Absent	17, 18, 19 and 20	None
NFH (dry)	12	12
Stream Crossings		
Confirmed	C001, C001a, C002, C003, C005, C006, C009, C013, C014	C003
Likely	None	C001, C001a, C002, C013 and C014
Unlikely	C004, C008, C011	C004, C005, C006, C008, C009, C011
Absent	None	None
NFH (dry)	C007, C010, and C012	C007, C010, and C012

Notes:
Confirmed = fish presence confirmed. Captured by fyke trap, electrofisher, or Gillnet
Likely = suitable habitat is present and this habitat is connected to habitat containing this species
Unlikely = no suitable habitat present and this habitat is not connected to habitat containing this species
Absent = substantial fishing effort expended, but species not caught.
NFH = dry, no fish habitat present

Most of the ponds surveyed were relatively small, with predominately fine substrate, shallow water (<2 M) and little aquatic vegetation. The exception is Victoria Lake and Valentine Lake, which are much larger and deeper. The streams surveyed were generally small (<5 m), shallow (<0.5 m), and slow flowing (<0.2 m/s). First order, low gradient streams that flowed through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow velocities, and fine substrates. The lower reaches of streams were generally more riffle / run habitat, associated with increased gradient and velocities, coarser substrates, and well-defined channels.

There was no defined channel at the mapped location of the unnamed tributary to M1, and no visible channel at stream crossing C007, C010 or C012. The channel at stream crossing C008 was intermittent and dissipated within the downstream portion of the survey area.

4.2.2 Vegetation

Two baseline vegetation-related studies have been completed for the Project: an ELC (Section 4.1.4) and a Vegetation and Rare Plants study.

The ELC study area was 1,831 km^2 and fully encompassed the Project Area (Stantec 2015). It identified 12 ecosystem units. Approximately 56% of the study area was upland environment, 22% was lowlands (i.e., wetlands), and 22% was open water. Upland areas were dominated by softwood forests (i.e., the Balsam Fir Forest and Black Spruce Forest Ecotypes), Alder Thicket Ecotype and Mixedwood Forest Ecotype. Lowland sites consisted of open peatlands (i.e., Shrub / Graminoid Fen and Shrub Bog Ecotypes) and treed wetlands (i.e., Wet Coniferous Forest Ecotype).

Vegetation surveys in the Project Area and slightly beyond (Figure 4-2) (Stantec 2015, 2017c) identified approximately 293 vascular plant species, distributed into 175 genera and 69 families; the most heavily represented families were the *Cyperaceae* (49 species), *Poaceae* (22 species) and *Asteraceae* (22 species) (Stantec 2017c). Three of the 293 vascular plant species are considered Species of Conservation Concern (SOCC). Section 4.2.5.1 provides further information on rare plants identified within the Project Area.

4.2.3 Wildlife

Two directed wildlife studies have been completed in support of the Project: a winter wildlife survey in 2013 and a Newfoundland marten survey in 2018. In addition, incidental wildlife observations were noted during other field surveys, including the ELC (Stantec 2015).

Species identified by visual observation in the Project Area include caribou, moose, lynx, coyote, fox, snowshoe hare, and squirrel. However, the most frequently encountered species, including track sightings, were moose, caribou, snowshoe hare, and squirrel. Other species identified by wildlife sign (i.e., tracks, scat, markings, feeding activity, kill sites, bedding, nests, and lodges / dams) included muskrat, river otter, red-backed vole, and meadow vole (Stantec 2015). Evidence of beaver activity (e.g., dams, lodges, stumps, cutting) were recorded along some small rivers and streams, and while no individual animals were observed, beaver is believed to occur throughout the vicinity of the Project Area where suitable habitat exists (i.e., habitat with a permanent water supply). Black bear, mink, and ermine are known to occur in the vicinity of the Project Area, however were not confirmed during the 2014 ELC field survey (Stantec 2015). While not identified in the baseline studies, bats, including the northern long-eared bat and little brown bat are also expected to roost in mature mixedwood forest (Stantec 2015).

American marten was the only ‘Threatened’ wildlife species [*Species at Risk Act* (SARA), Newfoundland and Labrador *Endangered Species Act* (NL ESA)] identified within the Project Area. Although woodland caribou is not listed under SARA, their population in Newfoundland is considered ‘Special Concern’ by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC) (COSEWIC 2014). More information on Species at Risk (SAR) in the vicinity of the Project Area is found in Section 4.2.5.2.

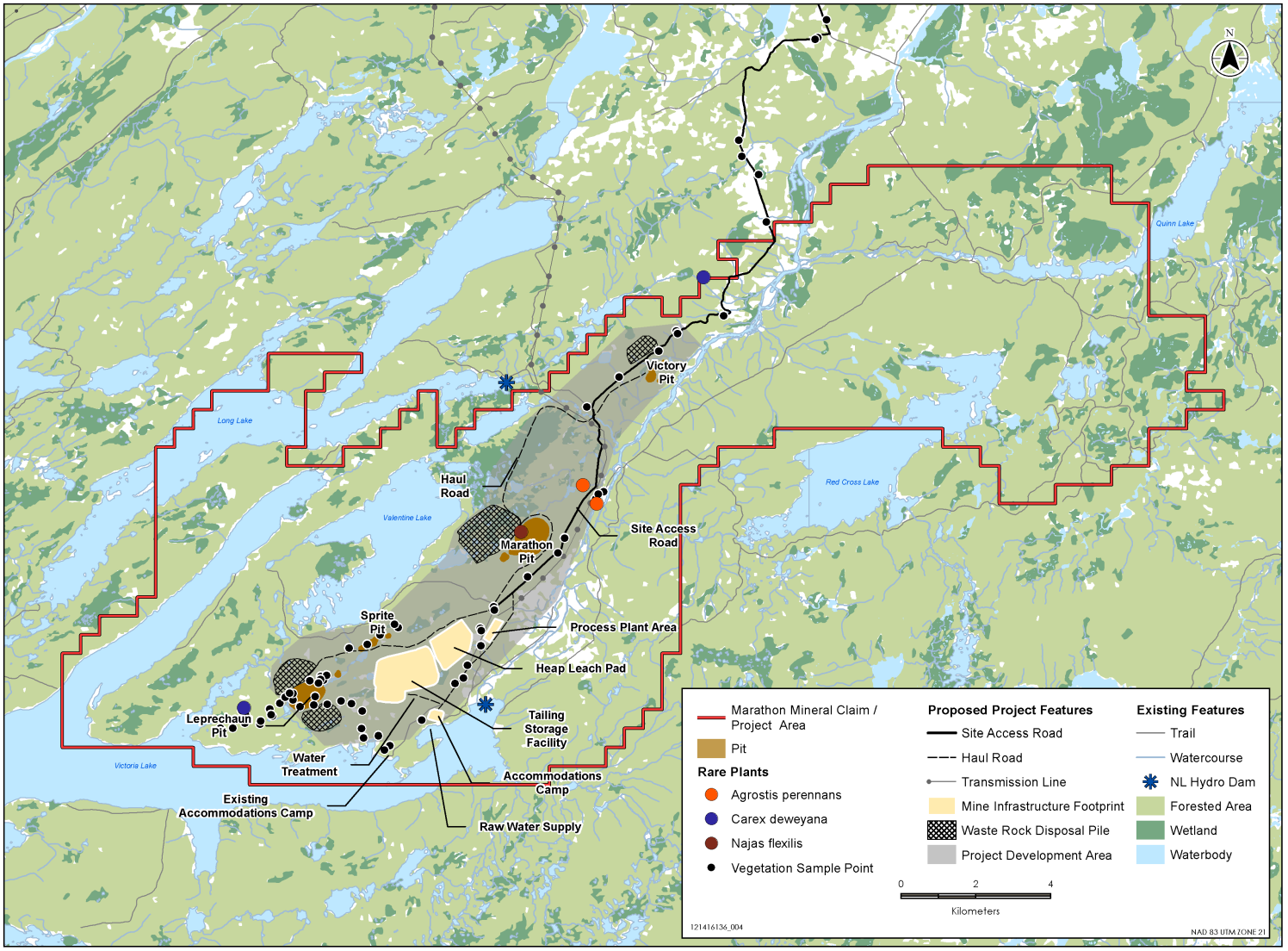

Figure 4-2 Location of Vegetation Surveys and Plant SOCC Observed in the Project Area, 2015-2017

4.2.4 Avifauna

Three directed avifauna surveys have been completed in support of the Project including songbird surveys and a waterfowl habitat study in 2011, and a waterfowl study in 2017. Incidental observation of avifauna have also been recorded during other baseline surveys.

Forty-five forest songbird, woodpecker, flycatcher, and corvid species were detected during point count surveys conducted in the PDA. The most commonly recorded species were White-throated Sparrow, Ruby-crowned Kinglet, Swainson's Thrush, chickadees, Gray Jay, Black-and-white Warbler, Yellow-bellied Flycatcher, and Common Loon (Stantec 2014). Several woodpecker species were identified, including Northern Flicker, Yellow-shafted Flicker, and Black-backed Woodpecker. Additional species such as American Crow, and Belted Kingfisher were also detected.

The raptors observed in the vicinity of the Project Area are boreal forest-dwelling species and rely on the habitat for nesting, hunting, and breeding. They included Bald Eagle, Northern Harrier, and Osprey.

Upland game birds were also identified through incidental observations during the vegetation surveys conducted in the Project Area during the ELC. Ruffed Grouse and Spruce Grouse were distributed throughout the vegetation survey areas (refer to Figure 4-2 for location of vegetation surveys), while Willow Ptarmigan was restricted to barren areas in open habitats characterized by low conifers and dwarf shrubs (e.g., blueberries and crowberries) (Stantec 2015).

Three avifauna SAR were identified in the vicinity of the Project Area: Olive-sided Flycatcher, Common Nighthawk, and Rusty Blackbird. Further information in available in Section 4.2.5.3.

With respect to waterfowl, a Sensitive Wildlife Area along the Victoria River has been identified by the NLDFLR and the Newfoundland and Labrador Eastern Habitat Joint Venture (NL-EHJV) as containing important waterfowl habitat (NL-EHJV 2008; J. Fenske, pers comm) (Figure 4-3). This Area was established for the protection of wetland habitat used as breeding, brood rearing, and staging grounds for waterfowl (J. Fenske, pers comm). In general, waterfowl and shorebirds are common in wetland and open water habitats in the vicinity of the Project Area during spring breeding and fall staging. Canada Goose, Black Duck, Ring-necked Duck are common in the wetlands, and Common Loon would be expected to occur on the lakes. Spring staging would occur in late April and early May, breeding and nesting from this time until mid-June (later for Common Loon). Marsh areas could serve as moulting sites during July for the males and later for females. In late August and in September, waterfowl would be expected to gather on the larger lakes prior to migration.

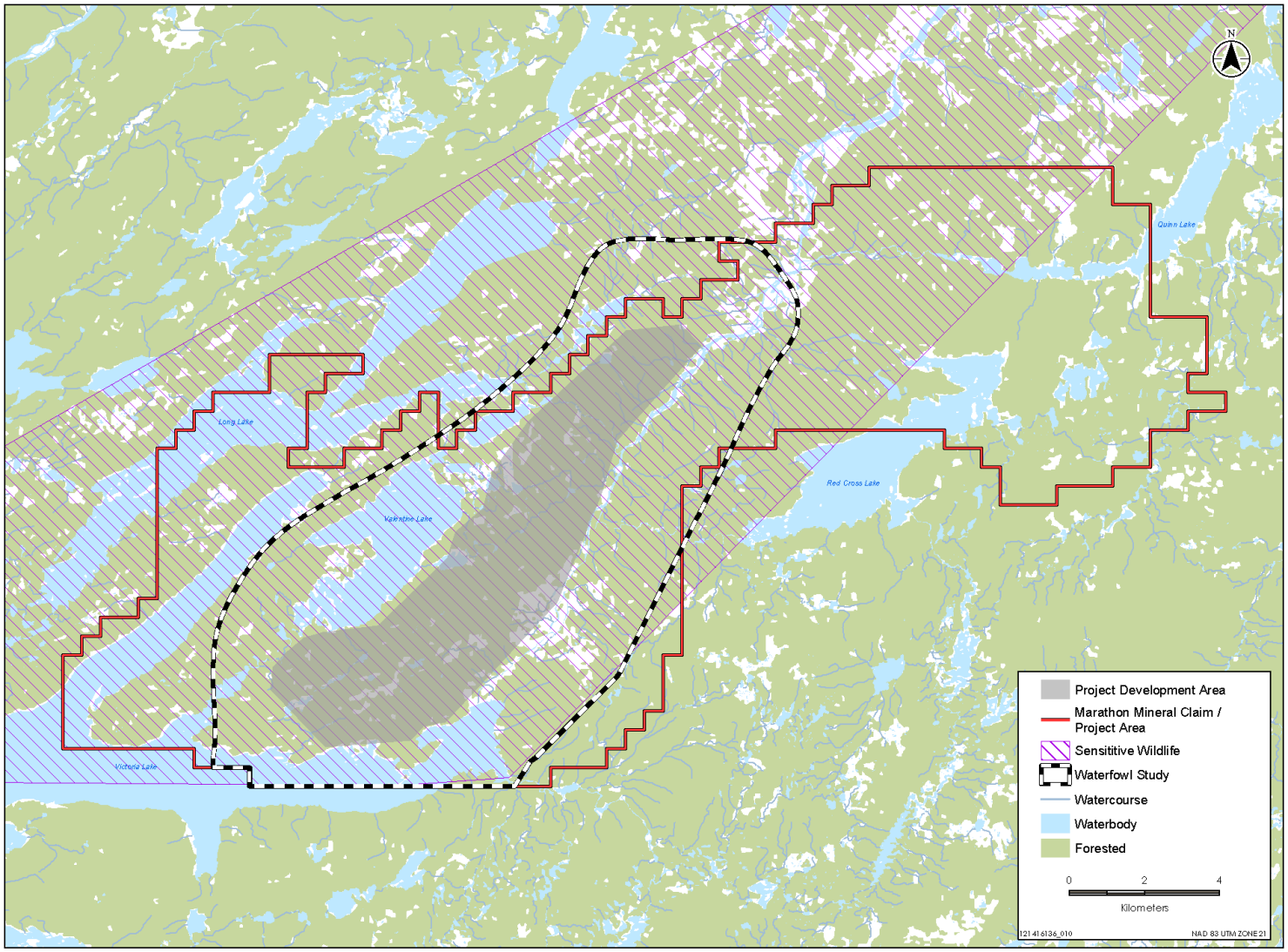

Figure 4-3 Project Area in Relation to Sensitive Wildlife Area

To describe wetland productivity in the vicinity of the Project and to assess waterfowl use of wetland habitat during spring breeding and fall staging (Figure 4-3), aerial surveys were conducted in spring (2011 and 2017) and fall (2017). Species richness was then calculated for species observed. The species with the highest counts included Canada Goose, American Black Duck, Green-winged Teal, and Ring-necked Duck (Stantec 2017d). Species observed in lower numbers included Common Goldeneye, Common Merganser, Red-breasted Merganser, and Mallard. The most common shorebird species was Spotted Sandpiper. Bald Eagle and Northern Harrier were observed in fall staging surveys. No species at risk were observed during waterfowl surveys.

While the Victoria Steadies area has been identified as an SWA, Marathon's exploration activities to date within the PDA have not been limited by regulators, other than guidance respecting activities in proximity to waterbodies and wetlands during breeding season. As part of the EA process, Marathon will continue to consult with regulators to identify appropriate mitigation measures for waterfowl, which may include timing of activities to avoid sensitive periods and buffering of wetland habitats where possible.

4.2.5 Species at Risk

The following sections describe the species designated SAR or SOCC that could occur within the vicinity of the Project Area or that have been confirmed to occur. These species are also listed in Table 4-3. SAR includes species considered extirpated, endangered, threatened, vulnerable, or of special concern under the NL ESA (Gov NL 2001), the federal SARA (Government of Canada 2002), or by COSEWIC. SOCC include those species recommended for listing by the provincial Species Status Advisory Committee (SSAC) as endangered, threatened, vulnerable, of special concern, or are considered provincially rare by the Atlantic Canada Conservation Data Centre (AC CDC) (Master et al. 2012). The SOCC designation is determined by the AC CDC; it includes plants that are considered provincially rare with provincial status ranks (S-ranks) of S1 (critically imperiled), S2 (imperiled), or combinations of S1 and S2 (Master et al. 2012). An S3 ranking refers to vulnerable species, and additional consultation with NLDFLR – Wildlife Division may be required to determine if these species are of conservation concern to the Province.

Comprehensive and up to date information on the protection and current designations of these species at risk and associated Recovery Strategies, Action Plans and Management Plans (including identified and designated critical habitat) are available from the relevant sources and will be used in any further EA required for this Project.

Table 4-3 Species of Conservation Interest with Potential to Occur in the Project Area and Surrounding Areas

Species		Federal		Provincial[1]	Confirmed Presence in the Project Area
Common Name	**Scientific Name**	**SARA Status (Schedule 1)**	**COSEWIC Designation**		
Vegetation					
American burred	*Sparganium americanum*	--	--	S3	Yes
Arctic bramble or plumboy	*Rubus arcticus* subsp. *acaulis*	--	--	S3	Yes
Arctic yellow-rattle	*Rhinanthus minor* subsp. *groenlandicus*	--	--	S3	Yes
green addersmouth	*Malaxis unifolia*	--	--	S3	Yes
nodding water nymph	*Najas flexilis*	--	--	S2	Yes
northern blackberry	*Rubus arcticus*	--	--	S3	Yes
northern yelloweyed grass	*Xyris montana*	--	--	S3	Yes
perennial bentgrass	*Agrostis perennans*	--	--	S2	Yes
purple false melic	*Schizachne purpurascens*	--	--	S3	Yes
short-scaled sedge	*Carex deweyana*	--	--	S1S2	Yes
sparse-flowered sedge	*Carex tenuiflora*	--	--	S3	Yes
Wiegand's sedge	C. *wiegandii*	--	--	S3	Yes
Note: [1] S3 = Vulnerable, S2 = Imperiled, S1 = Critically Imperiled, S#S# = Rank Range (as per AC CDC)					
Mammals					
American marten	*Martes americana atrata*	Threatened	Threatened	Threatened	Yes
little brown bat	*Myotis lucifugus*	Endangered	Endangered	--	No
northern long-eared bat	*Myotis septentrionalis*	Endangered	Endangered	--	No
woodland caribou	*Rangifer tarandus*	--	Special Concern	--	Yes
Avifauna					
Bank Swallow	*Riparia riparia*	Threatened	Threatened	--	No
Common Nighthawk	*Chordeiles minor*	Threatened	Special Concern	Threatened	Yes
Gray-cheeked Thrush	*Catharus minimus*	--	--	Vulnerable	No
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Special Concern	Threatened	Yes
Red Crossbill	*Loxia curvirostra*	Endangered	Threatened	Endangered	No
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Vulnerable	Yes
Short-eared Owl	*Asio flammeus*	Special Concern	Special Concern	Vulnerable	No

4.2.5.1 Vegetation

No plant species listed by COSEWIC or SARA were observed during the vegetation surveys that were conducted within the Project Area (Figure 4-2). Similarly, no species listed by the Province in Schedule A of the *Endangered Species List Regulations* (Gov NL 2003b) were observed. However, three species identified in the vicinity of the PDA were considered SOCC: nodding water nymph (S2), short-scaled sedge (S1S2), and perennial bentgrass (S2) (Figure 4-4).

Nine species observed during vegetation surveys were also ranked S3 (vulnerable) by the AC CDC: sparse-flowered sedge, Wiegand's sedge, purple false melic, Arctic yellow-rattle, green addersmouth, Arctic bramble or plumboy, northern blackberry, American burred, and northern yelloweyed grass. As noted above, additional consultation with NLDFLR – Wildlife Division may be required to determine if these S3 ranked species are of conservation concern to the Province.

4.2.5.2 Mammals

Baseline studies identified American marten within the Project Area. American marten (Newfoundland population) is designated as 'Threatened' under SARA and under the NL ESA. While trapping marten is prohibited in Newfoundland, the trapping of other furbearer species is permitted. Therefore, Best Management Practices are followed to reduce non-targeted mortality of marten. The Project Area falls within the Red Indian Lake Modified Snare and Trapping Area, which is a Category 2 trapping area (NLDFLR 2018). Trapping for other furbearers is permitted in Category 2 areas, but land-based traps, all land-based locking neck snares, and small game snares are prohibited to reduce the accidental mortality of marten. No other mammal species listed under SARA or the NL ESA were encountered.

Although not identified in the baseline studies, the northern long-eared bat and little brown bat are expected to roost in mature mixedwood forest, such as that found in the Project Area (Stantec 2015). The northern long-eared bat and little brown bat are both listed as 'Endangered' by COSEWIC and under SARA (COSEWIC 2013) due to their recent population decline.

While not listed under SARA, woodland caribou in Newfoundland is considered 'Special Concern' by COSEWIC (COSEWIC 2014). This species is culturally important to Newfoundland and has been a valuable hunting resource for residents. The Newfoundland population of caribou has decreased by approximately 60% in the last 15 years (Gov NL 2015, COSEWIC 2014). While the rate of decrease may have lessened, there are concerns about the full effect of the eastern coyote as a recent predator of caribou on the Island (Gov NL 2015, COSEWIC 2014).

4.2.5.3 Avifauna

Baseline studies identified three avifauna SAR within the vicinity of the Project Area: Olive-sided Flycatcher, Common Nighthawk, and Rusty Blackbird. The Olive-sided Flycatcher and Common Nighthawk are listed as 'Threatened' under provincial and federal SAR legislation (SARA, NL ESA). The Rusty Blackbird is considered a species of 'Special Concern' under SARA and COSEWIC. There are a number of other avifauna species listed as SAR and SOCC that have the potential to occur in the vicinity of the Project Area, based on available habitats. These include: Gray-cheeked Thrush, Red Crossbill, Short-eared Owl, and

Bank Swallow (Stantec 2014). Critical habitat for these species, as defined by SARA, has not been identified within the Project Area.

4.3 Socio-economic Environment

The Project is located approximately 45 km south of the nearest community of Buchans, and approximately 55 km southwest of the town of Millertown, or approximately 80 km by road. These nearby towns, along with the communities of Badger, Grand Falls-Windsor, and Springdale, have been shaped primarily by natural resource-based industries, including mining, forestry, and hydroelectric developments. The area surrounding the Project is also used for recreational activities, particularly moose and caribou hunting, and salmon fishing on the Exploits River. A number of cabins and commercial outfitters are also located in the general area. Further information on local communities, land and resource use in the area, the potential for historic resources, and Indigenous communities and land use is found in the following sections.

4.3.1 Local Communities and Infrastructure

The Project is located in a rural setting and not within the boundaries of a municipality. The closest towns are Buchans and Millertown. In 2016, Buchans had a population of 642, down nearly 8% from 2011 when the population was 696. The town has 417 private dwellings (Statistics Canada 2016a). Millertown was established to support lumber and sawmill operations and became one of four logging centres for the Anglo-Newfoundland Development Company. The population of Millertown decreased 18% percent between 2011 and 2016, falling from 99 to 81 (Statistics Canada 2016b). In 2016, Millertown had a total of 66 private dwellings. It is anticipated that the workforce will be residents of Buchans and Millertown, but also in larger communities of central and western Newfoundland, such as Grand Falls-Windsor, Badger, Springdale, and Gander.

4.3.1.1 Community Infrastructure

The NLDMAE, Water Resources Management Division is responsible for water resources management as per provisions of the *Environmental Protection Act* and the *Water Resources Act*, 2002 (Gov NL 2002b). The Division has programs to protect, enhance, conserve, develop, control and effectively use the water resources of the province (NLDMAE2017). Under the authority of Section 39 of the *Water Resources Act*, the Water Pond - Water Supply Area for the town of Millertown and the Buchans Lake - Water Supply Area for the town of Buchans are designated protected water supply areas. Given the distance of the Project from these communities, no interactions with these water supply areas are expected.

Waste disposal in Buchans and Millertown is managed by Central Newfoundland Waste Management. Residents of Buchans and Millertown send their waste to the Buchans Local Waste Management Facility. Domestic solid waste from the Project may be delivered to the Buchans Local Waste Management Facility, and Marathon will communicate with the Local Waste Management Facility in advance to confirm their capacity to receive waste from the Project.

4.3.1.2 Transportation Infrastructure

It is anticipated that most materials, equipment, and supplies will be brought to the Project site by road from larger communities in Newfoundland, such as Grand Falls-Windsor and Gander. However, materials, equipment, and supplies that need to be brought in from outside the Island will be delivered by air to airports in Deer Lake or Gander. They may also be delivered from outside the province on truck via the Marine Atlantic-operated ferry which connects North Sydney, NS with Port-aux-Basques on the west coast of Newfoundland.

In the vicinity of the Project, there are main roads in Buchans and Millertown and provincial highways connecting Millertown and Buchans to the Trans-Canada Highway. There are two “protected roads” in the vicinity of the Project Area: Highways 370 and 480; however, there are no protected roads within the Project Area. Protected roads are designated under the provincial *Urban and Rural Planning Act*, as a means of controlling development alongside the protected road. Buchans Highway 370 connects both towns to the Trans-Canada Highway at Badger and will be the main route for delivery of materials and equipment to the Project. Route 480 heads south from the Trans-Canada Highway to Burgeo and will not be used for the Project.

In addition to the main roads and highways, there are also a number of gravel access roads in the vicinity of the Project. Most of the gravel roads in the region are old forestry roads which are currently used to provide access to recreation areas for hunting, fishing, and access to remote cabins, and are used by snowmobilers and all-terrain vehicle (ATV) users in the vicinity of the Project Area.

4.3.2 Land and Resource Use

The economy of Central Newfoundland was built on natural resource-based industries, particularly forestry and mining. Logging has taken place in the region since the turn of the twentieth century, however, with the closing of Abibiti-Bowater Inc.’s pulp and paper mill in Grand-Falls-Windsor in 2009, forestry in the area has decreased. The communities closest to the Project, Buchans and Millertown, were founded in support of mining activities in the area, starting in the early 1900s and ending in the 1980s. Although there are currently no active mines in the area, mineral exploration activity does take place throughout the general region.

Exploration in the Buchans area began in the early part of the 20th century, and production of base metals (e.g., copper, zinc and lead) began in 1928. A base-metal mine established near Buchans contributed substantially to the provincial economy until closure in 1984 (Wardle 2004). The region saw an economic resurgence with continued exploration and the discovery of the Duck Pond base-metal deposit in 1987. Duck Pond Operations began commercial production in 2007, employing more than 270 people in the local Buchans-Millertown region (Canadian Mining Journal Editor 2013). Duck Pond, the only recently active mine in the area, ceased operation in July 2015 (Teck 2016). Some limited employment and procurement opportunities associated with the Duck Pond Operation remain through the three-phase decommissioning process. The first phase of decommissioning the site (2015 – 2018) includes infrastructure removal and reclamation. The second phase of decommissioning (2018 – 2024) involves water management and treatment. The third and final phase of Duck Ponds decommissioning (2024) will see the end of most activities at the site (Teck 2016). There are currently no operating mines in the region, although mineral

exploration has continued and there are many active mineral licenses surrounding the Project Area where exploration is being conducted. It is Marathon's hope that development of the Project into an operational mine will fill the void in employment and procurement opportunities in the region.

Forestry and logging were important economic drivers in central Newfoundland from the early 20th century until the early 21st century. The industry was primarily in support of the pulp and paper industry, which was greatly reduced following the closure of Abitibi-Consolidated Inc.'s mill in Grand Falls-Windsor in 2009. The PDA is within Forestry Management Division 13 (Figure 4-4), and the Project Area also overlaps with Forestry Management Division 12. The provincial 2016 to 2020 forestry Operating Plan indicates that there is 113,000 m^3 of timber scheduled to be harvested in District 13 in the next five years, the majority of which (94%) is commercial (NLDNR-FB 2015).

The hydrology of the region was altered in the late 1960s with construction of the Victoria Reservoir Dam, built as part of the Bay D'Espoir Hydroelectric Generating Facility. Built in 1967, the Victoria Reservoir Dam, now operating as an overflow spillway is within the Project Area and remains operational. It is maintained by NL Hydro as part of the Baie D'Espoir Hydroelectric Development.

The Exploits River (including tributaries) is a scheduled salmon river, and as such is regulated by the federal Department of Fisheries and Oceans as per the *Fisheries Act* and the *Canada Wildlife Act* (Government of Canada 1985a, 1985b), and is one of the most important Atlantic Salmon Rivers on the Island in terms of numbers of salmon returning. Atlantic Salmon fisheries in the province are currently recreational or subsistence (i.e., no commercial fishery for Atlantic Salmon). Angling retention limits are assigned to rivers by DFO. Based on 2016 population surveys, the returns of Atlantic Salmon to the Exploits River system have declined compared to previous five-year means (2011 – 2015), and the egg density was 37% of the conservation requirement (Veinott *et al*. 2018). Consequently, all rivers in insular Newfoundland were closed to the retention of Atlantic Salmon on July 20, 2018 (DFO 2018a, 2018b). The salmon rivers in the vicinity of Project Area are considered 'Class 0' (catch and release) (DFO 2018c). Trout angling (including brook trout) is permitted in insular Newfoundland during winter and summer (DFO 2018c).

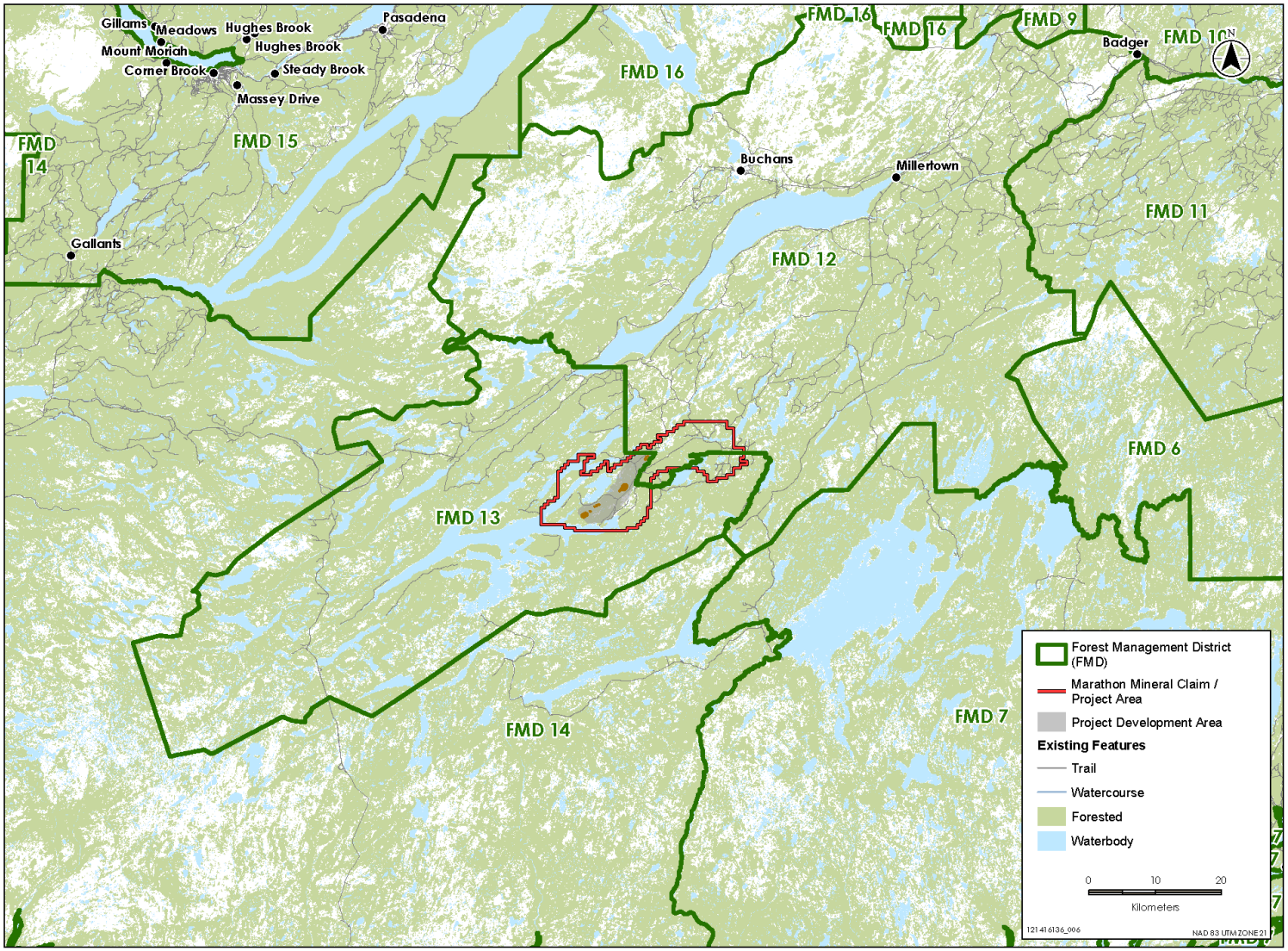

Figure 4-4 Forestry Management Divisions

The Project Area occurs within several provincial hunting and trapping areas for big-game (e.g., moose, caribou, black bear) and small-game (e.g., coyote, hare, furbearers) (Gov NL 2018), and the seasons for these species for 2018-2019 are indicated in Table 4-4.

Table 4-4 Hunting, Trapping, and Angling Zones That Overlap with the Project Area

Species	Hunting, Trapping, or Angling Zone		Season Dates[1]	Jurisdiction
Big Game				
Bear	BBMA	17 – Millertown 18 – Granite Lake	May 1 – July 15 and September 8 – November 11	Provincial
Caribou	CMA	62 – Buchans 63 – Grey River	September 8 – December 2	Provincial
Moose	MMA	17 – Millertown 18 – Granite Lake	September 8 – December 31	Provincial
Furbearers (via Trapping) and Small Game (Recreational)				
Lynx	Zone A		January 1 – February 1	Provincial
Beaver	Island		October 20 – April 15	Provincial
Muskrat, Otter	Island		November 1 – March 15	Provincial
Mink	Island		November 1 – February 28	Provincial
Coyote, Fox, Wolf	Island		Trap: November 1 – February 1	Provincial
Coyote	Island		Shoot: September 8 – July 15	Provincial
Wolf	Island		Shoot: October 15 – March 31	Provincial
Ermine, Squirrel	Island		November 1 – February 28	Provincial
Snowshoe Hare	Island		Snare: October 6 – March 10 Shoot: October 6 – March 10	Provincial
Game Birds				
Willow and Rock Ptarmigan	Island		Shoot: September 15 – December 2 Snare: October 6 – March 10	Provincial
Ruffed and Spruce Grouse	Island		Shoot: September 15 – December 23 Snare: October 6 – March 10	Provincial
Migratory Waterfowl	Inland Island		September 15 – December 29	Federal
Angling				
Salmon	Zone 4, Exploits River Class 0		June 1 – September 7	Federal
Trout	Insular Island		February 1 – April 15 May 15 – September 7	Federal

Notes: [1] – Dates for 2018-2019 Season

Numerous gravel roads, formerly Abitibi forestry access roads that are now maintained by government, provide access to the area for recreational and other users. The region contains private cabins, primarily around the ponds, lakes, and river, and is also used by outfitters. Marathon understands that there are currently nine Crown Land surface rights applications within the boundary of the Valentine Lake Property (aka Project Area) (Figure 4-6). None of these applications has been granted. Only one of these

applications occurs within the PDA. A second cabin exists within the PDA, however in consultation with Crown Lands, Marathon has confirmed this cabin is located on crown lands to which the owner has no title. Marathon has visited a small cabin located on the west side of Valentine Lake and it appears to be completely abandoned, with visible structural damage, and no known use over the nine years Marathon has been working on the Property.

Additionally, there are 51 outfitters/lodges that operate within a 60 km radius of the Project Area, however only one of these, Notch Mountain Lodge, operates within the Project Area, approximately 2 km from the PDA (Figure 4-6). They offer packages for hunting moose, caribou, black bear, as well as fishing, and snowmobiling (Notch Mountain Outfitters 2019). Marathon has consulted with this outfitter for many years, and there has been no conflict between Marathon's activities and this outfitter.

4.3.3 Historic and Heritage Resources

A Historic Resources Overview Assessment for the Project was completed in 2017. Although no known archaeological sites were identified within the Project Area, review of regional archaeological data indicates that the area surrounding the Project has broad theoretical potential for archaeological remains, particularly those pertaining to the pre-contact period (especially late pre-contact), and the historic Beothuk and Mi'kmaq occupations of the southwestern Newfoundland interior. This potential may be reduced, though not eliminated, by the impacts of historic flooding for commercial logging and hydroelectric development (Stantec 2017b).

Previous archaeological work on the Island of Newfoundland indicates approximately 5,000 years of pre-contact Indigenous occupation in four distinct periods: two Palaeo-Eskimo and two of Amerindian affiliation. Indigenous occupation was demonstrably intensive along the coast. Interior occupation, primarily by Amerindian groups, but increasingly including some evidence for Palaeo-Eskimo occupation, appears to have been focused on near-coastal interior lakes, and major NE-SW-oriented lakes and rivers traversing the deep interior. Along these waterways, specific site locations tend to be associated with sandy coves and points of land, prominent constrictions in major waterways, stream confluences and stream mouths, and above or below falls and rapids. Historic European archaeological sites are known primarily from coastal areas until the 20th century, but historic Mi'kmaq and Beothuk sites have been recorded, and may be anticipated, in deep interior settings.

Ethnohistoric evidence indicates that important caribou migration corridors approach and traverse the Project Area (Stantec 2017e), and that there is theoretical potential for pre-contact sites, particularly for sites of Maritime Archaic and late pre-contact Amerindian peoples, but also, to a lesser extent, potential for Palaeo-Eskimo sites. Turning to the historic sites' potential, the Project Area lies within the territory of the Beothuk prior to the second quarter of the 19th century, so there is potential for historic Beothuk sites, and for historic Mi'kmaq sites dating to the second half of the 19th century into the 20th century.

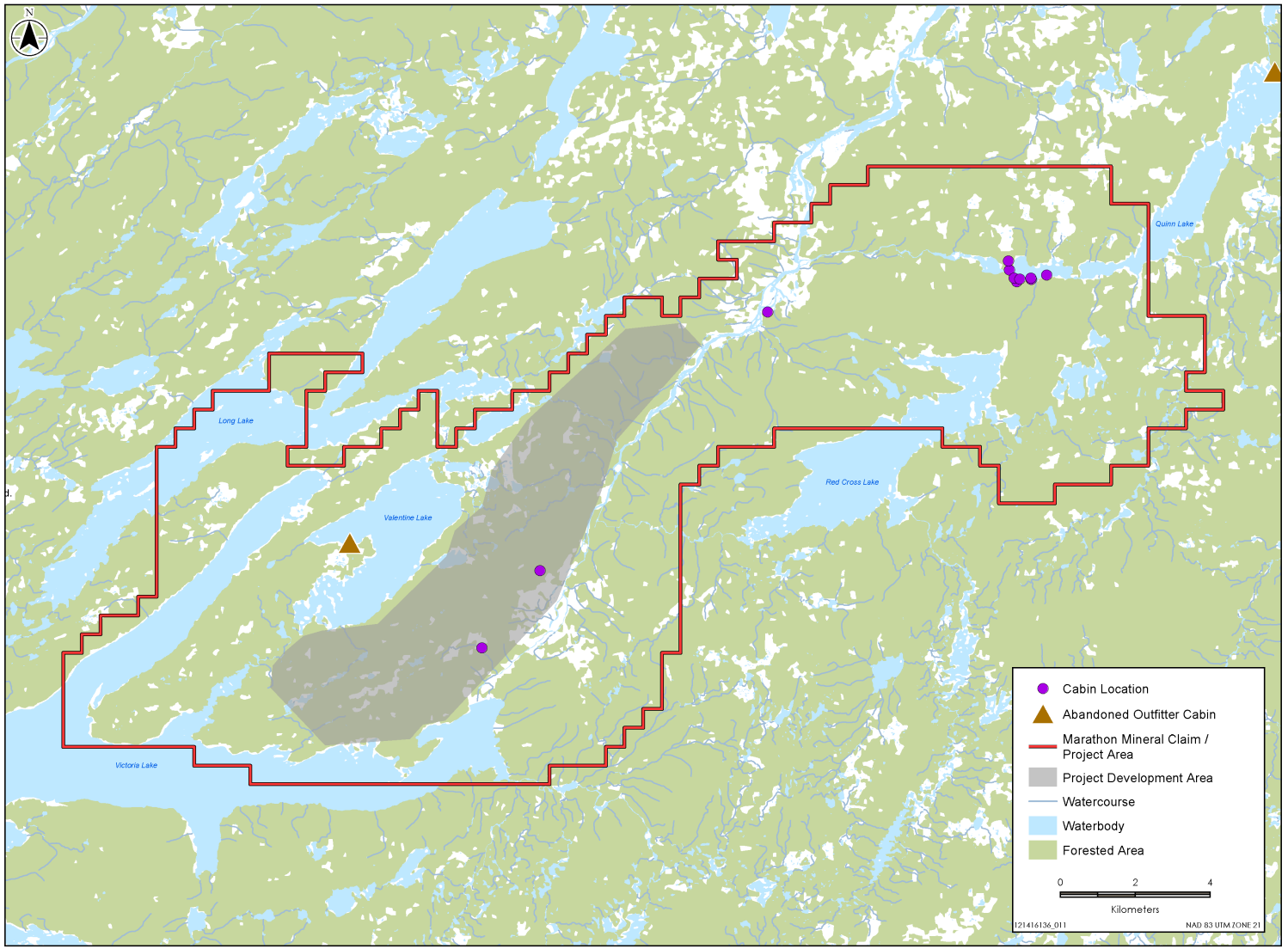

Figure 4-5 Cabins and Outfitters in the Project Area

4.3.4 Indigenous Groups and Communities

Miawpukek First Nation is located on the south coast of Newfoundland, approximately 244 km south of Gander. As of 2015, the total population of the Miawpukek band was 2,970, including 850 members living on-reserve at Conne River (Figure 4-6) and an additional 2,120 living off-reserve (AANDC 2015).

Qalipu Mi'kmaq Band members, a "landless band" formed under the *Indian Act*, 1985 (Gov NL 1985c) in 2011, live in a variety of communities across the province, with traditional communities extending from western to central Newfoundland. The Qalipu First Nation currently has just over 22,000 members (Qalipu First Nation, no date) and includes the nine Mi'kmaq bands formerly represented by the Federation of Newfoundland Indians (FNI). While there have been no land use studies of Qalipu members since the formation of the First Nation, a traditional land use study was conducted by the FNI in 2002 (FNI 2002). This study includes several mentions of the Victoria Lake area being visited by Mi'kmaq from western Newfoundland for the purposes of traditional land and resource use.

For the purposes of the 2002 land use study, the ten Mi'kmaq bands represented by the FNI were grouped in three regions. Documented land and resource use by members in Region B (representing the St. George's Bay / Port Au Port area of western Newfoundland, including Corner Brook and Stephenville) show some use of the Victoria Lake area within 8 to 10 km of the Project. Figure 4-7 illustrates the "core use" areas of the Mi'kmaq in this region. These areas are generally defined as the territory in which participants were most active and which participants cared about the most. It is also noted that these areas "are not to be construed as hard and fast boundaries", and that land use did occur beyond these areas. Site-specific land use activities by Mi'kmaq in western Newfoundland are shown in Figure 4-8.

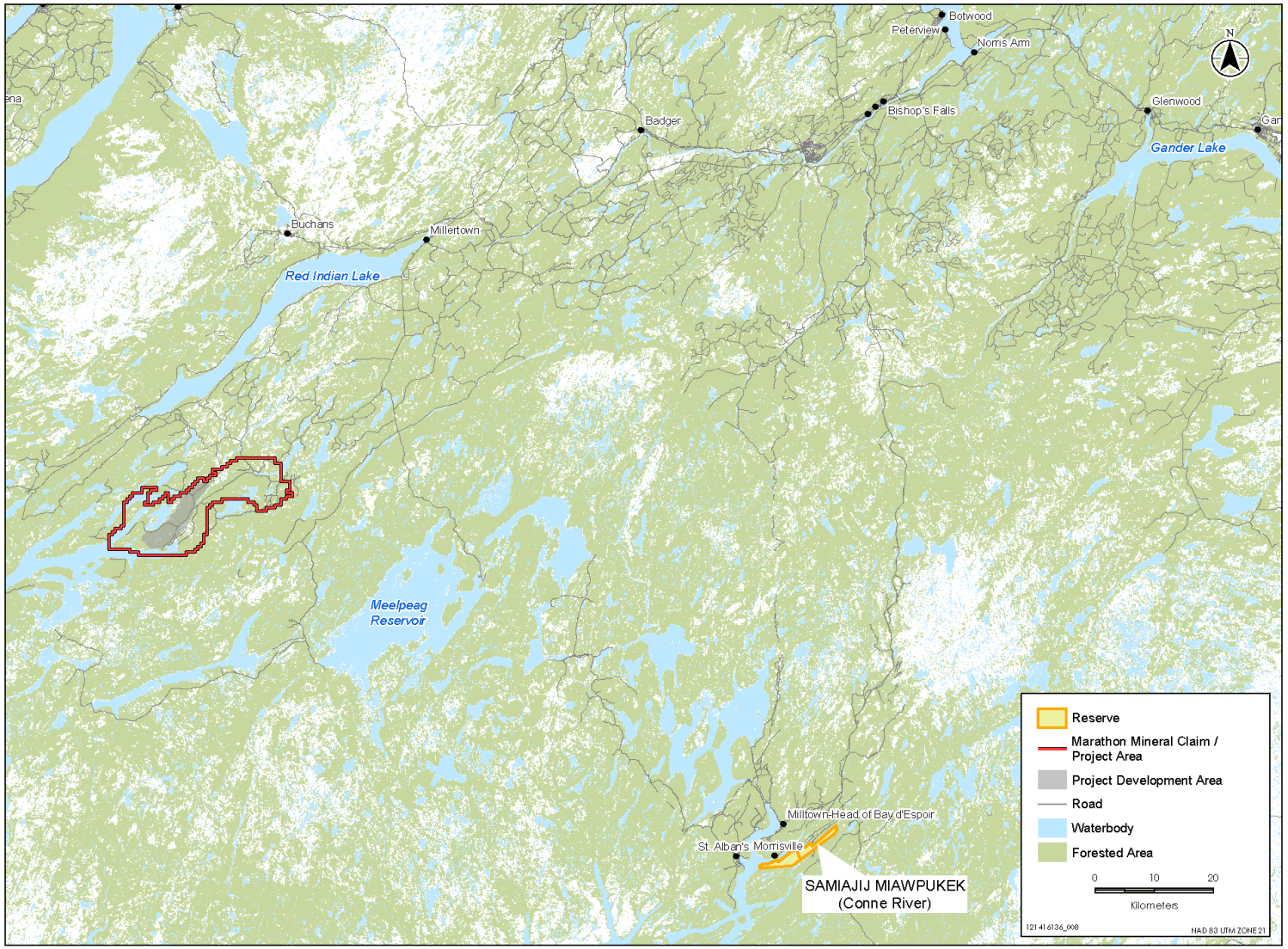

Figure 4-6 Location of Miawpukek First Nation at Conne River

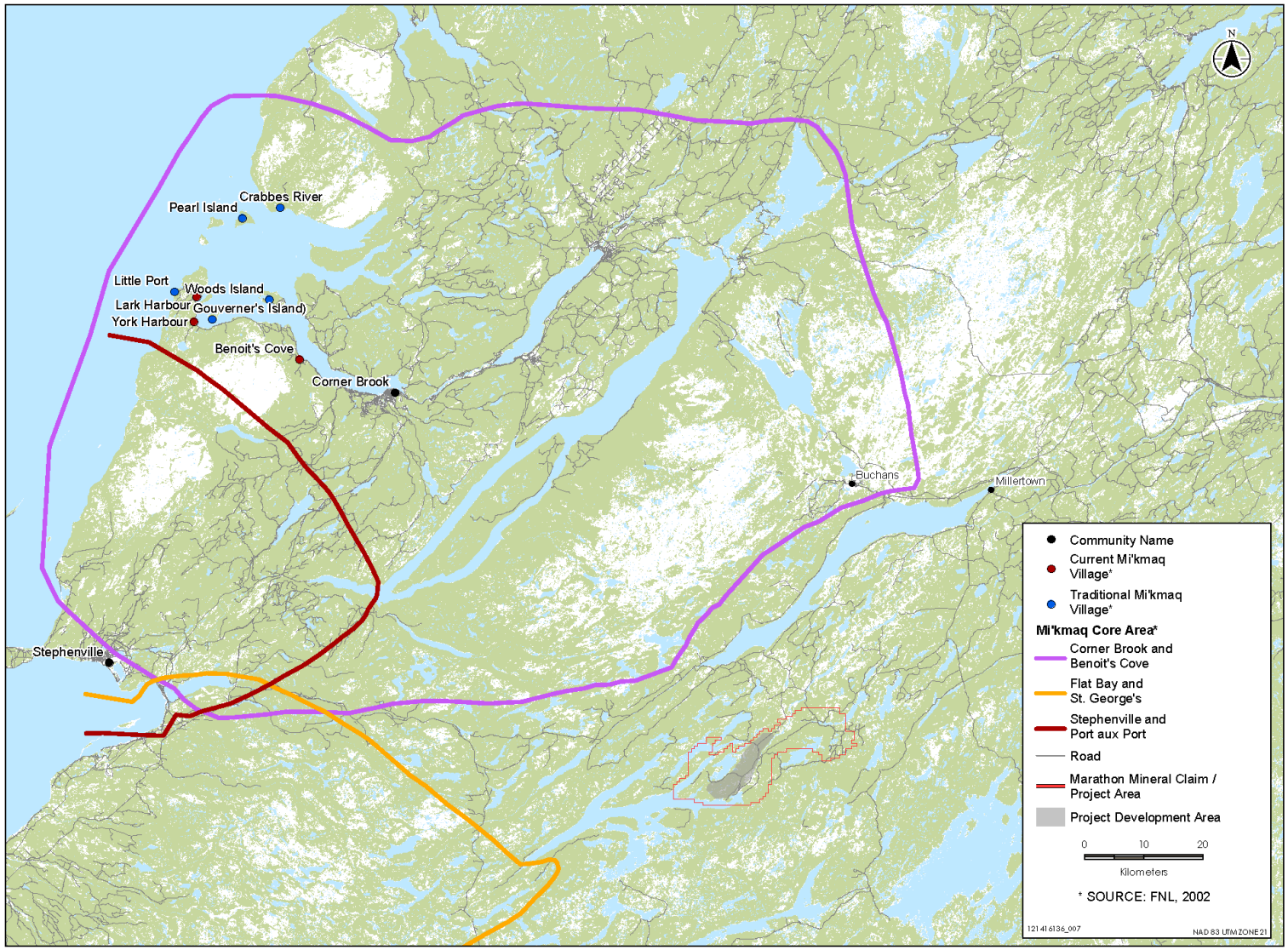

Figure 4-7 Mi'kmaq Core Use Areas in Western Newfoundland

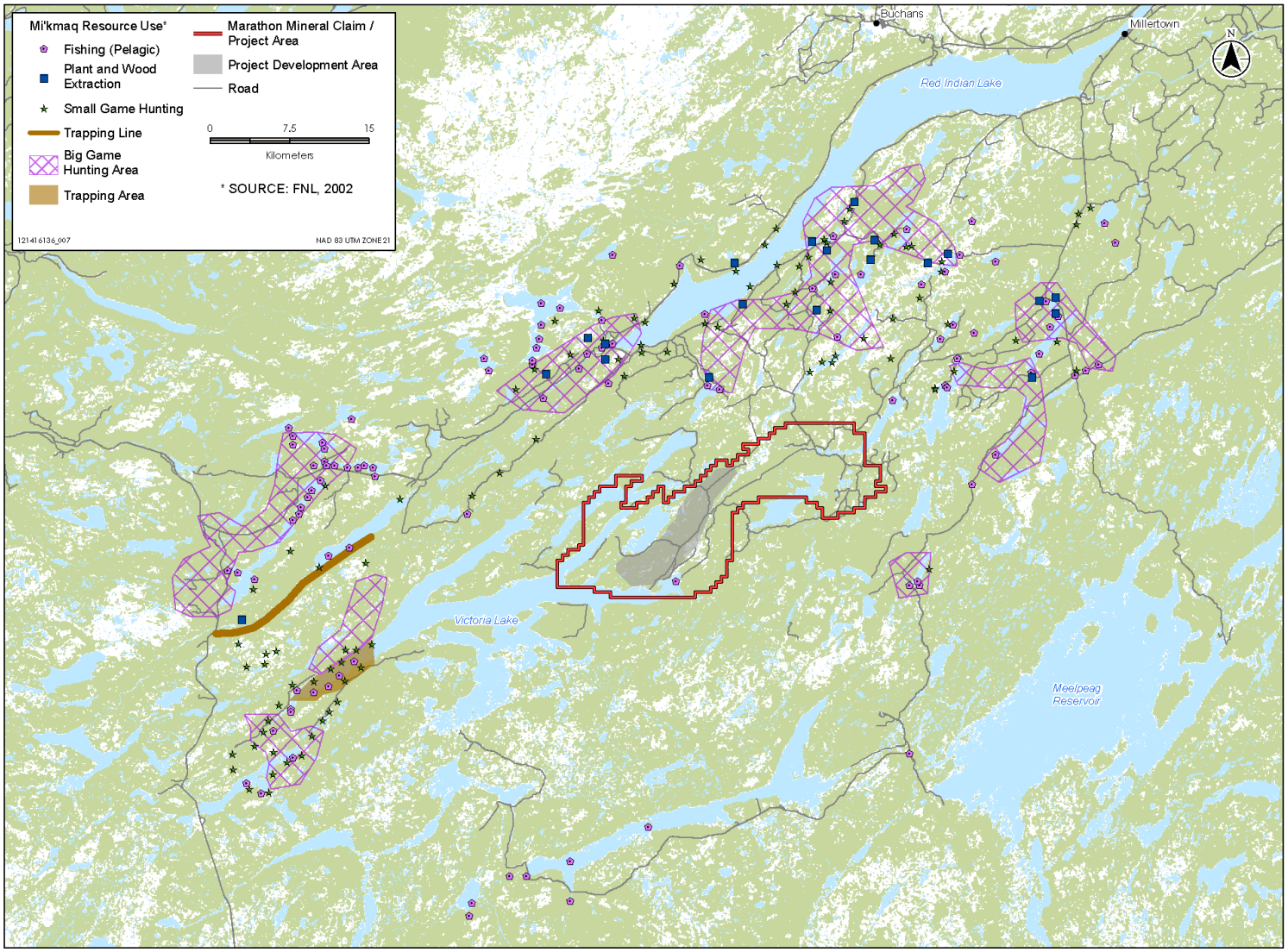

Figure 4-8 Mi'kmaq Land and Resource Use, Victoria Lake Area

4.4 Potential for Resource Conflicts

As described in detail in Section 4.3.2, the region surrounding the Project Area is used primarily for recreational activities, although there is some commercial activity. There is a network of gravel roads in the area, developed by Abitibi for past forestry activities, that are now maintained by the provincial government. The road and trail network in the area allows for off-highway vehicles and snowmobiles in addition to vehicle traffic. These provide access to the general area for recreational and other users, including seasonal dwellings, hunting, trapping, and angling.

Marathon's exploration work, and the potential future mining, has aided in keeping some parts of the Project Area open for hunters and anglers. Marathon agreed to replace five bridges and maintain the road beyond Red Indian Lake, or approximately the last 30 km of road into the existing exploration camp, which was otherwise slated for decommissioning by the province. Since 2010, Marathon has maintained the nearly 88 km of gravel road from approximately 8 km south of Millertown down to the exploration camp, maintaining and/or improving access along the road for cabin owners and other recreational users.

Commercial activity in the area includes hydroelectric development, forestry activity, mining and outfitters. Marathon plans to consult with stakeholders in the region on the Project as it goes forward with the EA. Further details on its consultation plans are provided in Section 6.

.

5.0 ENVIRONMENTAL EFFECTS

5.1 Potential Environmental Effects

Pursuant to the *Canadian Environmental Assessment Act* 2012 (CEAA 2012) (Government of Canada 2012a) and the *Prescribed Information for a Description of a Designated Project Regulations*, and in accordance with the "Guide to Preparing a Description of a Designated Project Under the Canadian Environmental Assessment Act, 2012" (Government of Canada 2015), the project description must include a description of potential changes that may be caused by the Project to: fish and fish habitat (as defined in the *Fisheries Act*); aquatic species (as defined in SARA); migratory birds (as defined in the *Migratory Birds Convention Act*, 1994); and potential changes to the environment that may occur on federal lands, in other provinces or internationally. The Project Description must also include a description of the effects on Indigenous peoples of changes to the environment that result from carrying out the Project. The following sections provide an overview of the potential environmental interactions of the Project on the environment and potential changes to the environment that may occur as a result of carrying out the Project, according to requirements of Section 5 of CEAA 2012.

Routine Project construction and operation activities will include: surface mining, milling, processing, site and haul road construction and maintenance, mine waste rock management, electrical power supply and distribution, process and potable water supply and distribution, site wide stormwater and effluent management, treatment and discharge, fuel storage and fueling stations, mine and plant workshops and services, administrative office, personnel accommodations and lunchrooms, and security. Accidental events that may occur as a result of the Project include a fuel or other hazardous materials spill, vehicle or equipment accidents, and failure of site infrastructure (e.g., breach of tailings dam or the heap leach pad containment infrastructure).

Table 5-1 includes the potential environmental interactions with routine Project activities or accidental events that may result in changes to the environmental components identified in the CEAA 2012. Other environmental components of concern, in addition to those identified in the CEAA 2012, are in Table 5-2, along with potential environmental interactions.

Table 5-1 Potential Environmental Interactions with Environmental Components Identified in CEAA 2012

Environmental Component	Relevant Section of CEAA, 2012	Potential Environmental Interactions
Fish, Fish Habitat, and Aquatic Species	5(1)(a)(i) 5(1)(a)(ii)	Routine Project activities or accidental events may result in changes affecting fish, fish habitat, and aquatic species as defined under SARA, including the following interactions with the environment: • avoidance of the area surrounding the area of work in aquatic environments • encroachment in fish habitats • changes in habitat availability • changes in habitat quality • changes in fish abundance and/or distribution

Table 5-1 Potential Environmental Interactions with Environmental Components Identified in CEAA 2012

Environmental Component	Relevant Section of CEAA, 2012	Potential Environmental Interactions
Migratory Birds	5(1)(a)(iii)	Routine Project activities and or accidental events that could potentially result in changes to the environment that may affect migratory birds, as defined under the *Migratory Birds Convention Act, 1994*, include: • changes to avifauna abundance and/or distribution • change in habitat availability
Project Activities Occurring on Federal Lands	5(1)(b)(i)	Routine Project activities and/or accidental events are not expected to occur on Federal Lands
Transboundary Issues	5(1)(b)(iii)	Routine Project activities and/or accidental events are not anticipated to result in changes to the environment outside Newfoundland and Labrador
Health and Socioeconomic Conditions of Indigenous Peoples, Including Current Use of Lands and Resources for Traditional Purposes	5(1)(c)(i) 5(2)(b)(i)	Routine Project activities or accidental events may result in the following changes to the environment that may affect current use of land and resources for traditional purposes by Indigenous people: • change in distribution or abundance of fish resources • change in distribution or abundance of harvested wildlife populations • potential disturbance of hunting/trapping/angling activities • concerns regarding the risks of contamination of the environment Project activities are not anticipated to result in changes to the environment that would have an effect on the health conditions of Indigenous peoples; however, this would be confirmed through further assessment in the EIS.
Physical and Cultural Heritage, or Resources of Historical, Archaeological, Paleontological, or Architectural Significance	5(1)(c)(ii) 5(1)(c)(iv) 5(2)(b)(ii) 5(2)(b)(iii)	Routine Project activities or accidental events may result in the following changes to the environment in and around the Project Area: • potential disturbance of hunting/trapping/angling activities • possible disturbance of archaeological resources • changes to the quality of life of Indigenous land users

Table 5-2 Potential Environmental Interactions with Additional Environmental Components of Concern

Environmental Component of Concern	Potential Environmental Interactions
Atmospheric Environment	Routine Project activities or accidental events could potentially result in changes to air quality and noise due to the following interactions with the environment: • Changes to air quality due to release of air contaminants to the atmosphere and changes in the quantities of greenhouse gases released to the atmosphere • Changes to ambient noise levels • Increase in vibrations during blasting
Surface Water	Routine Project activities or accidental events could potentially result in changes to hydrology due to the following interactions with the environment: • Changes in hydrological regime • Change in water quality or quantity
Groundwater	Routine Project activities or accidental events could potentially result in changes to groundwater due to the following interactions with the environment: • Change in the water table level • Change in groundwater quality
Vegetation, Wetlands and Soils	Routine Project activities or accidental events could potentially result in changes to vegetation and soils due to direct interaction with vegetation communities and potential soil contamination, to the following interactions with the environment: • Direct and indirect loss of plant groups • Change in plant communities • Change in wetland quality and quantity
Terrestrial Wildlife	Routine Project activities or accidental events could potentially result in changes to terrestrial wildlife (e.g., mammals, amphibians, avifauna) due to the following interactions with the environment: • Changes to wildlife abundance and distribution due to habitat or food availability, or avoidance behaviour to disturbance • Change in habitat availability
Land and Resource Use	Routine Project activities or accidental events may result in the following changes to the environment that may affect land use activities and opportunities in and around the Project Area: • Loss of commercially-exploitable forest area • Change in opportunity for commercial outfitters • Change in encroachment on registered trapping land • Change in access to angling and hunting resources • Potential change in access and use of seasonal residences
Community Services and Infrastructure	Presence of Project employees can place stress on nearby communities if there is not sufficient capacity within existing community services and infrastructure. However, as a result of the Project, certain infrastructure, such as the existing site access road, will be upgraded and maintained and will remain available for public use. In addition, the Project will not rely entirely on community-based first-response service. As an example, an ambulance will be kept on-site to reduce potential demand on local emergency medical services.
Employment and Economy	Employment and expenditures generated by the Project are anticipated to create positive effects in terms of employment and the economy. Measures will be identified to optimize these benefits and to address potential negative effects associated with a potential influx of workers.

5.2 Scoping Considerations

If a federal EIS is required under CEAA 2012 and/or a provincial EIS under the *Environmental Protection Act*, the potential interactions of the Project would be evaluated by considering individual biophysical and socio-economic components that could be affected by the Project, and resultant Project-related effects. The EIS would be planned and prepared in accordance with the requirements of CEAA 2012 and its associated Regulations, the provincial requirements as stated in the *Environmental Assessment Regulations*, and in compliance with the EIS Guidelines that may be issued by the Agency following governmental and public review and input and the EIS guidelines issued by the provincial government. The EIS would provide the required information about the Project, its existing environmental setting, potential environmental effects, and would present technically and economically feasible mitigation measures to address the key environmental effects of the Project. Conclusions regarding the residual environmental effects of the Project, and the significance of those effects after taking into account he mitigation measures would also be presented.

Although final direction on these matters would be provided in the provincial and federal EIS Guidelines, based on the interactions discussed in the tables above, the valued components (VCs) to be assessed in an EIS (if required) would likely include:

- Atmospheric Environment
- Geology and Landforms
- Surface Water Resources
- Groundwater Resources
- Vegetation and Wetlands
- Freshwater Fish and Fish Habitat
- Avifauna
- Terrestrial Wildlife
- Historic and Heritage Resources
- Land and Resource Use
- Community Services and Infrastructure
- Employment and Economy

Note that SAR potentially affected by the Project would be discussed within their respective VCs.

6.0 CONSULTATION

6.1 Approach to Consultation

Marathon understands that exploring and developing Newfoundland and Labrador's rich resource potential sustainably requires building long-term relationships and investment in people and communities. While industrial activity often brings much needed economic growth and opportunity to communities and regions, it is important that stakeholders most likely to be affected by the activities understand the potential impacts and have confidence that Project design and mitigation measures have incorporated their concerns. Consultation with all stakeholders who may have an interest in, or be affected by the Project, is key to operating within a sustainable development framework. It is Marathon's objective to pursue positive and constructive relationships with stakeholders throughout the life of the Project.

To date, Marathon has conducted relatively informal stakeholder consultation. However, with a better-defined Project scope and initiation of the EA process, Marathon will now formally engage stakeholders as part of the Project planning and regulatory stage of Project development. To this end, Marathon has developed a Consultation Strategy to guide in building these relationships, and this Strategy in turn is guided by Marathon's Community Relations Policy (Figure 6-1). The Strategy includes drafting a potential stakeholder list (Table 6-1), which will be updated as necessary throughout the life of the Project. Part of the Consultation Strategy will be the maintenance of a tracking system to record stakeholder consultation and engagement activities. In addition to recording specific engagement events and participants, the tracking system will also serve as a repository of issues, concerns, and questions raised, as well as a record of Marathon's responses (where applicable). The tracking system will be maintained throughout the life of the Project, from the planning stages through to decommissioning.

As part of its Consultation Strategy, Marathon conducted initial public open houses in the towns of Millertown, Buchans, and Grand Falls-Windsor on March 19 and 20, 2019. The meetings were advertised via posted notifications in these and other nearby communities, as well as via province-wide radio advertisements. The meetings were well attended with over 150 attendees over the three sessions. Marathon presented information about the company, work done on the Project to date, an overview of the proposed Project including schedule, and an overview of the EA process and the public's opportunity to participate in that process. A question and answer period was held at the end of the presentation and the majority of the questions and comments from the public pertained to employment and benefits to their communities. The key messages taken from these sessions were as follows:

- Community and public support for the Project is significant, and primarily based on much needed employment and business opportunities in the region.
- Local communities are looking for direct engagement over the life of mine, local hiring/contracting preferences, supply and services opportunities, and opportunities to leverage provincial infrastructure improvements (e.g., roads).
- The key concerns raised: keep access road (and therefore local employment and benefits) via Millertown access; improved environmental management relative to Hope Brook and Duck Pond; preferential hiring contracts for local people and companies. No other significant concerns, and no objections to the Project were raised.

Marathon has communicated with the Miawpukek First Nation and Qalipu Mi'kmaq Band to provide information on the status of the proposed Project, and information on the Project, as well as to arrange meetings with these groups to exchange additional information. No feedback from these groups regarding the proposed Project was available at the time of writing of this document.

Community Relations Policy

Exploration and mining activity can bring much needed social and economic benefit to communities and regions when potential environmental and socioeconomic impacts are understood and well-managed in collaboration with those communities.

Marathon Gold is committed to community engagement and we believe that social and economic considerations respecting local communities and stakeholders are integral to all stages of exploration and mining projects. Early development of meaningful relationships and maintaining respectful dialogue with local community leaders and members of the community will benefit Marathon Gold's projects and the surrounding communities, and will help to ensure our projects are sustainable and successful in all aspects.

Engagement activities that acknowledge, consider, and respond to the concerns of local people, communities, and other stakeholders in a timely manner, as well as provide regular project information updates, aid to alleviate and mitigate concerns relative to issues such as environmental protection, human health, land use, employment and economic development opportunities, as well as local services and infrastructure.

Marathon Gold will conduct community engagement activities in a transparent and culturally appropriate manner, and will endeavour to provide simple and safe mechanisms whereby individuals, groups, and communities can provide input and voice their concerns. Marathon Gold's engagement process will ensure that community concerns are respected and considered for incorporation into key decision-making processes.

Marathon Gold believes that community engagement is a normal part of doing business, as is building community trust and support. Marathon Gold is committed to working with local communities to develop sustainable projects which create value for our stakeholders and shareholders.

Figure 6-1 Marathon Community Relations Policy

Table 6-1 Potential Stakeholder List

Category	Sub-Category	Stakeholder
Government	Provincial	Department of Advanced Education, Skills, and Labour Executive Council – Intergovernmental and Indigenous Affairs Secretariat Executive Council – Women's Policy Office Department of Finance NLDFLR – Lands Branch NLDFLR – Wildlife Division NLDFLR – Forestry and Agrifoods Department of Health and Community Services Department of Justice and Public Safety NLDMAE – Fire, Emergency, and Corporate Services Branch NLDMAE – Water Resources Management Division NLDMAE – Pollution Prevention Division NLDMAE – Environmental Assessment Division NLDMAE – Climate Change Branch NLDNR – Executive Support Branch NLDNR – Mines Branch Service NL – Regulatory Affairs Branch Service NL – Government Services Branch NLDTCII– Business Branch NLDTCII – Regional Development and Diversification Branch NLDTCII – Provincial Archaeology Office Department of Transportation and Works Provincial Advisory Council on the Status of Women Newfoundland and Labrador Workplace NL
Government	Federal	Canadian Environmental Assessment Agency (CEA Agency) Environment and Climate Change Canada (ECCC) Fisheries and Oceans Canada (DFO) Transport Canada (TC)
	Municipal	Town of Buchans Town of Millertown Town of Badger Town of Grand Falls-Windsor
Community Groups	General Public	Residents of Nearby Towns
	Indigenous	Qalipu Mi'kmaq First Nation Miawpukek First Nation
	Economic Development and Industry Groups	Newfoundland and Labrador Organization of Women's Entrepreneurs (NLOWE) Exploits Regional Chamber of Commerce
	Outfitters and Recreation	Local Cabin Owners Newfoundland and Labrador Outfitters Association (NLOA) Salmonid Association of Eastern Newfoundland (SAEN) The Salmon Preservation Association for the Waters of Newfoundland (SPAWN)
	Education, Social Services, and Health	College of the North Atlantic Central Health Royal Newfoundland Constabulary Royal Canadian Mounted Police

6.2 Industry Relations

Marathon has been an active member of the NL mining industry community for more than eight years. This time has been spent fostering relationships with supply and service companies in support of Marathon's on-going exploration activities. Marathon has maintained a presence at local and provincial industry conferences, including being an active participant at the Mineral Resources Review, held annually in St. John's, and the Baie Verte Mining Conference, held annually on the Baie Verte Peninsula. In addition, Marathon held a seat on the Mining Industry Newfoundland and Labrador's Board of Directors for three (maximum term) of the past eight years.

6.3 Government Consultation

Marathon has consulted, and will continue to consult, with provincial and federal departments to discuss plans and activities occurring on-site since initiating exploration activities at the Valentine Lake site in 2010. Since that time, Marathon has maintained an internal tracking table of interactions with regulators. This table will form the initial version of the tracking system described in Section 6.1. Since 2010, Marathon has met with officials from the following provincial and federal departments and divisions:

- Provincial Government:
  - Department of Natural Resources:
    - Mines Branch
    - Forestry and Agrifoods Agency (now part of the NLDFLR)
  - Department of Environment and Conservation / NLDMAE:
    - Wildlife Division (now part of the NLDFLR)
    - Environmental Assessment Division
  - Service NL, Occupational Health and Safety Division
- Federal Government:
  - Fisheries and Oceans Canada
  - CEA Agency

7.0 PROJECT-RELATED DOCUMENT AND STUDIES

The following lists the environmental baseline studies completed in support of the Project between 2011 and 2018; all studies listed below were conducted by Stantec. Future work will include the continued assessment of acid rock drainage / metal leaching, fish and fish habitat surveys, hydrology, and hydrogeology. The requirement for other work may be identified in consultation with federal and provincial regulators.

- Fish and Fish Habitat Data Report (2012)
- Winter Wildlife (2013)
- 2011 Baseline Waterfowl and Waterfowl Habitat Study (2014)
- 2011 Forest Songbird Surveys (2014)
- Ecological Land Classification (2015)
- Baseline Hydrology and Surface Water Quality Monitoring, 2011 – 2016 (2017)
- Historic Resources Overview Assessment (2017)
- Land and Resource Use (2017)
- Preliminary Baseline Hydrogeology Assessment (2017)
- Vegetation Baseline Study, Rare Plants Survey (2017)
- Waterfowl (2017)
- Newfoundland Marten (2018)
- Preliminary Results of Phase I Acid Rock Drainage / Metal Leaching (ARD/ML) Assessment (2018)
- Valentine Lake Project: 2018 Fish and Fish Habitat Data Report
- Valentine Lake Project: Preliminary Hydrogeology Assessment, Water Level Data
- Draft Report 2018 Hydrology Monitoring Program

8.0 REFERENCES

AANDC (Aboriginal Affairs and Northern Development Canada). 2015. Registered Population: Miawpukek Band. Available at: https://web.archive.org/web/20150402141355/http://pse5-esd5.ainc-inac.gc.ca/FNP/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=47&lang=eng. Accessed: March 3, 2019.

AMEC. 2013. Hydrogeology of Central Newfoundland. Submitted to Water Resources Management Division, Department of Environment and Conservation, Government of Newfoundland & Labrador, Report No. TF8312718, dated January 2013. Available at: https://www.mae.gov.nl.ca/waterres/cycle/groundwater/Hydrogeology_Central_NL.pdf. Accessed: February 1, 2019.

Canadian Mining Journal Editor. 2013. *Duck Pond*. Canadian Mining Journal. 01 January 2013. Available at: http://www.canadianminingjournal.com/features/duck-pond/. Accessed: February 28, 2019.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2013. COSEWIC assessment and status report on the Little Brown Myotis *Myotis lucifugus*, Northern Myotis *Myotis septentrionalis* and Tri-colored Bat *Perimyotis subflavus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp. Available at: https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/cosewic/sr_Little%20Brown%20Myotis%26Northern%20Myotis%26Tri-colored%20Bat_2013_e.pdf. Accessed: February 8, 2019.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2014. COSEWIC assessment and status report on the Caribou *Rangifer tarandus*, Newfoundland population, Atlantic-Gaspésie population and Boreal population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiii + 128 pp. Available at: https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/sr_Caribou_NF_Boreal_Atlantic_2014_e.pdf. Accessed: February 9, 2019.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2017. Canadian Wildlife Species at Risk. Available at: www.cosewic.gc.ca/eng/sct0/rpt/rpt_csar_e.cfm. Accessed: February 4, 2019.

DFO. 2017. Stock Assessment of Newfoundland and Labrador Atlantic Salmon – 2016. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2017/035.

DFO (Department of Fisheries and Oceans). 2018a. Notice to Anglers: Atlantic Salmon Management Change. News Release, July 19, 2018. Government of Canada, St. John's, NL. Available at: http://www.nfl.dfo-mpo.gc.ca/NL/CP/Orders/2018/na18011SalmonManagementChange. Accessed: February 7, 2019.

DFO (Department of Fisheries and Oceans). 2018b. Notice to Anglers: Correction – Atlantic Salmon Management. News Release, July 19, 2018. Government of Canada, St. John's, NL. Available at: http://www.nfl.dfo-mpo.gc.ca/NL/CP/Orders/2018/na18012CorrectionSalmonManagement. Accessed: February 7, 2019.

DFO (Department of Fisheries and Oceans). 2018c. Newfoundland and Labrador Angler's Guide 2018-2019. Available at: http://waves-vagues.dfo-mpo.gc.ca/Library/40707647.pdf. Accessed: February 11, 2019.

FNI (Federation of Newfoundland Indians). 2002. Traditional Use Study Final Report Phase Three.

Government of Canada. 1985a. *Fisheries Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/F-14/page-1.html. Accessed: February 7, 2019.

Government of Canada. 1985b. *Canada Wildlife Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/W-9/page-1.html. Accessed: February 7, 2019.

Government of Canada. 1985c. *Indian Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/i-5/. Accessed: February 28, 2019.

Government of Canada. 1994. *Migratory Birds Convention Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/m-7.01/. Accessed: February 28, 2019.

Government of Canada. 2002. *Species at Risk Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/s-15.3/page-1.html. Accessed: February 4, 2019.

Government of Canada. 2012a. *Canadian Environmental Assessment Act*. Available online: https://laws-lois.justice.gc.ca/eng/acts/C-15.21/. Accessed: February 13, 2019.

Government of Canada. 2012b. *Regulations Designating Physical Activities* under the Canadian *Environmental Assessment Act, 2012*. Available online: https://laws-lois.justice.gc.ca/eng/regulations/sor-2012-147/FullText.html. Accessed: February 28, 2019.

Government of Canada. 2012c. *Prescribed Information for the Description of a Designated Project Regulations* under the Canadian *Environmental Assessment Act, 2012*. Available online: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-148/page-1.html. Accessed: February 28, 2019.

Government of Canada. 2015. Guide to Preparing a Description of a Designated Project under the Canadian *Environmental Assessment Act, 2012*. Available online: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/guide-preparing-description-designated-project-under-canadian-environmental-assessment-act-2012.html. Accessed: February 13, 2019.

Government of Canada. 2019. Canadian Climate Normals 1981-2010 Station Data, Buchans, NL. Available at: http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=6579&autofwd=1. Accessed: January 31, 2019.

Gov NL (Government of Newfoundland and Labrador).1990. *Mineral Act*. Available online: https://www.assembly.nl.ca/Legislation/sr/statutes/m12.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador).1991. *Lands Act*. Available online: https://www.assembly.nl.ca/legislation/sr/statutes/l3691.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador).1997. Guidelines for Sealing Groundwater Wells. Department of Environment and Conservation – Water Resources Management Division. 9pp. Available online: https://www.mae.gov.nl.ca/waterres/cycle/groundwater/well/guidelines_for_sealing_groundwater_wells.pdf. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador).1999. *Mining Act*. Available online: https://www.assembly.nl.ca/legislation/sr/statutes/m15-1.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador). 2001. *Endangered Species Act*. Available online: https://www.assembly.nl.ca/Legislation/sr/statutes/e10-1.htm. Accessed: February 7, 2019.

Gov NL (Government of Newfoundland and Labrador). 2002a. *Environmental Protection Act*. Available online: https://www.assembly.nl.ca/legislation/sr/statutes/e14-2.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador). 2002b. *Water Resources Act*. Available online: https://www.assembly.nl.ca/legislation/sr/statutes/w04-01.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador). 2003a. *Environmental Assessment Regulations* under the *Environmental Protection Act*. Available online: https://www.assembly.nl.ca/legislation/sr/regulations/rc030054.htm. Accessed: February 28, 2019.

Gov NL (Government of Newfoundland and Labrador). 2003b. *Endangered Species List Regulations* under the *Environmental Protection Act*. Available online: https://www.assembly.nl.ca/legislation/sr/regulations/rc020057.htm. Accessed: February 4, 2019.

Gov NL (Government of Newfoundland and Labrador). 2015. A Report on the Newfoundland Caribou: A summary and interpretation of the state of knowledge of the island of Newfoundland's caribou population and key considerations for sustainable management. 90pp.

Lycopodium (Lycopodium Minerals Canada Ltd). 2018. Technical Report – Preliminary Economic Assessment of the Valentine Lake Gold Project, Newfoundland, NL, Canada. Mississauga, ON. 370 pp.

Master, L. L., Faber-Langendoen, D., Bittman, R., Hammerson, G. A., Heidel, B., Ramsay L., Snow, K., Teucher, A, and Tomaino, A. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/sites/default/files/publications/files/natureserveconservationstatusfactors_apr12_1.pdf. Accessed: February 5, 2019.

Murahwi, C. 2015. Technical Report on the Valentine Lake Gold Project, Central Newfoundland, Canada. Prepared for Marathon Gold Corp.

NLDFLR (Newfoundland and Labrador Department of Fisheries and Land Resources). 2019. Mammals. Wildlife Division. Available at: https://www.flr.gov.nl.ca/wildlife/snp/programs/education/animal_facts/mammals/index.html. Accessed: February 5, 2019.

NLDFLR (Newfoundland and Labrador Department of Forestry and Land Resources). 2018. 2018-2019 Hunting and Trapping Guide. Government of Newfoundland and Labrador, St. John's, NL. Available at: https://www.gov.nl.ca/hunting-trapping-guide/files/Hunting-Trapping-Guide.pdf. Accessed: February 8, 2019.

NLDNR-FB (Newfoundland and Labrador Department of Natural Resources – Forestry Branch). 2015. Crown Five Year Operating Plan Forest Management Districts 10, 11, 12 and 13 - 2016-2020. Department of Natural Resources - Forestry Branch. Available at: https://www.mae.gov.nl.ca/env_assessment/projects/Y2015/1827/1827_main_text.pdf. Accessed: February 11, 2019.

NL-EHJV (Newfoundland and Labrador Eastern Habitat Joint Venture). 2008. Eastern Habitat Joint Venture five year plan for the implementation of the North American Waterfowl Management Plan in Newfoundland and Labrador (2008-2012). Newfoundland and Labrador Eastern Habitat Joint Venture. St. John's. 50pp + Appendices. Available at: http://www.ehjv.ca/wp-content/uploads/2013/11/NL-5-year-plan_2008-2012.pdf. Accessed: February 5, 2019.

Notch Mountain Outfitters. 2019. Home. Available at: http://www.notchmountainoutfitters.com/index.html. Accessed: February 28, 2019.

PAA (Protected Areas Association). 2008. Central Newfoundland Ecoregions – Red Indian Lake Subregion. Parks and Natural Areas Division. Available at: http://ww.flr.gov.nl.ca/publications/parks/ecoregions/island_2b_red_indian_lake.pdf. Accessed: January 31, 2019.

Piercey, S.J., Squires, G.C., and Brace, T.D. 2014. Lithostratigraphic, Hydrothermal, and Tectonic Setting of the Boundary Volcanogenic Massive Sulfide Deposit, Newfoundland Appalachians, Canada: Formation by Subseafloor Replacement in a Cambrian Rifted Arc. Economic Geology, v. 109, p661-687.

Qalipu Mi'kmaq First Nation. No Date. Band Membership List. Available at: http://qalipu.ca/qalipu/wp-content/uploads/2018/09/Member%20List.pdf. Accessed: March 3, 2019.

Stantec Consulting Ltd. 2012. Marathon Baseline Fish and Fish Habitat Data Report. Draft Report prepared for Marathon Gold Incorporated. January 10, 2012. 16 pp. + Appendices.

Stantec Consulting Ltd. 2014. 2011 Forest Songbird Surveys at the Valentine Lake Prospect. Report prepared for Marathon Gold Corporation, Toronto, ON. August 13, 2014. 13 pp. + Appendices.

Stantec Consulting Ltd. 2015. Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Lake Project, Central Newfoundland. Report prepared for Marathon Gold Corporation, Pasadena, NL. November 23, 2015. 215 pp. + Appendices.

Stantec Consulting Ltd. 2017a. Valentine Lake Project: Baseline Hydrology and Surface Water Quality Monitoring Program. Report prepared for Marathon Gold Corporation, Pasadena, NL. December 1, 2017. 47 pp. + Appendices.

Stantec Consulting Ltd. 2017b. Valentine Lake Project: Preliminary Baseline Hydrogeology Assessment. Report prepared for Marathon Gold Corporation, Pasadena, NL. December 15, 2017. 14 pp. + Appendices.

Stantec Consulting Ltd. 2017c. Valentine Lake Project: Vegetation Baseline Study, Rare Plant Survey Report. Report prepared for Marathon Gold Corporation, Pasadena, NL. November 30, 2017. 27 pp + Appendices.

Stantec Consulting Ltd. 2017d. Valentine Lake Project: Waterfowl Baseline Study. Report prepared for Marathon Gold Corporation, Pasadena, NL. December 1, 2017. 20 pp. + Appendices.

Stantec Consulting Ltd. 2017e. Valentine Lake Project: Historic Resources Baseline Study. Report prepared for Marathon Gold Corporation, Pasadena, NL. August 22, 2017. 20 pp.Stantec. 2018. Valentine Lake Project: Newfoundland Marten Baseline Study. Report prepared for Marathon Gold Corporation. August 24, 2018. 8 pp + Appendices.

Stantec Consulting Ltd. 2019. Valentine Lake Project: Preliminary Baseline Hydrogeology Assessment, Water Level Data. Letter report to Marathon. Jan 18, 2019.

Statistics Canada. 2016a. Census Profile, 2016 Census – Buchans, Town, Newfoundland and Labrador. Available at: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?B1=All&Code1=1006031&Code2=10&Data=Count&Geo1=CSD&Geo2=PR&Lang=E&SearchPR=01&SearchText=Buchans&SearchType=Begins&TABID=1. Accessed: February 28, 2019.

Statistics Canada. 2016b. Census Profile, 2016 Census – Millertown, Town, Newfoundland and Labrador. Available at: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?B1=All&Code1=1006028&Code2=10&Data=Count&Geo1=CSD&Geo2=PR&Lang=E&SearchPR=01&SearchText=Millertown&SearchType=Begins&TABID=1. Accessed: February 28, 2019.

Teck. 2016. Collaborating on Closure Planning at Duck Pond Operations. Available at: https://www.teck.com/news/stories/2016/collaborating-on-closure-planning-at-duck-pond-operations. Accessed: February 28, 2019.

Veinott, G.I., Robertson, M.J., Bradbury, I., Dempson, J.B., Grant, C., Kelly, N., Whalen, J., and Poole, R. 2018. Status of Atlantic Salmon (*Salmo salar L.*) stocks within the Newfoundland and Labrador Region (Salmon Fishing Areas 1-14B), 2016. DFO Can. Sci. Advis. Sec. Res. Doc. 2018/008. v + 38 p. Available at: http://publications.gc.ca/collections/collection_2018/mpo-dfo/fs70-6/Fs70-6-2018-034-eng.pdf. Accessed: February 7, 2019.

Wardle, R.J. 2004. The Minerals Industry in Newfoundland and Labrador: Its Development and Economic Contributions. Government of Newfoundland and Labrador, Geological Survey, Department of Natural Resources. St. John’s, NL. Open File NFLD/2889. 96p.

APPENDIX A

Site Photos

Photo 1 **View North, Existing, Permitted Marathon Exploration Camp**

Photo 2 **View North East, Leprechaun Deposit**

Photo 3 **View South West, Sprite to Leprechaun Deposit Area**

Photo 4 **View West, Marathon Deposit**

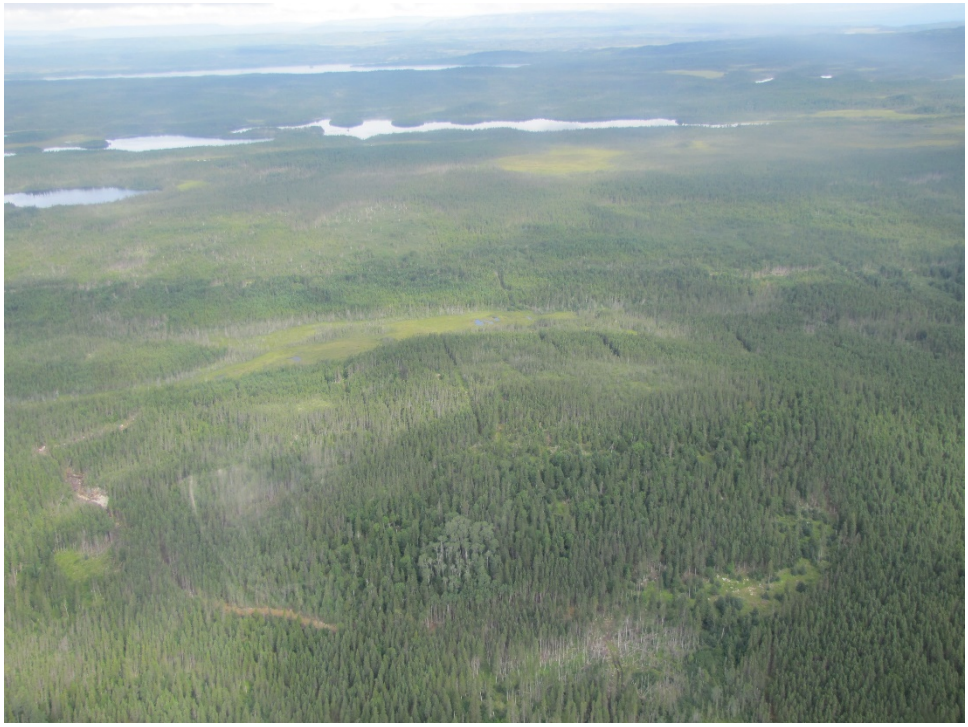

Photo 5 **View West, Victory Deposit Area**

Photo 6 **View Northeast from Southwest of Leprechaun Area, Valentine Lake in background**

APPENDIX B

Species List

Table B-1 Species List

Common Name	Scientific Name
Plants / Vegetation	
American burred	*Sparganium americanum*
Arctic bramble or plumboy	*Rubus arcticus* subsp. *acaulis*
Arctic yellow-rattle	*Rhinanthus minor* subsp. *groenlandicus*
balsam fir	*Abies balsamea*
black spruce	*Picea mariana*
green addersmouth	*Malaxis unifolia*
nodding water nymph	*Najas flexilis*
northern blackberry	*Rubus arcticus*
northern yelloweyed grass	*Xyris montana*
perennial bentgrass	*Agrostis perennans*
purple false melic	*Schizachne purpurascens*
short-scaled sedge	*Carex deweyana*
sparse-flowered sedge	*Carex tenuiflora*
trembling aspen	*Populus tremuloides*
white birch	*Betula papyrifera*
Wiegand's sedge	C. wiegandii
Fish Species	
Atlantic salmon	*Salmo salar*
brook trout	*Salvelinus fontinalis*
threespine stickleback	*Gasterosteus aculeatus*
Avifauna	
American Black Duck	*Anas rubripes*
American Crow	*Corvus brachyrhynchos*
Bald Eagle	*Haliaeetus leucocephalus*
Bank Swallow	*Riparia riparia*
Belted Kingfisher	*Megaceryle alcyon*
Black-and-white Warbler	*Mniotilta varia*
Black-backed Woodpecker	*Picoides arcticus*
Black-capped Chickadee	*Poecile atricapillus*
Blackpoll Warbler	*Dendroica striata*
Boreal Chickadee	*Poecile hudsonicus*
Canada Goose	*Branta canadensis*
Common Loon	*Gavia immer*
Common Nighthawk	*Chordeiles minor*

Table B-1 Species List

Common Name	Scientific Name
Fox Sparrow	*Passerella iliaca*
Gray Jay	*Perisoreus canadensis*
Gray-cheeked Thrush	*Catharus minimus*
Great Horned Owl	*Bubo virginianus*
Greater Yellowlegs	*Tringa melanoleuca*
Green-Winged Teal	*Anas carolinensis*
Killdeer	*Charadrius vociferus*
Mallard	*Anas platyrhynchos*
Northern Flicker	*Colaptes auratus*
Northern Harrier	*Circus hudsonicus*
Olive-sided Flycatcher	*Contopus cooperi*
Osprey	*Pandion haliaetus*
Pine Grosbeak	*Pinacola enucleator*
Pine Siskin	*Spinus pinus*
Red Crossbill	*Loxia curvirostra*
Ring-Necked Duck	*Aythya collaris*
Rock Ptarmigan	*Lagopus muta*
Ruby-crowned Kinglet	*Regulus calendula*
Ruffed Grouse	*Bonasa umbellus*
Rusty Blackbird	*Euphagus carolinus*
Sharp-shinned Hawk	*Accipiter striatus*
Short-eared Owl	*Asio flammeus*
Spotted Sandpiper	*Actitus macularius*
Spruce Grouse	*Falcipennis canadensis*
Swainson’s Thrush	*Catharus ustulatus*
White-throated Sparrow	*Zonotrichia albicollis*
White-winged Crossbill	*Loxia leucoptera*
Willow Ptarmigan	*Lagopus lagopus*
Wilson’s Snipe	*Gallinago delicata*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Yellow-rumped Warbler	*Dendroica coronate*
Yellow-shafted Flicker	*Colaptes auratus*
Wildlife	
American marten	*Martes americana atrata*
beaver	*Castor canadensis*

Table B-1 Species List

Common Name	Scientific Name
black bear	*Ursus americanus*
coyote	*Canis latrans*
ermine	*Mustela erminea*
fox	*Vulpes Vulpes*
little brown bat	*Myotis lucifugus*
lynx	*Lynx canadensis*
meadow vole	*Microtus pennsylvanicus*
mink	*Neovison vison*
moose	*Alces alces*
muskrat	*Ondatra zibethicus*
northern long-eared bat	*Myotis septentrionalis*
red-backed vole	*Myodes rutilus*
river otter	*Lontra canadensis*
snowshoe hare	*Lepus americanus*
woodland caribou	*Rangifer tarandus*